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Germany's Rhön Biosphere Reserve: Promoting Sustainable Tourism Through Branding and Local Foods

What can be learned from the Rhön Biosphere Reserve in Germany about promoting sustainable tourism and environmental education through initiatives that encourage conservation, the consumption of local products and services, and sustainable living practices? The manager of this biosphere reserve describes how his organization is structured and functions before sharing some experiences with projects that integrate economic and environmental concerns. One such project is highlighted, that of developing a marketing label based on a regional identity. Products and practices are permitted to display the biosphere reserve brand once they demonstrate how their ecological footprint is reduced and how they support the local economy. Through partnerships, branding not only raises awareness of biosphere reserve ideals of living in harmony with nature, but also encourages sustainable tourism through adding value to products in the region and helps to promote and conserve valuable cultural landscapes.

Session: W1.1

Al-Ageili, M

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Integrating GIS and Dynamic Models: Cellular Automata Approach for the Simulation of Urban Growth

Geographic Information Systems (GIS) are recognized tools for the storage, handling, analyzing, and visualizing of spatial data. GIS have been widely used in many application such as land use planning, site selection, and crime analysis. Despite these advantages, the limited capabilities of GIS for handling the temporal dimension of spatial data make them imperfect for modeling complex dynamic spatial phenomena. This raises the need for integration of GIS with dynamic models. Cities are among the most complex of spatial systems, making them ideal candidates for modeling efforts designed to handle their dynamics and patterns of change. In this paper cellular automata (CA) is discussed as a dynamic approach for modeling urban growth. As an example, an application of an urban CA model to a metropolitan area is presented.

Session: F1.5

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A Sediment Budgeting Framework for Large, Data-Sparse Drainage Basins

High rates of soil loss and high sediment loads in rivers necessitate efficient monitoring and quantification methodologies so that effective land management strategies can be designed. Constructing a sediment budget is a useful approach to address these issues. Quantifying a sediment budget using classical field-based techniques is labour intensive, time-consuming and expensive for poorly gauged, large drainage basins. The availability of global environmental datasets in combination with GIS and remote sensing techniques provides an opportunity for studying large basins, and identifying and quantifying the contribution of potential sediment source areas. Following this approach, a framework is presented for constructing sediment budgets for large, data-sparse drainage basins, which is applied to the mountainous upper Indus River basin in northern Pakistan. Sediment source contributions and rates of deposition have been determined based on the analysis of hydrological data, multiple regression analysis, and spatially distributed modelling of erosion and sediment yields in the basin. The long-term mean annual sediment budget, based on mass balance, is characterized by a gross erosion of 762.9, 96.7 and 8.4 Mt and a gross storage of 551.4, 66.1, and 6.5 Mt in the upper, middle, and lower regions of the basin, respectively. The sediment budget indicates that the major sources of eroded sediment are located in the Karakoram, in particular the Hunza basin. Substantial sediment storage occurs throughout the basin, in particular on the relatively flat Tibetan Plateau and the Indus River valley reach between Partab Bridge and Shatial. The sediment budgeting framework presented in this study has low data requirements and it is therefore useful for large data sparse drainage basins.

Session: R1.4

Alizadeh, K

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Spatial Interactions Between a Regional Metropolis and Small Settlements Around It: A Case Study of Mashhad City and Torghabeh and Shandiz Towns

Sustainable development is a goal of many countries. It requires that decision making be informed by data on phenomena, incidents, actions and reactions as well as legal considerations when considering the relationship between population centres. Therefore, in this research it is tried to make known the governing common states of law abiding on existence of space. Several findings are recorded: metropolitan's presence affects the quantity and quality of population habitation located in small centres in periphery and increases the efficiency of economic activities on the part of the populated centres that are moving along with metropolitan's economy; the analysis of metropolitan's function in regional space in cities depends on the perception structure of regional and national political economy; during last two decades, some changes have occurred in population habitation and economic rate which is for the benefit of middle size cities; being aware of metropolitan's function in providing a regional space sustainable development in cities is impossible without having a full knowledge and systematic analysis about their situations from the national function point of view and being familiar with the manner, amount and reasons of their relationships with smaller centres; considering research limits, the less distance exists, the more similarity occurs in cultural indexes between metropolitan populated centres in periphery; and to satisfy metropolitan's requirements, its periphery provided many natural facilities and surrounding space weakened from the ecological point of view.

Session: R4.7

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Adaptive Governance for Wildfire Management in Saskatchewan: Coordinating Wildfire Management Planning Across Jurisdictions

Fire is a natural ecological process in the boreal forest, but also a threat to human lives, properties and other values at risk. Intense wildfires in the past have made governments aware of the need for national cooperation in planning

and implementation in order to improve the efficiency and effectiveness of Canadian wildfire management, as well as the need to learn to coexist with fire. This study argues that both these aspects could be facilitated by implementing governance arrangements for wildfire management that are adaptive and effective. Principles, criteria and indicators of adaptive governance were identified and used to assess wildfire management planning efforts in and near Prince Albert National Park, Saskatchewan. The focus is on the coordination of wildfire management across jurisdictions, in particular between Parks Canada and the Saskatchewan Ministry of Environment. Based on data collected through reviewing policy documents and conducting interviews we demonstrate that some aspects of adaptive governance, such as being prepared for surprise, have already been implemented. Yet, there is a need to improve information-sharing and communication, especially across jurisdictions, supporting the case for multi-level governance arrangements. The establishment of social capital is also crucial and may be a key to future success in wildlife management planning, both from intra- and inter-agency perspectives.

Poster Session A

Anderson, C

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Dominion Lands Policy, Drought and Agricultural Rehabilitation in Southwestern Saskatchewan, 1908-1935

The federal government's opening of the entire Palliser Triangle to large scale agricultural settlement in 1908, along with a series of devastating droughts over the ensuing decade, resulted in severe hardships for settlers and an intolerable agricultural relief burden for the Saskatchewan government. The Royal Commission of Inquiry into Farming Conditions – the province's formal response to the problem – identified certain adjustments in farming methods, natural resource use and settlement patterns in its 1921 report that, if put into practice, might help to stabilize production and income levels in Saskatchewan's semiarid farming regions. Certain constraints hampered provincial efforts to implement the report's key recommendations during the 1920s, and the federal government kept its involvement to a minimum, as it viewed agricultural rehabilitation as a mainly provincial problem. As the experience of severe drought and widespread crop failures during the 1930s demonstrated, the province was financially unable to sponsor a comprehensive agricultural rehabilitation program on its own. This, along with a rapidly deteriorating political and economic situation on the prairies, finally forced the federal government to own up to the oversights in its earlier Dominion Lands policy by passing the Prairie Farm Rehabilitation Act in 1935. The effectiveness of the activities under the Act owed much to the earlier implementation of certain recommendations of Saskatchewan's 1921 investigative commission.

Session: F2.2

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Attracting Toronto's Chosen: Golfing and the Elite Edwardian Suburb

In 1905, the *Toronto Star* estimated that there were 750,000 golfers in the world, indulging their pastime at an annual cost of \$50,000,000. Some 3,000 golf courses had spread across the English-speaking world and "no British colony is complete without one." The British colony known as Toronto was no exception. Golf was the most popular sport in the city's posh suburbs by 1905, and had become integral to its recreational culture. Gaining social acceptance among the elite in the 1890s, golf and the upscale suburb developed an almost symbiotic relationship. It is time to explore this relationship and to evaluate its implications.

Session: R4.8

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Being Home: Family Spatialities of Teleworking Households

This case study of teleworkers provides insights into how the temporal and spatial rhythm of family life is renegotiated by this alternative work arrangement. As well, it explores the implications of telework for social change. Insights are drawn from semi-structured interviews with 52 employees of a large financial firm with offices across Canada. While the introduction of telework may appear on the surface to be uncomplicated, it can be a catalyst and facilitator of fundamental changes in family life. Such changes are sometimes stressful, creating ongoing challenges in household, workplace and family dynamics; and other times empowering in terms of adjusting one's priorities or adopting new routines. Challenges are associated with tensions related to the integration versus separation of paid work and personal/family life. A strong theme to emerge relates to the ethic of care and the way in which home-based telework is valued to allow this, sometimes to the extreme. It remains unclear, however, as to the degree to which telework is an agent of change in society versus the extent to which it allows individuals and families to live out current societal norms in less stressful ways. In summary, our participants provide mixed messages about whether telework liberates them as workers and as members of a highly gendered society. Still, almost without exception, they describe telework in highly positive terms.

Session: R2.9

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Remote Sensing Image Classification Using Random Forests Classifier

Classification and regression trees (CART) have been used to identify important variables for classifying categorical and continuous complex data sets, but these methods are prone to over-fitting. A recent interest in ensemble learning methods, particularly the use of Random Forests (RF), to improve classification accuracy is hoping to solve the over-fitting problem. The objective of this study was to assess the accuracy of RF by considering two elements: 1) manipulation of the standard input parameters and 2) conducting a sensitivity analysis, which evaluates the sensitivity of the results from the standard input parameters by integrating ancillary data. The two standard user-defined parameters of RF include the number of variables and number of trees to grow; these can alter the predictive capabilities of RF. The use of RF is explored using a multispectral ASTER image acquired on May 2000 which has been classified into eight land cover classes. Ancillary data such as NDVI and texture measures (entropy and standard deviation) are also applied to accomplish the sensitivity analysis. Results from this study indicate that the overall error rate was generally low for the feature classes considered in the study. It was further discovered that a relatively higher error rate was obtained for feature classes defined by smaller training samples. Finally, we conclude that while all variables were important for classification, the near infrared and NDVI bands were most important for classifying all the feature classes studied.

Poster Session A

Avard, E

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Greenhouses in Arctic Communities: The Social and Cultural Acceptability of Alternative Systems of Food Production in Nunavik, Quebec

Is the construction of greenhouses in Inuit communities an acceptable way to integrate sustainable development initiatives into traditional social structures? Can such initiatives increase food security as well as improve the health and social condition of local populations? These were the principal questions that were addressed in a study that was conducted during the fall of 2009 in the village of Kuujuaq, the administrative capital of Nunavik (the arctic region of the province of Quebec). The general objective of the study, conducted jointly by Quebec Horticultural Council and Laval University Geography Department, was to establish the social and cultural acceptability of the construction of

greenhouses in arctic communities. Specific objectives of the study included: determining the role of fruits and vegetables in northern diets; the level of familiarity/interest in gardening and greenhouses; and the potential for the appropriation [by communities] of greenhouse projects. In order to collect the information necessary for the study, 31 questionnaires were administered to local residents, and 36 semi-directed interviews with local leaders, administrators and professionals were conducted. Preliminary results show that there is indeed a great deal of interest on behalf of the local population for a greenhouse project in the village of Kuujuaq. Results also indicate that greenhouse initiatives (elaborated in Kuujuaq as well as in other northern villages) could concretely lead to the sustainable development of arctic communities through the reduction of 'food miles', the creation of employment and training opportunities, and the provision of good quality, accessible, fresh produce.

Session: W2.1

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The Wal-Mart Era: The Super-Sizing of Canadian Retail

This paper looks at the impact of Wal-Mart Canada Inc. on the Canadian retail marketplace. It tracks the entry of Wal-Mart into Canada and the subsequent waves of locational strategies that have served to fundamentally change the retail industry. The catalytic development of Wal-Mart Canada Inc. is placed within the broader context of large format store growth in Canada. Emphasis is placed on the growth of the Wal-Mart Supercentre format and the associated impacts on both the general merchandise and grocery sectors in Canada. The analysis is particularly timely given the recent announcements from Wal-Mart Canada Inc. with regard to the on-going roll-out of the Supercentre format. The locational strategies of Wal-Mart are assessed within the framework of urban change in Canada. The paper concludes with an outlook for future growth and potential market saturation.

Session: R4.3

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Tree-Ring Variability of Lodgepole Pine on the Eastern Slopes of the Rocky Mountains, Alberta

In Alberta, lodgepole pine is found in every forested region. The sudden expansion and spread of the mountain pine beetle (MPB) into the central and northern latitudes of the east slopes puts extensive areas of lodgepole pine ecosystems at risk, potentially threatening more than two million hectares of pine forests. In this study we used dendrochronological methods and factor analysis to examine the relationship between tree-ring growth, MPB disturbances and climate, along a north-south transect on the eastern slopes of the Canadian Rocky Mountains. We analyzed 26 lodgepole pine tree-ring chronologies with a common period of 94 years collected from a variety of natural sub-regions. We used standard dendrochronological techniques, factor analysis, regime shift detection and correlation analysis. Four significant factor chronologies (FC) were retained from the factor analysis that represented tight geographical groups across the south-north gradient. Ring-width variation of the FCs was extremely heterogeneous and regime shift detected a number of growth phases in each. Correlation coefficients were computed between FC and temperature and precipitation, and the Pacific Decadal Oscillation (PDO), Southern Oscillation Index (SOI) and the North Pacific Pattern (PNA). Factor chronologies were weakly correlated to station data, but FC2 (Hinton) had a strong positive correlation to spring PDO and FC3 (Waterton Lakes) had negative correlations to winter and spring SOI. Moving interval correlation analysis revealed that during periods of known MPB outbreaks in southern Alberta FC3 and SOI were not significantly correlated, demonstrating tree-ring variability response to stand dynamics and a diminished response to climate.

Session: W1.3

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Engineering Characteristics of Avonlea Badland Sediments

The engineering characteristics of badland sediments are derived from geologic history and climatic conditions. Different types of geomaterials are generally encountered in such landscapes as evident from lithologic variations in composition and texture. Three distinct slope surfaces (steep cemented sandstone, mildly-sloped weathered mudrock, and flat basal pediment) characterize the Avonlea badlands in the semi-arid environment of southern Saskatchewan. Seasonal variations in water availability (snow melt in spring and rainfall in summer) and water deficiency (low rainfall and freezing in fall and winter) result in periodic saturation and de-saturation of surface soils in the area. Given the increasing economic activity, a geotechnical evaluation of marginal materials is required for construction in such terrains. The main objective of this paper is to investigate the engineering behaviour of Avonlea badland sediments. The soil water characteristics curve and the hydraulic conductivity is being determined for selected samples. Preliminary results indicate that a genetic relationship exists between the cemented sandstone and the basal pediment. Further, the investigated materials respond differently when exposed to identical water saturation conditions. These data will be used to develop a clear understanding of hydrological losses (particularly infiltration rates and amounts) and cyclic changes in material behaviour under the prevalent climate.

Session: R3.4

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Indicators for Watershed Cumulative Effects Assessment: An Analysis of Environmental Impact Statements in the South Saskatchewan River Basin

There is general acceptance that assessing the effects of development on watersheds and aquatic systems must be done at a regional scale. In practice, however, cumulative effects assessment (CEA) is often limited to the individual project. Assessing cumulative effects to aquatic systems needs to account for stressors and effects at both the watershed and the project scale, and requires both stressor-based science used in Environmental Impact Assessment (EIA) and effects-based science used in aquatic monitoring programs. This demands a consistent and effective set of indicators that will allow the sharing of information. The ecosystem components and indicators used in EIA were identified in a review of 35 environmental impact statements in the South Saskatchewan River Basin to examine their potential to facilitate CEA at the watershed scale. The results indicate that the use of ecosystem components and indicators is infrequent and inconsistent across EIA practice, and that stressor-based indicators are of a different nature than effects-based indicators. While most sources of stress to water quality were identified and associated with an indicator, such indicators were not consistently assessed in impact analyses. Many assessments skirted watershed-scale stresses by taking a narrow view of what constituted an environmental effect. The ability of current EIA practice, and the indicators used, to facilitate aquatic CEA is limited. 'Scaling-up' current EIA practices to better assess and understand cumulative effects will only be successful with more 'top-down' watershed-based guidance to indicator use and selection in project-specific EIA terms of reference.

Session: W1.6

Barchyn, T
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Comparing Measurements of Aeolian Sediment Transport with Piezoelectric Sensors: Is it Possible?

Measurement of aeolian sediment transport is challenging; it varies at many scales: sub second to seasonal, centimetre to dunefield. However, accurate measurement is essential for developing and validating models used to predict the dynamics of aeolian landforms in arid and coastal environments (e.g., the Canadian Prairies). Piezoelectric sensors are one of the most common types of instruments used to measure aeolian sediment transport at a high temporal resolution. Unfortunately, little comparative data are available regarding sensor response. In this

investigation, we tested the sediment transport detection capabilities of four piezoelectric sensors during an 11 day field deployment (Sensit H11-B, Sensit H11-LIN 10X, Safire, Sensit H11-LIN 1X). Results demonstrate dramatic differences between detection capabilities (reported as % of deployment transport was detected): Sensit H11-B: 7.212%, Sensit H11-LIN 10X: 3.260%, Safire: 1.832% and, Sensit H11-LIN 1X: 0.089%. We illustrate how these inconsistencies cannot be predicted from published specifications. We also demonstrate how estimates of sediment transport threshold vary substantially between sensors. Regardless of the precise cause of discrepancies, the very presence of variability is problematic. From the data presented here, we conclude that comparison of aeolian sediment transport measurements with piezoelectric sensors is, at best, tenuous.

Poster Session C

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Seasonal Vegetation Growth as a Control of Aeolian Sediment Transport Threshold in Mid to High Latitudes

Aeolian sediment transport threshold defines the minimum wind speed required to entrain particles. Threshold is an essential parameter in models predicting the flux of aeolian sediment and the dynamics of aeolian landforms. Commonly, models incorporate a fixed threshold value; however, in mid to high latitude settings threshold fluctuates at a variety of scales due to varying surface conditions. In this investigation we examine the effects of seasonal vegetation growth on threshold. Whereas numerous studies have examined how different vegetation types and structures influence threshold, temporal effects associated with seasonal vegetation growth have largely been overlooked. At the outset of this investigation we hypothesized that threshold increases during the summer growth period due to greater surface sheltering by vegetation. To test this hypothesis we measured threshold from May 2009 to Nov 2009 on a partially vegetated sand dune where a marked seasonal pattern of vegetation growth is known to occur. We demonstrate how the wind profile is modified during summer months; however, a corresponding increase in threshold is not conclusively shown. We discuss the implications of these results by considering how temporal changes of threshold in partially vegetated areas might affect dune morphodynamics and dune activity modeling.

Session: S1.4

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Remote Predictive Mapping of Surficial Geology in Aid of Regional Land-Use Planning in the Far North of Ontario, Canada

In 2008, the Ontario government announced plans to permanently protect half of the Far North region of Ontario and launched a planning process to support this goal. During the initial stages of planning the need for primary landscape data became apparent. For example, existing surficial geology map coverage is at a scale of 1:250 000 and not sufficient for regional land-use planning. A project to remotely predict surficial materials was initiated by the Ontario Geological Survey in response to this information need. Remotely sensed imagery which is available at various resolutions and degrees of coverage, and existing digital elevation models (DEMs) can be used as proxies for the landscape. Combining information gained from the imagery, such as vegetation type and moisture conditions, with landform recognition from DEMs, various landform/sediment and vegetation cover/material relationships can be determined and applied to remotely predict surficial material distribution. Object based image analysis is being used in the processing of imagery and DEM data. On-screen digitization of select landforms supplements the predicted material distribution and will occur as symbols on the maps. Ground verification is based on data collected during previous field programs and a modest amount of field work. Key aspects of the field work include making observations of landform/sediment relations, observations of the associated vegetation communities and attempting to understand the spatial and stratigraphic relationships between materials. The understanding of these associations is vital to the project's goal of remotely predicting surficial materials and producing maps of these in the Far North of Ontario.

Poster Session A

Beach, K

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Drug Law and International Patterns of Illicit Drug Use

Despite the frequent depiction of the law as an enduring constant beyond cultural and political influence, the law is, in fact, a spatio-temporal construct directly influenced by local culture and politics. The illegal status of drugs prohibited under UN conventions is ostensibly uniform around the world, yet the people of each nation, city and neighbourhood possess unique attitudes and perspectives towards illicit drug use that shape the local interpretation, application and enforcement of drug legislation. In this way, drug laws (both *de facto* and *de jure*) operate to both create and shape social space and frequently act as a central mechanism in the social production of drug use environments. Although my doctoral research is focused on a case study of Regina, Saskatchewan, this presentation will focus solely on the first phase of my research: an international analysis of drug law and drug use that will provide context for a future in-depth analysis at the local scale. Recognizing that law is but one factor in the geography of drug use, this textual analysis of international drug conventions, criminal codes and expert testimony (from secondary sources) will be augmented with a statistical analysis of international drug use rates and suspected legal, social, cultural and environmental correlates.

Session: W1.5

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A Semi-Automated Method for Lineament Extraction in Aeromagnetic and DEM Data

A methodology is being developed to identify lineaments in aeromagnetic and digital elevation models (DEM) data that will lead to the interpretation of brittle faults. The method focuses on magnetic contacts in aeromagnetic data and local curvature extrema in a DEM. The current approach combines several techniques including multi-scale edge detection, curvature analysis, image thresholding, eigenvalue analysis, and mathematical morphology. The test area is the northern Melville Peninsula (Canadian Arctic) where a diamond prospect is possibly associated with brittle faults. The present paper reports on the methodology being elaborated and the preliminary results obtained.

Poster Session A

Beaudoin, A

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A Postglacial Macrofossil Record from the Grande Prairie Area, Alberta

The Wood Bog (informal name) site is located east of Grande Prairie in the Boreal Mixedwood Ecoregion of northwest Alberta. Fifty samples from a 3 m sediment section, exposed in the walls of a dugout, have been processed to extract macrofossils. The record's base dates to about 9600 radiocarbon years ago; it provides a continuous sequence through the Holocene. A taxonomically rich and varied assemblage has been recovered and includes plant fragments, insect parts, mollusc shells, seeds (s.l.), Charophyte oogonia, and ostracodes. Blue-grey clay exposed at the base likely represents Glacial Lake Peace. Above this is a 65 cm thick wood-rich layer. Much of this wood exhibits clear signs of beaver-gnawing. This is overlain by organic-rich mud, then a layer containing abundant mollusc shells. Samples from this lower sequence are dominated by seeds from aquatic and emergent plants, including *Potamogeton* spp., *Zannichellia palustris*, *Utricularia*, and *Ranunculus sceleratus*, and aquatic molluscs, such as *Gyraulus* spp., *Promenetus*, and *Pisidium*. The upper sequence (about 2 m) consists of peat, and shows a marked transition between seed assemblages dominated by *Typha latifolia* to ones dominated by *Carex* spp., with spruce (*Picea*) needles appearing towards the top. Climate signals throughout the record are weak. The lower part is a terrestrialization sequence, recording a beaver dam and an in-filling beaver pond, and indicating that lowland terrain was rapidly re-occupied by plants and animals following drainage of Glacial Lake Peace. The record also provides evidence for the geomorphic activity of beavers during the early Holocene.

Poster Session B

Bedore, M

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Retail Food Capital and the Geography of Dignity

People living with low income have complex relationships with retail food spaces and food procurement practices. In this presentation, I draw from doctoral fieldwork with low-income people living in Kingston, Ontario's spatially segregated North End to explore the geography of dignity and its relationship to the food procurement experience. Between 2006 and 2009, the retail food landscape of the North End changed significantly, with the closure of two older full-service grocery stores and the opening of a new large-scale chain store. I studied these changes by attending public meetings around the closures, and through focus groups and surveys of North End residents. The results of several focus groups suggest that while retail food capital is ultimately an unsustainable solution to poor retail food access in low-income communities, corporatized food spaces are culturally significant to low-income residents. On the one hand, they are a means of enhancing personal dignity, as low-income and food-insecure research participants aspire to middle-class food shopping experiences, valuing luxuries like convenience, selection and feeling welcome or 'entitled' as patrons. On the other hand, negative experiences in retail food spaces (such as having to remove items at checkout, deny oneself the basics or walk great distances to the nearest store) can be damaging to a resident's dignity, subtly reinforcing urban class disparity.

Session: W1.5

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Restoration of Active Sand Dune Habitats in Alberta

Active sand dunes on the Canadian prairies provide a rare form of habitat to many specialized species, several of which are at risk of becoming extirpated/extinct. Dune stabilization by vegetation encroachment has been observed across the region, although the exact mechanism is not well understood. While shifts in climate are one driver, anecdotal evidence suggests that suppression of disturbance, such as fire and grazing, may also be significant. In 2007, a long-term research project was initiated in the CFB Suffield National Wildlife Area (SNWA) which contains the greater portion of the Middle Sand Hills. Treatments of prescribed fire and grazer attractants were applied in a factorial design to 12 stabilized dunes. The goals of the experiment were to determine: (1) whether natural forms of disturbance could be used to reactivate sustained erosion, (2) whether habitat could be restored for dune-dependent species, such as the Ord's kangaroo rat, and (3) what disturbance regime would be required to maintain sustained erosion. While the treatments immediately stimulated erosion, it was not sustained. Pronounced shifts in vegetation composition occurred, but re-growth was fast and potential for re-burning was low. Although the experiment is still underway, preliminary interpretation of results to date will be discussed.

Session: S1.4

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Successful Aboriginal Tourism Development Through Community Empowerment: The Story of The Cree Village Ec lodge

The development of Aboriginal tourism and ecotourism products in rural communities has the potential to contribute positively to the preservation and revitalization of Aboriginal cultural heritage. Yet in spite of extensive marketing campaigns, ongoing capacity building programs, and numerous studies and reports, the success of tourism development initiatives in remote Canadian Aboriginal communities remains an enigma. Given the recent successes and positive potential for growth of Aboriginal tourism in Northern Canada and other polar destinations, the assessment of these activities and enterprises is imperative. In this case study, we examine the history and development of the Cree Village Ec lodge, located in Northern Ontario, and explore the factors that have contributed to the lodge's continuity and success through the application of an expanded ecotourism empowerment framework (Scheyvens 1999).

Session: F1.2

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Community Lead Environmental Action on Nutrient and Organic Contaminant Elimination and Removal in Dead Horse Creek, Manitoba

Excess nutrient (phosphorous and nitrogen) and organic contaminants (persistent organic pollutants, pesticides, pharmaceuticals) loadings to our lakes and rivers are two of the major environmental health issues we face currently. They reflect the combination of an increase in the sewage disposal requirements of an expanding human population and the intensification of agriculture within drainage basins of most freshwater ecosystems throughout the world. Eutrophication leads to a fairly predictable series of consequential outcomes initiated by the formation of fast growing dense algal mats at water surfaces followed by reductions in water dissolved oxygen levels, a result which has a profound influence on all aquatic organisms. Water contaminants loadings have also been linked to adverse consequences on the quality of drinking water, irrigation and aquatic ecosystem animal communities. Nutrient and contaminants loadings can however be reduced or removed from point pollution sources, such as sewage and industrial wastewaters, through initiatives which represent the first steps in reducing the consequences linked to these pollutants. Here, the main goal is to attain an improved overall water quality of the Dead Horse Creek, Manitoba. Information is reported on the monitoring of nutrients and contaminants emanating from sewage lagoons discharging into the Dead Horse Creek, as well as interesting possible solutions aimed at reducing these detrimental loadings.

Session: W1.6

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Potential of SAR for Assessing and Ranking Prince Edward Island Best Wind Resources Sites

In 2008 the Prince Edward Island (PEI) government initiated a project to support the installation of small wind turbines, capacity up to 100 kW. Among 25 community rinks interested by the project, five sites have been selected to be funded. For that purpose, 40 Synthetic aperture radar (SAR) images have been acquired; while directional information was obtained with the QuikSCAT diffusimeter. The interest of using the SAR approach for PEI community rink project is double: testing the applicability of the SAR technique in a real life project and providing an additional tool in assessing and ranking the sites with the best wind resources. To estimate the correlation between

offshore and onshore wind for Prince Edward Island region, the instantaneous offshore wind maps, were correlated with meteorological mast data on the island. To assess the ranking of potential sites, comparison with the Canadian wind atlas were performed and two methods tested. The directional mean wind speed classification, all SAR scenes from a same direction were superimposed and the mean wind speed per direction was computed, in a 10 Km range. The second method, relative wind speed is similar, while the speed difference between the speed at a specific location and the mean speed of the region at a specific moment is calculated. A directional coefficient factor in regards to frequency was calculated for each direction for both methods. It seems clear that SAR technology has a great potential in helping decision makers in their wind resource analysis.

Session: W4.4

Bernier, M
Gauthier, Y
Poulin, J
Clerc, C
Gagnon, M
Guimond, A
Rouyn Savard, J

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Monitoring Sea and Coastal Ice to Assess the Vulnerability of Nunavik's Marine Infrastructures to Climate Change

Climate change is affecting the ice and water regime of the Arctic. In Nunavik, accessibility to marine infrastructures, safety for users and integrity of infrastructures could be affected. Ice is naturally protecting the coast during winter. But unstable ice or shorter ice season, combined with higher water levels and more frequent storms, can lead to increased erosion and damages. It is therefore essential to determine the potential extent and impact of climate change on the ice cover and consequently, on marine infrastructures in order to identify adaptation measures. Such an objective can be achieved through predicting models. But these models need detailed inputs from past and present ice conditions, which are scarcely available for Nunavik. In an effort to bridge this gap, a four years project (2009-2013) is underway through the leadership of Transport Quebec and with contributions from the OURANOS Consortium, Indian and Northern Affairs Canada, the Kativik Regional Government, Environment Canada, the Canadian Space Agency, Quebec's National Institute for Scientific Research (INRS) and the Institute for Marine Sciences (ISMER). The main objective of this monitoring is to characterize the past and present behaviour of the ice, regionally (Hudson Bay, Hudson Strait and Ungava Bay) and locally (around the marine infrastructures of the villages). Historical data are compiled from products at the Canadian Ice Service. It is combined with traditional knowledge, which is obtained through interviews with elders in local Inuit communities. Present day data are obtained through in situ cameras providing hourly pictures of the marine infrastructures and surrounding waters and high resolution RADARSAT-2 images (3m spatial resolution, 20 x 20km coverage) acquired every three days during freeze-up and breakup. Wind monitoring stations and tidal gauges were also installed. The main output of this monitoring will be the compilation of change indicators (ice-in, ice-out, ice concentration, ice transport, ice mobility) that will be fed to ice and climate predicting models.

Session: W1.4

Bewer, R
Bjornlund, H
Wei, X

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Water Irrigation Infrastructure, Multiple Water Demand and Current Use Conflicts: Towards a Synthesis of the Literature

Competition for scarce water resources has elevated in recent decades, especially between agricultural users and diverse non-agricultural users such as urban (domestic), environmental goods and services (EGS), and industry. This competition can at times result in conflict between the different user types as to how water and infrastructure is managed. This literature review aims to identify methods and information about three areas of water management: 1) measurement and assessment of user values and attitudes; 2) present legal and regulatory background of water management in Alberta; and 3) background and methods of implementing market-based incentives (MBIs) for the provision of Ecosystem Services so that sustainable use of water and water and irrigation infrastructure can be achieved. The results of the review will then be used in a study that will seek out information about the use of MBIs in southern Alberta concentrating on land users' provision of Ecosystem Services in the context of multi-use of irrigation infrastructure, specifically the Chestermere Lake east of Calgary.

Session: W3.1

Bhattacharya, A
Touzi, R

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Classification of Wetland and Urban Area with Touzi Polarimetric SAR Decomposition Parameters Selected by Information Theoretic Criteria

Studies conferring to polarimetric SAR image classification in general do not consider the contribution of individual parameters and hence are often unaware of the physical importance of the parameters involved in classification. In this study we will analyse the Touzi decomposition parameters selected and ranked by information theoretic methods for classifying the CV-580 polarimetric C-band SAR data collected over Mer-Bleue wetlands site and the urban site of Tunney's pasture, Ottawa. The study shows that the dominant scattering type phase ($\Phi_{\alpha s1}$) and the scattering type magnitude ($\alpha s1$) are selected as the first two rank parameters for all the wetland classes. This shows that even though ($\Phi_{\alpha s1}$) permits better discrimination of fen, marsh, shrub bog and treed bog than ($\alpha s1$), both phase and magnitude of the complex scattering type are needed for an unambiguous characterization of the symmetric scattering. It can also be seen that the selection of the eigenvalue of the dominant scattering ($\lambda1$) by a selection criterion plays an important role in discriminating the bog classes. Parameter selection and ranking for the urban classes shows that even though ($\Phi_{\alpha s1}$) and ($\alpha s1$) are selected for all the urban classes, ($\alpha s1$) is ranked higher than ($\Phi_{\alpha s1}$). This can be explained from the fact that ($\alpha s1$) provides better understanding of urban structures in terms of their scattering mechanisms. The medium target helicity ($\tau2$) selected by a criterion permits the separation of symmetric and asymmetric targets having the same scattering type magnitude in urban areas. All these studies can elevate the understanding and monitoring of wetland and urban areas.

Session: R1.9

Binkley, L

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Imposed Identity from Above: Aboriginal Peoples in Ontario Secondary School Grade 9 Geography

With a focus on the development of Native Studies programs for Aboriginal students in the Ontario education system, and the development of the Ontario Ministry of Aboriginal Affairs, the Ontario Ministry of Education continues to encourage the creation and mechanism of colonial hierarchies through the education system. Over the past four decades a mounting focus on multiculturalism and increased recognition for the rights of Aboriginal peoples within Canada has also imposed requirements on the education system for more cultural and Aboriginal inclusion within mainstream education. An examination of the Ontario grade 9 geography programs (the only Ontario secondary school geography course required to earn a graduation diploma), including relevant education documents and textbooks from 1980 through to 2005, demonstrates Aboriginal coverage imposed by the highly regulated Ontario

Ministry of Education from the top down, rendering Aboriginal content from the grass roots absent. This conceptualization of Aboriginal content legitimized through the public education system becomes naturalized over time. This paper will demonstrate that Aboriginal peoples in Canada will continue to be marginalized through the top down constructed identity within public education.

Session: W1.2

Birch, C
Butterworth, C

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Preliminary Study into the Use of DINSAR on the Haiti 2010 Earthquake

The earthquake of magnitude 7.0Mw that battered Haiti on January 12, 2010 had crippled the country and had profound effects on the cities, rural areas, and transportation routes. The after effects of the damage are of great interest in aiding the people in Haiti with housing and medical relief. Differential interferometric synthetic aperture radar (DInSAR) has shown to be successful in modeling earthquake terrain effects in several earthquake applications to centimetre accuracies. In this study, the use of three pass DInSAR and two-pass DEM-derived DInSAR is applied to ENVISAT ASAR data to model the terrain changes in Haiti. An interferogram is created using two images preceding the event and a second interferogram is created using the same master image, but applied to an image acquired after the earthquake. The use of a change detection algorithm is applied to three SPOT images acquired in the same time period is used for validation of the DInSAR results.

Session: W4.4

Bissonnette, J

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The Abundant Commodity: Unskilled Labour in the Plantation Sector of Indonesia

Indonesia is characterized by high rates of unemployment and underemployment. This situation is largely due to the fact that industrial growth remains unable to absorb surplus labour in densely populated islands such as Java. As a result, over the past decade, many politicians and high civil servants have continually praised large-scale oil palm cultivation projects as a panacea for economic development and employment. For example, oil palm plantations in Kalimantan Barat, an Indonesian province on the island of Borneo, require the mobilization of approximately 200,000 workers, the large majority of whom are low-skilled. In this context, the paper examines the information pertaining to unskilled oil palm labourers as conveyed in plantation management documentation and by actors from the upper management of plantation companies and training centres for plantation agriculture. First, the paper presents a brief historical background on plantation labour in Indonesia and colonial agriculture. This is followed by a focus on state actors' perceptions of the importance of oil palm plantation economy for employment in Kalimantan Barat and at the national scale. In the second part, interviews and documents are analyzed and demonstrate the absence of formal knowledge pertaining to the management of unskilled labour on plantations and hence the non-existence of plantation labourers in the narratives of the administrators of an estate. The paper concludes by analyzing the question of unskilled labour in the plantation economy and in Indonesia at large by using postcolonial insights and notions of value.

Session: F2.1

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Determinants of Earnings Inequality in Canada Between 1996 and 2006: A Spatial Econometrics Analysis

There is a general consensus that national-scale economic inequality increased in Canada between 1996 and 2006. However, few studies in geography examine the multi-dimensional causes of this trend at the sub-national scale. The

main contributions of this paper are the use of spatial econometric methods to analyze socioeconomic determinants of economic inequality within Canada, and the implications of its findings. It focuses on earnings inequality among individuals at the census division scale before taxes and government transfers, and draws upon the one-in-five long form sample of the Census of Population for 1996, 2001 and 2006. The use of spatial regressions controls for geographic clustering in testing the hypothetical determinants of inequality, which include levels of urbanization, unemployment, economic development, manufacturing and educational attainment. Our results show that substantial changes have occurred in the magnitude of correlations between inequality and its determinants, suggesting that the current nature of economic inequality in Canada is different than that of earlier years. Additionally, relatively high levels of earnings inequality have increasingly clustered regionally since 2001, and urban areas have experienced higher rates of inequality growth during the period studied.

Session: W1.5

Bouroubi, Y
Cavayas, F
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REFLECT: Software for Ground Reflectance Restitution to Enhance the Accuracy of the Information Extracted from Satellite Images

Multi-spectral satellite imagery, especially at high spatial resolution, represents an invaluable source of information for decision making in various domains. However, satellite sensor measurements are also affected by parasite inputs due to illumination and observation conditions, atmosphere, topography and sensor properties. In this research, we have developed a tool to retrieve ground reflectance (the new version of the REFLECT software). This software is based on the formulas (and routines) of the 6S code and on the dark targets method to estimate the aerosol optical thickness. Substantial improvements have been made to the existing models. These improvements essentially concern the aerosols properties (integration of a more recent model, improvement of the dark targets selection), the adjacency effect, the adaptation to most used high resolution and very high resolution sensors and the correction of topographic effects with a model adaptable to forest canopy. Validation has shown that ground reflectance estimation with REFLECT is performed with an accuracy of approximately ± 0.01 in reflectance units even for a surface with varying topography. This software has allowed demonstrating how much parasite factors influencing numerical values of the images may alter the ground reflectance (errors ranging from 10 to 50%). REFLECT has also been used to examine the usefulness of ground reflectance instead of raw data for various common remote sensing applications in domains such as change detection, agriculture and forestry. In most applications (multi-temporal, biophysical parameters estimation, etc.) image correction is a crucial step to obtain reliable results.

Session: W1.8

Brauen, G

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A Sound Design Kit for Audiovisual Web-Mapping

The use of music, voice, and sound effects as components of web- and computer-based maps has been tested by researchers over at least the last two decades. Although current practice in animated and interactive mapping can often be traced to visual metaphors developed earlier in other media, notably cinema (Caquard 2009), it is not clear that this type of experimentation has yet been conducted systematically for uses of sound in audiovisual mapping. Considering sounds as both "cultural objects, replete with meanings and associations" (Theberge 2005, 389) and as media capable of conveying information through formal, abstract transformations, this project has attempted to experiment with a variety of sound design ideas for audiovisual maps. In the process a flexible, modular programmers kit for web-based audiovisual maps has been created. This presentation focuses on how this kit enables experiments in sound design for audiovisual maps with particular reference to a map visualization of Canada-US regional commodity trade flows.

Session: W4.5

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Pyne, S

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Reflections on Project Roles and Technologies: The Cybercartographic Atlas of the Lake Huron Treaty

Current trends in education initiatives, including those relevant to Aboriginal knowledge, indicate not only an increasing prevalence of digital technologies, but also an increase in the use of geospatial technologies. Along with promises of new modes of expression and new possibilities for engagement in learning, these innovations bring challenges. One is the potential complexity of implementing the visions of content developers using the technologies. The project to create the Cybercartographic Atlas of the Lake Huron Treaty is situated firmly in both trends. The Atlas is a web-based educational resource designed to organize and portray the historical geography of the relationships between the 'Lake Huron' Anishinaabe and British Crown representatives. Aimed at creating an innovative educational tool that incorporates and reflects Anishinaabe approaches to knowledge, the design process requires a diverse set of skills, ranging from community knowledge and liaison, to programming and geomatics support, to collecting, organizing and conveying information using a variety of media. Research and innovation with atlas content requires that technologies be designed for flexibility and project-specific adaptation is often required. But flexibility may create complexity, potentially preventing those with information from being able to contribute. This atlas project uses open source software technologies originally designed to support community contribution to wiki-style atlases and now being adapted to assist in team organization. This presentation will provide an overview of the ongoing atlas project and reflections on the coordination of roles in the construction of educational tools related to Aboriginal knowledge.

Session: W1.2

Braun, R

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Germany's Rhön Biosphere Reserve: Understanding Landscapes with GIS

Germany declared 2009 as the 'Year of the Biosphere Reserve', providing an opportunity for sites such as the Rhön Biosphere Reserve, with its 'land of open expanses', to showcase how local people live in harmony with nature and encourage sustainable land-use practices. A practitioner from Rhön shares how a Geographical Information System (GIS) was constructed for the biosphere reserve to allow for electronic data processing and presenting surface-related information to support land-use decision-making. This GIS supports transboundary and integrated ecological monitoring initiatives that began in 1997 and are now supported by different institutions. In this way, GIS is shown to be a useful tool for helping to realize specific goals of the Rhön Biosphere Reserve: to enhance understandings of the human-environment relationship; to foster integrated ecological monitoring; and to promote environmental education.

Session: W2.2

Brook, R

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Toward an Integrated Approach to Managing Bovine Tuberculosis in Wildlife and Cattle Within Riding Mountain Biosphere Reserve, Manitoba

There have been many important successes in managing bovine tuberculosis (TB) in cattle, elk and deer within Riding Mountain Biosphere Reserve in Manitoba. However, the local goal of eradicating the disease is no closer to being achieved than it was ten or twenty years ago, and conflicts associated with TB are arguably as severe as ever. Perhaps the greatest barrier to success is that research and management continues to be largely focused on the epidemiology of the disease while failing to adequately consider the social aspects and effectively engage the many stakeholders involved. As such, there is a clear need for an integrated approach that simultaneously addresses the complex social and biophysical aspects of the ecology of TB, that incorporates local knowledge effectively, and that communicates all information in a clear, understandable and transparent manner. Such an approach should be based on agreed-upon and measurable objectives, direct accountability of all participants, and independent, science-based

evaluation. During this presentation, I provide data from stakeholder meetings, interviews with local stakeholders, a regional mail-back survey, and ecological studies of radio-collared elk to support this contention, and identify a set of 'best practices' for studying and managing bovine TB in an integrated way.

Session: W2.2

Brooks, R
Wiseman, D
Wiseman, G

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Application of UAV Imagery for Riparian Health Assessment and Monitoring

The conservation and management of riparian habitat is a critical component of long term soil and water management initiatives. An essential component of such efforts is the development of a detailed baseline land cover inventory and the systematic monitoring of land cover conditions through time as various management treatments or restoration initiatives are applied. The objective of this research was to assess the utility of a small, autonomous, unmanned aerial vehicle (UAV) for collecting high resolution standard colour and NIR imagery that was used to produce detailed land cover classifications of riparian landscapes. A standard handheld digital camera and a modified digital camera were secured to the airframe of a small UAV. Numerous images acquired for three test site were mosaicked and a high-resolution five channel (B, G, R, NIR, NDVI), georeferenced image was produced. An unsupervised classification was used to identify spectrally unique clusters that were then aggregated into a number of selected land cover categories. The resulting land cover classes were then compared to similar classification schemes derived from standard colour aerial photography, comparatively low resolution panchromatic photography, and a ground based vegetation inventory conducted during the same field season. Preliminary results indicate that the UAV imagery produced superior land cover classifications as compared to other imagery tested and is a comparatively cost effective means of producing baseline land cover inventories of riparian habitat. In addition, the greatest advantage of the system may be the ability to acquire imagery on-demand to facilitate continued monitoring efforts.

Session: F1.8

Brooks, R
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Assessing the Utility of Oblique Aerial Photography for Constructing a Geospatial Database for Conservation Management

Ground based GPS surveys and high resolution vertical aerial photography are common methods of collecting accurate proprietary geospatial data. However, GPS surveys are time consuming and impractical when large tracts of inaccessible land are involved, and traditional aerial photography can be very costly. The Manitoba Habitat Heritage Corporation has been collecting oblique aerial photographs of properties placed under conservation easements for several years. The photographs are acquired with a handheld digital camera and used to assess land cover change and identify easement violations. This approach has enabled them to monitor hundreds of small and widely scattered parcels of land at a fraction of the cost of conducting either annual ground based GPS surveys or aerial photography. However, until recently the oblique photography was used only for visual inspection of easements and no method of extracting thematic map information was used. The purpose of this project was to develop and assess a method of extracting geospatial data from the oblique aerial photographs that could be integrated into their GIS database. The software application Oblique Mapper was selected and photography from various sites analyzed. Results suggest that accurate geospatial data can be easily extracted from these oblique photographs provided that each photograph has an accurate GPS coordinate associated with it and that several photos are taken of the property from orthogonal vantage points.

Poster Session B

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UAV Image Acquisition and Data Processing Techniques

The use of small, autonomous, unmanned aerial vehicles (UAVs) for the acquisition of high resolution remotely sensed imagery is becoming increasingly common. Standard hand-held digital cameras or specially modified digital cameras are the most common camera systems used to collect colour and near infrared imagery; video camera and other specially designed sensor may also be used. Unlike purchasing other commercially available digital imagery or photographic products, the UAV operator is faced with a variety of tasks related to image acquisition and processing a large number of individual images. The objective of this poster presentation is to outline the steps and critical decisions in the UAV image acquisition process from flight planning to post-processing operations such as image mosaicking, georeferencing, and the production of a composite multiband image. Imagery from two different camera systems used to collect standard colour and near infrared imagery of three test sites located in south-western Manitoba has been used to outline this process and compare various software applications and software settings used in the process.

Poster Session B

Brown, O
Hugenholtz, C

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A New Approach for Mapping Aerodynamic Surface Roughness

Establishing suitable values of aerodynamic roughness is important for modeling a variety of biophysical processes (e.g., wind erosion, snow drifting, energy exchanges, habitat structure). Methods used to estimate roughness are dominated by field-based empirical techniques (wind profiling) and metrics derived from remote sensing imagery. These methods rely on major assumptions and require intensive data manipulation. Here we describe a new technique involving airborne LiDAR to estimate aerodynamic roughness over a large area and at a fine resolution. The study site is a vegetation-stabilized prairie dune field in southwestern Saskatchewan. The raw LiDAR point data were processed in a GIS using min/max filters in order to separate vegetation and underlying topography. The elevation difference between these two raster layers yielded a surface representing vegetation height. A roughness value was calculated with the empirical function developed by Meneti and Richie (1994): aerodynamic roughness = $0.33h^{1.07}$, where h is vegetation height. This procedure yielded a unique roughness value for each raster cell, thus providing a high resolution representation of roughness variation. In contrast, existing methods generally provide one roughness value at a regional scale. Empirical testing of the LiDAR-derived aerodynamic roughness values is currently underway. Overall, this study demonstrates how the spatial representation of aerodynamic roughness can be enhanced through application of LiDAR data.

Poster Session C

Brunner, L

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From Protracted Situations to Protracted Separations

Findings from research with Acehnese refugees in Vancouver suggest that the Canadian state distorts refugee aspirations to marry and have families, despite its provision of political asylum through resettlement. The analysis advances current understandings of transnationalism by highlighting the role of the state in mediating transnational marriage in contexts of refugee resettlement. Levitt and Glick Schiller (2004) usefully distinguish between transnational ways of being and ways of belonging. Among Acehnese refugees who came to Vancouver and are mostly single men, evidence of both is clear. After five years in Canada, however, the lives of most Acehnese are marked by periods of intense waiting to establish families with Acehnese overseas. Canadian state policies that encourage family reunification stand in stark contrast to the realities of how this occurs on the ground, resulting in significant consequences for Acehnese living in both Canada and Aceh, Indonesia. Close attention is paid to transnational 'ways of waiting' and the impact of state family reunification regulations that extend periods of waiting and separation.

Session: W1.7

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Rural Transformation in the Plains-Prairies Borderland: Implications for Transboundary Environmental Cooperation

Canada-U.S. environmental relations are driven by regional cross-border relationships. The indirect influence of national-level politics on this relationship has meant that it has generally been unaffected by national divergences in other policy domains. Subnational relationships, including local grassroots efforts and informal networks of state and non-state actors, have been strong in the Plains-Prairies borderland, a region historically characterized by ecological and social similarity across the border. This paper examines the case of transboundary grasslands conservation across the Saskatchewan-Montana border. It argues that national responses to the 9/11 terrorist attacks, and regional/local responses to the BSE crisis, have changed the dynamics of the border. In particular, increased border security and eroded international trust in the post-9/11 era have reduced cross-border cohesion to the detriment of transboundary environmental cooperation among state, non-state and grassroots actors. This represents a case in which a national-level event and its policy responses have had a direct influence on the Canada-U.S. environmental relationship by constraining regional, subnational action.

Session: R3.1

Buck, L

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St. Marys River Maps and Historic GIS: Four Centuries of Revelations

The importance of the St. Marys River as a historic geographic feature has yielded nearly four hundred years of international cartography and other documentation, including large scale mapping of the river morphology near Sault Ste. Marie, ON since the late 18th century. The historic bathymetry recorded on 19th century navigation charts can be interpolated to accurately reconstruct the physical structure of the riverbed, providing time series data over nearly two centuries. Bathymetric models indicate that there is a similarity in the pattern of water level change between the river and the Great Lakes; however, there is little cartographic evidence to indicate that the shorelines responded to changing lake levels. Plan and oblique views, temporal series, and 3D modeling enhance the historical depiction of underwater topography, of the building of the canals and locks, and other landscape representations. Changes in the levels of regional geographic knowledge, going from *terrae semicognitae* to *terrae cognitae* knowledge, become evident with the establishment of a historical GIS. Data visualization techniques also provide options for making old maps appealing to a contemporary audience. The results obtained from the historic data show that historic maps can contribute to contemporary research and can make history appealing.

Session: F2.6

Buckley, J

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An Extended Time Series of Polarimetric SAR Observations of Prairie Vegetation

Canadian Forces Base Shilo, a 40 000 ha region in south western Manitoba, has been the subject of a continuing time series of Radarsat-2 fine mode quad-pol image acquisitions. Since June 2008, the site has been imaged every 24 days at an incidence angle of 38° on a descending path. Only a few imaging opportunities have been missed. To date there have been 20 images acquired. Since May 2009 this data set has been complemented with an imagery time series acquired at the same incidence angle on ascending orbits. So far 11 images have been acquired in this sequence. Specific areas of interest were selected in the region, representing healthy grassland, unhealthy grassland, bare ground, aspen forest, spruce forest and wetlands. These areas were analyzed by scattering type using a modified Yamaguchi decomposition, and time series were plotted. There is a strong annual signal evident in the random volume scattering, related to the annual cycle of vegetation growth and decay. The signal is less evident in the vertically oriented volume scattering and in the surface scattering. Some differences were noted between the descending (morning) and ascending (afternoon) images that may be related to changes in surface moisture.

Session: W4.4

Bullock, R

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'Mill Town' Identity Crisis: Reframing Community and the Culture of Forest Resource Dependence in Single Industry Towns

This paper addresses two main questions linked to processes of rural transformation in Canada's forest hinterland, specifically, how do different public-private-civic actors view themselves and others in the changing context of Northern Ontario's 'forestry crisis' and what are the implications of reframing rural identities and community-industry relations for forest governance and local culture? The frame analysis is based on 55 interviews with actors from forest-dependent communities in the Superior East Region conducted between May 2008 and July 2009. Evolving social framings of different identities (e.g., place-based, interest-based, institutional) and problem and solution perspectives were analyzed for the period 2001-2009. The analysis builds to the main conclusions that local capacity constraints and institutional change are possible when local, state and industry actors collectively reframe forest resources, local identities and the 'mill town' culture of resource dependence. This includes facilitating collaboration between First Nations and non-Aboriginal residents, development of alternative forest products and non-conventional

economic opportunities, and validating the legitimacy of other forest users as a way forward. Collective reframing of community identities and local human-forest relations shapes and is shaped by the restructuring of public forest control and diverges from the conventional industry-state administration of day to day work and life in the woods. Reconciling old and new identities involves a significant reframing of the 'mill town' and the nature of local forest dependence—one based on a vision developed by local people committed to living and working in Northern Ontario, Canada.

Session: R1.1

Bulthuis, M

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Border Experiences and Everyday Life: The Spatial (Citizenship) Practices of Street-Involved Youth in the Ottawa/Gatineau Region

The inter-provincial border dividing the Ottawa-Gatineau metropolitan area may have little impact on the everyday mobility of many residents who reside within the region. However, for young people who are homeless or street-involved, experiences of this region may be more complex. This paper presents findings from qualitative research investigating the everyday lives of street-involved youth living in the two municipalities (Ottawa and Gatineau) and provinces (Ontario and Quebec) that constitute Canada's capital region. On one hand, limited access to provincially or municipally funded assistance programs (dependent on residential status), or varied practices of law enforcement and security, may have an obvious impact on an individual's rights within one space or another. Apart from these formal citizenship claims, youth also perceive of and experience socio-cultural, economic and linguistic differences across and within these two communities; these differences may impact upon feelings of attachment, belonging or of being 'in place' or 'out of place' across everyday landscapes. In these ways, this particular sub-national border becomes significant in effecting both the formal and substantive urban citizenship claims of street-involved young people. The border is experienced simultaneously as both a barrier and opportunity, while also made more or less visible in particular situations. Drawing on the personal geographies of some street-involved youth living within this region, the paper investigates the ways this border is learned, experienced and negotiated while illustrating its impact on the citizenship practices of street-involved youth within a regional urban space.

Session: W2.8

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Cook, N

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Local Understandings of Road Construction, Geographical Accessibility and Social Change in Shimshal, Pakistan

Shimshal is a farming and herding community in Pakistan's Gilgit-Baltistan high mountain region. For most of the community's 400 year history, travel from the village required more than a week's walk along a difficult mountain footpath. In 1983, the community began to construct a road from the Karakoram Highway to the village; it was completed in 2003. In this paper, we examine 35 oral testimony interviews that Shimshalis recorded and transcribed in 2001 and 2002, in which they narrate their hopes and worries for changes the road will bring, and their ideas for how to manage those changes to benefit themselves and the community. We also draw on interviews we conducted in Shimshal in 2007, and on our ethnographic work in the community since 1988. The evidence we present leads to the preliminary conclusion that Shimshalis experience the new road as having both "alienating" (Augé 1995) and "dis-alienating" effects on their lives and identities, although not always as they anticipated.

Session: W1.5

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Dale, J

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Comparison of Winter Sand Transport at Two Great Lake Coastal Dune Locations in Point Pelee National Park and Sauble Beach, Ontario, Canada

A study was initiated in 2009 to characterize the dune forming processes in Point Pelee National Park along Lake Erie and Sauble Beach in Lake Huron, Ontario. Both beaches have been heavily impacted by recreational use, have a finite sediment supply and are essentially closed during the winter season. Point Pelee is protected under Parks Canada legislation whereas a local volunteer group called Friends of Sauble Beach has adopted stewardship of that beach. There is active management at both locations. Our studies suggest that much of the landward movement of sand occurs during late winter with minimal summer transport. Sand becomes entrained within the ice foot during freeze-up. Sublimation and melt exposes the material and grain by grain movement of sand occurs in a landward direction. At Point Pelee, sands become trapped by a line of cottonwoods and the dune ridge. A former fence line acts as a barrier to sands moving back into the former parking lot except through blowouts in the ridge. The Sauble Beach dune ridge forms the same function as the treeline at Point Pelee and along with strategically placed snow fences has successfully trapped sand moving inland. Similarities in process exist at both locations, but pressures external to the beach/dune area require different strategies to sustainably manage the systems.

Session: R2.4

Cai, H
Moon, W
Zou, B

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Extracting Building Height from Super-Resolution PolInSAR Image

Polarimetric SAR interferometry (PolInSAR) is not only sensitive to space distribution of object in interferometric SAR (InSAR), but also to distribution and shape of object in polarimetric SAR (PoSAR). Hence, PolInSAR is more advantageous and precise than either polarimetric or interferometric SAR alone in extracting the information of vertical object structures. Usually in PoSAR satellite images, each resolution cell contains several different scattering mechanisms. If these mechanisms can be allocated to different parts in one resolution cell, the detailed information of the images can be obtained. In this study, a super-resolution algorithm for PoSAR image is used, and the building height is extracted from a PolInSAR image. Fully polarimetric L-band interferometric ALOS PALSAR data (April 16th and June 1st, 2007) over Singapore are used for this study. The study areas include mostly urban areas. For extracting building height from PolInSAR image, the phase of the PolInSAR image must be preserved. So a super-resolution algorithm which doesn't discard phase information is used for PoSAR image. Then, the building information can be estimated from PolInSAR processing using the ESPRIT algorithm and Schneider's method separately. PolInSAR technique, which has broad application potential in the next generation of SAR remote sensing technology, can provide additional information of target objects than PoSAR or InSAR alone.

Session: R1.9

Canart, C

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Perspectives from the Tractor: A Manitoba-Saskatchewan Comparison of Agricultural Programming

The federal government has taken the lead role in the development of agricultural extension programming for Canadian producers. In 2003, Agriculture and Agri-Food Canada introduced a five-year Agricultural Policy Framework, under which programming is available to producers in an attempt to address challenges faced by the sector. While agricultural research has largely concentrated on the macro-analysis of the sector, this comparative research specifically examines the impact of programming at the ground-level in two rural municipalities in the provinces of Manitoba and Saskatchewan. The agriculture sector is the recipient of large amounts of fiscal support from governments and as such, the research aims to determine the effectiveness of programming offered. The

research asks the question of whether three fundamental programs are effective in meeting policy objectives as viewed by farm operators, whether producer needs are being addressed, and whether variations occur across provincial boundaries. The program analysis focuses on the ground-level outcome of the: i) Canadian Agricultural Income Stabilization Account; ii) Environmental Farm Planning program; and iii) Production Insurance. The research contributes to our knowledge of the impact of programming on producers within the case study areas and aims to provide insight for future program formulation.

Session: W3.5

Capriles, M

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Imbalances in the Land Occupation of Anzoátegui State, Venezuela

Analysis of land occupation in Anzoátegui state, through fieldwork and 1:250,000 scale mapping of the State Authority for Spatial Plan Territory, reveals that the North Subregion occupies 4.7% of the state area but has 50% of the population (767,570) and experiences high levels of pressure on natural resources. Conversely, the South Zone occupies 47.3% of the state area but has only 4% of the population (64,662). It has low levels of industrial and agricultural development, despite having the biggest share of natural resources in Anzoátegui (Orinoco Oil Belt). The South Zone serves as an area of purely extractive mineral and forest development, activities with low demand for personnel. These resources are transferred to the North Subregion where they are processed and shipped to other regions of the country and abroad. This activity supports urban development and generates income and taxes for the North. Because of this, poverty levels are comparatively low compared to the South. This imbalance in economic development is undesirable. Planning is needed to focus a greater share of urban-industrial development and population in the South Zone.

Session: W2.6

Carrirere, J

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Reframing the 'Local' in Public Policy: Transnational 'Place-Based' Policies 'In Motion'

This paper reviews the transnationalism of targeted neighbourhood improvement policies – or 'place-based' policies – as they are constructed in both the United Kingdom and Toronto. It outlines the geographical and ideological origins of the celebrated approach to 'local' governance, and the means through which it has been established in political networks. Focusing on the discourse and rhetoric of 'place-based' policies, the question of whether these 'local' policies are in fact global – both in the sense that they are developed and disseminated transnationally, and because they aim to localize the 'problems' of sociospatial polarization associated with neoliberalism and global city formation – will be explored. In examining this question, I look to the role of targeted neighbourhood improvement policies in London, U.K. in shaping seemingly 'local' Toronto policies. The methodology pursued will draw from Devorah Yanow's (2000) interpretive policy approach, and will focus broadly on discourse and interpretive methods in critical policy analysis (with an emphasis on the relationship of discourse to power).

Session: S1.2

Carter, T

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The Resettlement and Integration Experience of Provincial Nominees in Manitoba

Immigration to Manitoba over the last decade has been dominated by arrivals under the Manitoba Provincial Nominee Program. With more than 38,000 nominee arrivals since 1998 the Program has shifted the spatial pattern of immigrants in the Province and changed the demographic profile of many communities. Indicators measuring the

resettlement and integration experience illustrate overall positive trajectories but newcomers still face labour force integration issues. Indicators also vary depending on location and can be very different for visible minorities. Principal applicants under the program, and spouses arriving with them, also have different resettlement experiences. With continued high levels of immigration expected under the Program over the next decade, newcomers will continue to change the nature of Manitoba communities and will require expanded immigration services to ensure successful integration.

Session: W4.7

Casey, V
Johnston, T
Cuthbert, R

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Drought Proofing On-farm Water Supplies in Southern Alberta: A Behavioural Analysis

Public agencies such as Alberta Agriculture, Food and Rural Development (AAFRD) have long been interested in promoting the development of sustainable water supplies on farms and ranches. The drought of 2001-2002 stimulated renewed interest in this issue, prompting the establishment of a joint federal/provincial initiative aimed at drought-proofing water supplies. According to AAFRD more than 15,000 applications for financial assistance with water development projects have been processed over three rounds of funding. In this presentation, we will report the results of an examination of the usage of drought-proofing measures. We use a behavioural-analytical framework, focusing on individuals' perception of the risks associated with drought, to differentiate the process of assessment of farmers and ranchers who have actively engaged in drought-proofing their operational water supplies from those who have done so less actively. After describing the salient features of our conceptual model, it will be tested using data obtained from a sample of farm/ranch operators from Vulcan County, located in southern Alberta, south east of Calgary. We hypothesise that those producers who predict that the government will respond to future droughts with compensation programming are less likely to take steps to drought proof their operational water supplies.

Session: W3.1

Castleden, H

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“Not Another Interview!”: Exploring Photography, Digital Stories, Art and Camps to Maintain Cultural Continuity and Address Inherent Limitations with Traditional Research Methods

Research that employs visual data is increasingly recognized in participatory research as an effective way to create space for shared interpretation. While photography in field research is not a novel approach, putting cameras in the hands of participants and asking them to determine the subject matter and meaning of the photograph is relatively new. By sharing this decision-making power with participants, researchers are able to open up new spaces for cross and inter-cultural dialogue. The focus of this paper/panel is to briefly introduce the value of using a modified version of Photovoice to engage Aboriginal participants in producing and explaining visual images in an effort to create a sense of participant ownership over and democratization of the research process and results. The remainder of the paper/panel outlines three additional methodological innovations aimed for use in future research with Aboriginal peoples, all of which are intended to expand my repertoire of participatory methods and create space for shared interpretation: (1) digital storytelling, an approach that emphasizes personal voice/experiences by weaving narrative, images, motion, and music, creating a multi-dimensional story, which can then be effectively accessed, analyzed, and shared; (2) artistic creations that represent cultural beliefs, an approach that explores the power of art as a healing tool, which can then be used as health interventions in order to contribute towards health equity; and (3) on-the-land camps, an approach that supports the ability to maintain cultural continuity and relationships, which can effectively address inherent process limitations associated with traditional methods.

Session: R2.2

Catto, N
Catto, G

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Geomorphology, Sedimentology, and Management Issues, Hog Island (Pemamgiag) Sandhills, PEI

The Hog Island Sandhills barrier island and dune complex, north coast of PEI, is one of the least disturbed coastal dune complexes in Atlantic Canada. The Sandhills, including four segments of dune-backed coast, encompasses 1496 ha, extending linearly for 113 km. The complex consists of transverse, parabolic, shield, and dome dunes. Smaller features superimposed on larger ones indicate both multiple periods of dune development and irregular reworking and redeposition of sand on dune surfaces. Internal structures indicate deposition by grain avalanching, viscous grainflow, and kinetic sieving. Erosional scoured surfaces containing adhesion ripples, adhesion warts, rain pit structures, and niveo-aeolian features are common. Crestal platforms, formed where periodic snow cover allows sand grains to adhere to the surface, are evident on transverse dunes. Ongoing deflation of the dune complex is indicated by blowouts. Saucer blowouts are dominant in areas not subject to intensive human disturbance. Trough blowouts, indicative of human disturbance, range from 0.5 m to 4 m in depth. Large trough deflation hollows are present, with depths locally exceeding 11 m. Anthropogenic pressure is the primary influence controlling the observed change from saucer to trough development, and the enhanced deflation evident in the trough blowouts and deflation hollows. The Hog Island Sandhills complex has retained most of its natural landscape features. However, increased tourism without appropriate forethought will result in significant damage to the Hog Island Sandhills from erosion of the dune complex, particularly the development of trough blowouts and deflation hollows, increased erosion, and substantial alteration of the dune landscape.

Session: S2.4

Chaput, P

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Film as a Proxy for Orality

Of all the issues and debates linked to the representation of Indigenous Peoples in the Americas, stories are the most important. Thomas King sums it up: "The truth about stories is that that's all we are" (King 2003, 2). In the Indigenous epistemology, stories and storytelling encompass education, history, religion, geography, sense of self and sense of place. To silence a people's stories is to "disappear" them, to forget them. Conversely, when people are able to remember and pass on their stories, their cultures continue to exist. "You don't have anything/If you don't have stories," says Leslie Silko as confirmation (King 2003, 92). This paper answers the question 'Why film?' in the context of Indigenous storytelling. Indigenous scholars and filmmakers from the four directions support the use of film as the best medium for transmitting stories and providing education about Indigenous Peoples because it incorporates a significant piece of the multi-sensorial experience of orality that is central to Indigenous storytelling. Over the years I have tried my hand at different approaches to reaching audiences including song writing, singing, acting, academic writing, advocacy consultation, film writing, film and theatre production and direction but I have found film the most effective for reaching international audiences. This paper will look at the parallels between traditional storytelling and film and the strengths and weaknesses of film as a proxy for orality.

Session: R2.2

Charbonneau, F
McNairn, H
Brisco, B
Raney, R
Chen, L
Vachon, P
Shang, J
DeAbreu, R
Champagne, C
Merzouki, A
Geldsetzer, T

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Compact Polarimetry Overview and Applications Assessment

A Synthetic Aperture Radar (SAR) with hybrid-polarity architecture (CL-pol) transmits circular polarization and receives two orthogonal mutually-coherent linear polarizations, which is one manifestation of compact polarimetry. The resulting radar is relatively simple to implement, and has unique self-calibration features and low susceptibility to noise and cross-channel errors. It also enables maintaining larger swath coverage than fully polarimetric SAR systems. A research team, composed of various departments of the Government of Canada, have evaluated the compact polarimetry mode configuration for agriculture, wetland classification, ship detection, soil moisture estimation, and sea-ice classification. This paper will present an overview of compact polarimetry, the approach developed for applications evaluation and provide some preliminary results for applications important to the Government of Canada. The implications of the results are also discussed with respect to the future RADARSAT Constellation.

Session: W2.5

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The Temporal Response of NDVI to Climate Variables in the Prairie Region, Canada

Normalized Difference Vegetation Index (NDVI) is generally recognized as a good indicator of terrestrial vegetation health and productivity. Environment factors such as soils, geomorphology and vegetation all influence NDVI values. Variations in climatic factors, in particular precipitation and temperature, have a strong influence on variation in NDVI. A systematic analysis of monthly climatic data and Moderate Resolution Imaging Spectroradiometer (MODIS) derived NDVI data was undertaken for last ten years (2000 – 2009). The results provide an enhanced understanding of the climatic influences on the NDVI and of how quickly NDVI responds to the climate change.

Poster Session B

Chen, Y
Jiang, X

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The Delimitation of Multinational Marine Cadastral Management and its Enlightenment to Chinese Coastal Area

The world's oceans, regulating weather patterns and producing a huge variety of plant and animal life, cover almost two thirds of the surface of the earth. The complex and changing nature of marine environment, increasing for control over marine areas with vast arrays of natural resources, and the ambulatory of marine boundaries, makes the effective management and delimitation of coastal areas increasingly important. Based on this situation, there is a need to create an integrate framework such as an efficient marine cadastre, in order to achieve the sustainable development of marine resource and integrated coastal management. Marine cadastre is an information system to define, manage and administer the interests, right and responsibilities extension and boundaries in marine environment during a certain period. It aims to enable the access, use and maintenance of marine spatial data, and exchange and sharing of such data between stakeholders through the utilization of spatial data infrastructure. Around the goal of marine cadastral management, this paper aims to investigate the physical definition and accurate

delimitation of coastal areas, as well as the accurate position of marine boundaries between the stakeholders from different jurisdictions, also analysis and assesses the research in the framework of marine cadastre in coastal states such as Canada, USA, New Zealand, Australia and so on. Comparing to the goal of Chinese marine cadastral management, the research uses the GIS and land cadastral management system for reference and proposing an approach to carry out an efficient management model of Chinese coastal zone.

Session: F2.8

Childs, J

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Wave Climate and Nearshore Processes Along the Western Shoreline of Prince Edward County, ON

This study discusses the wave climate and potential littoral transport along the western shore of Prince Edward County, approximately two hours east of Toronto along the north shore of Lake Ontario. The limestone headlands and barrier bars of the western coast are exposed toward a southwesterly fetch of approximately 200 km that can produce large offshore wave heights of 2–5 m. The wave model STWAVE was used to transform a standard set of wave conditions developed from recent hindcast data to examine fair weather, storm and extreme conditions for five directions between south and west-northwest along the shore. The resulting simulations indicate a complex nearshore wave environment and a pattern of changing littoral transport directions resulting from shifting wave approach angles. A total of seven large littoral cells were defined in the study area with each cell have a smaller circulation pattern principally along the barrier bars. The data from this research project will be very helpful for coastal managers as the region continues to experience economic growth.

Session: R2.4

Christensen, J

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'To Activate the Heart': Creative Writing as a Meaningful Tool for Moving Audiences with Research

A growing number of academics lend significant importance to communicating their research to audiences beyond the academic. Community-based and participatory action research models have been developed, in part, with this goal in mind. Yet despite many promising developments, researchers continue to struggle with finding effective communicative tools to engage broader audiences in their research. Throughout my doctoral research on homelessness in the Northwest Territories, I have collaborated with many community groups. Through these relationships, a research plan was developed that includes the delivery of research results through policy reports and community workshops. While these communicative means fulfill important community engagement goals, I fear that they still fail to engage the homeless men and women themselves, as well as the broader public, in the research themes. As a creative writer, I have begun to explore fiction as a means to explore research themes and communicate ideas in a visceral way. The emphasis on storytelling traditions within northern cultures makes this approach all the more meaningful to participants in this research, most of whom are Indigenous northerners. In this presentation, I will read from short stories I have written as a starting point to discuss the potential that creative writing and performance have for facilitating dialogue with both research participants and the broader public. I suggest that creative writing and performance are effective tools not only for self-expression but also to deepen emotional connections to the research issues, heighten understanding of alternative perspectives, and communicate more meaningfully with marginalized populations.

Session: R1.2

Christensen, J

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'It's Not a Home, It's an Institution': The Relationships Between Rural-Urban Migration, Institutional Resources and Individual Pathways to Homelessness in Yellowknife and Inuvik, Northwest Territories

Homelessness, as it is commonly understood, is generally regarded as a recent phenomenon in the Northwest Territories (NWT). Before the 1990s, visible signs of homelessness were largely uncommon, however shelters in both Yellowknife and Inuvik report a steady increase in use over the past decade. Significantly, homelessness in the NWT disproportionately affects Indigenous northerners. However, little is known about their experiences, nor about the roots of visible homelessness in northern communities more generally. In this paper, I discuss the urban nature of northern regional centres like Yellowknife and Inuvik, firmly embedded within the broader institutional, political and socioeconomic geographies of the NWT. Drawing on the experiences of homeless research participants in the two study communities, I suggest that the recent colonial history of the NWT, the boom-bust nature of its frontier economy, and its fragmented social and economic infrastructure, result in a unique geography of vulnerability to homelessness through the production of particular tensions between small settlement communities and northern urban centres. Specific attention is paid to how the transition from a reliance on social relations to one on institutional resources contributes to these rural-urban tensions, as well as to individual pathways to homelessness. Finally, 'institutionalization' is a concept that is both useful and one to be critiqued. I suggest that while it sheds light upon the ways in which the social and economic policy landscape marginalizes the Indigenous homeless, it also fuels a dependency discourse that may further entrench this marginalization.

Session: R3.3

Christianson, A
McGee, T
L'Hirondelle, L

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Métis Fire Perspectives: The Influences of Community History, Values and Traditions on Wildfire Risk Perception and Mitigation

Peavine Métis Settlement is an Aboriginal community of approximately 1,000 located in north-western Alberta in the boreal forest. Wildfires are a common occurrence in this region, and the risk is increasing due to population growth, increased fuels resulting from fire suppression, climate change, and mountain pine beetle killed trees. There has been an increasing call in Canada at both the federal and provincial levels for research to be conducted in Aboriginal communities that are at high risk to wildfire as little is known about how wildfire is currently perceived by Aboriginal communities in Canada. It is also unknown if unique approaches to wildfire risk reduction are warranted, as Canada risk managers tend to use one-size-fits-all recommendations to reduce the wildfire risk, which research in other countries indicates will be ineffective. Qualitative research methods, including interviews, focus groups and participant observation, were used to collect data in Peavine over a two year period. The results of this part of my PhD indicate that Peavine has developed a unique wildfire risk reduction program called Peavine FireSmart Projects in the community that incorporate social and cultural factors, such as the high regard for community Elders, the need to provide employment for community members, and traditional burning practices. Many wildland fire-fighters live in the community, which has also influenced the development and acceptance of the wildfire program. However, economic constraints in the community are currently influencing the continuation of this program.

Session: W4.6

Clark, M
Gedalof, Z
Kelly, P
Larson, D

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2,500 Years of Environmental Variability Along a Natural Transect of Thuja Occidentalis Forest Sites on the Niagara Escarpment Cliff Face in Southern Ontario

We analyzed the growth patterns of Thuja Occidentalis sampled from the limestone cliffs of the Niagara Escarpment. We concluded that growth in the 20th century was larger than any other period within the 2,500 year record, putting at

risk a community that has developed a unique longevity as a result of maintaining low levels of growth. The onset of this period of high growth is variable across the Niagara Escarpment, suggesting that it is not caused by CO₂ fertilization. Analysis of the growth climate relations for the chronologies suggests that, while an important determinant of growth, climate alone cannot explain the elevated growth. We think the most likely explanation is groundwater eutrophication associated with agricultural development. Regardless of the cause, this unprecedented growth is cause for concern from a conservation perspective, as small stature is a condition for survival in the cliff face environment.

Session: W3.3

Cole, D

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Deployment of the Ocean GeoPortal

In development for nearly four years, the launch of the Ocean GeoPortal encompassed the geo-referenced portion of NMNH's 33 million marine specimens from eight of the museum's divisions (Invertebrate Zoology, Fish, Mammals, Amphibians and Reptiles, Minerals, Botany, and Paleobiology). These large data sets can be combined for display and analysis (based on fields of taxonomy, location, depth, collector, ship, expedition, etc) with any world-wide or site-specific data sets from our collaborators (NOAA, NASA, USGS, Woods Hole Oceanographic Institute, Scripps, Monterey Bay Research Institute, National Geographic Society, New England Aquarium, other Smithsonian research units and any other academic institutions, governmental agencies and non-governmental organizations from around the world with marine programs). We are providing extensive data bases for outside scientists to harvest spatial data through the ESRI's GIS Portal Toolkit (GPTK) software; and we are translating these spatial views for the public to view results in Google Ocean.

Session: W3.6

Coleman, A
Buckley, J

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Finding Weeds from Space: Experiences with SAR Polarimetry of Prairie Rangelands

The ability of polarimetric SAR imagery to differentiate between different sorts of natural surfaces, based on their morphology, is reasonably well established. As part of a larger rangeland study, we have been conducting an experiment to determine if this ability is sufficiently sensitive to be able to identify different species of invasive brush and weeds in native grasslands. Twenty-five Radarsat-2 fine quad-pol images were acquired over an area in southern Alberta, in the Oldman River coulee from April to October, 2009. Patches of three types of brush, as well as areas of grass, bare ground, trees and water were delineated by ground survey, and by airphoto, lidar and hyperspectral imagery. These patches were located on the radar imagery. Computation of the Bhattachaiyya distance between class centres showed that the brush classes ought to be separable from the other classes with 89% probability, and from each other with about 85% probability. Supervised classification of the surveyed data using an SVM algorithm showed that accuracy was low when just the three Cloude-Pottier parameters and a single image were used, but increased by using the three Freeman-Durden parameters as well, or by using the nine terms of the coherency matrix. Using multiple images, either at different incidence angles or different times improved classification accuracy even further. These preliminary results show that polarimetric radar has the potential for providing a remotely sensed means of estimating the distribution and density of brush in rangelands, and possibly the potential for separating different sorts of brush.

Session: W3.8

Cooke, J

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A 'Muddled' Regional Geography: The Influence of Oil Extraction on the Metropolitan Development of Los Angeles, 1890-1931

The rapid industrialization of southern California and growth of Los Angeles in the first few decades of the twentieth century was triggered by the discovery and extraction of oil in the region beginning in the 1890s. The extractive industry acted like a magnet that attracted numerous oil-related industries to southern California. Even though Los Angeles in the 1920s became the administrative nucleus of this industry as well as the hub of the oil-equipment and service industry, industrial networks stretched far beyond the municipal boundaries of the city and into a sprawling and politically-fragmented southern California landscape. This paper examines the contradictory influence of natural resource extraction on the metropolitan development of Los Angeles between 1890 and 1930. It will be argued that the spatial distribution of oil deposits across the southern California landscape presented numerous political challenges to the city-building process. Meanwhile, a thriving oil industry, dominated by large companies like Standard Oil, lubricated regional and urban economic development. The result was that by 1930 Los Angeles had become the nucleus of a vast, networked oil-producing region that was fragmented politically but integrated economically.

Session: F1.1

Crumplin, W
Williams, D

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'Soccer Moms': Sports, Driving and Geography of Fear

Recent findings suggest that a gender difference exists between mothers and fathers with respect to who drives to sporting venues. While there is general belief that mothers typically do much driving day to day in the more local setting such as ferrying children to medical appointments and extracurricular events like sports, it appears that mothers exhibit hesitation when it comes to longer distance driving that is considered normal when supporting competitive teenage athletes. Preliminary findings of parents' attitudes toward driving, discovered from interviewing parents of athletes about the benefits and tradeoffs of youth participating in competitive athletics, are compared to athletes' perceptions of parents' driving to and from practices, games and tournaments as reported in an on-line survey. This paper presents common trends from these sources and puts these in context of other research related to gender differences in cognition, Mothers' and Fathers' roles as they relate to the space they occupy and the geography of fear.

Session: R1.6

Dahl, M

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The Geography of Gasoline Prices in Canada: Linking the Price of Gas to the Theories of Agglomeration and Metropolitan Growth

Recent economic studies pertaining to the price of gasoline have placed blame on changing crude oil costs and taxes for the price changes witnessed at the gasoline pump. However, very little analysis with a geographic emphasis has been put forth explaining why retail gasoline price differences exist between different cities; this is the purpose of this study. Factors that are discussed in geographic literature addressed here fall under the banners of agglomeration theory (location of industry) and concepts of urban growth from a human/urban/economic viewpoint (differences in socio-economic conditions). A data set, containing gasoline prices in 38 Canadian cities between June 1998 and December 2005, and a relational model, containing 20,935 cases and 45 variables, developed from both the economic and geographic literature, is statistically scrutinized. The relational model is first subjected to correlation analysis to understand the interaction between the variables and the price of gasoline. Cluster analysis follows and it determines the relationships between variables; it finds distinct groupings of variables that display the characteristics of larger factors involved in the determination of the price of gasoline. These clusters are then regressed against the

price of gasoline; this reveals the statistical importance of these variable groupings. The findings show that, in addition to a cluster that statistically explains the price of crude oil, a statistically significant geographical demand cluster is present. This cluster contains both agglomeration and socio-economic variables, which statistically explain the gasoline price segment that excludes the price of crude oil, thus highlighting the importance of geography in the price of gasoline.

Session: F1.1

Davis, E
Reed, M

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Social Resilience and the Challenges of Environmental Governance: Addressing Identity and Memory in British Columbia's Interior Forests

The concept of resilience has had enormous influence in linking social-ecological systems and in advancing our understandings of factors shaping human responses to ecological and social change. Yet, its application to the social dimensions of complex systems and changing circumstances has not been fully realized. To date, concepts of social resilience read more as analogues of ecological resilience as they emphasize the ability of social systems to withstand change while retaining functions, structures and options for future development. In this paper, we propose to develop a broad conception of social resilience – one that captures identity and memory within structures and processes of environmental governance. First, we define what we mean by social resilience, governance, identity and memory and discuss their interrelations. Next, we discuss these concepts in a detailed study of the Cariboo-Chilcotin Beetle Action Coalition (CCBAC) in the northern Cariboo-Chilcotin forest region of British Columbia, Canada. Finally, we suggest new methodological and public contributions that our approach might offer.

Session: R1.1

Dawson, J
Fenech, A
Winfree, R
Reed, M
Birtch, J
Bermúdez, B
Pankratz, V
Reynolds, D
Rodríguez, M
Comer, N
Gough, B
Maclver, D

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Considering the Opportunities, Limitations and Challenges of Oral Histories Versus Scientific Record in Identifying Climate Trends at Biosphere Reserves in Canada, the USA and Mexico

The purpose of this study is to gain an understanding of how indigenous and local knowledge observations complement the climate station record. Ultimately, with a better understanding of how these two types of observations compare they could be used together or separately to better understand regional climate change and extreme events. The study compared community observations of climate with the climate station record at three biosphere reserves across North America – Noatak Biosphere Reserve, Alaska, USA, Riding Mountain Biosphere Reserve, Winnipeg, Canada, and Sierra La Laguna, Baja California, Mexico. It appears that where there is a long climate station record (50-60 years), instrument-derived trends complement local and indigenous observations. Indigenous or local observations can be based on one single variable, such as precipitation, or they can be more complex combinations of several variables. With these more complex observations, it is difficult to find comparisons with the climate station record and the relationship is not as strong between observation and instrument-derived trends. This paper will present quantifiable examples of how community observations of the three biospheres compare with the climate station record, as well as recommendations for further study in this area of inquiry.

Session: W2.2

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Evans, M

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Sediment Fingerprinting in the Athabasca River Basin

A sharp rise in demand for the Mackenzie River basin's rich mineral resources has the potential to drastically change this northern environment. Data collected for various environmental monitoring programs provide insight into the current spatial patterns of sediment quality in the basin. Metal ratios were calculated for 121 sites and rescaled to a maximum magnitude of 1 for hierarchical cluster analysis using Ward's method and a Euclidean distance measure, resulting in six clusters. The overall picture that emerges from the sediment fingerprinting analysis in the Athabasca River basin is that the cluster 2 and 3 sites along the main stem of the Athabasca River and on the larger tributaries near the confluence with the Athabasca River have a fingerprint similar to the sites in the Athabasca River delta. By contrast, upstream sites in the Muskeg River (cluster 5) and Steepbank River (clusters 1, 4, and 5) basins, on McLelland Lake (cluster 5) have a different fingerprint, as do the two cluster 6 sites west of the Athabasca River in the Calumet River basin (cluster 6 and 1) and on the Tar River near the confluence with the Athabasca River (cluster 6). The interpretation of the clusters is that the oils sands activity in the Muskeg River and Clearwater River basins results in a sediment fingerprint that is distinct from that in other parts of the Athabasca River basin, but that there is no evidence of this sediment moving down the river system along the main stem of the Athabasca River basin and into the Athabasca River delta.

Session: R1.4

de Gomez, W

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Vulnerability and Local Environmental Change: The Case of Urban Homeless Citizens in Waterloo Region

Waterloo Region (population 470,000) is the tenth largest urban region in the country. Within this region, in 2007, 2,831 people used emergency shelters and this only accounted for the population which are defined as absolutely homeless (defined as commonly living or sleeping in indoor or outdoor spaces not intended for inhabitation) and does not capture the relative homeless population (defined as people living in homes which do not meet the basic housing standards). It is expected that individuals who have inadequate or no permanent housing are particularly exposed and sensitive to environmental conditions such as extreme heat and cold events and poor air quality. Under climate change, it can be expected that the frequency of extreme events and days when air quality fails to meet healthy guidelines may increase. In the Canadian context, climate change vulnerability assessments frequently focus on resource-dependent sectors or indigenous groups. Relatively little research exists on climate change vulnerability and adaptation among marginalized groups in the Canadian urban context. A wide survey of literature from both climate change vulnerability assessments and environmental issues related to homelessness in first world countries has demonstrated that there is a research gap in understanding how urban citizens experiencing or facing homelessness adapt to environmental change. Therefore, this research will address this gap by using both the vulnerability approach to local climate change assessments and participatory action research to better understand the specificities of adaptation and the available services and future institutional strategies that could enhance the lives of this vulnerable population in relation to local environmental change.

Session: W2.8

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First World Political Ecology: The Bala Falls Case Study

The Bala Falls sit on 0.07 acres of Crown land in the tiny village of Bala, Ontario three hours North of Toronto. The falls have been the central tourism attraction and recreational hot spot for the town for over 100 years. Currently, the

falls are the designate spot for the development of a run-of-the-river renewable hydro-electricity facility proposed by Swift River Energy Company. Swift River Energy won the right to the proposed development in an open proposal process initiated by the Province of Ontario in 2004, and has since begun preparations for its installation on the site of the north falls. This paper is an attempt to capture first world political ecology in relation to the proposed development. This paper will highlight issues as they relate first, to urban and rural periphery imbalances nested within provincial scale objectives to initiate clean energy projects and local desires to have both an effective voice into the proposed development through public consultation and a fair understanding of the livelihood issues at stake. Second, the issue will be analyzed using the concept of different social constructionist perspectives of landscapes outlined in Robbins and McCarthy. Third, the issues of resource use and access will be developed with a critical analysis of who actually benefits from the proposed changes to the existing site, and how much local 'ownership' is lost in the process. Finally, at the end of the paper, the concepts of adaptive capacity and management will be applied to the case study.

Session: R2.1

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The Intentions of Alice: Decolonizing Contemporary Geographic Research About Indigenous People by Theorizing its Perpetuation of the Past

Geographers of indigenous issues in Canada spend significant energy explaining how our work attempts to ameliorate, and not exacerbate, historical wrongs and power imbalances still rife across our nation's landscape. This is particularly the case in geographic research about contemporary politics and spatialities of relationships between

settler-colonial and First Nations' peoples in British Columbia. In this paper I argue that, albeit unconsciously or

inadvertently, many contemporary efforts to produce topographies countering the wrongs of historic colonial projects

risk instead a distancing of present-day work from historical injustices and, consequently, may perpetuate those

injustices and the ongoing production of Aboriginal otherness and marginalization. To elucidate this I offer the example of Alice Ravenhill, an influential colonial subject who, between 1910 and 1954, worked diligently in B.C. to advance what she thought to be new and moral ways of addressing and overturning previously problematic colonial strategies about 'the Indian question' in the province. Specifically, and drawing upon Walter Benjamin's insistence that the only way to stop perpetuating violences of the past is to understand ourselves as perpetually of and touched by them, I explore the deep connections between well-intentioned contemporary research about colonialism – still

produced predominantly by non-Indigenous peoples – and equally well-intentioned efforts by previous generations of

colonial settlers in B.C. I conclude that inquiries about resistance, countering, opposition and difference may not prove as effective in achieving some kind of social justice, and an 'unmapping' of current Canadian colonial topographies, as would research about responsibility, responsiveness and connectivity.

Session: W2.3

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Bradshaw, B

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Company Practice or Just Context? Explaining Healthy Company-Community Relations at Kinross Paracatu, Brazil

Mineral extraction projects in the Global South have been subjected to ever increasing opposition, especially from communities proximate to mining sites. In some cases, this opposition has forced firms to abandon government-permitted and financially viable projects. Consequently, both the academic and industry-generated literatures on community engagement in the mining sector have become saturated with studies on company-community conflict resolution and prescriptive toolkits. These literatures are problematic in two ways: conflict resolution studies have understandably focussed on just conflict situations and therefore have not revealed insights from cases where company-community relations are relatively healthy; and much of the prescriptive literature has not been substantiated with 'real life' examples. This paper responds to these limitations through an assessment of the community engagement practices and associated outcomes of the Canadian mining firm Kinross Gold at Paracatu, Brazil, where company-community relations have seemingly been healthy for many years. It is evident that Kinross Gold has exerted considerable effort to engage positively with the community through initiatives such as the creation of a computer lab and a sewing workshop in adjacent neighbourhoods, as well as a yearly Seminar of Partnerships in which the community presents and selects projects to be funded by the firm. That said, not all of these initiatives have been effective nor well received. Nevertheless, community relations at Kinross Paracatu are strong especially as compared with the situation at other foreign-owned mines in Latin America. This suggests that the situational context matters as much as company practice in determining company-community relations.

Session: F1.1

Desloges, J
Clubine, N
Phillips, R
Stewart, A

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Floodplain Development and Annual Sediment Yield Variability from the Ausable River, Ontario.

Sediment yield into Lake Huron from the 1142 km² Ausable River watershed, Ontario is controlled by suspended sediment response to flood events, hydrologic change and land use. Twenty four years (1970-1993) of daily suspended sediment observation show that the spring nival melt dominates the flood record and yields the majority of annual sediment load. Multiple clock-wise hysteresis loops indicate a continuous supply of sediment during the early melt period. As the season progresses there is a tendency towards counter-clockwise loops suggesting delayed inputs from bank erosion and other watershed-wide sediment storage sinks. A time series of exponents for the twenty four spring season rating curves shows a weak trend towards a reduced response of sediment input from floods of an equivalent magnitude during the spring freshet. The Ausable River has one of the highest specific sediment yields of rivers flowing into Lake Huron from the eastern (Canadian) side but yields have been declining significantly over the last quarter century. Geoarchaeological investigations show a floodplain dominated by lateral accretion in the middle and early Holocene, followed by vertical accretion as the lower reaches of the river became deeply entrenched. Lower channel boundaries are comprised of glaciolacustrine clays and silts that are capped by alluvium in the upper channel boundary. These tall, and often vertical, embankments exposed in the lower river reaches are a significant sediment source.

Session: R1.4

Désy, Y

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Topographic Mapping of Canada: The Last 25 Years

This paper provides a short history of topographic mapping in Canada, and describes the efforts of the federal and provincial governments during the past two decades leading to the development of a national digital topographic database, followed by the implementation at Natural Resources Canada of a new semi-automated map production

system, which uses this national database as the main source. The term Map Generator was adopted to emphasize that the new 1:50 000 scale map publication system would maximize automation and limit human intervention to the strict minimum. The federal government needed a very efficient system to publish maps from the best available topographic data, in the form of print-ready digital files. While symbolization and the creation of the map surround or template could be fully automated, text placement requires some data preparation and a minimal amount of editing to maintain the high cartographic standards of previous 'conventional' maps. Having implemented a process whereby we can generate a print-ready map file from a vector topographic database, two areas of improvement remain: the data integration, and the map delivery formats. Throughout the last 25 years, the digitization of topographic mapping and the advent of GIS have created a new set of relationships between Canadian topographic data producers, data managers, map publishers and map users, which will serve us well as we take the next leap into the future of mapping services.

Session: R2.6

Dolter, B
Krahn, A
Jones, M
Goulden, D
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Bridging the 'EligAbility Gap' in Saskatchewan: Reducing Greenhouse Gas Emissions and Paving Pathways Out of Poverty

Using spatial analysis and census data we theorized that homes that are most eligible for energy efficiency retrofits are often located in low-income neighbourhoods where the ability of the occupants of these homes to carry out the retrofits is severely limited. We call this spatial gap in the market for energy efficient retrofits the 'EligAbility Gap.' To test our theory we conducted EnerGuide audits on forty owner-occupied homes in Regina's North Central neighbourhood and interviewed the owners. We found that homes in this low-income neighbourhood were in need of energy efficiency retrofits, that living in inefficient housing had negative quality of life impacts, and that households did not have the financial ability to conduct the retrofits. Our results suggest that government policy is needed to help 'Bridge the EligAbility Gap.' We propose that a community economic development approach to energy efficiency retrofits can help 'Bridge the EligAbility Gap' and act as a catalyst to lift people and communities out of poverty. Conducting energy efficiency retrofits will also generate substantial greenhouse gas emissions reductions. We will present a method of locating neighbourhoods that possess the 'EligAbility Gap.'

Session: R1.7

Du, J
Biao, D
Hu, J
La, B
Zhou, K

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Responses of Climatic Change on Surface Humid Index in Northern Tibet During the Period of 1961-2006

Based on the observational data of monthly maximum temperature, minimum temperature, precipitation, wind speed, relative humidity and sunshine duration of 6 stations in the Northern Tibet from 1961 to 2006, the potential evapotranspiration were computed using Penman-Monteith equation. The linear trend, inter-decadal variation and the seasonal difference of the surface humid index were analyzed, and the relationships between surface humidity index and elements such as sunshine duration, mean wind speed and diurnal temperature range were discussed. The results show that: (1) the annual surface humidity index increased during the period of 1961-2006, and the increase rate was around 0.01-0.05/10a. Also, the seasonal surface humidity index increased in most parts of the Northern Tibet, especially in spring and summer. In recent 26 years (1981-2006), the annual and seasonal potential evapotranspiration showed a declining tendency, and precipitation plays an obvious increasing trend, which resulted in the rise of annual and seasonal surface humidity index increase, especially in summer. (2) In terms of inter-decadal variations for surface humidity index, from the early to mid 1960s, the climate showed higher precipitation and lower temperature in the Northern Tibet. While from the late 1960s to the mid 1980s, the climate presented colder and drier. After the early 1990s, the increasing trend of mean temperature existed, the surface humidity index increased significantly, and the climate showed warm and wetter. (3) The surface humidity index was most sensitive to precipitation and relative humidity as well as daily temperature range change, which was more sensitive to sunshine

duration and wind speed change.

Poster Session B

Duerden, F
Swales, S
Hennessey, R
Jones, S

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Assessing Community Capacity to Respond to Changing Climate: The Case of Dawson City, Yukon

A vulnerability framework was employed to assess the probable response of Dawson City, Yukon to anticipated changes in the physical environment emanating from climate change. The community, with a permanent population of some 1,500, sits on a flood plain at the confluence of the Klondike and Yukon rivers close to the junction of two significant bio-zones. Dawson City has long dealt with exposure to the volatility of global markets and local environmental conditions, the latter manifest in extreme weather conditions, flooding and forest fire. Warming, increased spring run-off and drier summers may bring with them accelerated permafrost melt, and the possibility of increased flooding and incidence of forest fire. This IPY funded project, in collaboration with the community and the Northern Climate Exchange utilized community interviews and workshops leading to the development of a plan that recognizes that vulnerability and the capacity to adapt to changing circumstances are the outcome of a synergistic mix of factors. These include the magnitude of environmental and economic challenges facing the community and external and local characteristics conditioning adaptive capacity. In the course of this paper we review the plan development process, and critically review the broad utility of the approach to the development of community based adaptive strategies.

Session: F2.3

Duo, C

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Estimating Aboveground Biomass in North Tibetan Plateau Using MODIS Imagery

As one of important biophysical parameters of vegetation, vegetation biomass estimation not only is necessary for studying productivity, carbon circles, and nutrition allocation in terrestrial ecosystem but also is important to the natural resources management since the amount of vegetation biomass directly influence human utilization patterns of surface vegetation and affects other biophysical parameters. Remote sensing techniques make it possible that scientists examine properties and processes of ecosystems and their interannual variability and monitor biophysical parameters such as biomass over broad areas at multiple scales because satellite observations can be obtained over large areas of interest with high revisitation frequencies. Vegetation Index such as normalized difference vegetation index (NDVI), Enhanced Vegetation Index (EVI) and soil adjusted vegetation index (SAVI). obtained from satellite data are useful predictors of biomass and productivity in grasslands. In this paper the relationships between aboveground grassland biomass, green dry material from the field measurement in North Tibetan Plateau from August to September 2004 and NDVI, EVI from corresponding MODIS remotely sensed data acquired from EOS/MODIS Receiving Station in Tibet Remote Sensing Center and MOD13Q1 products from LPDAAC with 250m resolution are established, and the impacts of climate conditions and elevation on aboveground grassland biomass are analyzed as well. Exponential relations exist between aboveground grassland biomass, green dry material and vegetation index (NDVI, EVI). The relationship coefficients between aboveground grassland biomass and NDVI, EVI are 0.793 and 0.706; coefficients between green dry material and NDVI, EVI are 0.833 and 0.769, respectively. It is apparent that NDVI can effectively estimate grassland vegetation biomass in North Tibetan Plateau. Furthermore, based on the relationship between NDVI and ground data the spatial distribution of aboveground grassland biomass and green dry material in North Tibetan Plateau are mapped at a scale of 250m. The spatial distribution patterns of aboveground grassland biomass and green dry material in North Tibetan Plateau decrease from above 2000 kg/ha in southeast to below 200 kg/ha in northwest. The main factor affecting the spatial distribution of aboveground grassland biomass is the precipitation and their coefficient is 0.64. The coefficient between aboveground grassland biomass and temperature is 0.44. There is a negative relationship between aboveground grassland biomass and elevation in study area and the coefficient is -0.29, which means that the elevation has negative impacts on vegetation productivity in North Tibetan Plateau.

Session: R4.5

Eaton, E

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Biofuel Driven Changes to the Regulation of Grain in Canada

The increasing and global demand for biofuel production is spurring significant changes to the regulation of Canadian Prairie agriculture. Under the auspices of incorporating incentives and removing barriers to the development of a domestic biofuel industry, the regulation of grain is now moving away from its firm political and cultural foundations in producer participation and leadership and from its focus on high-quality grains for human consumption. At issue is a set of changes that would challenge and re-organize the institutions and regulatory environment that family farmers have struggled to build and maintain in their interests since the early 1900s. This paper examines how the recent push for biofuels in prairie agriculture shapes proposed changes to the two key regulatory frameworks for Canadian grain: the Canada Grain Act and the Canadian Food Inspection Agency's Seed Regulatory Framework. It argues that grain industry actors in partnership with the Canadian state are using environmental crisis to push forward regulatory changes that shift relations of power further away from small producers.

Session: W3.2

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The Shadow Side of Tourism: Impacts of Waste on Quality of Life in Puerto Vallarta, Mexico

This paper reports on the initial findings of a survey on perceptions of the garbage dump by residents in several areas of Puerto Vallarta. The city's economy is driven primarily by tourism and, as a result, visitors and the services provided to them account for a substantial share of the waste handled by the municipal landfill. The effects of this on the city's residents are not well understood. While the literature on the impacts of tourism has increasingly attempted to address negative effects, much of this work focuses broadly on themes such as 'sustainability' and less commonly on direct and concrete changes, such as to neighbourhood health and quality of life. This research, therefore, begins to fill a gap in our understanding of the unseen dimensions of tourism and their local effects.

Session: W4.1

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Hayter, R

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Restructuring as Routine: Evolving Spatial and Industrial Patterns in BC's Forest Sector

Since 1980, the BC's forest sector has faced virtually continuous restructuring. The overall trend has been one of decline with substantial fluctuations associated with alternating recessions and booms. Yet, there have been plant openings, and some industries have expanded. This paper contemplates this remarkably long period of restructuring and crisis, a period that could even be extended to incorporate the turbulent 1970s. Conceptually, the paper notes three general perspectives ('hypotheses') of restructuring relevant to contemporary times and a traditional industry: flexible specialization, flexible mass production and neo-Fordism. Empirically, the paper provides an aggregate perspective on employment change since 1980 to reveal broad spatial and industrial trends in employment and production changes, and in plant-size distributions. The trends are not straightforward to interpret and require insights from the literature and recent field-based case studies. There is evidence consistent with the flexible specialization thesis and for a neo-Fordist path dependency thesis. In general, plant-sizes are becoming smaller, the growth segments show tendencies towards clustering and Canadian ownership has probably increased.

Session: F1.7

Edwards, S

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Story, Place and Identity: Linking the Experiences of a Community Driven School Project with Academic Research

Through this paper, I will tell a story about a community arts land/story project on Manitoulin Island, Ontario in a school of 50/50 Aboriginal and non-Aboriginal students. Elements Living Arts projects are created using experience, intuition, observation, context and elder teachings, to create and develop projects that respond to the needs of the students and schools. This paper will use images of shape poems by students to demonstrate what was observed emerging in language, written communication, understanding of historical context of place, and legitimation of perspectives. An overview of our longer-term goals to research, in partnership with Laurentian University, impacts of land/story projects will be outlined and conceptualized through theoretical work about Aboriginal story theory and epistemology (Vizenor 1993; Momaday 1998; Nelson 1997), story and language development (Gold 2002), language and self-continuity (Chandler and Lalonde 1998; Hallett, Chandler and Lalonde 2007; Hallett *et al.* 2007), and educational approaches for teaching Aboriginal children (Harris 1990; Battiste 1998). The importance of place within the 'post' colonial context (land appropriation, treaties, traditional aboriginal ways of learning) of the La Cloche and Manitoulin area frames the relevance of the project and hypotheses regarding potential impacts of longer-term projects. Elders know that story, land and language are important and inter-related. Within a western school system, being able to communicate why certain teaching approaches are relevant and produce results is important, and may help to frame and develop nuanced understandings about teaching in mixed Aboriginal and non-Aboriginal schools.

Session: R1.2

El-Bayomi, G

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Archeological Hazard in Ehnasia Site, Bani Souf, Egypt

Archaeological sites are most visible records of our cultural heritage. These sites are often constructed of stone and are threatened by geomorphological processes, pollution, urbanization, public access, groundwater seepage, and other geological hazards, such as rock falls. The archaeological sites in Bani Souf, Egypt, have suffered from deterioration and failure of some parts. In this paper a quantitative analysis of this deterioration is given. The methodology includes: (1) Determination of the local archaeological stratigraphy; (2) Analysis of the morphological process affecting the sites; (3) Analysis of the depositional characteristics of the collapsed material; (4) Investigation of the local geology and geomorphology to define possible natural cause(s) of the destruction; (5) Investigation of the local factors affecting ground motion amplifications; and (6) Estimation of the dynamic excitation, which has affected the site under investigation. This gives a basic dataset necessary to perform quantitative analyses.

Session: S2.2

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Urban Policy Transfer and Place-Based Poverty Reduction Strategies: The Canadian Experience

Place-based poverty reduction strategies have rapidly become a favoured policy response to the social problems associated with concentrated urban poverty in Canadian cities. Such strategies typically involve community-based, socio-economic interventions targeted directly to 'distressed neighbourhoods.' Policy learning and transfer processes have played a pivotal role in the development and spread of these place-based poverty reduction strategies across Canada. This paper examines the diffusion of this policy approach vis-à-vis two recent and influential Pan-Canadian policy learning networks; namely, Vibrant Communities and Action for Neighbourhood Change. These policy learning networks have provided a mechanism by which poverty reduction strategies employed in one place have been turned into standardized models which have then been 'downloaded' and adapted by local actors in other places. In the process, these strategies have not only 'travelled' but have also become 'hybridized,' reflecting attributes of standardized models and dynamics in the local setting. This paper examines these policy learning and transfer

processes by mapping these policy 'transfer networks'; examining the role of particular policy 'transfer actors' (i.e., sponsoring foundations, policy entrepreneurs and strategic brokers); and exploring the function of virtual and real policy 'transfer sites' (i.e., websites, conferencing).

Session: S1.2

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Zhang, X

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Impact of Moss Soil Crust on Vegetation Indices Interpretation

Vegetation Indexes were the most common and the most important parameters to characterize large-scale terrestrial ecosystems. It is vital to get precise vegetation indexes for running land surface process models and computation of NPP change, moisture and heat fluxes over surface. Biological Soil Crusts (BSC) are widely distributed in arid and semi-arid, polar and sub-polar regions. The spectral characteristics of dry and wet BSCs were quite different, which could produce much higher Vegetation Indexes value for the wet BSC than for the dry BSC as reports. But no research was reported about whether the BSC would impact on regional vegetation indexes and how much had dry and wet BSC impact on regional vegetation indexes. In this paper, the most common vegetation index NDVI was used to analyze how MSC affects on regional NDVI values. It showed that 100% coverage of the wet MSC have a much higher NDVI value (0.657) than the dry MSC NDVI value (0.320). Dry and wet MSC NDVI value reached significant difference between the level of 0.000. In the study area, MSC, which had the average coverage of 12.25%, would have a great contribution to the composition of vegetation index. Linear mixed model was employed to analyze how the NDVI would be changed in regional scale as wet MSC become dry MSC. The impact of wet moss crust than the dry moss crust in the study area can make the regional NDVI increase 0.04 (14.3%). Due to the MSC existence and rainfall variation in arid and semi-arid zones, it was found that result in NDVI change instability in a short time in the region. For the wet MSC's spectral reflectance curve is similar to those of the higher plants, misinterpretation of the vegetation dynamics could be more severe due to the 'maximum value composite' (MVC) technique used to compose the global vegetation maps in the study of vegetation dynamics. The researches would be useful for detecting and mapping MSC, from remote sensing imagery.

Session: R4.5

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Vegetation Cover and its Relationship with Environmental Factors in Ordos Region

Distributions of vegetation were determined by diverse environmental conditions in different spatial scales. The aim of this study is to analyze the relationship between the environmental factors and vegetation cover in different spatial scales. In this research, we studied the distribution of NDVI by mapping the remote sensing data (LANDSAT5 TM) in the Ordos basin. Supported by the GIS software, geo-database was built in the form of thematic map, and GIS-based spatial analysis was carried out to detect the relationship between the environment factors and NDVI in different spatial scales. Results indicated that in the Ordos regional scale, mean annual rainfall played an important role in vegetation distribution, and high-cover vegetation mainly distributes over diluvial deposit and alluvial deposit geomorphology regions. At local scale, Kubuqi Desert has been studied as an example, and the relations between the geological environments and the vegetation distribution were investigated. We concluded that geohydrologic condition is one of important factors which contribute to the distribution of vegetation cover in Kubuqi Desert. In Mu-U, the lithology of sublyer terrane greatly affect the vegetation cover and distribution.

Session: R4.5

Favrholdt, K

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“... Without Any Real Home in This Our Own Country”: The Historical Geography of Aboriginal Land Claims in the Southern Interior of British Columbia.

A century ago this year, Prime Minister Sir Wilfrid Laurier visited Kamloops and met with a delegation of First Nations chiefs who presented him with a memorial, an extended letter, outlining their grievances. The letter to Laurier represents a unique and eloquent description of the deterritorialization of the Shuswap (Secwepemc), Okanagan, and Couteau (Nlaka'pamux) tribes over the period of a century before 1910, from their perspective. This paper will provide a regional interpretation of the origins of land claims of the three Interior tribes in southern British Columbia, describing First Nations and non-Aboriginal geographies in the century before the presentation of the memorial. The historical geography of the region spans the period of the fur trade from 1812 to 1858, the gold rushes which followed, the smallpox epidemic of 1862, the establishment of reserves in the late 19th century, and the beginning of activism around the land question in the early 20th century. Ancestral alliances, shared resources and cultural traditions, and a common colonial history unified the purpose of the three tribes. The paper considers questions of language and discourse, traditional territory, and ideas of sovereignty and ownership. Of particular interest is the research and assistance provided to the Interior tribes by non-native advocates such as James Teit, who helped frame the famous memorial.

Session: F1.6

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Public Participation Remote Sensing

Advances in web and mobile communications technology are changing the way maps are made. In the past, mapping projects were generally limited to government and academic groups with funding to employ specially trained Geographic Information Systems (GIS) technicians, license software, and acquire airborne and spaceborne remote sensing data. Recent advances in internet technology now allow interested citizens to enter geographic information using services such as Google Maps at minimal cost and with minimal geography and computer training. In addition, mobile communication devices, such as the Apple iPhone, are increasingly widespread, and provide an advanced interface for citizens not only to view geographic data, but also to collect geographic data in real time. As remote sensing scientists, these advances are providing new opportunities to collect data utilizing a vast network of concerned citizens, at a range of spatial scales (e.g. close up measurements of forest floor and wide angle views of the landscape), and in places which are difficult to measure using airborne and spaceborne sensors (such as under dense forest canopies). However, new questions must also be addressed such as how to maintain the integrity of data collected by citizens with a range of expertise and motivations. In this presentation, we will discuss the technological advances that make PPRS possible, some of the cautions and considerations when working with PPRS data, and possible remote sensing science-based PPRS applications.

Session: W4.5

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Noble, B

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Advancing Aboriginal Community-Corporate Agreements: Lessons from Practice in the Canadian Mining Sector

A significant volume of literature has emerged in recent years on negotiated agreements between the mining industry and Aboriginal communities. The focus of much attention, however, has been on characterizing and explaining the emergence of such agreements, and identifying their potential to supplement existing regulatory-based processes. There has been much less attention to examining practical experiences with negotiated agreements and the lessons emerging to improve their value added. In this presentation we examine two case studies of negotiated agreements

in the mining industry: an impact benefit agreement in British Columbia for an open pit copper, gold and silver mine, and an environmental agreement in Saskatchewan for uranium mining operations. In the British Columbia case, the agreement was established to recognize each party's rights in mineral development and to formalize a process of working together through the mining sequence, specifically the environmental impact assessment process. In the Saskatchewan case, the agreement was established between seven Aboriginal communities and two project proponents to engage communities in environmental monitoring and impact management programs post-environmental impact assessment. For each case we provide an overview of the mining operation and negotiated agreement, followed by a brief discussion of 'what worked' and 'what didn't work' based on the experiences of those involved. Although the two cases are very different in nature and scope, we identify a number of common lessons that demonstrate the challenges that arise from negotiating agreements with a community, and the opportunities and lessons for improving current practices.

Session: W4.6

Finnigan, C

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Object Oriented Classification of the Western Canadian Prairie Region

Large area classification present a unique set of challenges: the spatial extent is often larger than the individual image footprint, and the study area may encompass different climatic and environmental conditions. We used an ecoregion based analysis combined with object-oriented rule based classification to create an accurate map of the Prairie Plains region of Canada. Threshold values for classification rules were determined by the Classification and Regression Tree algorithm. A careful analysis of the CART rule-set can point to further refinement of difficult to separate land cover types.

Session: W3.8

Fisker, C

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The Evolving Coping Strategies of the Networked Self: A Theoretical Frame for Examining Later Life Everyday (Auto)mobility in Jeopardy

A wave of baby boomers is starting to enter their senior years, having spent their adult lives with everyday life practices (Jensen 2009) holding a strong reliance on the automobile for mobility (Rosenbloom 2001). With age comes the potential for issues which will make driving a challenge or no longer safe or physically possible, thereby shrinking motility (Kaufmann 2002). This will bring a significant number of seniors to a point where they may have to make decisions such as self-regulating their driving activity, or deciding to stop driving all together, or alternatively the decision will be made for them. For seniors who can no longer drive, they can potentially become the immobilized others of automobility (Thomsen 2004). This loss or degradation in ability to use a key form of technology (car) within an environment that was designed for its exclusive, or nearly exclusive use, and it continues to be 'locked in' to this technology (see Urry 2003 and Richardson and Jensen 2008), can place the non-users in a considerable predicament. Utilizing concepts and approaches being developed through the 'mobility turn' (Urry 2007, 2008), together with notions of the networked self (Jensen 2010), extensions of the self (McLuhan 1964/1994; Hall 1959/1990, 1966/1990, 1976/1989) and knowledge from the fields of geography, planning, gerontology, sociology, disabilities, and science and technology studies, a theoretical frame will be presented for examining later life (auto)mobility and coping strategies of the networked self across mobility technologies, mobility infrastructures and the built environment.

Session: R3.8

Fletcher, A
Kubik, W

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Survival and the Family Farm: Food Sustainability and Farm Women's Health in a Changing Climate

In the current context of neoliberal corporatization and impending climate change, there is a point upon which many farmers and agriculturalists concur: the Canadian family farm is in a state of crisis. This farm crisis has implications for our system of food production and, we argue, for the future of food security and sustainability in Canada. Further, at the very micro-level, the crisis has had a profound effect on the health and well-being of farm women. Despite the challenges, these women continue to support a more sustainable system of food production – namely, the family farm. This paper weaves together the seemingly disparate issues of climate change, commercialized agriculture, food production, and farm women's health. All of these are linked to a broader concern about food sustainability, which holds its own implications for global health. We argue that large-scale commercial agriculture poses a threat to environmental stability and thus to long-term food sustainability and security, while the family farm holds the key to a more secure and environmentally accountable system of food production. Because of farm women's important role in family farm survival, we promote policymaking strategies that acknowledge and recognize farm women's role in sustainable food production on the Canadian prairie.

Session: W3.2

Foote, K

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Creating a Community of Support for Graduate Students and Early Career Academic

My presentation focuses on strategies for enhancing the preparation of geographers moving into academic careers. Based on research and experience gained from the Geography Faculty Development Alliance and Enhancing Departments and Graduate Education in geography projects, several suggestions for improved practice are detailed. These move beyond self-help models and argue for a systematic, community-based approach to professional development. Reasons for change are disparities that sometimes exist between the implicit knowledge needed for career success and the topics addressed explicitly in graduate curricula. Although the focus is geography, the argument is set in the context of interdisciplinary debate about improving doctoral education.

Session: R2.10

Forsythe, K
Schatz, B
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Landsat Mapping of Changes in the Shoreline of Lake Mead from 1972-2009

Over the last decade, the south-western portion of the United States has experienced an enduring drought. Lake Mead is one of the major reservoirs in this region and current water levels have reached historic lows. The appearance of the Lake Mead 'bathtub ring' highlights the loss of water from the lake. In this paper, satellite imagery available from the United States Geological Service (USGS) Earth Explorer Landsat archive were obtained for the 1972 to 2009 period. A total of 28 images were examined consisting of: 6 Multispectral Scanner (MSS), 19 Thematic Mapper (TM), and 3 Enhanced Thematic Mapper Plus (ETM+) images. The analysis showed that decadal water minimums/maximums were achieved in 1972/1979, 1981/1988, 1991/1998, and 2009/2000. The minimum lake extent occurred in 2009 (356.4369 sq. km), while the maximum occurred in 1998 (590.5764 sq. km). There has been a permanent downward trend in lake area and water levels since 2000. The Landsat derived water areas show a very strong relationship with actual measured water levels at the Hoover Dam. Obtaining a complete (yearly) record of satellite images was not possible and this may have caused some of the slight mismatch problems in the time series as yearly water level variations at the dam do not completely correspond with the satellite derived estimates. In addition, varying slopes around the lake can account for some of the observed variance in parts of the time series (*i.e.* depending on slope... more or less lakebed may be exposed depending on water levels).

Session: W4.8

Fraser, C
Luke, S

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Measuring Health Inequalities in Urban Canada: How well do Deprivation Indices Capture Population Health Outcomes?

Deprivation indices are often used to measure inequalities in socio-economic status (SES) and health and to inform related policy interventions. To enhance understanding of deprivation indices, the Canadian Population Health Initiative examined four measures used to examine SES: Statistics Canada's Low Income Cut-Off, the Institut national de santé publique du Québec Deprivation Index, the Vancouver Area Neighbourhood Deprivation Index and the Winnipeg Socioeconomic Factor Deprivation Index. Using statistical and geographic information system analysis, scores from each index were compared to selected health outcomes (ambulatory care sensitive conditions, injuries and mental health conditions) at the dissemination area level in Vancouver and Winnipeg. This revealed how the inclusion and weighting of different variables impacted differences in health between geographic areas based on their SES. The analysis explored whether national deprivation indices are useful for conducting studies of SES, place and health or whether more specific measures should be developed to score neighbourhood-level deprivation. The goal is to promote better understanding of how inequalities are measured and to provide methodological context for the use of index-derived health data when constructing place-based interventions in metropolitan Canada.

Session: S1.2

Fraser, J

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Managing CanVec Data in ArcGIS: A Programming Approach Using Python

Assembling base data quickly is a priority for geographic data users. Natural Resource Canada's CanVec dataset is an important topographical resource for many in the geomatics industry. The ESRI product catalogue has a number of tools available that makes using this data simple. This paper outlines the process of creating a geodatabase to interpret the fields within the CanVec dataset using custom software tools. Methods of editing the geodatabase's XML structure using ArcGIS Diagrammer and ArcCatalog are discussed. Most important to the process is the use of Python-based scripts to populate the CanVec geodatabase, and as a method to symbolize the data using cartographic representations. With these tools, a 1:50,000 map sheet can be produced in minimal time for any area in the country.

Session: R4.6

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Walker, R**

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More Than a House: Urban Aboriginal Housing and Quality of Life

The effect that housing has on quality of life has primarily been examined from a western perspective and has been applied to the provision of housing for Aboriginal people by non-Aboriginal institutions. Urban Aboriginal social housing organizations provide more than 11,000 housing units to urban Aboriginal people through a variety of funding sources and operational arrangements with provincial and federal agencies such as the Canada Mortgage and Housing Corporation (CMHC) or regional housing agencies such as BC Housing. However, it has been repeatedly noted in a variety of sectors, including housing, that services provided by Aboriginal people for Aboriginal people are outperforming traditional service provision models. Self-determination is of growing importance to the wellbeing of Aboriginal people as urban Aboriginal populations grow. Aboriginal self-determination in service provision is linked with successful outcomes in social welfare. Anecdotally, there is something unique and valuable in the provision of housing for Aboriginal people by Aboriginal-run organizations. At the heart of this research are the underlying questions: when put to examination is it a true assertion that Aboriginal-run social housing organizations are a distinct form of urban housing provision, and if so, why and how are they positively affecting the wellbeing of the urban Aboriginal community? Is the anecdotal evidence portraying a complete picture? This research begins by examining what appropriate housing is from an urban Aboriginal perspective and then continues on to examine how housing links to quality of life, self-determination and determinants of wellbeing.

Session: R2.3

Friedman, A

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Revealing Revitalization: In-between Place-Based Policy and Redevelopment

This paper compares the discourses and practices of neighbourhood revitalization in two urban policy areas - place-based social policy and the redevelopment of the built environment. My research examines the contradictory meanings and geographies of neighbourhood revitalization in the marginal spaces of the inner suburbs of Toronto. Neighbourhood revitalization is situated within the context of the in-between city and a wider agenda of urban restructuring, rescaling and transitions in urban governance. Through a comparative case study of two neighbourhoods, Steeles L'Amoreaux, a 'priority neighbourhood' in Scarborough and Mimico, a non-priority neighbourhood in Etobicoke, I explore and identify whether identification as a targeted 'priority neighbourhood' under the City of Toronto's Strong Neighbourhood Strategy changes the role of community organizations and low-income

residents in the urban planning and redevelopment process. Neighbourhood revitalization is a process based on ideological assumptions and spatial imaginaries of a normal-citizen and a normal-city, yet when practiced is contingent on complex social and spatial relations.

Session: S1.2

Froese, D
Reyes, A
Robinson, S

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Late Pleistocene-Early Holocene Climate Oscillations in Interior Alaska Inferred from Radiocarbon Dating of Eolian Sandsheets, Paleosols and Loess

Paleoenvironmental proxy data, primarily from lacustrine sediments (pollen, lake level data) support varying interpretations of the timing and nature of environmental change in the interior of Yukon and Alaska around the late Pleistocene-early Holocene (LP-EH) transition (ca. 13,500-10,000 yrs BP). The onset of early Holocene warmth is seen in most records around 10,000 14C yrs BP (ca. 11,500 cal yr BP) with temperature reconstructions suggesting a climate as warm as or warmer than modern. However, the presence of climate oscillations associated broadly with the Allerød and Younger Dryas chronozone are less clear both in terms of the nature of changes (if any), and their timing. This interval is of considerable interest given the dramatic declines of Pleistocene megafauna, and causal links to these losses suggested to reflect environmental changes at this time. We investigated eolian sandsheets and loess from the LP-EH interval in interior Alaska to determine whether perennially-frozen, high accumulation (eolian) sites with excellent organic preservation may provide more clarity on the environmental changes. In the Yukon Flats area, two periods of sandsheet accumulation are recognized, an earlier interval around 11,500 14C yr BP (ca. 13,200-13,600 cal yr BP), and a later interval, separated by a prominent paleosol (turbic cryosol), beginning after 10,300 14C yr BP (ca. 12,400-11,700 cal yr BP). Radiocarbon ages indicate an abrupt transition in the area from eolian sandsheets to loessal sedimentation by 9,800 14C yr BP (ca. 11,200 cal yr BP). Collectively, the eolian record indicates several rapid transitions during the LP-EH interval between warm, mesic conditions conducive to paleosol development, and dry arid conditions associated with sandsheet development prior to the early Holocene.

Session: S3.1

Garvin, T
Nykiforuk, C
Johnson, S

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Can We Get Old Here? Older Adults' Perceptions of Seasonal Constraints of Neighbourhood Built Environments in Edmonton

Current estimates of Canadian demographics suggest that by the year 2040, approximately 1 in 5 Canadians will be over the age of 55. As identified by the WHO (2007) this aging population will place increasing demands on the design and maintenance of neighbourhood built environments. In Canada's Prairie Provinces (Manitoba, Saskatchewan, Alberta), these demands are coupled with the need to accommodate the maintenance and use of neighbourhood spaces in a climate that ranges from hot, dry summers to cold, snowy winters. The work here uses Photovoice to examine perceptions of the impact of the built environment on older adults' independence, mobility and safety in Edmonton, Alberta by comparing perceptions from summer and winter. This case study is part of a larger project examining how to accommodate future aging populations in Canada's low-density, sprawling prairie suburbs.

Session: R3.8

Gedalof, Z
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Daniels, L

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Scaling the Mountain: Environmental Controls on Wildfire in the Joseph & Gold Creek Watersheds, Kootenay Mountains, BC

The Kootenay Mountains in southeastern British Columbia, Canada, occur at the transition between warm, dry forests characterized by frequent low-severity fires, and cool, moist montane forests characterized by infrequent stand-

replacing fires. They have a complex history of anthropogenic land use, including periods of prescribed fire, fire suppression, and grazing by sheep and cattle. The effects of these actions on the natural fire regime are unknown, but the transitional nature of their geography and their variable history of occupation make them an ideal natural laboratory for testing the relative importance of top-down and bottom-up controls on wildfire, as well as the role of people in affecting these roles. We reconstructed fire history at 30 randomly selected sites in the Joseph and Gold Creek watersheds near Cranbrook, BC, stratified according to their historic natural fire regime. We found that fire frequency has decreased over the 20th century, probably due to both direct and indirect fire suppression efforts. As a consequence, fire has become less regionally synchronous, as only small fires have burned. However we speculate that this relationship will reverse in coming decades as fuel loadings and the frequency of severe fire weather increase. The relative importance of top-down and bottom-up controls varied over very short distances, with aspect, elevation, and recent fire history mediating stand structure and composition. Comparisons to instrumental climate and reconstructions of ENSO, the PDO, and the AMO indicate that regionally synchronous fires are most strongly associated with the warm phase of the PDO.

Poster Session A

Geldsetzer, T
van der Sanden, J
Brisco, B

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Monitoring Lake Ice Using Multi-Polarized SAR Imagery

Multi-polarized Radarsat-2 SAR imagery is used to monitor lake ice within three National Parks in the Canadian Arctic. During the spring melt period, HH and HV backscatter thresholds classify lake ice versus open water; these classifications are used to produce ice-off date maps showing inter-lake diversity in melt duration. Classification accuracies are presented for the three study areas and sources of error are discussed. Preliminary analysis of fall imagery illustrates the challenges of monitoring lake ice freeze-up. Polarimetric decomposition of Fine-quad winter imagery is used to infer lake ice characteristics. This work is part of the Remote Sensing Science Program of the Earth Sciences Sector, Natural Resources Canada. It is financially supported, in part, through the Government Related Initiatives Program of the Canadian Space Agency. Parks Canada and Environment Canada are the primary end users, as well as research partners.

Session: W3.4

George, C
Reed, M

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Problems of Fit: Applying Sustainable Development Criteria and Indicator Frameworks to Institutional Objectives in Atlantic Canada

As tools designed to assess and guide sustainability, sustainable development criteria and indicator frameworks have increased in popularity in recent decades. Such frameworks have been primarily derived from top-down approaches and have been critiqued for failing to realise the importance of local populations in assessing and monitoring change. Local populations experience the successes and shortcomings of sustainable development initiatives firsthand and have their own defining priorities for sustainable development. Using existing literature from biosphere reserves, model forests and vibrant communities in Atlantic Canada, we compare local goals and objectives for sustainable development to recognized criteria and indicator frameworks at both the national and international level. We demonstrate that criteria and indicators derived from sustainable development priorities at the local level are able to complement existing national and international frameworks, as they offer a level of detail that is crucial for developing strategies that meet local needs, as well as address the broader objectives of sustainable development.

Session: R2.7

Germain, V
Lamothe, M
Froese, D

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Luminescence Dating of Late Pleistocene Sandsheets from Interior Yukon and Alaska

Eolian sandsheets occur commonly in the unglaciated region of northwestern Canada and Alaska, but relatively few have been independently dated. These sandsheets result from unique climatic and environmental conditions that prevailed towards the end of the late Pleistocene, providing information on the relations between climate, vegetation cover and sand supply. Sandsheets are well exposed along the banks the middle Yukon River, and widespread between the mouth of the Fortymile River, Yukon, and the community of Eagle, Alaska. These sub-horizontal deposits are found on fluvial and glaciofluvial gravel and are currently stabilized, with typical Holocene soils on their surfaces. The sediments are composed of well-sorted fine to medium sand, with structures ranging from massive-to-well stratified, and thicknesses up to eight metres. They show sharply defined parallel and low-angle laminations, suggesting migration of low-amplitude wind ripples. Sand supply was from the Yukon River and their aggradation suggests sparse vegetation cover in an arid climate. In this study we use infrared simulated luminescence (IRSL) and radiocarbon dating to constrain the timing of their deposition. Optical simulated luminescence (OSL) has proven to be a very useful technique for establishing their chronology. Statistical IRSL parameters confirm their eolian origin and are coherent with the ca. 12-18 ka range deduced from preliminary radiocarbon dating.

Poster Session C

Giesbrecht, K
Nolin, C

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Resisting Neoliberalism: Activism and Energy Development in the Skeena Watershed, BC

Global and local demands for energy resources and neoliberal government policies are impacting the Skeena Watershed in rural, northwest, British Columbia (BC). Hydro-electric dams, coal mines, coal bed methane wells and oil pipelines are some of the energy development pressures faced by this region over the last 40 years. During the same period, several local organizations and groups formed to oppose these proposed developments. Based on initial fieldwork, this poster sets the context for a case study of resistance to neoliberal development by illustrating the history of energy development and activism in the Skeena Watershed. We draw on the concepts of neoliberalism and development, place and identity, and power and resistance from a critical geographic perspective in order to examine the broader interrelationships of power, place and identity and to better understand why local organizations are resisting the forces of neoliberal energy development within the Skeena Watershed. Can we link motivations for resistance to the deeply ingrained connections between place and identity in this remote region?

Poster Session A

Gill, J
Fuller, M
Yackel, J

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Examination of Backscatter and Polarimetric Parameters from C- and X-Band SAR Coincident to Sea Ice Geophysical Mensurations

In this study we compute polarimetric discriminators at different incidence angles for C (Radarsat-2) and X-band (TerraSAR-X) frequencies to analyze backscatter with respect to various snow depth and surface roughness categories. In-situ geophysical, dielectric and meteorological measurements made with simultaneous image acquisitions are derived from two field expeditions conducted in summer of 2008 and 2009. We characterize microwave signatures of different sea ice classes from coarse spatial resolution, single and dual polarized data and utilize the same for sea ice classification. Our results show nearly equal classification accuracies for both C and X-band frequencies. With regard to polarization, VV is better suited for discriminating level ice from open water and VH for level ice from deformed ice. Cross-polarization produces better results than co-polarization and their combination produces the best results. Investigations on incidence angle dependence on backscatter signatures at C and X band

for all polarizations show decrease in phase difference and backscatter with increase in incidence angle. The decrease is high for level ice as compared to deformed ice. Incident angle has no significant effect on co-polarized correlation coefficient and phase of correlation coefficient. Increase in snow depth and surface roughness increase SAR backscatter at both C and X-band frequencies.

Session: W3.4

Gismondi, M

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Spatial Analysis of the Behaviour of Residents After the 2004 Chuetsu Earthquake: A Case Study of Kawaguchi Village, Japan

Japan is a country with a high number of earthquakes due to its geographical position and geomorphological structure. Even if anti-seismic construction technology and investigations on natural disasters are rapidly developing, there is no guarantee of safety. The aim of this study is to spatially analyze the behaviour of people living in rural areas, using GIS to understand the situation during a seismic event, the short time recovery process and proposing more reliable solutions for emergency procedures. The study area is Kawaguchi Village, located in the central part of Niigata Prefecture on the Sea of Japan coast of Honshu Island. In 2004, one of the strongest earthquakes (magnitude 6.8) of this century in Japan struck this area. The experiences and behaviours of residents were collected by conducting random interviews inside the study area. Results from digitized data show how geographical location has a deep impact on the behaviour and organization of the community. In fact, the isolated areas are disposed of a better organization within the community rather than the central areas. Nevertheless, it appears that their behaviour is not due to a preventive organization but partly due to the necessity of the situation. Hence, it is believed that cultivating and enhancing the community connections and precautions will lead to a more efficient and effective preparation to natural disasters.

Session: S2.2

**Godlewska, A
Massey, J**

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Lack of Knowledge as Power: Results of an On-Line Survey of Aboriginal Knowledge Amongst Students at Queen's

Ignorance is an extremely powerful political force as has been noted by colonial theorists, epistemologists and many Aboriginal leaders who have called for improved school education. This paper looks at a survey designed and piloted at Queen's University to measure the knowledge of first-year university students and final-year education students about Aboriginal people and issues. The survey is a follow up and extension of the CAAS 2004 Learning About Walking in Beauty study which, with a survey pool of 500 students, found pervasive ignorance across Canada. We are trying to do a more comprehensive assessment of awareness of Aboriginal issues, history and culture in the Canadian population with a primary focus on secondary education. The most important first step is to develop a test that can be implemented Canada-wide, province by province and university and college by university and college. Our questionnaire is designed to: 1) test student's knowledge of Aboriginal history, geography, culture and issues of law and society concerning Aboriginal peoples and Canada; 2) determine the sources of their knowledge; and 3) inquire about the respondents to determine whether there are significant patterns in the populations' awareness. We will explore the challenges of designing a survey to assess a reasonable level of knowledge and examine the first results of an on-line survey of over 3,000 undergraduate students and over 500 education students at Queen's University. We plan to extend the survey to other universities in Ontario and Canada to track regional differences in attitude, knowledge and experience.

Session: W1.2

Gonçalves, G
Gomes Pereira, L

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Integration of Aerial Laser Scanning Data and CIR Images to Produce DTM in Urban Areas: Preliminary Results

Airborne Laser Scanning is an established technique to produce Digital Terrain Models (DTM). In spite of its widespread use, the extraction of a DTM in urban areas still poses problems because the filtering process often fails to separate some of the objects on the terrain surface from the terrain itself. This happens because only one kind of information – geometric information – is used in the process. To overcome this problem a methodology is proposed that integrates aerial laser scanning data with high-resolution ortho-rectified CIR images to extract reliable information of the terrain and of the objects on it (like buildings and trees). The methodology was tested in an urban area located in north Portugal. The obtained results show that in complex urban areas the proposed methodology has a superior performance than the conventional one.

Poster Session A

Gosselin, G
Touzi, R

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Investigation of the Touzi Decomposition for Characterization of Vegetal Physiognomy Using Polarimetric SAR

The Touzi decomposition parameters have been compared to the polarization intensity for the characterization of the vegetal physiognomy of farmland and wetlands of the Lac Saint-Pierre area (Quebec, Canada). The analysis were conducted with two ALOS-PALSAR PLR images acquired in wet (2006-11-10) and dry weather (2007-05-13) conditions. Two Landsat-TM images that were acquired few days apart from the ALOS images were used as ground truth. The Landsat-TM image of the 11 of November has been classified with the unsupervised ISODATA algorithm. The classification results were interpreted and more than 2,300 objects belonging to 21 physiognomy classes were vectorized. The class separability (transformed divergence) and the first order statistics and of these objects were examined. The class separability analysis shows that it is essential to take into account the contribution of the first and the second component of the Touzi decomposition for a better discrimination between land occupation classes. Swamps, open peatlands (bog and fen) and herbaceous marsh have been reasonably well discriminated from other vegetal physiognomy unlike forested peatlands that are confused with forest on dry substrates. A deeper analysis in this work has demonstrated that the dominant scattering type magnitude (α_s1) is able to compensate the soil humidity variations unlike the polarization intensities. Furthermore, the dominant scattering type phase ($\Phi\alpha_s1$) provides a unique information which specifically for open peatland is sensitive to the surface runoff pattern and water level fluctuations in peat subsurface.

Session: R1.9

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Bell, S

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Remote Sensing of Vegetation in the Northern Mixed Prairie: Patterns at Multiple Spatial Scales

Understanding the spatial variation and spatial scale of plant biophysical properties is fundamental for many ecological- and ecosystem studies. This study was aimed to describe the vegetation patterns and to identify the dominant spatial scale of plant biophysical properties in the northern mixed prairie. In this regard, remotely sensed data of vegetation were collected at four spatial scales using a field spectroradiometer and three satellite images (SPOT-5 HRG1, SPOT-4 HRVIR1, and Landsat-5 TM). To relate remotely sensed data to field estimates, phytosociological data were collected from 41 sites in the West Block of Grasslands National Park of Canada in 2006 and 2007. The performance of normalized difference vegetation index (NDVI) and normalized difference wetness index (NDWI) computed from remotely sensed data at multiple spatial scales were compared to field estimates of vegetation and leaf area index (LAI). To identify the dominant spatial scale of variation of vegetation properties, semivariogram analysis was used on the plant biophysical variables. Results show that both at finer and coarser

spatial scales, remotely-sensed data successfully captured the spatial variation of plant biophysical properties from the lowland to upland mixed prairie. LAI, canopy spectral reflectance, NDVI, NDWI, and aboveground biomass decreased with increase in elevation and with decrease in the availability of soil moisture. Pearson's correlation revealed that the plant biophysical variables are negatively correlated with elevation and positively correlated to soil moisture, thus agreeing with previous studies that these are the driving environmental variables controlling vegetation patterns in the northern mixed prairie. Vegetation indices (VI) derived from remotely sensed data at all spatial scales showed significant relationships ($r = 0.5-0.7$) to vegetation composition and plant cover seen on the ground, however VI obtained from finer scale remotely sensed data showed the highest relationships to field estimates. Semivariogram analysis of plant biophysical variables, derived at multiple scales showed that various plant biophysical variables have different spatial scales. In general, the dominant scale of spatial variation of plant biophysical properties varied from 30-100 m.

Session: R3.5

Grimwood, B
Doubleday, N
Donaldson, S

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Engaged Acclimatization: Research(ing) Responsibility in an Arctic Riverscape

The Thelon River is a Canadian Heritage River traversing the central Arctic and emptying at Qamani'tuaq (Baker Lake). The 'heritage' designation entangles the Thelon in power relations and their negotiation (e.g., whose 'nature' or 'culture' counts), with implications for land use, governance and management. Related complexities are interlaced in conducting research concerning tourism and livelihoods within this riverscape, as diverse worldviews, behaviours and capacities are enacted amid cross-cultural encounters and relations. Accordingly, the substantive investigation of Thelon River responsibility is intimately tied to the praxis of responsible tourism research. This paper reflects critically upon the first author's initial visits to Nunavut, which have been integral to developing a study concerning the geographies of responsibility along the Thelon River. To assist the construction of safe social spaces for sharing knowledge about the river across cultures (Tester and Irniq 2008), we present and explain a process of 'engaged acclimatization' (Doubleday and Donaldson 2001), an initial stage in developing community-based research relations in Qamani'tuaq. Fundamentally, engaged acclimatization entails embodied and experiential immersion within the mingled relations of a research setting; thus, informing the research design phase. Implications for funding, research capacity in the north, and training tourism and geography graduate students are discussed.

Session: F1.2

Gunn, G
Piowar, J

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Determining the Temporal Detection Period of Fire Scars in a Mixed Grassland Ecosystem

This analysis attempted to determine the effective temporal window in which a fire scar in a mixed grassland ecosystem would remain with enough of a spectral differentiation for useful classification. Landsat TM and ETM+ data were used with transformations and vegetation indices. Images were examined using a histogram-based separation analysis to form groups of highly separated images for classification. A single-image classification was performed on band groups for each image, followed by manual reclassification into burnt and unburnt information classes. We determined a principal component transformation of all standard Landsat bands provided the most consistent low-error image of the fire scar. Nearly as effective was a classification that incorporated multiple bands, transformations and vegetation indices. Separation index values appeared useful when grouped over a given constant value, rather than a set number of bands in this analysis. From this we find a principal component transformation is the best candidate for reliable classification especially when the thermal band is included. This may be caused by the differing thermal responses of burned areas which have a black ash layer and unburned areas which retain a normal, higher-albedo surface cover. This analysis attempted to determine the effective temporal window in which a fire scar in a mixed grassland ecosystem would remain with enough of a spectral differentiation for useful classification. Landsat TM and ETM+ data were used with transformations and vegetation indices. Images were examined using a histogram-based separation analysis to form groups of highly separated images for classification. A single-image classification was performed on band groups for each image, followed by manual reclassification into burnt and unburnt information classes. We determined a principal component transformation of all standard Landsat bands provided the most consistent low-error image of the fire scar. Nearly as effective was a classification that incorporated

multiple bands, transformations and vegetation indices. Separation index values appeared useful when grouped over a given constant value, rather than a set number of bands in this analysis. From this we find a principal component transformation is the best candidate for reliable classification especially when the thermal band is included. This may be caused by the differing thermal responses of burned areas which have a black ash layer and unburned areas which retain a normal, higher-albedo surface cover.

Session: R1.5

Günther-Diringer, D

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Cartographic Cross-Media Examples of the Department of Geomatics, Hochschule Karlsruhe, Germany

Rapidly changing technology has always affected the field of geomatics throughout the past. Currently, the broad availability of extremely diverse geospatial data is influencing the discipline in particular. As a result of latest developments, standardized geographic information systems, including functionalities for storing, organizing and analyzing data, are available to access geospatial data sets and allow for audience specific publication of processed data. Standardized dissemination technology is available in form of offset printing, high quality digital printing, or web GIS-based online publication. Other, non-standardized forms of publication include new, dynamic technologies, e.g. EarthBrowser (new global player with worldwide audience and attention), dynamic 3D visualization (new hardware possibilities) and location based services (new output devices with extended resolution, particularly with regard to cartographic applications). Selected projects by students of the Hochschule Karlsruhe (Germany) are presented to demonstrate current, as well as future activities in the Department of Geomatics. Samples include: EarthBrowser application (scale transition from small scale, globe representation to highly detailed 3D visualization) and 3D visualization applications (visualization of vegetation with dynamic high water simulation).

Session: W4.5

Guo, X

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Framework of ISTP Canada-China Grasslands Study

Funded by ISTP Canada and MOST in China and collaborated with Digital Environmental™ (DEM), Agriculture and Agri-Food Canada (AAFC) and Chinese Academy of Meteorological Sciences (CAMS), this project aims to develop a grassland health monitoring and productivity prediction system with the consideration of climate change. The study areas include the mixed grass prairie in Canada and grassland in Tibet; both areas are sensitive to climate change based on the report from IPCC in 2007. Because of the lack of an accurate grassland productivity prediction system especially the understanding of their response to climate change, this project will aim to 1) establish a comprehensive database including climate data, ground biophysical data, remote sensing data, and any ancillary data, 2) classify grassland types (communities) based on satellite imagery with multi-spatial, multi-spectral, and multi-temporal approaches for both study areas, 3) investigate an effective approach to monitoring grassland health in both countries, 4) develop and test models to predict grassland productivity using both remote sensing and climate parameters, 5) understand the climate change effects on environment such as soil carbon, greenhouse gas emission, and soil erosion and leaching as well as on economy in these regions, and 6) the last and the most important, develop a grassland health monitoring and productivity prediction software as a web version in both Chinese and English languages, which will be commercialized for end users. This study will also be a comparison study in term of regions. Results from this study will not only help understand how ecosystems response to climate change, but also provide strategies for climate change adaptation.

Session: R2.5

Gyepi-Garbrah, J
Walker, R

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Understanding Diversity and Interculturalism Between Aboriginal Peoples and Newcomers (Immigrants) in Winnipeg

Indigeneity, the politics of original occupancy, plays a central role in planning for diversity and creating inclusive cities in Canada. In the public domain, racism remains prominent in cities and presents obstacles to realization by urban Aboriginal peoples and Newcomers of their aspirations in urban society. In Winnipeg, an Aboriginal-led organization, Ka Ni Kanichihk Inc. has initiated partnerships with Newcomer settlement organizations to bring both groups together to bridge communication gaps and build intercultural relationships. A case study of the United Against Racism/ Aboriginal Youth Circle component of Ka Ni Kanichihk provides the opportunity to examine how the knowledge developed through its partnerships has helped in deconstructing colonial relationships. The operations of the organization include Aboriginal awareness, cross-cultural activities and anti-racism education. These serve to: promote intercultural understanding and friendships, change negative perceptions and build confidence among Aboriginal peoples and Newcomers, and help to facilitate Newcomer integration into communities predominantly occupied by Aboriginal peoples in Winnipeg. An evaluation of the partnership programs revealed that there were tensions and misunderstandings built on false impressions. The sharing of cultures and ideas has helped them to value differences and similarities, break down stereotypes, and increase social cohesion.

Session: R2.3

Haber, R
Masuda, J

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What is 'Healthy' Public Space? A Critical Discourse Analysis of Place-Based Intervention in Vancouver

The Downtown Eastside (DTES) in Vancouver has been the target of many place-based policies and interventions in the recent past. Two particular examples are the Vancouver Agreement, a federal, provincial and municipal government partnership, and the City of Vancouver's Downtown Eastside Revitalization Program. Both of these programs support community-level initiatives that address economic, social, health and safety issues with the aim of 'revitalizing' the DTES, making it a healthier and safer place to live. In my project, I use critical discourse analysis to examine how these place-based programs represent a 'healthy' neighbourhood, and how they socially position residents of the DTES. My analysis questions how social structures and power dynamics are (re)produced in the policy texts related to these programs. The DTES has a predominantly low-income community, high levels of social and health inequities, and faces increasing pressures of gentrification. My project will elaborate on the social context in the neighbourhood, providing a critical perspective on the implications and assumptions behind place-based interventions in this unique urban Canadian setting.

Session: R1.8

Hadarits, M
Hill, H
Lee, N

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Extreme Climate Events Simulations: The Drought Preparedness Partnership (DPP) Pilot Project

Extreme climate events such as drought and excessive moisture create significant risks for society, the environment, agriculture, and other economic sectors. Preparedness initiatives, such as tabletop exercises and simulations, are increasingly recognized as ways to identify the risks associated with, and possibly reveal opportunities to take advantage of, these events. Agriculture and Agri-Food Canada (AAFC) and its partners are investigating ways the Canadian agricultural sector can better prepare for, and perhaps even draw benefits from, extreme climate events. The Drought Preparedness Partnership (DPP), under the EXtreme ClimaTe Events PrepaRedness and Adaptation (EXTRA) project, is one existing AAFC preparedness initiative. The DPP provides a framework for government institutions to document and evaluate past drought strategies and responses and to identify gaps in responses, which, if addressed, may enhance resiliency in the agricultural sector. Pilot tabletop exercises held in Saskatchewan

and Manitoba revealed that institutional drought response capacity has increased since the last drought event. The exercises also revealed that more proactive strategies may be required to alleviate the impacts of future droughts. This paper introduces EXTRA, summarizes the key findings from the DPP pilot exercises, and makes recommendations for future simulation projects based on the lessons learned from the DPP.

Session: F2.3

Hall-Beyer, M

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Sub-Seasonal Vegetation Variability Within Alberta: The Picture from 1982-2006 from AVHRR GIMMS Data

The Vegetation Condition Index (VCI) uses multitemporal image data to indicate the density of vegetation at a certain date relative to the variability at that date over the time span of the repeated images. It is thus ideal to show whether vegetation is having a relatively 'good' or 'bad' year, although it is not able to show the cause (presumably cumulative temperature or precipitation). VCI was calculated on 8 km GIMMS AVHRR data for bi-monthly composites April through October from 1982 through 2006 for Alberta. The resulting patterns indicate spatial coherence of VCI values over a sub-regional area for a short time period only. However, Alberta cannot be considered as a single region (we cannot say "Alberta had a poor spring") nor can a growing season be within a single year be uniformly characterized even within sub-regions (we cannot say "year x was a good year on the prairies"). This variability pattern complicates assessing the connections between global weather patterns such as El Niño and prairie climate. It also complicates predictions of ecosystem response to climate change based on coarse spatial scale climate modelling.

Session: W4.8

Hallman, B
Walton-Roberts, M
Andrey, J
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Family Geographies: The Spatiality of Families and Family Life

This panel of contributors to the new book *Family Geographies: The Spatiality of Families and Family Life* will: a) introduce the book, published June 2010 by Oxford University Press Canada; b) introduce and discuss key themes in the represented research on spaces and places of family life (places of family interaction and identity construction; and, mobility and migration effects on family life); and c) discuss future directions in the subfield of family geographies. A central focus of the book, and therefore of the panel discussion, is furthering our understanding of how, and to what outcomes and effects, our day-to-day activities, responsibilities and opinions regarding family life are grounded / experienced in the spaces and places of family life. In addition, linkages are explored between the 'everydayness' of family life and the increasingly 'stretched' social relations of families across space, which are anything but simply 'local' or private. Rather, families of all ages, socio-economic circumstances, cultural backgrounds and sexual orientations react to, and are agents of, economic and social change.

Session: R2.9

Hambly, D

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Long-Term Trends and Contributing Factors in Pedestrian-Vehicle Collisions

As cities in the developed world move toward sustainable and more balanced urban transportation systems, greater emphasis will be placed on pedestrian travel. With this shift, it is likely that exposure to risk associated with walking will increase. This study examines long-term trends in pedestrian-vehicle collisions in several Canadian cities over a 19-year period. Annual road safety statistics and Transport Canada's national collision database are utilized to

investigate temporal (e.g., season, day of week, time of day) and situational (e.g., weather and light conditions, speed limit, accident location) factors that contribute to pedestrian-vehicle collisions and to identify conditions in which higher than expected incident rates occur. Potential safety interventions are then discussed.

Session: R1.7

Hanlon, N
Halseth, G
Ostry, A

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Stealth Voluntarism: An Expectation of Health Professional Work in Underserved Areas?

Voluntarism in the health care sector is greatly shaped by place, policy and the restructuring of state welfare responsibilities. In this paper, we explore a particular type of voluntarism carried out as an add-on to formal duties of health care professionals and administrators. We outline some impressions of what we term 'stealth voluntarism', which we situate at the interstices of health care professionalism, place integration and welfare retrenchment. Our discussion draws on exploratory research looking at health care and social support in smaller urban centres in the interior of British Columbia, Canada. While stealth voluntarism can occur anywhere, we highlight its unique implications for systems of support in rural and small town places. We conclude by considering the wider implications of stealth voluntarism as an expectation of professional work in underserved areas, particularly in the context of welfare retrenchment and the offloading of care.

Session: R1.3

Hanson, M A
Clague, J

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Late Pleistocene Glaciolacustrine and Glacial Outburst Flood Sedimentation in Glacial Lake Columbia, Washington

During the Late Pleistocene, the Okanogan lobe of the Cordilleran Ice Sheet blocked the Columbia River, impounding glacial Lake Columbia in northeast Washington. Concurrently, the Purcell Trench lobe blocked the Clark Fork River and impounded glacial Lake Missoula in western Montana. We studied previously unreported exposures of glacial, glaciolacustrine and outburst flood sediments exposed along present-day Lake Roosevelt between Grand Coulee Dam and Kettle Falls, Washington. Exposures consist of till, ice-proximal and ice-distal glaciolacustrine sediments, and coarse outburst flood sediments deposited during repeated draining of glacial Lake Missoula. Stratigraphic and sedimentological study of the exposures indicates that floods from glacial Lake Missoula entered glacial Lake Columbia from the east and flowed part way up the lower Columbia River arm of the lake. No evidence was found of floodwaters flowing south from British Columbia down the Columbia River valley. A 97 m high section in the Hawk Creek arm of Lake Roosevelt exposes deposits of at least 43 glacial Lake Missoula floods interbedded with Lake Columbia glaciolacustrine sediments. Each flood unit comprises, from bottom to top, massive pebbly coarse sand, plane-bedded fine to medium sand, rippled fine to medium sand, interlaminated fine sand and silt, and a thick bed of massive silt. Each flood unit is capped by up to 40 silt and clay varves. A radiocarbon age of $13,400 \pm 100$ 14C yr BP on plant fossils near the base of this exposure helps to constrain the timing of glacial Lake Missoula outburst floods.

Session: R3.4

Harvey, J
Coulthard, B
Johnson, K
Patterson, K
Pitman, K
Smith, D

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Tiding up the Tiedemann Advance in the Mt Waddington Area, Central British Columbia Coast Mountains

The application of dendroglaciological research techniques in the Mt. Waddington area of the central British Columbia

Coast Mountains has contributed to our understanding of the late-Holocene glacial history of Pacific North America. The Tiedemann Advance was originally proposed to represent a glacial advance between ca. 3000 to 1900 14C years BP. Continuing investigations, including recent dendroglaciological investigations conducted at Jambeau and Confederation glaciers, have improved our understanding of the temporal and spatial resolution of Tiedemann-aged glacial expansion in this region. At Jambeau Glacier a subfossil wood mat resting on an extensively weathered pedogenic surface was discovered in the eastern and western lateral moraines. Radiocarbon dating shows that this deposit records the early Tiedemann phase of glacial expansion ca. 3000 years before present. Radiocarbon dates assigned to samples extracted from detrital boles and a rooted stump in growth position at nearby Confederation Glacier forefield illustrate this widespread character of ice expansion ca. 3500 years before present. The dendroglaciological discoveries at Jambeau and Confederation glaciers match the findings at nearby glaciers and emphasize the regional significance of the early Tiedemann Phase of glacier activity. Growing evidence for the regional synchronicity in glacier behaviour in this region during the late-Holocene suggests a glaciological response to large-scale shifts in the prevailing climate regime.

Session: W4.3

Hatvany, M

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The Multiple Meanings of 'Développement Durable': Actors, Citizens and the Ideal of Sustainable Development in the Réserve Mondiale de la Biosphère de Charlevoix

The Charlevoix region of Quebec was recognized by UNESCO in 1988 as an inhabited biosphere reserve. Some 80 km east of Quebec City, the Charlevoix biosphere is comprised of three separate areas of preservation surrounded by a number of small- and medium-sized communities of approximately 30,000 people known for their distinct cultural, patrimonial and landscape attributes. Through a series of formal and informal field observations and interviews with local preservation actors, economic entrepreneurs and governmental actors, and with average citizens, this presentation explores the concept of sustainable development as it is understood and employed within the limits of the Charlevoix biosphere. The paper argues that the contemporary problems in balancing the environmental, socio-cultural and economic pillars of sustainable development that exist within the larger community of Quebec are likewise replicated within the boundaries of the Charlevoix biosphere. However, within those boundaries, the problem of finding an optimum balance among the three pillars of sustainable development are exacerbated by the inherent understanding that biodiversity preservation should receive priority within a biosphere reserve. Can, however, sustainable development be achieved if one of the three pillars receives inordinate attention (or development)? In a period of severe underemployment and outmigration of the region's youth, sustainable development has become the fundamental question that faces the inhabitants of the biosphere. In order to remain sustainable, Charlevoix must not only succeed in preserving the biodiversity of the region but also maintain an adequate economic development that will assure the socio-cultural needs of the people who live therein.

Session: W1.1

Hatvany, M

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An Edible Landscape: The Sustainable Development of Salt Marshes in France and Quebec

In contrast to the industrial age when salt marshes were drained and filled in the name of progress, in the post-industrial period they are preserved as landscapes exhibiting some of the highest production rates of all generalized ecosystem types. Ironically, as knowledge of marsh ecosystems has increased, the understanding of the place of humans therein has decreased. Unaware of the sustainable role that marshes played in preindustrial food economies, modern science and land management laws encourage the restriction of anthropogenic activities in marshes under the guise that humans are culturally predisposed agents of wetland destruction. However, the search by coastal communities in France and Quebec to find developmental models that meet the criteria of sustainable development is bringing the perception of salt marshes full circle as preindustrial modes of marsh exploitation – mowing salt hay, pasturing animals on the marshes, production of gourmet cheeses - are revalorized and re-erecting the perception of marshlands as edible landscapes for postmodern markets in search of unique produits du terroir.

Session: F1.6

Hatvany, M

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Culture, Geomorphology and Salt Marsh Dynamics: An Interdisciplinary Approach to Environmental Change in the St. Lawrence Estuary

The salt marshes of the St. Lawrence Estuary have engendered two opposing paradigms and discourses. As early as the 1860s, scientists established the paradigm that salt marshes were in a continual state of accretion and biological succession. Linked to that paradigm was a socio-economic discourse emphasizing the ease by which industrial society could assist nature by speeding accretion and succession through diking and draining. In an abrupt shift in the 1970s, a new paradigm and discourse emerged. Displacing the older paradigm, the new model holds that marsh ecosystems are in a fragile steady state. This paradigm is intimately linked with a discourse that portrays salt marshes as a milieu 'at risk' to direct and indirect human disruption – especially climate change. The opposition between the historic and actual understanding of salt marsh dynamics raises a fundamental question: is the sudden shift in paradigms and discourses rooted in actual physical change? Or, is it related to perceptual changes in the way the scientific community and public understands the environment and the place of humans therein? To resolve this problem, the paper relies on an interdisciplinary approach divided into an analytical section focused on the temporal evolution of the scientific paradigms and socio-economic discourses used by the scientific community, followed by a geomorphological section (using historical maps, aerial photography and GIS) focused on the spatio-temporal evolution of the marshes. The conclusion combines these results to explore the cultural and physical causes underlying the paradigm and discourse shifts in the understanding of salt marsh dynamics.

Session: S1.1

He, Y
Guo, X

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Object-Based Grassland Ecosystem Modelling

A spatially explicit ecosystem model can effectively integrate a diverse assemblage of environmental data (land cover, vegetation, soil, and climate) to quantify vegetation productivity and predict future trends. Most spatially explicit ecosystem models made use of remote sensing data and simulated ecosystem conditions in a grid-based mode. However, grid-based spatial ecosystem modeling is less accurate when simulating vegetation productivity for a heterogeneous area like Canadian critically important grassland ecosystems. As a result, the authors have developed an object-based ecosystem model framework aiming to simulate spatially explicit vegetation productivity for grassland ecosystems. Study is needed to continue this work by addressing following research questions. 1) How can the prescribed initial conditions in the model framework be defined across an environmentally variable region (*i.e.* Saskatchewan and Alberta grasslands)? 2) What extent and with what limitations can the initial conditions (parameters) be derived from available remote sensing data? To answer the research questions, this work 1) investigated the initial conditions and the associated parameters that the concept models needed, 2) developed a complete protocol for defining the initial conditions for Canadian grasslands, and 3) investigated the appropriated methodology to derive critical remote sensing parameters that are required by the model from coarse satellite images (*i.e.* AVHRR or MODIS). The work also provided the examples of modelling -remote sensing data integration, and discussed the challenges in the integration.

Session: R2.5

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Markey, S

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CSR: Communities Securing Remuneration? Negotiating Community Benefit with Mining Companies in Northern British Columbia

This paper explores the corporate social responsibility (CSR) practices of the former Barrick Gold Eskay Creek Mine

in northwestern British Columbia. Local communities in northern resource based economies struggle to identify methods to retain benefit from resource activities in adjacent rural regions. The growing corporate practice of negotiating private benefit contracts between First Nation communities and mining companies presents a shift in power in rural regions between First Nations, municipalities, private resource companies and the province. Explored through a case study, this paper investigates the benefits received by First Nation and non-First Nation communities adjacent to the mine. The lack of jurisdictional authority over resource activity makes local governments reliant on the CSR practices of companies to secure direct benefit from mines operating in the region. Mining companies have focused their CSR activities in negotiations with First Nations communities to meet the provincially mandated duty to consult for all projects proposed on traditional territories. Non-First Nation communities, excluded from the formal negotiation process, must solicit one-off benefits from companies. This paper reveals the disparity between the experiences of rural communities and CSR activities within the region and discusses how CSR activities are being used to replace the development of public policy to ensure local benefit for First Nations and non-First Nations communities in northwestern British Columbia.

Session: F1.7

Henderson, A

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Are Private Lands for the Birds?: Grassland Songbird Conservation Through Grazing Management

To date, the recovery process for species listed under Canada's Species at Risk Act has provided species at risk with inadequate protection. Socioeconomic factors are thought to complicate or hinder species recovery, especially where habitat occurs on economically important or privately-managed lands. The grasslands of Saskatchewan are an excellent system for examining this problem; the majority of species at risk habitat is found on privately-managed, agricultural lands that provide important habitat for many grassland songbirds. Here, grazing management plays an important role in securing songbird habitat and preventing its further loss. In my research, I examine how grazing management decisions and habitat characteristics influence grassland songbird abundance. I present preliminary results that offer insight into how livestock producers contribute to grassland songbird recovery on private lands in south-western Saskatchewan.

Session: R2.1

Henderson, J
Piwowar, J

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Vegetation Monitoring in Grasslands National Park

Grasslands National Park is located within a mixed-grass prairie ecosystem in Southern Saskatchewan, along the United States-Canada border. Grasslands National Park provides a unique opportunity to study this ecosystem, because a large portion of the land within the park has not been disturbed by human activity. The purpose of this research was to answer the question: How has the northern mixed-grass prairie been responding to climatic change? Using remotely sensed data from the past several decades, normal variability of vegetation productivity in the park was measured and then correlated with meteorological conditions to determine how changes in weather impact the vegetation in this area. The research showed that vegetation productivity in the park varies year by year, and that some vegetation communities are more vulnerable to meteorological conditions than others. It also showed that precipitation and temperature do have an impact on the vegetation.

Session: R3.5

Henwood, B
Wallis, C

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The World's Temperate Grasslands: Towards a Strategy for Their Conservation and Protection

The Temperate Grasslands Conservation Initiative (TGCI), a project of the IUCN/WCPA Grasslands Protected Areas Specialist Group, has described the state of the world's temperate grasslands and has supported various temperate grassland conservation initiatives. Temperate grasslands are now the most altered and least protected ecosystem on the planet. Habitat conversion in grasslands exceeds habitat protection by 10:1. The mission of the TGCI is "To reverse the trend of biodiversity loss and degradation of temperate grasslands by promoting both the designation and special management of representative protected areas and the widespread use of sustainable management practices beyond protected area boundaries, with the goal of at least doubling the current level of protection by 2014." This work continues to build on various international programs as well as the Hohhot Declaration of 2008 which states: "...temperate grasslands are critically endangered and urgent action is required to protect and maintain the many valuable ecological services they provide." The TGCI hopes to assist grassland conservation by educating and influencing decision-makers responsible for temperate grassland management and protection. Regionally in North America, the TGCI is working on revitalizing the Northern Plains Conservation Network as well as supporting the work of the Crossing the Medicine Line Network.

Session: F1.3

Herkes, J

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The Role of Place and Organization of Space in the Development of Social Cohesion

Social cohesion develops as a result of the trust that stems from interaction. Social cohesion expands beyond individual interactions and is the creation of networks made through various shared commonalities. As such, there are several variables that affect the development of social cohesion. This paper will explore the role played by place and the organization of space on the development of social cohesion. In resource and industrial towns, factors that affect place, and commonalities based on place, include isolation, industrial influence and spatial organization of the town. A triangulated research approach combined an historical analysis of Statistics Canada data, GIS techniques, as well as focus groups and key informant interviews was conducted in the planned instant town of Kitimat, BC. In instant towns, the combined characteristics of prescient construction, municipal government and comprehensive planning were intended to encourage interaction. The analysis indicates that geographical location, topographic characteristics and the organization of space can affect how and with whom residents interact, which in turn affects the development of social cohesion.

Session: W2.6

Hernandez, T
Svindal, M

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Beyond Power Retailing

Power retailing has transformed the Canadian retail landscape over the last two decades with successive waves of power centre development across Canada (clusters of large format or big box retailers). From the suburbs of major metropolitan areas to small town markets the ubiquity of power retailing coupled with the large proportion of Canadian households that reside within relatively short driving distances of such centres is astonishing. However, over recent years the rate of power retail growth has slowed and has raised questions as to the nature of future retail activity in Canada. This paper looks at the development of power retailing and outlines probable future directions for growth. Discussion is focused on a set of newly emerging retail location types, including a range of lifestyle and mixed-use type developments, that collectively mark a departure from traditional power centres. The multifaceted challenges and opportunities surrounding the integration of retail activity with other land uses is examined and forwarded in the context of the next chapter of retail development in Canada.

Session: R4.3

Hodder, K
Goeres, I
Olsen, S
Ryba, R

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Freezeup in a Large, Shallow Prairie Lake

Lake ice is a significant component of the terrestrial cryosphere and partially governs geomorphic process and form in lakes. Shallow lakes are particularly sensitive to hydroclimatic conditions, and the onset of surface ice marks a seasonal pause in allocthonous input, evaporation and wind-induced resuspension. Evaluations of freshwater ice and environmental change typically focus on relatively simple parameters, such as ice period or ice thickness. Less consideration has been directed to the cascade of processes that change under the presence of surface ice. Freezeup in the shallow prairie lakes of central North America is governed by conditions over periods measured in hours, in contrast to conditions in deeper lakes over periods measured in weeks. Field sampling to capture changes in mass and energy flux that occur during, and after, the appearance of surface ice in shallow lakes can therefore rely heavily on short-term meteorological forecasts. This study verified 0- to 6-day forecasts of temperature and precipitation, including their skill relative to 1971–2000 Canadian Climate Normals (CCN) at Wascana Lake, SK. Results indicate that temperature forecasts >1 day in advance had marginal skill relative to CCN, with average high [low] temperature error magnitudes >3.5°C [>2.0]. Although 0- and 1-day precipitation forecasts were a 25% and 15% improvement over CCN, respectively, forecasts >1 day in advance were of marginal skill relative to CCN. These results indicate that outputs from the Canadian atmospheric environmental forecasting system are of almost no utility in planning a field sampling campaign directed at surface ice. Prediction of freezeup in shallow prairie lakes is therefore analogous to nowcasting, and relies on the hour-to-hour link between air (*ex situ*) and water (*in situ*) temperatures.

Session:

Hogan, M

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The Resilient Identities of Urban Aboriginal Women

This paper presents results of a 2007 research project on First Nations and Métis identities in cities done with the urban Aboriginal population of Saskatoon, Saskatchewan. It focuses on data from a subset of female participants in this study. This paper describes identity as originating from the processes of inclusion, exclusion, culture change and culture acquisition experienced by Aboriginal women who participated in the project. This study suggests that urban Aboriginal identity is experienced as a set of processes of inclusion and exclusion by the women who participated. This paper identifies seven areas of inclusion and exclusion: ancestry, appearance, cultural activities, cultural ideology, relations, political/legal membership and linguistic. The women in this study maintained Aboriginal identity by retaining contact with their home communities, by contact with urban Aboriginal organization and by forming new Aboriginal communities of friends and family members in the city. Many women in this study were not only maintaining an Aboriginal identity within the city, they were creating new urban Aboriginal identities for themselves. The data suggest that some urban Aboriginal women negotiated the areas of inclusion/exclusion to create fluid urban Aboriginal identities based on a unique combination of tribal identity, pan-Aboriginal identity and identity as minority residents of Saskatoon.

Session: R2.3

Hogg, E
Hook, T
Michaelian, M
Barr, A

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A Simple Soil Moisture Index for Representing Multi-Year Drought Impacts on Aspen Productivity in Western Canada

Tree ring studies have shown that drought is a major factor governing growth of aspen (*Populus tremuloides*) forests in western Canada. Previous analyses showed that interannual variation in aspen radial growth is moderately well-correlated with a climate moisture index (CMI), calculated annually as the difference between precipitation (P) and potential evapotranspiration (PET). However, there are multi-year lags, where current year growth is significantly correlated with CMI over each of the previous 2-5 years. We postulated that such multi-year lags arise from tree growth responding directly to soil moisture in the rooting zone. To address this, a model was developed that simulates soil moisture (SM) from inputs of P and PET only. The model successfully emulated changes in SM at an intensively instrumented boreal aspen stand in Saskatchewan over a 7-year period that included a severe drought (2001-2003). This model was then used to estimate historic variation in SM across a regional network of plots where aspen growth has been reconstructed from tree-rings. Subsequent analyses showed that SM during the current growing season (May-August) was comparable to the CMI in its ability to explain temporal variation in aspen growth. However, the multi-year lags associated with CMI were no longer significant when SM was used as the independent moisture variable. Thus, hydrological lags can explain much of the delay in aspen growth responses to CMI, and future studies may benefit from using modeled SM as a more realistic index for assessing drought impacts on the productivity of aspen and other forest types.

Session: W3.3

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Stubbs, T

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Revisiting Orillia's Golden Age of Industry 1895-1925: A Historical-Geographical Perspective

For a brief period of time between 1885 and 1925 Orillia, Ontario was on its way to becoming a classical industrial town. The 1911 Census shows one in six residents of the town employed in industry. It had a small cadre of entrepreneurs who had invested in the latest technology and taken control of the municipal government. It had a large and rapidly growing working class who had to overcome housing shortages. Their non-working lives consisted of activities that had little to do with the products they manufactured. Through content analysis of local newspapers and examination of a variety of other historical documents this study looks at life in Orillia at the turn of the last century including the spatial distribution of industry and the various social classes.

Session: F1.6

Hostetler, G

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Conceptualizing Participatory Resource Management as Deliberative Democratic Practice

A 'communicative turn' has emerged and is solidifying in resource and environmental management, in part in response to perceived failures of traditional decision-making processes that have often exacerbated conflicts, left various publics voiceless, and produced ecologically irrational decisions. Much of this newer, more participatory approach assumes theoretical concepts described in other fields, for example in Jurgen Habermas' theory of communicative action and in theories of deliberative democracy, but the resource management literature often fails to acknowledge or to fully explore the consequences of these theoretical underpinnings. My presentation explores how participatory resource management decision making might be understood if considered as part a growing web of deliberative institutions designed to steer administrative decisions toward more democratic outcomes. I first briefly discuss relevant aspects of Habermas' theory of communicative action and of his model of deliberative democracy that is derived from it. After considering some of the implications of using this as a lens through which to view decision and planning processes I present a generalized conceptual framework for such processes that translates the

relevant communicative and democratic assumptions and understandings into the field of resource management. In this framework a communicative decision-making process is described situated between, interpenetrating and joining together emergent public and administrative spheres. The decision process thus envisioned takes up content from discourses in relevant public and administrative spheres, thematizes and communicatively rationalizes arguments, provides identified problems with possible solutions, and transmits these outcomes on to administrative decision makers.

Session: W1.6

Howard, K
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Effects of Market-Based Instruments on Landowners' Willingness to Supply Ecosystem Goods and Services in Southern Alberta

Depletion of goods and services produced by healthy ecosystems, which many people benefit from, is an increasing concern. The Government of Alberta is looking into market-based instruments (MBIs) as viable options to entice landowners with the use of economic incentives into supplying these ecosystem goods and services (EGS), rather than using strict policies and regulations. In order for MBIs to be successful they must be tailored to accommodate the specific demands and supplies of EGS from the areas of concern. The objective of this research is to determine whether the selected MBIs will affect landowners' willingness to supply EGS in southern Alberta, and how socio-demographic characteristics, personal attitudes and values, and economic conditions of the landowners affect their preferences. The area of study will be within the Bow River Watershed with focus on the Battersea Drain and the Willow Creek Basin. Data will be collected through a series of interviews and surveys based on the Theory of Planned Behaviour (TPB) adapted to incorporate constraints and barriers outside the individual level. A review of literature on adoption of environmental programs and MBIs, as well as willingness to supply EGS, will be presented. Additionally, a review of the conceptual frameworks, TPB and Belief System Theory, guiding the study and an explanation of the methodology and expected results will be provided.

Session: W3.1

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Using a Multi-Factor Remote Sensing Method to Detect Red Tide in the Yangtze River Estuary

Since the problem of algal bloom in the Yangtze River estuary is getting increasingly serious, the traditional field sampling and spectral measurement methods are insufficient in meeting the imperative need of monitoring and predicting coastal red tide. Remote sensing technology, with significant advantages in rapid and simultaneous large-scale observations at low cost, plays a central role in solving the problem. A cruise designed for surveying the coastal ocean environments was held in July, 2009. Nearly one hundred field spectra were measured using ASD Fieldspec3. The water samples, the sea surface temperature and salinity were measured at the same time. The spectral characteristics of red tide based on the field measurements were discussed in detail. The correlation analysis method was used for spectral analyses of both red tide and suspended sediments. A multi-factor red tide detection method for MODIS data based on the principle of multi-element detection was established. First, true colour image of MODIS bands was composited for visual interpretation and for supervised classification learning. Second, the OC3 algorithms, Carder algorithms and split window algorithms were applied to invert chlorophyll concentration and the sea surface temperature. According to the spectral response to the *Skeletonema costatum*, which is one of the most important algae of the East China Sea, a discrimination model, (Res555-Res412)/Res412, was built thirdly. Finally, all the results were used for integrated interpretation.

Session: F2.8

Huang, Y
Todd, D
Zhang, L
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A New Perspective on Chinese Regional Disparities

It is an undoubted fact that regional disparities in China exist and are still severe. Particularly alarming is the growing economic gap between the coastal provinces and the western ones. Using the three dimensions introduced by the World Bank to analyze world development and data for the year 2008, Western China was shown to be suffering from the lowest density of economic activities, the longest distance to the density zones and the worst divisions of all the constituent parts of China. Remedial action has taken the form of the China Western Development program, implemented since 1999, which was expressly conceived to help the western part of China catch up with other fast-growing parts. Great progress has been made during the last 10 years, especially in the way of infrastructure construction and the inauguration of huge development projects. But the Western people's living standard has not improved in line with GDP increase notwithstanding this effort. How to help the people in Western China share the benefits of national economic growth and enjoy a much richer life remains a critical issue for China's central government. To that end, strategies for strengthening industry, improving and fine-tuning infrastructure and reducing interregional barriers should be prosecuted much more vigorously in the years to come.

Session: S2.1

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Applications of Digital Elevation Data in Aeolian Geomorphology

Despite increased availability of global elevation datasets (e.g., SRTM, ASTER GDEM) digital elevation data are largely under-utilized in aeolian geomorphology. This restricts progress in a range of topics where the geometric characterization of aeolian bedforms is paramount, including: dune morphodynamics, dunefield pattern development, and paleoenvironmental reconstruction. To illustrate potential research applications of digital elevation data in aeolian geomorphology we developed a series of GIS-based methods that are used to resolve a number of existing and emerging research themes. First, we present a technique known as geomorphic backstripping, which is used to discriminate dune hierarchies in the Badain Jaran Desert, China. Second, we present a method to quantify spatial patterns of sand supply in a portion of the Rub' Al Khali Desert, Saudi Arabia. Third, we show how the integration of digital elevation data, Computational Fluid Dynamics software, and GIS can be used to develop a wind erosion sensitivity map of a stabilized dunefield in the Canadian Prairies. Collectively, these three examples illustrate simple yet useful applications of digital elevation data in aeolian geomorphology.

Session: S1.4

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Achieving an Environmentally Just Climate Policy - Post Copenhagen

Many hoped that the fifteenth Conference of the Parties (COP15) pursuant to the United Nations Framework Convention on Climate Change (UNFCCC) in Copenhagen in December, 2009 would achieve a legally binding agreement reducing global greenhouse gas emissions. The Copenhagen Accord, arrived at during the last hours of the meetings, fell far short of the stated goal. The Accord established a target of two percent as the maximum global temperature increase acceptable and left parties to file emission reduction targets at a later date. Was Copenhagen a failure? Should we conclude that international law is not able to respond to the challenge of climate change? This paper will explore the theme of environmental justice surrounding climate change and argue that the COP15 at Copenhagen was an important step to achieving an environmentally just international climate policy. Environmental justice entails having and affecting a fair and open process, hearing and understanding all parties, and achieving a result that is substantively fair. Environmental justice is practiced and reflected in all forums and in many spheres

including the local, regional, national and international. For all its flaws, Copenhagen contributed to the achievement of environmental justice illustrating key dynamics in achieving an environmentally just international climate policy. Capitalizing and building on these dynamics (whether termed successes or failures) will advance an environmentally just climate policy.

Session: S1.5

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Transitioning to Sustainability in Saskatchewan Power Production

This paper hypothesizes the future of Saskatchewan power production based on the theory of transition management. Power generation law and policy in Saskatchewan over the last century to the present is analyzed as a key component of a socio-technical regime. Understanding the legacy of law and policy is important given sustainability concerns and the realization that significant changes will be required in trajectories of development putting less strain on natural capital and ecosystem services. In this paper, we examine the critical relationship between governance strategies at the macro socio and political landscape level and the particular policy mix that is found in the socio-technical regime of power generation in Saskatchewan. This exercise is informed by transition management theory and also the alternative explanations of path dependency. Switch points critical to the trajectory of power generation development are identified and used to illustrate and assess the plausibility of these theoretical concepts. Current landscape developments in Saskatchewan, including the emergence of concerns for human-induced climate change, the development of wind power and even the re-emergence of nuclear power generation as a policy option, may facilitate a transition towards greater sustainability. Possible future alternative pathways are outlined and critiqued.

Session: S1.5

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Hwang, B
Barber, D
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Results of C-Band Polarimetric Remote Sensing Experiments over Newly Formed Sea Ice During the Fall Freeze-up

The fall freeze-up is a critical time of year in the Arctic due to the rapid changes that occur in the thermodynamic

balance of the ocean – sea ice – atmosphere system. In light of the recent and dramatic reduction in sea ice extent and thickness, new observation techniques are vital to improve our understanding of the observed changes and to aid in the development of a capability to precisely monitor these changes in the future. *In situ* scatterometer experiments can provide a close-up look at the sea ice electrical and physical properties, thereby providing the link between the state of the ice and the polarimetric measurements. A ship-based C-band scatterometer was used to obtain polarimetric backscattering measurements for a large variety of sea ice types and surface coverage conditions during the fall freeze-up of 2003, 2006, and 2007. An analysis of the relationship of polarimetric parameters

(specifically the co-polarized correlation coefficient) to ice thickness was derived. Implications of ice floe deformation

and surface features in naturally occurring new ice types, including frost flowers, were evaluated to see the impact on the backscattering signatures. These data can be used in future modeling studies and can provide ice type validation for satellite-based SAR.

Session: W3.4

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How to Watch Big Bird: How American Children Learned to Love the City

Beyond letter 'R' and '1-2-3-4' what does Sesame Street teach? Arising at the end of the 1960s, Sesame Street was one the most highly researched television productions through the Children's Television Workshop, an institute funded by the Ford Foundation and the Carnegie Institute to the tune of \$8 million. This education research was primarily directed at how poor inner city African-American children learned, and what they should learn particularly in terms of affective and emotional skills. Build upon Piaget evolutionary education theories the show was hoped to be corrective to the failing liberal American Dream. Many of the innovations of CTW developed were to keep children's 'eyes on the screen' (choice of inner city location, integration of muppets and actors, choice of race/ethnicity of actors). Yet as a nationally consumed medium, indeed the show becoming the flagship of US children programming, what else was learned about the intersection of urban form, conflict, race relations, community and urban spontaneity? And how did this reflect the fears of the media producers at the beginning of the 1970s? How does Sesame Street, produced as the imagination of the child, allow adult producers to engage with the social and political urban crises, yet 'coated in the syrup of paradise' in a puppet-filled fantasy?

Session: W4.2

Jasiak, A

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Mapping Census Data in The Atlas of Canada

The Atlas of Canada has been producing maps using census data since the publication of the First Edition in 1906. Basic socio-economic and demographic information is critical to understanding the geography of Canada in the context of our ever-changing societal and demographic landscape at any given point in time. With the introduction of digital data following the 5th Edition and the Internet for the 6th Edition, The Atlas of Canada had the opportunity to integrate census data with other non demographic variables. This approach demonstrated the value of using maps to illustrate issues important to Canadians using geospatial and place-based data. This presentation reviews the evolution of census mapping published in the 6th Edition, using the 1996, 2001 and 2006 Census data, along with cartographic challenges experienced and future opportunities envisioned.

Session: R2.6

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Visitors and Residents Images of Qingdao as a Tourism Destination and the Influence of Place Attachment on Those Images

While the images of a tourist destination perceived by visitors have a significant impact on their travel choices, how residents perceive a destination where they reside influences both potential visitors' images of that place as an information source and residents' support of local tourism development. The purposes of this research are to investigate image similarities and differences between visitors and residents associated with Qingdao, China, and to examine the relationship between place attachment and images of Qingdao perceived by visitors and residents. The data were collected by self-administered survey from 578 visitors and 337 residents of Qingdao in May and June 2009. The image construct was conceptualized as three dimensions: cognitive, affect and overall. The results indicate that the images perceived by visitors and residents converged mostly in cognitive image and less in affective and overall images. The main differences between the images perceived by visitors and by residents were founded on eight cognitive images: seafood, traffic congestion, airline schedule, highway system, cultural attractions, beach, weather, and hygiene and cleanliness. The findings also provide evidence that place attachment was an important predictor of perceived images by visitors and residents of Qingdao.

Session: S2.5

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Cheng, J

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Modeling the Projected Surface Area and Settling Velocity of Fine-Grained Suspended Sediment Flocs Based on Spectral Characteristics in Yangtze Estuary, China

In situ spectral reflectance and physical characteristics of fine-grained suspended sediment flocs in surface water (0.5 m) were measured in the maximum turbidity at south channel of Yangtze Estuary from May 23 to June 2 of 2009 with a spectroradiometer and a laser particle size analyzer, respectively. In addition, suspended sediment concentration (SSC) was obtained by water sample analysis. The projected surface area and settling velocity of fine-grained suspended sediment flocs based on spectral characteristics in Yangtze Estuary were modeled. The results showed that 1) Spectral reflectivity increased with increased projected surface area (PSA) of fine-grained suspended sediment flocs. Two spectral reflectivity peaks exist in 690~720 nm and 810 nm wavelength range, respectively. 2) Flocculation process changed the spectral characteristics of fine-grained suspended sediment, resulted the correlation between PSA and spectral reflectance higher than that between SSC and spectral reflectance. 3) Exponential relationship was the best one between single band spectral reflectance and PSA, and also between multi-band spectral reflectance ratio and PSA. The correlations of single band at 860 nm with $r=0.92$, and multi-band spectral reflectivity ratio of 860/670 with $r=0.94$ were the best. 4) Based on the fine relationships between PSA and spectral reflectance, and between PSA and settling velocity (WS) of flocs, a power relationship with $r=0.83$ was established between spectral reflectance and WS which could provide a new attemptable method to understand the distribution and changing process of PSA and WS of fine-grained suspended sediment at a large water area such as in Yangtze Estuary.

Session: F2.8

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Rapid Assessment of the Impacts of Climate Change at Canada's Biosphere Reserves

Biosphere reserves (BRs), designated under the United Nations Educational, Scientific and Cultural Organization's (UNESCO's) Man and Biosphere Programme, contain some of the world's most valuable natural assets that are vulnerable to climate change. This paper reports the results of a study that assesses recent climate conditions of three Canadian BRs (Charlevoix, Frontenac Arch and Mont Saint Hilaire) and projects scenarios of future climate change using global climate models from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. A history of climate extremes using precipitation and temperature developed from climate stations proximate to the three BRs is given. Global climate models validated against baseline data are used to determine projections of future climate change. This paper presents the historic and modeled climate data communicated as various climate extremes (*i.e.*, growing season length, consecutive dry days) that are meaningful to a variety of socio-economic sectors such as eco-tourism and biodiversity, and thus indicate possible impacts on sustainable development.

Session: W1.1

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Integrating GIS and Agent-Based Modeling: An Approach for Urban Growth Simulation

Changes in urban land use patterns are driven by the complex interactions between the various stakeholders. These interactions are characterized by competition for space, economic benefits and the implementation of sustainable

living goals. Stakeholders can be represented as independent agents that are formalized as software objects using an agent-based modeling approach integrated within a Geographic Information Systems (GIS) environment. In this study, a GIS agent-based modeling approach is developed to simulate the process of urban land-use change at a high spatial resolution that corresponds in this case to urban cadastral lots. Agents that represent four key types of stakeholders, urban planners, households, residential developer, and commercial retailers and industrial manufacturers, are incorporated within the model to capture their complex interactions in land use change. A vector-based GIS environment was used to represent the cadastral parcels and model how parcel geometry could be transformed as the city develops and parcel subdivision occurs. Simulations were conducted using data from Chilliwack, British Columbia to develop several urban growth scenarios that are based on feasible urban planning policies and the relocation choices of the households. Sensitivity analysis demonstrated that the simulation results were quite robust and that the model used in the research can assist in forecasting future urban growth patterns and helps improve our understanding of stakeholders' influences in land use change.

Session: F1.5

Johnson, K
Smith, D

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Dendroglaciological Reconstruction of Late Holocene Glacier Activity at White and South Flat Glaciers, Boundary Range, Northwestern British Columbia Coast Mountains

The rapid retreat and downwasting of glaciers in Pacific North America (PNA) over the last few decades is exposing land surfaces and glacially-killed wood samples that provide singular insights into periods of glacier activity during the Holocene Epoch. Dendrochronologic analyses of increment core samples from living trees (*Tsuga mertensiana*) and samples of subfossil wood collected in the Cambria Icefield area, Boundary Ranges, British Columbia Coast Mountains, provide the basis for a dendroglaciological and radiocarbon-based reconstruction of late Holocene glacier activity. An interval of glacier expansion is recorded by trees killed or buried by advancing glaciers around 1500 14C years BP that corresponds with the regional First Millennium Advance (FMA). Analysis of sediment units, geomorphological features and buried wood highlights a subsequent phase of glacier expansion associated with the regional Little Ice Age (LIA) interval between 1000 and 1400 AD. This chronology of late Holocene glacial activity closely matches that emerging from similar investigations in PNA and provides additional support for the regional significance of both the FMA and LIA advances.

Session: W4.3

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The Tar Sands of Alberta: Exploring the Gigaproject Concept

The tar sands of Alberta are rapidly emerging as one of the largest energy projects in history. According to some, the tar sands are worthy of a new term: gigaproject. In considering this idea I sort through the current 'large project' literature and identify nine defining characteristics of megaprojects including identifiability, novel technology, risk and symbolism. I then use this definition to put the tar sands in context and in doing so show new perspectives on the tar sands, highlighting its physical breadth, symbolism, relationship to longstanding social objectives in Canada and the US, controversies, the extent of private and state involvement, and other interesting features. I conclude that indeed there are quantitative and qualitative differences between the tar sands and a 'typical' megaproject. I then discuss the concept of gigaproject and its usefulness in light of other very large scale development phenomena. I conclude by discussing planning in the gigaproject context. I point out challenges in planning gigaprojects and discuss how some of the planning tools that we already have may help.

Session: F2.1

Kamal, M
Guo, X

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A Comparative Review of Grassland Phenomenon in Canadian Prairie and Tibet Plateau

Grassland ecosystem covers almost one-fifth of the Earth's surface and widely distributed over all the continents except Antarctica. Grasslands are immensely important not only for its extent, but also for the ecological and economic benefits, such as, nutrient cycling and volume of global carbon stock, soil organic matter, and providing much of the world's grazing capacity. Today there is experts' consensus that grasslands are degrading and shrinking due to extended human activities like over-grazing and agriculture, as well as the climate changes. Canadian prairie grassland and the grassland in Tibet plateau occupy significant portions of the world's grasslands. Both areas are sensitive to climate change as reported in the Intergovernmental Panel on Climate Change (IPCC) in 2007. It also a general understanding that there is a lack of the accurate grassland productivity prediction system that is vital for adopting globally harmonized appropriate conservation policies. This paper presents a comparative review on grassland of Canada and Tibet plateau and application of remote sensing and geographic information technologies in grassland health monitoring and productivity prediction as part of an ISTPCanada 'Climatic Affect on Grassland in Prairie And Tibet (CAGPAT)' project.

Session: R2.5

Kearns, J
Reed, M

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The Evolution of Northern Research Protocols in Canada: Demonstrating Leadership in the Circumpolar North

Canada is a leader in conducting natural and social science research in the circumpolar North. However, northerners have often been unequal research participants, especially prior to Aboriginal political mobilization in the 1960s. For more than 30 years, Canadian research institutions and funding agencies have attempted to advance equitable research relations with northern and Aboriginal communities and individuals through the establishment of specific protocols for research practice. This paper traces the evolution of research protocols to determine their key concerns and to compare the Canadian experience with other countries in the circumpolar north. My assessment of Canadian and international protocols suggests that an 'ethical climate' has evolved in Canada that demonstrates leadership in advancing best research practices with northern communities, as well as Aboriginal peoples in the circumpolar world. I have synthesized reviews conducted by individual researchers who have assessed research activity, relationships and ethics protocols in northern Canada, and drawn on efforts by research and government institutions to establish guidelines for engaging Aboriginal peoples in ways that maintain cultural and research integrity. Based on this evidence I suggest that Canada has established a unique and robust ethical climate in relation to northern research. I then compare the Canadian ethical climate with practices of other countries in the circumpolar north where communities and Indigenous peoples are engaged in research relationships. I find that Canada has demonstrated leadership in advancing equitable relationships with northern and Aboriginal communities.

Session: W2.1

Khaldoune, J
Bernier, M
Chokmani, K
DeSeve, D
Gauthier, Y

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Characterization of the Water Balance Dynamic of a Minerotrophic Fen Using Radar Polarimetry

The hydroelectric production in the Province of Quebec is strongly dependent on hydrological conditions of the middle north of the province. In this area, the hydroelectric complex of the La Grande River generates about 40% of the total hydroelectricity produced in Quebec while about 20% of this territory is covered with peatlands. Recently, a research project has been initiated to study the hydrological processes of boreal minerotrophic fens in order to provide more adapted hydrological modeling tools for the hydroelectric managers. In this effort and for better understanding of the water balance dynamics in such a complex ecosystem, a minerotrophic fen (11.3 ha) was selected in the La Forge region, a subbasin of the La Grande river watershed. It has been instrumented in order to measure all components of the water balance. A network of ground-water monitoring wells and piezometers were used to identify the hydrologic regime. To determine the hydrologic conditions related to storage (soil moisture, water balance changes, and water storage capacity), remote sensing data represents a potential source of continuous and synoptic information not only for the peatland experimental site but also for the entire basin that supply water to the wetlands. Therefore, a combination of 23 polarimetric SAR images (Radarsat-2, polarimetric Fine mode) and four optical satellite images (GeoEye panchromatic and multispectral images) were acquired between May and October 2009, covering a wide range of hydrological conditions. Using change detection techniques, the radiometric information is related to changes in the hydrologic conditions at the peatland level as measured by soil moisture and water table level sensors. Validated findings at the local level are therefore upscaled at the basin level.

Session: R3.9

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Xu, W
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Rural Sustainability, Land use Change and Tree Plantation Options: From Peasant Consensus to Public Land Use Policies

Planting vegetation is one of the practical approaches in mitigating global warming by sequestering carbon from the atmosphere to plant matter and soil. In order to protect the environment, reduce excessive soil erosion and decrease the propensity and frequency of flooding and other natural disasters, China has initiated nationwide pivotal projects such as 'Grain for Green' to mitigate exacerbated environmental deterioration and degradation. Such ecological programs may affect the socio-economic livelihoods of peasants and the economic activities of the whole region. The impact and economic uncertainty associated with such projects urges policy makers to include all stakeholders in decision-making processes so that an agreeable solution towards sustainable rural development can be identified. This study uses Liping County in Guizhou province as a case study to identify a consensus among peasants regarding planting selected tree species. Analytic Hierarchy Process (AHP) is used as a multicriteria decision-making tool to rank sustainability criteria and determine the priority of options. The method helps the policy makers to realize what a peasant desires and what his/her priorities are with respect to particular types of vegetation. It also promotes sustainable rural development and identifies the benefits of carbon sequestration from peasants' point of view and integrates these views into policy development.

Session: R2.7

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Redberry Lake Watershed Agri Environmental Group Plan: Local Experiences and Landscape Benefits

The Redberry Lake Biosphere Reserve (RLBR) is a proponent and strong supporter of the Redberry Lake Watershed Agri Environmental Group Plan (RLWAEGP). The RLWAEGP works with farmers and ranchers to increase

awareness of potential impacts of agriculture on water, soil, air and biodiversity within the RLBR region and surrounding area, and encourage the adoption of 'Beneficial Management Practices'. The RLWAEGP projects help to build capacity with local farmers as to how they perceive what being a biosphere reserves means and what the associated organization is trying to achieve. Given by a local community leader, this talk provides an overview of farmer-led projects and the benefits that local people are seeing on the landscape within the Biosphere reserve.

Session: W1.1

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Gutberlet, J

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Evaluating the Contribution of Organized and Informal Sector Recycling to the Reduction of Greenhouse Gas Emissions in São Paulo, Brazil

Urban greenhouse gas emissions can be reduced through recovery and recycling of resources from the municipal solid waste stream. In São Paulo, Brazil, organized informal sector recycling plays a crucial role in providing municipal solid waste management services including collection, separation, cleaning, stocking and collective sale of recyclables. Using participatory research methods and a life cycle assessment approach, the present research will document, analyze and model a) the resource recovery and recycling activities of the recycling cooperatives, and b) the ancillary linkages between recycling cooperatives and the reverse logistics industry. The methods will include participant observation, focus groups and diagramming with members from recycling coops, and a life cycle assessment. The results will define a model to help measure the contribution of recycling cooperatives to the reduction of São Paulo's greenhouse gas emissions, and thus, evaluate the opportunities for recycling cooperatives to participate in the Brazilian carbon credit market. These findings will lead to more informed policy decisions in waste management, climate change mitigation, and poverty reduction in São Paulo, and establish policy models that can be adapted to other cities in both developing and developed countries.

Poster Session A

Kirchhoff, D
McCarthy, D
Crandall, D
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Policy Windows and Strategic Environmental Assessment: The Case of York Region, Ontario

Government agenda setting has been a focus of research in the field of policy sciences for over two decades. However, within the strategic environmental assessment (SEA) literature, few have attempted to understand how SEA adoption becomes a priority, as most SEA scholars have focused their research on process issues, the generation of alternatives and governance and decision-making. Few have addressed how SEA gains policy attention and becomes a governmental priority in the first place. This paper explores the concept of a policy window as a driver of governmental agenda setting. The Regional Municipality of York, Ontario, Canada was chosen as a case study for exploring the application of strategic environmental assessment (SEA) at the municipal level through a policy window lens. Problem, policy and political streams converged to provide the necessary conditions for improved environmental assessment and infrastructure planning in York Region. A focusing event and the resulting crisis motivated stakeholders to identify and act on the problem. An SEA-type approach was initiated as one key response. A variety of activities were initiated by York Region including the development of a Sustainability Strategy, synchronization of infrastructure master planning, wider consideration of alternatives at the master plan level and improved public consultation. Several recommendations are presented and discussed.

Session: R4.7

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Changes in the Socio-Economic Status of Canadian Model Forest Regions (1996-2006): Using a Gender Lens to Assess Adaptive Capacity

As forest communities have experienced economic downturns, the socio-economic impacts of these changes have affected men and women differently and in turn, have differential effects on these communities' adaptive capacity to respond to future challenges and opportunities. Adaptive capacity of people in forestry communities can be analyzed by considering assets and endowments as well as formal and informal governance institutions. Assets involve capital formation and mobilization while institutions include formal and informal rules, procedures and relations. In this paper, we argue that adaptive capacity should be interpreted by using a gender lens to an assessment of assets and institutions. We trace the changing socio-economic status of Canadian Model Forest communities using Canada Census data (1996, 2001, 2006) to demonstrate gender-based differences in access to assets and endowments that facilitate adaptation. By documenting specific cases, this paper encourages researchers and practitioners to think of transformation and response as variegated, not only across resource sectors, but also because of social differences of those with economic dependencies within a resource sector – in this case forestry. We conclude that gender and adaptive capacity shape one another and inform our understanding of adaptation in forestry communities to rapid socio-economic and environmental change.

Session: R2.1

Klodawsky, F
Siltanen, J
Andrew, C

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An Urban Politics of Possibility

In this paper we explore a formulation of political participation at the urban scale that we identify as a politics of possibility. This formulation addresses not only issues of inclusion and substance – the classic concerns of citizenship – but also enactment. We present the argument that what gets identified as progressive change is highly contingent on time, place and configurations of power, and that forms of institutionalization are required in order to embed and stabilize positive (progressive) gains. Our insights are drawn from two case studies of organizations whose primary objective is to bring a diversity of women's voices and concerns to the attention of, and into the daily business of, cities. One organization is based in Ottawa; the other is a global network of city-based initiatives. The authors have a two-fold relation to the organizations – as researchers and as participants.

Session: W3.7

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Rommel, T
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A Statistical Partitioning of Vegetated Airborne Laser Scanning Data Towards Understorey and Canopy Separation

The understorey is generally defined as the lowest layer of vegetation in an ecosystem, persisting below the main forest canopy, often representing a significant component of the total ecosystem biomass. Identifying means for partitioning this level from the main canopy and computing its volume can provide improved biomass estimates and other biophysical parameters; unfortunately robust and wide-extent methods for such tasks are limited. We propose an improved method based on LiDAR data with an average density of 40 points per m² to achieve these goals. Typically, understorey partitioning is achieved by setting a height threshold to partition points into subsets above and below the threshold; however, irregular topography or understorey growth above the specified local threshold height

can complicate the process. Our method classifies LiDAR point clouds into three classes: 1) the overstory, 2) understory, and 3) the volume between the overstory and understory by using adaptive thresholds. We produce two boundary planes as output; the first defines the base of the overstory and the second defines the top of the understory, which form the segmenting planes that achieve the 3 desired point cloud classes. Consequently the volume of each new segmented point cloud is calculated. The resulting overstory can be used as an output for other purposes such as single tree delineation, determining tree height, crown geometry, and potentially aid in species identification among other biophysical parameters. The volumes of the remaining layers have important implications for studies involving fire, habitat utilization, ecological characterization, and biomass estimation.

Session: F1.4

Koenig, D
Duke, G
Barchyn, T
Hugenholtz, C

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Supervised Classification of Drumlins: A Step Towards Objective Landform Mapping with GIS

Drumlins are streamlined glaciogenic landforms that provide insight into the dynamics of former ice sheets. Mapping and morphometric analysis of drumlins and allied subglacial bedforms typically involves manual techniques utilizing aerial photographs, satellite imagery, or digital elevation models (DEMs). In an attempt to increase the efficacy and objectivity of drumlin mapping we developed a supervised classification technique using digital elevation data and GIS. The site examined in this investigation covers a portion of the Livingstone Lake drumlin field in northern Saskatchewan. Topographic derivatives (wetness index, solar radiation, and vertical distance to streams) were developed from a 10 m DEM of the site. A series of training drumlins were digitized in order to define zonal statistics for each derivative layer. These zonal statistics were used to create a probability surface for each layer representing the likelihood that a given cell belongs to a drumlin. From a composite probability surface areas with high probability z-scores (drumlins) were delineated. The accuracy of the supervised classification was assessed against 190 manually digitized drumlins. Results indicate that 92.4% of cells comprising drumlins were classified correctly. Overall, results from this study demonstrate that supervised classification of digital elevation data provides an objective exploratory tool for mapping drumlins, particularly in areas lacking high resolution imagery.

Poster Session B

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Royer, A

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A Retrieval Method for Soil Temperature Determination from AMSR-E During the Winter

A new technique is presented for retrieving soil temperature, within the first five centimetres of soil, and determining the freeze/thaw state below the snowpack for several locations in Canada. The technique coupled a physical multilayer snow model, SNTHERM, with the HUT microwave snow emission model and applied an inversion routine for estimating soil temperature by using passive microwave brightness temperature observations from the Advanced Microwave Scanning Radiometer on Earth Observing System (AMSR-E) at 10.7 GHz in vertical polarization. The snow model is driven with measurements from meteorological stations (air temperature, precipitation, air relative humidity, wind speed) and data generated by the NARR reanalysis. The retrieved temperatures are validated with in-situ measurements in Canada, over several years, and the overall root mean square error in the soil temperature retrieval is 3.29 K, which is lower compared to simulated soil temperature using the snow model alone. This performance is the same or better than that reported for physical temperature at the surface level under snow-free conditions. The potential applications of this methodology include land applications related to seasonal changes and permafrost monitoring. Understanding permafrost is important to civil engineering and it is also a crucial part of studying global change and protecting the environment in cold regions.

Session: W1.4

Koster, R
Wiersma, E

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***Rural Communities as Retirement Communities – What Retirees are We Talking About?
Connecting Community Economic Development Strategies with Healthcare Realities***

Many remote and single industry communities in Canada continue to face the dilemma of how to address their declining population and economic base. While those located within the urban periphery can benefit from supplying 'quality of life amenities' to a wide variety of people who commute to the city, those in peripheral regions must examine other options. Attracting retirees is one strategy that several communities have chosen (for example Tumbler Ridge, BC and Elliot Lake, ON). This paper is part of a larger research project focused on successful aging in a remote single industry town in northwestern Ontario. Our purpose in this paper, is to examine the connection (or disconnection) between attracting seniors and the services required to support them to successfully age in place. The research was conducted based on a focused ethnographic approach typically adopted in applied research; 84 interviews were conducted with a variety of community members over a three month time period. Findings indicate that while the community possesses several positive attributes (acceptance of newcomers, accessibility services, abundance of recreation activities, provision of good healthcare and facilities), these largely support 'healthy seniors'; services for those who require additional levels of care are limited, on both a formal and informal basis. This calls into question the long term viability of developing a community economic development strategy based on attracting retirees and suggests that further engagement with the healthcare industry is required.

Session: R2.8

Kotowich, R

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The Influence of Landuse on Alluvial Fans in the Qu'Appelle Valley Area of Saskatchewan

Sedimentation on alluvial fans is controlled by erosional processes acting on source drainage basins and slopes. In the Qu'Appelle Valley, landuse changes during the last 150-years have strongly influenced erosion and sedimentation patterns in the valley catchments and subsequently the alluvial fans. Two alluvial fans in the Qu'Appelle Valley were chosen in order to analyze the influence of these landuse changes on sediment deposition and to document the geomorphic response. The first alluvial fan is situated adjacent to intensive agricultural landuse near Lumsden, whereas the second lies within the Cowessess First Nation with little to no agriculture activity documented in the catchment. Bore holes were drilled and sediment cores extracted from each fan: on the First Nation the length of core is 350cm and near Lumsden the length is 850cm. Particle size analyses in combination with geochemical parameters were used to identify sediments which reflect times of severe erosion in the catchment and sediments which reflect times of geomorphic stability in the cores.

Poster Session B

Krahn, A

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Residential Segregation of Aboriginal People in Regina, Saskatchewan

In 1988, Douglas S. Massey and Nancy A. Denton published 'The Dimensions of Residential Segregation.' In this article, the authors discussed residential segregation as a multidimensional phenomenon, which could be characterized, measured and specified with the five dimensions of evenness, exposure, concentration, centralization and clustering. Out of twenty indices of segregation, they chose one to represent each dimension of segregation applying a principal component analysis. In this paper, the five indices have been applied to identify the residential segregation of Aboriginal people in Regina, Saskatchewan: evenness is calculated by the Index of Dissimilarity (D); exposure by the Interaction Index (xP*y); concentration by the Relative Concentration Index (RCO); centralization by the Absolute Centralization Index (ACE); and clustering by the Spatial Proximity Index (SP). Computation of these indices is based on data from the 2006 Census for Regina's Dissemination Areas and Census Tracts. Indices are

determined for people of Aboriginal origin (*i.e.*, Inuit, Métis and North American Indian), as well as Métis and North American Indian separately. Maps and graphics are used to display and interpret the analysis. Contrasting results for different areas of the city are explained.

Poster Session A

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Sinclair, J

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Implementing Participatory Irrigation Management in Thailand

Participatory irrigation management (PIM) was formally incorporated in Thailand in 2004. Farmer involvement in water management decision making is necessary to meet the implementation challenges of this initiative. As such, the research presented in this paper considered the level of farmer involvement in water management and decision making and the lessons learned by both government officials and farmers through the implementation of PIM in Thailand to date. Data collected from document reviews and a total of 44 semi-structured face-to-face and telephone interviews of public irrigation officials and farmers nationwide show that farmers possess the full potential to manage irrigation water by themselves and are making important changes to governance systems for irrigation. However, they need both the opportunities and the continuing support of public irrigation officials for success, which is currently only being partly achieved through the PIM initiative.

Session: W2.7

Laforge, J

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Social Capital and Prairie Drought Migration in the 1930s

During the 1930s, extreme droughts compounded by economic hardship led to high unemployment, falling commodity prices and farm failures across much of North America's Great Plains. In Saskatchewan, many rural households adapted by migrating north to the cooler and wetter Aspen Parkland, the transition area from plains to boreal forest. While government agencies offered incentives to some migrants, the majority of families chose to move on their own. Social capital is increasingly recognized as being an important factor in migration decision-making and in building household capacity to adapt to environmental and climatic variability and change. This presentation reports results from an empirical study of the role social capital played in the migration and its importance in the incorporation of migrant households into a new environment. The study combined a review of archival and secondary resources combined with detailed interviews with 30 individuals with first-hand experience of the migration. The findings provide useful insights for those interested in the study of environmental migration and in how communities and households adapt or respond to conditions of combined economic and environmental hardship.

Session: F2.2

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Rommel, T

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Monitoring Moisture Dynamics in a Tree Canopy Using 4D GIS

This study develops an interactive Geographic Information System (GIS) model to capture the movement of water through a tree canopy in four dimensions (4D) during and following precipitation events. During a rain event, precipitation is intercepted by vegetation and either 1) transported as throughfall, stemflow, or leaf flow, or 2) stored by the canopy temporarily until moisture is evapotranspired. The amount and pathway of water movement vary by canopy architecture and are functions of rainfall duration and intensity. Precipitation data was collected for a six-month period (June to November 2009) by installing 20 leaf wetness sensors within the canopy of a Japanese Lilac Tree (approximately 6m in height) on York University's campus in Toronto, Canada. These leaf wetness sensors were spatially distributed to cover the top, outer edges, centre, and bottom of the canopy. A small weather station (consisting of a rain gauge, two soil moisture sensors, a relative humidity sensor, and a pyranometer) was also

installed near the tree. Investigations into the spatial and temporal variability of leaf flow at high resolutions have implications for both water resource management and 4D GIS development. The main objective of this study is to quantify canopy moisture of individual leaves at a one-minute temporal resolution for different storm events. This innovative approach will improve existing interception models and contribute to the understanding of wetting and drying phases at the canopy scale.

Poster Session A

Lange, H
Parrott, L
Mahecha, M
Reichstein, M

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Global fAPAR Variability and Complexity on Multiple Time Scales and Its Relation to Meteorological Drivers

Understanding the feedbacks between terrestrial biosphere processes and meteorological drivers is crucial to ecosystem research as well as management. For example, remote sensing of the activity of vegetation in relation to environmental conditions provides an invaluable basis for investigating the spatiotemporal dynamics and patterns of variability. We investigate the Fraction of Absorbed Photosynthetically Active Radiation (FAPAR) using SeaWiFS satellite observations from 1998 to 2005 and ancillary meteorological variables from the CRU-PIK dataset. To what extent do precipitation and temperature dominate the terrestrial photosynthetic activity on monthly to interannual time scales? A spectral decomposition using Singular System Analysis leads to a global 'classification' of the terrestrial biosphere according to prevalent time-scale dependent dynamics of fAPAR and its relation to the meteorology. A complexity analysis and a combined subsignal extraction and dimensionality reduction reveals a series of dominant geographical gradients, separately for different time scales. Here, we differentiate between three time scales: on short time scales (compared to the annual cycle), variations in FAPAR coincide with corresponding precipitation dynamics. At the annual scale, which explains around 50% of the FAPAR variability as a global average, patterns largely resemble the biomes of the world as mapped by biogeographic methods. At longer time scales, spatially coherent patterns emerge which are induced by precipitation and temperature fluctuations combined. However, we can also identify regions where the variability of fAPAR on specific time scales cannot be traced back to climate and is apparently shaped by other geoecological or anthropogenic drivers.

Session: R4.9

Lapka, S
Moorman, B
McDermid, G

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Analyzing Oceanic Storm Surge Impacts Using Remote Sensing Within the Mackenzie Delta, Northwest Territories

The coastal Mackenzie Delta, NT, is very unique because it is influenced by both riverine and oceanic processes. Over 1000 square kilometres of this arctic delta is impacted by oceanic storm surge events. The flooding of saline water into a sensitive freshwater ecosystem creates dramatic, prolonged and potentially dangerous ecological and geomorphic change. Such dangers include widespread vegetation damage and regional lake salinization. This study involves utilizing multidisciplinary techniques to examine the degree of impact and spatial extent of oceanic storm surges within the coastal regions of the Mackenzie Delta over the past 37 years. Change detection analysis was performed on multispectral Landsat 1, 2, 5 and 7 images taken from 1972-2009. Historic tide gauge data was also examined to determine the frequency and magnitude of these storm surge events. Results from this study can be used for ecological and species management as well as utility route selection for oil and gas exploration. This research demonstrates the utility of remote sensing in understanding the influence of storm surges on vegetation within the Mackenzie Delta. Moreover, this research will be the first to provide a historical and cumulative model demonstrating vegetation responses from oceanic impacts within this region.

Session: W4.8

Lapp, S
Sauchyn, D
Byrne, J
MacDonald, R

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Developing Paleoclimate, Historical and GCM Based Future Scenarios of Moisture Indices for Upper Basin Watersheds in Western Canada

This presentation describes an ongoing project linking dendrochronology proxy climate records and General Circulation Model (GCM) climate scenarios to the GENESYS (Generate Earth Systems Science input) Model as a means to identify changes in drought periodicity and duration. GENESYS is a fine scale physically based, spatial hydrometeorological model that has been shown to provide reasonable estimates of hydrometeorological conditions in complex terrain of upper watershed basins. Daily time series of instrument weather and developed future climate scenarios, which encompass both shifts in the mean (climate change) and departures from mean conditions (climate variability), are linked to the GENESYS Model. A range of hydrologic outputs will be produced for the eastern slopes of Alberta, reflecting possible north-south changes in hydrology for these important water tower regions of western Canada. Through the application of paleoclimatic proxy data we develop reconstructed moisture indices as measurements of drought during the spring/summer season for the past 200-500 yrs. These reconstructions reflect the seasonal changes in moisture relative to both the instrumental and future time periods for western Canada. The major drivers of climate for this region, PDO, ENSO and NAO will also be derived from multiple GCMs as a tool to better understand changes in future moisture conditions. Decision makers responsible for adaptation to climate variability and change may use our forecasts of persistent departures from mean hydroclimate to plan for watershed scale adaptation.

Session: W2.4

Laroque, C
Young, A
Phillips, B
Presley, M

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Dendrochronological Evidence for The Moffat Stick: Canada's Oldest Hockey Stick

The particular situation of the hand-carved Moffatt hockey stick makes it unique among old hockey sticks in that it has a ring pattern evident to allow crossdating of the stick against a known master chronology. Added to this, the particular way in which the stick was carved from one solid piece of timber, left evidence that the perimeter of the tree is near the outside of the shaft of the stick. An analysis of the ring-widths was conducted and two paths were able to be measured from the butt of the stick (42 and 43 years long). A local sugar maple chronology was developed from the Pottles Lake region of Nova Scotia where the stick originated and a crossdate of 1815 was achieved against a time period where limited sample depth exists in the master chronology. Added to this date are seven rings that can be seen on the rounded portion of the butt, and six more rings where tangential wood illustrates that material was carved away. These additional rings add up to a minimum outside date for the wood of 1828, with additional rings needed to get to the wood/bark interface. Although the sample sizes are low for the crossdate and further research will continue to strengthen the pattern match, the dendrochronological data fit well with the archival details suggesting the stick was originally made for WM 'Dilly' Moffatt sometime in the 1830s. This would suggest that this is the oldest 'hockey' stick known to exist in Canada.

Session: W1.3

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Pouliot, D
Fernandes, R
Olthof, I

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National Scale Satellite Data Record Derived from MERIS and AATSR

In the project framework "Characterizing and Monitoring Changes in Canada's Land Cover" under the NRCan/ESS Program "Remote Sensing Science" research and development efforts for national scale satellite time series and applications are planned. Presently the project maintains a national scale satellite data record generated from POES from NOAA, MODIS from NASA and MERIS from ESA. The goal of this article is to provide information on a new data record generated from MERIS and AATSR using CCRS newly designed data processing system. Furthermore,

suitability of processing scheme and derived satellite data records for land surface monitoring will be analyzed and discussed. Research and development on MERIS and AATSR data record is an important step toward adopting data that will be available from ESA Sentinel-3 mission. This mission will carry the MERIS-follow-on instrument OLCI (Ocean & Land Color Instrument) as well as Sea and Land Surface Temperature Radiometer (SLSTR), and is currently planned for launch in 2012. The subsequent sensors have been confirmed to allow for at least 15 years of continuous coverage. Canada, as an associate member of the European Space Agency, has in principle the ability to influence the design and operation of these missions and also to receive and use data from the sensors on the satellites.

This work is supported by the Canadian Space Agency through the Government Related Initiative Program (09MOA94555).

Session: R4.9

Lehrbass, B
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Object-Based Urban Tree Cover Extraction from Relief-Corrected Colour-Infrared Aerial Imagery and LiDAR

Tree canopy cover is a fundamental structural measure of the urban forest, which has many environmental and social benefits. Tree cover is often measured using high-resolution colour-infrared imagery, but it can be difficult to differentiate low-lying vegetation from tree cover using optical information alone. This can be improved by combining the imagery with a Digital Surface Model (DSM) derived from airborne LiDAR. However, simply classifying each pixel using its height and spectral information produces many classification errors. Slight misalignment of the data occurs because of relief displacement of tall objects in traditionally orthorectified aerial imagery and imperfect geometric registration of the aerial imagery with the DSM. Power lines above vegetation can cause confusion, as can bodies of water which do not reflect LiDAR. Relief displacement can be corrected using the DSM and photogrammetric techniques. Other sources of confusion can be reduced using object-based classification, which segments the images into image-objects and uses rules to classify them. Presented in this paper is an object-based urban tree cover extraction method combining relief-corrected multispectral aerial imagery with a LiDAR-derived DSM. The method relies on spectral and height data, but also uses contextual information to extract the tree cover with greater classification accuracy. Using this method, the tree cover was extracted from a 1600 ha region of London, Ontario with 96.98% overall accuracy.

Session: W2.9

Lewis, M
Morris, E

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Estimating Wind Erosion Soil Losses and Evaluating Wind Erosion Control Practices on Prairie Farms

Prairie soils under low residue crop rotations, such as potatoes and beans, are often at risk from wind erosion. Over the past 20 years prairie farmers have reduced soil losses due to wind erosion by applying new farm management practices. In the future, however, climate change on the prairies could increase the risk of soil loss caused by wind erosion. A multi-year wind erosion project was initiated in 2007 to better understand the benefits and potential applications of current wind erosion control practices. Measurements of soil surface characteristics, daily wind conditions and soil movement were made at a number of sites. Soil movement was measured using BSNE dust collector arrays. We created the Wind Erosion Estimation Program (WEEP) to estimate how much soil has been eroded from a field based on samples from the dust collectors. This computer program provides useful results. In the future the accuracy of soil loss estimates can be improved if wind direction is monitored on a minute-by-minute basis during erosion events. Future research is required to better understand the effect of field length on wind erosion and how variation of soil texture within a field affects wind erosion. Soil erodibility was most heavily linked with soil texture. Management practices played a significant role in reducing wind erosion. Appropriate management practices depend on the soil texture and the time of year. Early results look promising for the development of more effective erosion control practices in low residue crop systems.

Poster Session B

Ley, D

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Embodied Real Estate: Bearing Hong Kong to Canada

This paper examines the overdetermined impulse to property investment in Canada, especially Vancouver, by wealthy immigrants and investors from East Asia in the 1980s and 1990s. Both cultural predisposition and economic history had inculcated the pre-eminence of property among members of the overseas Chinese. In addition, there were the successful precedents of business families who had left Hong Kong for Canada during the pro-Communist riots of the late 1960s. Finally the movement of the large Hong Kong development corporations to mega-projects in downtown Vancouver created a precedent to be imitated by smaller investors. Innovations in real estate marketing cementing these transnational ties included off-shore pre-selling and self-owned retailing condominiums. Yet the effects of these investment practices were denied by authoritative Vancouver-based interests. The paper considers the politics of explanation in the shaping of the city's property market during the turbulent decade from 1987-1997.

Session: W1.7

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Transnationalism, Citizenship and Sense of Belonging Among Elderly Hong Kong Immigrants in Canada

Previous research has looked into the life experiences of middle-aged and younger Hong Kong immigrants in Canada, while the unique experiences of elderly Hong Kong immigrants have not been analyzed in detail. This research aims to fill the gap by focusing on the transnational linkages, concepts of citizenship and sense of belonging among Hong Kong elderly immigrants. It analyses their multigenerational transnational family arrangements and experiences of racism. Through questionnaire surveys and in-depth interviews with 35 elderly Hong Kong immigrants residing in Vancouver at the time of data collection, it is shown that they engage in transnationalism to satisfy emotional needs instead of for economic reasons; they hold a high rate of dual citizenship and have a strong sense of belonging and commitment to Canada despite limited citizenship participation and language barriers; and they do not perceive encountering serious racism in their daily lives in Canada despite language and educational constraints. Being mostly grandparents and not in the workplace, their multigenerational transnational family arrangements also impact on their sense of belonging and overall immigration experience. This research acts as one of the first steps to further expose the unique experiences of elderly immigrants in Canada.

Session: W1.7

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Land Grab or Empowerment? International Land Deals in Africa and Global Food Security

Following the global food crisis in 2008, some wealthy nations with limited land and resources to grow foods to feed their own populations have devised strategies to purchase or lease farmland, sometimes for as long as 99 years, mainly in Africa, Latin America and Asia. Among the largest purchasers/leasers are Saudi Arabia, the United Arab Emirates, Japan, Korea, Egypt, the United Kingdom and Germany. Both foods and biofuels are grown for export (usually back to the purchasing/leasing nation), and the agricultural practices are often unsustainable, which may be destructive in the already impoverished developing countries such as Sudan, Madagascar, Ethiopia, Kenya and Tanzania. While critics argue that this type of international land deals is 'land-grabbing' or 'neo-colonialism,' advocates stress the potential economic, social and infrastructural benefits brought by foreign investments. Due to the recency of the phenomenon, and difficulty in obtaining sensitive data such as land contracts and agreements detailing the terms and conditions, empirical research findings are limited. However, as the world's population continues to expand, more quantitative and qualitative research on these international land deals is needed to inform

policymakers of ways to create a food secure future.

Session: W3.2

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Luminescence Dating of Aeolian Sand from the Northern Great Plains, Canada – the Utility of Feldspar and Quartz for Providing Temporal Control on Postglacial Environmental Change

Over the past 15 years more than 100 luminescence ages have been calculated from feldspar and quartz grains extracted from sand dunes on the Northern Great Plains, Canada. The vast majority of these ages have come from feldspar, and they range from a few decades to more than 15,000 years. Feldspar ages have traditionally been calculated using multiple-aliquot techniques where it is assumed that all of the grains sampled have been exposed to sufficient sunlight prior to burial. Although these techniques are, in most cases, well-suited to the aeolian depositional environments of interest, the luminescence signal from feldspar suffers from anomalous fading, and this requires that relatively complex laboratory measurements be made in order to correct for its effect. Quartz, on the other hand, would appear to be a more suitable as the luminescence signal from it resets much more quickly than that from feldspar, and it does not suffer from anomalous fading. Moreover, the latest single-aliquot regenerative (SAR) protocols can be applied to quartz, whereas they are not generally applicable to feldspar. The SAR technique is simple and less laborious, and it easily allows for the discrimination of age populations in a sample. Despite the favourable characteristics of quartz we have found instances where it, and standard SAR protocols, appear to be unsuitable. In this paper we illustrate the utility of using quartz and feldspar to dating sand dune evolution on the Great Northern Plains, and we provide recommendations for estimating the fidelity of luminescence ages from this region.

Session: S2.4

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Seeing the Forest and the Trees: Visualizing both Geographic and Environmental Space Using Enhanced Exploratory Data Analysis

There are many applications that require a simultaneous yet distinguishable view of the geographic and environmental spaces associated with a phenomenon of interest. For example, whenever we elect to randomly sample locations in a region of interest, the question naturally arises of how adequately we have sampled the natural range of environmental variability. Could our sampling protocol have missed important 'niches' within the environmental space? In the field of biogeography, it is often of interest to better understand the niche or environmental envelope in which different species (or subspecies) reside. Do different species show different responses to environmental conditions? How does this manifest itself in geographic space? The author encountered a need for a visualization method capable of providing this 'simultaneous yet distinguishable' view while assessing the predictive accuracy of species distribution models using geographic cross-validation, *i.e.*, reserving the sample locations from an entire geographic area to test predictions based on locations collected everywhere else. The paper introduces an exploratory data analysis tool capable of exploring this issue – one which would be freely accessible and provides high quality graphical output. The data visualization tool provided here (envt. sample) can be used to expose such differential responses, and more importantly, stimulate further areas of inquiry.

Session: F1.5

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Preston, V

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Aging in Suburbs: Human Service Need, Access and Utilization

In North American cities, population growth continues in the suburbs that are also becoming much more socially diverse. Increasing numbers of seniors, low-income households, and recent immigrants are living in the suburbs, a low density and car-oriented environment in which public services of all types are often in short supply. American studies indicate that the limited infrastructure in the suburbs poses particular challenges for vulnerable populations such as elderly residents who have limited mobility, the poor who lack financial resources, and immigrants and refugees who need specialized services. However, little is known about Canadian suburbs. This paper assesses the growth and composition of vulnerable older populations in Canadian suburbs, and their access to and use of human services by a case study of York Region, one of the outer suburbs in the Greater Toronto Area. It will first identify the residential patterns of seniors and the socioeconomic character of neighbourhoods where they are concentrated; then assess their human service need, their access to services, and their use of services. Contrary to popular imaginings of the suburbs, this paper shows that suburbs are neither homogeneous nor affluent, and that policy makers need to pay more attention to seniors in suburbs.

Session: R2.8

Lowe, S
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Henderson, D

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Spatio-Temporal Habitat Characterization for the Threatened Hairy Prairie-Clover

Hairy prairie-clover (*Dalea villosa* var. *villosa* (Nutt.) Spreng.) was listed as threatened under Canada's Species at Risk Act in 2004 making identification of critical habitat a necessary first step towards federal conservation efforts. The objective of this study is to determine how habitat area and configuration are correlated with the hairy prairie-clover metapopulation within the Dundurn PFRA community pasture located south of Saskatoon, Saskatchewan, Canada. A multi-temporal, multi-resolution land cover classification using object-oriented methods was carried out with SPOT5 imagery acquired in 2007 and 2009. Potential sand dune habitat identified in the classification was analyzed using patch level metrics of area, shape, nearest neighbour distance, proximity, fractal dimension and edge contrast to identify which components of spatial configuration were best correlated with hairy prairie-clover occurrences. Air photos from 1944 were subsequently analyzed for the study area using the above methods. Preliminary results show a relationship between hairy prairie-clover occurrences and spatial habitat configuration present in 1944 as opposed to current habitat configuration because plants exhibit a delayed response to landscape change and may not be in equilibrium with current environmental conditions.

Session: F1.3

Lu, B
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Comparing Different Atmospheric Correction Methods for Applying Landsat TM Images to Extract Suspended Sediment Concentration in Yangtze Estuary, China

The Yangtze Estuary which lies in the subtropics is usually covered by thick clouds and with a high aerosol concentration, which can introduce serious errors into the quantitative retrieval of suspended sediments concentration using remote sensing imagery. Atmospheric correction is an important preprocessing step in ocean color remote sensing applications. The water in Yangtze Estuary is typical Case-II water with high sediment load together with large temporal and spatial variations. For Case-II waters, the atmospheric correction has always been a complicated problem. In view of the spatial scales of Yangtze Estuary and satellite image features, Landsat TM images were selected in the comparative experiments among different atmospheric correction methods, including 6S atmospheric correction model, FLAASH method, the dark object subtraction (DOS) method, improved Gordon model respectively.

Influence of the runoff and estuarine tidal to the image is also considered. The results show that most of these methods can restore the water spectral features, but the errors of the 6S model and FLAASH method are larger and the 6S model even did not performed well in the comparative experiments. The DOS method is better than the 6S and FLAASH method. The improved Gordon model can achieve a higher accuracy than others with the auxiliary computation of the synchronous MODIS data, and has the improved potential. In order to obtain the better results when using Landsat imagery to establish the retrieval mode of the suspended sediments concentration, this paper suggests that researchers should analyze and make a choice of the atmospheric correction methods for different situations in Yangtze Estuary.

Session: F2.8

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Watson E

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Paraglacial Landslide at Columbia Glacier, Jasper National Park, Canada

Columbia Glacier is a western flowing outlet from the Columbia Icefield and has retreated over 3 km during the last 150 years. High lateral moraines indicate the glacier tongue has also downwasted over 150 metres during this interval. Subsequently part of the northern lateral moraine has been displaced by a landslide that delivered debris and trees onto the glacier surface below. Slight deformation of the moraines is first seen on 1955 aerial photography but no landslide scar was developed at that time. Cross sections were recovered from living trees on the landslide and wood from the glacier surface to investigate the landslide history. A living tree at the margin of the slide shows abrupt radial suppressions in 1955-60 and 1979-84 that are thought to result from root damage as the landslide block moved downslope. Reaction wood series, radial suppression and mortality data from other trees on the landslide and glacier surface confirm major slope disturbance in the 1955-60 period though the landslide has continued to move, at least episodically, between that time and 1996. It is possible that the valley side was destabilized by removal of support for the slope due to glacier downwasting during the past century though rainfall events are also being investigated as a possible trigger of movement. Similar paraglacial slope failures following glacier recession have been reported from elsewhere in the Canadian cordillera and may represent a significant hazard associated with glacier recession in steep mountain terrain.

Session: W1.3

Ludlow, N

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Impact of Urban Morphology and Social Determinants of Health on Spatial Morbidity and Mortality Patterns: A Comparative Analysis of Two Historical Communities

The poster will present the preliminary research for an upcoming PhD thesis. The goal of this research is to examine, through a mixed methods approach, how spatial variations and temporal changes in the social determinants of health (such as occupation, income, education, ethnic origin, gender) and the built environment affected the morbidity and mortality patterns in an urban historical context (1881-1931). Two North American cities, St. John's, Newfoundland, and Winnipeg, Manitoba, were chosen to allow for an examination and comparison of this relationship. In order to perform a comprehensive comparative analysis, archival data will be collected and analyzed. The data (historical maps, census records, death registry, city directories, photographs) are expected to reflect characteristics of population, health, and urban environment for the two study areas. Analysis will incorporate a combination of statistical (SPSS) and carto-GIS analysis (ArcGIS), and will be supplemented by qualitative historical and anthropological methods.

Poster Session A

Luk, F

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Vulnerability Assessment of Rural Communities in Southern Saskatchewan

Climate change is no longer an environmental issue that merely affects remote areas, but is a pressing global problem that has profound effects on our daily lives. Recently, more and more literature has been devoted to the study of climate change owing to its significant impact on society. A projected increase in climate variability is affecting water resources availability. If we could predict the impact of climate change on water resources accurately, we would be able to minimize the impact or even make use of the opportunity posed by climate change. However, with the uncertainties associated with climate change, there is urgent need to understand the impact of climatic variability on water resources so as to improve the adaptive capacity of communities. Traditional supply-side water management practices may not be able to deal with the situation adequately; therefore, a more innovative approach should be adopted so that communities can reduce their vulnerability to future water shortages. In this paper, rural communities in Southern Saskatchewan are used as case studies to assess the impact of climate change on water resources. Frameworks for community-level vulnerability assessment will be examined and adaptive integrated water resource management based on soft water path will be studied. Rural communities will be used as a starting point for finding an appropriate framework for application at a broader geographical scale.

Session: W2.7

Lynch, N

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The Re-Use of Urban Churches in Toronto, Ontario: An Exploration of the Intersections of Religion, Gentrification and Heritage in the Post-Modern City

This paper evaluates the current phenomenon of church re-use in the private real-estate market in the city of Toronto, Ontario. In particular, I examine this process through the lens of gentrification theory to argue that the recent increase of the conversion of church properties and the use of religious architecture for upscale loft spaces is led by an appropriation of Christian heritage and material culture into a particular 'gentrification aesthetic'. Furthermore, I argue that this aesthetic, as a display of distinct taste and lifestyle represented in housing choice, is increasingly produced by a cohort of cultural intermediaries (e.g., architects, designers, real-estate agents, heritage planners and developers) and is designed for image conscious middle-class consumers seeking new avenues to build both material and cultural capital. I highlight interview data and advertising media collected during my doctoral research to evaluate this gentrification aesthetic and explore its role both in increasing demands for unique church properties in the real-estate market, and, as a crucial aspect in the production of post-modern urban identities and the commodification of religious (hi)stories.

Session: R4.8

Lysenko, E
Vodden, K

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Responsibility Without Authority: Voluntary Organizations and Labour Market Development in Newfoundland and Labrador

Newfoundland and Labrador's labour market has traditionally been characterized by three distinctive features: a very high unemployment rate, a high proportion of rural workers and a highly seasonal economy. In recent years labour shortages have also occurred in some sectors. A number of local volunteer organizations have attempted to improve these conditions, including Rural Development Associations, Community Business Development Corporations, Community Youth Network Centres, Regional Economic Development Boards, Chambers of Commerce, tourism associations and others. Results of a three year project investigating rural-urban interactions and regional governance in Newfoundland and Labrador indicate that these organizations are often strategically located in rural and remote communities and therefore able to utilize their social networks and local knowledge to address development of local

labour markets and tailor services to the needs of particular clients. The presence of an extended number of labour market service providers has negative aspects as well. Delivery of labour market services is fragmented, creating difficulties with maintaining standards and impeding collaboration and information exchange. Echoing concerns in the literature related to new public management approaches, these organizations fulfill an important public service role but do not have formal authority for labour market planning or spending decisions. As a result, labour market development is only sporadically incorporated into regional planning efforts and long time lags in funding decisions decrease program effectiveness.

Session: R1.3

MacLachlan, I

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Canada's Cattle Herd Post-BSE: A Regional Interpretation of Seasonal Rhythms, Market Cycles and Secular Change

Seven years after the BSE crisis led to a global embargo on Canadian beef exports and a continental embargo on Canadian cattle exports, many aspects of beef cattle production appear to have returned to 'normal'. Yet, in February 2010, Statistics Canada's *The Daily* announced that the number of farms reporting cattle in Canada had declined to 99,265, "the first time since data has been collected that the number of cattle farms has fallen below 100,000." In fact, the Canadian cattle herd continues to follow an agro-industrial trend that can be traced back to the 1941 Census of Agriculture: average herd size continues to grow while the number of farms reporting cattle continues to decline. The total size of Canada's cattle herd has plunged since 2005 and the export orientation of cattle production appears about to shift from continental to overseas markets.

Session: W3.5

Magnan, A

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Corporate Mega-Farms in the Prairie Grains Sector: Food Crisis, Financialization and the Case of One Earth Farms

This paper addresses longstanding debates around changing patterns of farm ownership and farm structure on the North American plains. Over the last 150 years, the agrofood system has been transformed by a process of capitalist penetration through which non-farm capital has appropriated key links in the 'food chain'. Today, large, often transnational corporations dominate in the provision of farm inputs, as well as in food processing, distribution and retailing. The paradox for food system scholars has been that primary food production (*i.e.*, farming) has generally remained in the hands of independent, family-based operations, especially in the grains and livestock sector. This paradox has generated a substantial literature on the barriers to capitalist penetration in agriculture. My intent is to revisit these debates in light of two recent trends. First, I examine the most recent data available on farm structure, size, and ownership in Saskatchewan, highlighting increasing rates of incorporation among very large, albeit family-owned, grain farming operations. Second, I discuss the implications of the launch of One Earth Farms, a corporate farming entity embodying altogether new strategies of land use, labour, and ownership. Structured as a partnership between a Toronto based investment firm, Sprott Resources, and seventeen First Nations bands, One Earth Farms intends to put one million acres of leased First Nations land under production in grains and livestock. I interpret the significance of this new enterprise in light of food system financialization, food crisis, and corporate-First Nations relations in other extractive industries.

Session: W3.2

Mahaffey, A
Evans, M
de Boer, D

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Spatial Analysis of Dissolved Metal Ratios in the Athabasca River Basin

Increasing demand has led to the rapid expansion of oil sands operations in northeastern Alberta, Canada. Because these operations lie on either side of the Athabasca River, there are concerns regarding the impact of these activities on the health of downstream ecosystems and local communities, in particular in the Athabasca River delta. Large-scale resource development and extraction activities release a variety of contaminants through wastewater and effluent discharges, stack and vehicle emissions, tailings leakages, and accidental spills. The objective of this study is to evaluate the impact of development within the tributaries on water quality in the Athabasca River basin. Dissolved metal concentrations from 55 sites in the Athabasca River basin from 2003 to 2007 were used to calculate metal ratios. Preliminary cluster and GIS analyses indicate that throughout the study period, sites along the Athabasca River are characterized by a distinct and separate metal signature from the tributaries. This is likely due to the much larger average annual discharge in the Athabasca River compared to the tributaries. Further analyses will include the separation of spring and fall data to examine the seasonal influence on this relationship due to increased snow melt in the spring and increased groundwater input in the fall, as well as the analysis of total concentrations.

Session: R1.4

Marchildon, G

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History of the Special Areas of Alberta: Institutional Adaptation to Climate Change

The Special Areas of Alberta were established in response to a prolonged agricultural drought in the Alberta Dry Belt that began in 1917 and did not abate until the end of the 1930s. The ultimate response was the culmination of 20 years of more incremental responses, none of which was adequate given the major change in climatic exposure and the vulnerability posed by the dominant system of land tenure. The eventual 'solution' required major changes in land tenure, organized out-migration, and a complete overhaul of infrastructure as well as governance.

Session: F2.2

Markey, S
Heisler, K

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Getting a Fair Share: Regional Development in a Rapid Boom-Bust Rural Setting

The purpose of this paper is to investigate a regionalist response to the shifting and seemingly placeless dynamics of the oil and gas sector in north eastern British Columbia. The growth of the oil and gas sector (40% growth from 2001-2006, now representing 30% of the regional economy) has had far-reaching implications for the economy and settlement patterns of the region. Oil and gas activities generally take place on either private or Crown lands located beyond municipal taxation boundaries. While the economic activity may take place beyond municipal lands, communities face direct impacts in terms of service provision, infrastructure stress and a growing pattern of social ills

associated with a highly transient and seasonal workforce. In 1993, driven by regionalist pressure, the Province recognized the fiscal imbalance facing the area and began negotiations for what would become the Fair Share Agreement (FSA). The MOU acknowledges that local governments should be compensated for the services and infrastructure costs associated with resource development activities within the region. The current agreement runs until 2020, with indexing in place to deliver up to \$28 million per year to the region. The FSA represents an innovative regional solution to the impacts associated with an industrial sector that is not traditionally associated with a 'company town', and offers a precedent for other resource regions. However, concerns exist that funds are being used for operational purposes and that there is limited long-term planning being done within the region – setting-up an interesting tension between regional capacity and the institutional response represented by the FSA.

Session: F1.7

Martin, A

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Towards a 'Post-Staples' Economy in the Periphery?: Examining the Responses of Two Forestry-Dependent Communities to Economic Restructuring in BC's Northern Interior

Beginning in the early 1950s, the British Columbia (BC) provincial government, forestry companies and organized labour entered into an institutional framework predicated on mass production of standardized forestry products for export. The recession in the 1980s initiated significant economic restructuring of BC's forestry sector, challenging the viability of this framework. It has been argued in the literature that forest-dependent communities now face a 'post-staples' economy that is no longer rooted in productivism. This paper argues that forest-dependent communities in BC's northern Interior have not adopted community development or community economic development planning initiatives congruent with the 'post-staples' economy. My research found that the recent recession has highlighted how vulnerabilities identified during and since the 1980s recession have not been addressed. Furthermore, communities are also facing a new institutional framework that is redefining their relationships with companies and the state. These findings are based on fieldwork conducted in Houston and Mackenzie, and are part of a larger research project examining the impact of changing community-company relationships in BC's Interior.

Session: R3.1

Mason, J
Swinehart, J
Hanson, P
Loope, D
Goble, R
Miao, X

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Late Pleistocene Cold-Climate Dune Activity in the Central Great Plains, U.S.A.

Multiple episodes of Holocene dune activity in the Nebraska Sand Hills and other central Great Plains dunefields are now well-documented. Published evidence for Late Pleistocene dune mobility in this region remains limited, however, despite early interpretations of the Sand Hills as Pleistocene relicts. Assuming that preservation of Pleistocene sands would be best within large, slowly migrating dunes, we collected drill cores from that setting across the Nebraska Sand Hills and nearby dunefields. All but one of the dunes sampled contain a core of Late Pleistocene sand, with optically stimulated luminescence (OSL) ages between 19 and 14 ka. Eolian sands interbedded with Pleistocene loess south of the Sand Hills yield ages of 20-25 ka. Thus, dune and sand sheet activity was extensive during and just after the last glacial maximum (LGM) on the central Great Plains. Numerical models of LGM and late-glacial climates and the limited paleoecological evidence suggest that reduced effective moisture cannot adequately explain this cold-climate eolian activity. While these information sources may underestimate episodic aridity during the LGM and late-glacial period, effects of growing season length and low temperature in general must also be considered as controls on dune mobility. The large barchanoid ridges and megabarchans of the Nebraska Sand Hills may record northerly to westerly dune-forming winds of the Late Pleistocene, despite substantial Holocene reactivation. Such paleowinds are consistent with wind regimes simulated by many global circulation models for the Great Plains south of LGM ice margins, despite confusion on this point in the literature.

Session: S2.4

Massie, M

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Wheat Miners of the Plains, Mixed Farmers of the Parkland: Perception and Place in Agricultural Development in Western Canada to 1940

The overwhelming interrelation between the Prairies and King Wheat has dominated historical perception. The common narrative claims that an ideal farm grew wheat for export to an international market, which led to the construction of roads, railways, grain elevators and service centres to facilitate that goal. This story overshadows the important countercurrent of the mixed farming movement, which advocated a mix of grain and livestock to spread a farm's asset base and lessen the impact of market forces or environmental disaster. Mixed farms were specifically tied to place: parkland and forest edge areas were actively promoted as ideal sites for mixed farms. The mixed farming movement, combined with environmental adversity on the plains, encouraged northern migration. This essay outlines the rhetoric and impact of the mixed farming movement, in particular its role in encouraging parkland and forest edge agricultural development through Soldier Settlement and as a result of the Dryland Disaster throughout the 1920s. These migrations paved the way for the massive influx of dust bowl refugees into the north during the 1930s.

Session: F2.2

Masuda, J

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Reconciling Preferences and Constraints in Building Online Communities of Youth with Asthma and Allergies

Youth are at the leading edge of a revolution in social networking, supported by fast-paced technological changes that are transforming the culture of communication and social interaction. There is growing interest in the health promotion community to adopt social networking culture as a model for accessible program delivery, social support, and community building, particularly for youth with chronic conditions. This paper reports results from a pilot project that delivered an eight-week online support intervention to a cohort of 28 youth in rural and urban sites who experience severe asthma and anaphylaxis. I will focus on findings that reveal the challenges of meeting the interests and capabilities of youth within both the current technologically constrained online health promotion environment as well as the ethical obligations required in online research. Implications for further research with other age groups, geographic settings, vulnerable populations, technologies, and the use of online community building to address health inequities will be suggested.

Session: R1.8

Mathews, V

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Reevaluating Industrial Landscapes: Film Space and Urban Redevelopment

Over the past three decades, manufacturing employment in North America has declined, leaving a network of spaces as refuse of an industrial past. While the use of these spaces for industrial purposes is diminishing, their utility in the circuit of cultural production is rising (Zukin 1982, 1995; Lloyd 2005). Although a great deal of research has been conducted on the role of the arts in urban regeneration – where art serves to naturalize economic processes and smooth capital flows – there is less exploration to date on the role of the film industry in transforming urban space. In this paper I examine the relationship between urban redevelopment and the film industry through comparative research on industrial landscapes in Toronto (King-Parliament, Port Lands) and Hamilton (Port of Hamilton) that are classified as (established or emerging) film locations. Using textual analysis of policy and planning reports, production procedures and newspaper articles, I evaluate how film production is incorporated into local economic development processes, how it shapes public image and place identity for place-makers, and the potential social policy implications for this form of industrial revaluation (social and economic upgrading, uneven development).

Session: W4.2

Mayda, C

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Evolution of Prairie Ranchers and Farmers in Relation to Sustainability and Climate Change

In 1995, I began what became a long-term relationship with ranchers and farmers on the Saskatchewan and Manitoba borders. This access came about because of walking the US/Canadian border. I have continued to document the changes that have happened in ranching, sustainability, and climate change and how the changes have affected these families over the past 15 years. In this regard, I would like to discuss these changes and see what others have learned.

Session: R1.1

Mazumdar, D

Coburn, C
Teillet, P
Rochdi, N
Smith, A

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Extraction of LAI Using Agricultural Crop Canopy BRDF and Inverting the PROSPECT + SAIL Models

The vast majority of natural Earth surfaces reflect and absorb light differentially, not only with respect to spectral, spatial, temporal and radiometric considerations, but also with respect to illumination and observation angles. Remotely sensed spectroradiometric data vary accordingly. These angular dependences are characterised by the Bidirectional Reflectance Distribution Function (BRDF). It is important to understand BRDF if remotely sensed data are to be used optimally to perform agricultural crop differentiation, and provide key information in support of national and international food productivity and sustainability. The reflectance and absorption features derived from BRDF can also be used to identify plant conditions. However, this ability of remote sensing to provide environmentally relevant information is limited by the anisotropy of vegetation reflectance. The effect of BRDF can lead to an underestimation of the biophysical and biochemical properties derived from remote sensing data. Leaf area index (LAI) is a key biophysical parameter in the modelling of terrestrial carbon and water flux exchanges. One-dimensional radiative transfer models are often used to evaluate the relationship between reflectance and LAI. However, LAI is often not estimated correctly because of the BRDF effect. We developed a method to extract LAI by simulating the PROSPECT + SAIL models in the inverse mode using field BRDF data and validated the same with field LAI data for better estimation.

Session: F1.8

McCalla, R

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Arctic Shipping: Possibilities and Challenges in the Canadian Sector

Because of global warming and changes to the Arctic Ocean ice regime, increased shipping activity in and through Canadian Arctic waters, especially involving the North West Passage, is a distinct possibility in the future. This paper will review the state of Canadian Arctic shipping now and speculate about its future. Shipping activity today involves community resupply, resource export shipping, cruise shipping, fishing, icebreaker, and government and research operations. In addition to these activities, the future may bring transit shipping. An assessment of this possibility is presented. Even though the ice regime is changing to increase the shipping season, many other challenges still exist. These include governance issues, environmental knowledge especially hydrographic, accident and incident response systems including search and rescue, icebreaker support, location of deepwater ports and refuge sites, and

communications and traffic management. Each of these challenges will be reviewed and assessed. In conclusion, it is true that Arctic shipping may increase because of changes in the ice regime, but more is involved in this development than just the physical changes to the water environment. Future Arctic shipping is as much a human challenge as a physical one.

Session: W2.1

McCollum, J
Wheate, R

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Tug of War at the Border: The Geographic Centre of North America

Rugby, North Dakota claims the distinction of being the geographic centre of North America. The authors examine this claim and attempt to compute where the geographic centre of North America really is. For good measure, they provide estimates of the geographic centre of a number of other places of interest.

Session: F2.4

McCreary, T
Milligan, R

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The Contemporary Fiction of Eden Robinson and the Politics of Traditional Knowledge (TK) in Ecolitics of Haisla Territory

Our paper summarizes the emergence of Traditional Knowledge (TK) in Environmental Assessments (EA) and enters the debate with the purpose of disturbing the taxonomies of TK by examining Eden Robinson's *Traplines*, *Monkey Beach* and *Blood Sports* as novel forms of IK that interrupt both the 'buried epistemologies' that situate IK's inclusion in EA, but also the unintended silencing that critiques of 'buried epistemologies' often inherit. While Indigenous political activism has pressed that resource management regimes such as EA engage with TK, anti-colonial critiques have been powerful in exposing the imbrications of contemporary ecolitics with the histories of dispossession and the containment of Indigenous voice. However, these critiques of the circumscription if not silencing of Indigenous subject positions often inadvertently reinscribe the centrality of colonial power. Interrogating texts not to discover Indigenous voice but to examine how colonial discourse constrains the terms on which Indigenous peoples can speak, this scholarship too often assumes an Indigenous condition of voicelessness. Where poststructural critique often overdetermines colonial discourse, presuming completeness in the colonial project and inscribing Indigenous peoples as either victims of or as the embodiment of limits to colonial discourse, we argue it is necessary to further register the ways in which Indigenous peoples themselves are contesting their exclusion and silencing. Here we examine the possibilities and repercussions of including the novel in discussions of what constitutes TK in discourses of ecolitics and resource management.

Session: W2.3

McCreary, T
Mills, S

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Reconciling the Geographies of Academia and Aboriginal Peoples

Schools were central to colonial assimilation policies through the twentieth century and they have since become a key arena for the contestation of Western knowledge and control by Aboriginal peoples. In post-secondary education, this struggle has resulted in the development of Aboriginal-directed programs and the expansion of curriculum addressing Aboriginal issues within non-Aboriginal institutions. Using a case study of a northern college's process of indigenization, we examine the tensions that inform negotiations over teaching content, process and qualifications. Traditionally, the knowledge and qualifications privileged in post-secondary education reflected the abstract universals of academic knowledge and credentials. However, Aboriginal peoples' claims, both political and epistemic, have asserted the necessity of engaging their local geographies. Negotiating between providing educational content appropriate to Aboriginal communities and maintaining established academic disciplines, the indigenization process has exposed the tensions in redefining the geographies of education. Academic workers preferable work conditions, higher salaries and identities are interwoven with traditional definitions of academic work. Indigenization threatens to increase academic instructors' workloads and decrease their autonomy, while undermining their job security through the recognition and privileging of other forms of knowledge and other types of knowledge-holders. Administrators, while supporting the recognition of Indigenous knowledge in the creation of new programs and positions, have been reticent to recognize the equivalence of Indigenous knowledge in terms of remuneration. This study demonstrates that the redefinition of academic work within indigenization processes raises significant questions and tensions regarding the associated distribution of the costs in terms of wages, time and academic freedom.

Session: W1.2

McGinn, R

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The McFadden Valley-Polonia Trench, Riding Mountain Uplands, Manitoba: Forced Meanders and Glaciofluvial Deposits in a Glacial Spillway

Approximately 12,000 B.P. an integrated network of supraglacial lakes drained over/through stagnating glacial ice on the Eastern Uplands of Riding Mountain. The flow eroded a 30 km long channel into the local diamict substrate. Generally, the spillway is oriented north to south paralleling the crestline of the Riding Mountain Escarpment. Paleocurrent measurements suggest that the flow was from the north towards the south-south-west. Greatest entrenchment occurred in the northern McFadden Valley segment (55 m); down slope entrenchment is approximately 35 m in the southern Polonia Trench segment of the spillway system. The relic channel, including fill has a relatively steep mean slope (0.0014). In the McFadden Valley, meltwaters were apparently diverted by sub-cropping rock hummocks which created valley scale forced meanders and associated point bar deposits. Along the length of the Polonia Trench, remnant terminoglacial stream deposits near the valley rim indicate a braided stream environment. Today the valley floor consists of outwash gravels overlain by recent colluvium and alluvial fan deposits. The McFadden Valley-Polonia Trench drained into a terminoglacial (perhaps supraglacial) lake and the eroded material is deposited in a lake margin sandur plain composed of braided stream deposits which grade into subaqueous fan and lacustrine sediments.

Session: R3.4

McLeman, R

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Climate-Related Human Migration: Enhancing Our Understanding Through Use of Analogues

With growing recognition of the risks posed by anthropogenic climate change has come a greater interest on the potential effects on population movements. A variety of popular studies suggest that climate change could create hundreds of millions of environmental refugees in coming decades. While migration is seen as one way by which populations exposed to climatic risks and opportunities may adapt, scholarly understanding of the nature of the

interactions of environmental and human systems that influence climate-related migration is still developing. This presentation reviews the use of geographical and historical analogues as a means of enhancing our knowledge of climatic influences on migration and of the ways by which households, communities and governance structures may build capacity that minimizes the potential for distress migration. Studies of past migration events on the North American Great Plains are used to illustrate methodological challenges and outcomes.

Session: R3.6

McMartin, D

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Trends in Small-Scale Energy Production and Technologies in Saskatchewan

The Law of Conservation of Energy states that energy can neither be created nor destroyed. However, humans harness and convert energy into usable forms and transmit it across long distances to reach consumers. The processes of energy 'production' and transmission result in losses (from the usable portion) such that produced energy does not equal that available for consumption. Therefore, a trend toward small-scale, on-site, green energy production and use that minimizes transmission-related losses is on the rise. This trend has been embraced through SaskPower's program development in demand side management and net metering. These programs promote smart electricity use, senses of ownership and responsibility, and a direct visual connection to energy that is lost under a system of large-scale, remote power production infrastructure systems. An overview of the available and most common technologies for prairie use, a discussion of human interaction with sustainable power production, and an analysis of these systems for addressing the projected Saskatchewan power gap between generation and demand are provided.

Session: S1.5

McNabb, C

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Examining Geographies of Waste and Value Through Electronic Scrap

Stories of electronic waste continue to appear in the popular media. This presentation offers an investigation of waste and value by examining the effects that geography has on the disposal of end of life electronic devices. This work takes Memorial University as its departure point and through an examination of disposal practices I demonstrate through a mixed methods approach how waste and value are realized as these devices follow different trajectories. Finally, I suggest that these geographies of waste and value will proliferate and expand as Newfoundland and Labrador move closer to participating in an electronic waste management program.

Session: W4.1

Mendis-Millard, S

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Fostering Adaptive Capacity: A Framework and Examples from Canadian Biosphere Reserves

What roles might biosphere reserve organizations, as non-state actors, play in helping rural communities adapt to change? I answer this by proposing a framework of adaptive capacity that hinges on 1) focused collaboration and 2) social learning that accounts for multiple knowledges and builds on opportunities for critical reflection. Empirical evidence from Clayoquot Sound, BC and Riding Mountain, MB is given. In the former site, a network of Advisory Committees has engaged citizens around issues such as the future of forestry, declining salmon stocks and promoting a sense of place. In the latter, the Biosphere Reserve Committee initiated and chairs the bovine tuberculosis (TB) Stakeholders Advisory Committee (TBSAC), a boundary organization that provides a forum and voice for diverse interests (e.g., producers, hunters). Such examples demonstrate how biosphere reserves can play a unique role in fostering key social dimensions to assess and address complex changes at the regional scale.

Session: R1.1

Mendis-Millard, S

Abe, K-F
Braun, R
Hawrysh, A
Kindrachuk, J

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Panel: Biosphere Reserve Practitioners from Germany and Saskatchewan

The two special sessions on biosphere reserves end with a panel discussion featuring two representatives from the Rhön Biosphere Reserve in Germany and two representatives from Saskatchewan's only biosphere reserve, Redberry Lake. This panel is an opportunity to ask these on-the-ground practitioners about their personal experiences with operationalizing the UNESCO biosphere reserve concept. Our panellists will share the opportunities and challenges they have encountered in Europe and Canada with respect to shaping localized discourses of sustainability, raising awareness of the work of their biosphere reserve organizations, networking with other sites around the world, and implementing initiatives that promote conservation and sustainable development.

Session: W2.2

Mertler, J

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Physical Parameters of Water at Waterfowl Park's Display Ponds, Regina, SK, During Autumn 2009

The evaluation of physical parameters of water is crucial to determining the overall health of an aquatic eco-system. This study investigated the impact of a concentrated population of waterfowl on water quality in a controlled system of small, shallow, macrophyte-rich ponds situated in urban parkland in the city of Regina. The ponds are ideal for this assessment, as inflow and outflow are controlled, and proved useful in the assessment of potential human health risks associated with an urban waterfowl sanctuary. Water quality was assessed according to physical parameters, including pH, specific conductance (EC), temperature, and total dissolved solids (TDS). The measurement of these characteristics at the point of inflow was a direct indicator of water quality in the ponds' main water source, a nearby urban lake. Extreme fluctuations in EC, basic-heavy pH, cool temperatures, and variable TDS levels indicated inflow of poor to variable quality. Outflow water quality was very different, and it appeared that waterfowl reduced pH, EC and TDS levels. The results have application in policy, planning, and programming decisions in urban parklands.

Poster Session B

Middleton, M
Närhi, P
Sutinen, R

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Imaging Spectroscopic Detection of Time-Stable Spatial Patterns of Soil Water for Artificial Regeneration to Scots Pine

The success rate of artificial regeneration to Scots pine (*Pinus sylvestris* L.) can be improved by including a soil water content based assessment of site suitability in the reforestation planning process in a humid northern boreal climate of northern Fennoscandia. In this paper, we introduce a new use of airborne visible-near-infrared imaging spectroscopic data to identify suitable subregions of clear-cut forest compartments for the low volumetric soil water content (<27%) tolerant Scots pine. Nonmetric multidimensional scaling results indicate that occurrence and abundance of understorey species and land cover components, and thus spatial patterns of understorey observed by the AISA imaging spectrometer (Airborne Imaging Spectrometer for Applications), are dependent on time stable patterns of underlying soil water content. A supervised artificial neural network approach is taken to classify AISA imaging spectrometer data with dielectric (as a measure volumetric soil water content) ground referencing into regimes suitable and unsuitable for Scots pine. The neural network model accuracy assessment with receiver operating characteristics curves demonstrated a maximum of 74.1% area under the curve values which indicated moderate success. The results signify the importance of training set quality, adequate quantity (>2.43 points/ha) and neural network algorithm selection over the NN algorithm training parameter optimization into perfection. The methodology for the analysis of site suitability of Scots pine can be recommended, especially when artificial regeneration of former mixed wood Norway spruce (*Picea abies* L. Karst) - downy birch (*Betula pubescens* Ehrh.) stands is being considered, so that pine regenerated areas for forestry purposes can be optimized.

Session: F2.5

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Sutinen, R

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Visualization of Glacio-Seismotectonic Landform Associations in Northern Finnish Lapland

Northern Fennoscandia has experienced high-magnitude postglacial fault deformations attributable to glacio-isostatic rebound. Conceptually, paleolandslides are associated with these crustal events, but the role of seismic tremors in triggering subglacial deformations has thus far remained uncertain. We studied the glacio-seismotectonic geomorphology in Utsjoki, Finnish Lapland, by visualizing Landsat TM, historic panchromatic aerial photographs and high spatial resolution digital elevation model with modern image interpretation techniques and in combination with field observations. As the study area is located above the forest line without tree-canopy interference and is contrasted by vast amounts of bedrock outcrops vs. vegetated shrub surfaces, it serves as an ideal place for remote recognizance of geomorphological features. A number of landslides were found on fells west of the Utsjoki drumlin field, and were interpreted to be ice-marginal. Bare bedrock in the slide scars suggests water saturation to have preceded the slide events. Rim-ridged moraine hummocks were common on the tops of fells, but exhibited transition into sinuous forms on down-slope positions. Hummocky (ribbed) moraines were found in valleys, but were often coexistent with esker ridges in the sheetflow tracks. The anastomosing network of sheetflow tracks did not display evidence of conceptual time-transgressive evolution, but were generated by short-lived mass-floods. The alignment of sheetflow tracks was not consistent with the ice-flow streamlined forms, but were superimposing on drumlins suggesting that streamlining and subglacial sheetwash drainage are separated in time. We propose that along with the landslides the glacio-seismotectonic events were the driving forces also in the subglacial evolution of many of the other landform associations.

Poster Session B

Mills, S

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***Labour Unions and Aboriginal Involvement in Northern Resource Development Projects:
Considering the Significance of Aboriginal Geographies for Labour Environment Coalitions.***

Over the past three decades, Aboriginal peoples have gained increasing legal and political recognition of their rights to lands and resources in northern Canada. As a result of struggles over resource development, many Aboriginal governments now have greater control over environmental and employment decisions in their territories. Yet, despite the crucial roles played by Aboriginal peoples in resource development, researchers examining topics pertaining to labour and the environment have often neglected to incorporate Aboriginal peoples' struggles into their analysis. In this paper, I argue that labour geographers in North America need to engage more thoroughly with Indigenous geographies if they hope to advance social and environmental justice. I raise three considerations for this engagement. First, I argue that conceptualizing Aboriginal peoples' relationships to the environment from a position of prior occupancy and Aboriginal rights has greater political tenancy than subsuming Aboriginal peoples' relationships to nature within environmentalism. Second, and related to this point, I raise the issue of the need for Aboriginal controlled development in northern Aboriginal communities and suggest that this is an area where labour-environment researchers can make an important contribution. Last, I draw on results from a case study on Inuit and union participation in the creation of the Vale Inco, Voisey's Bay nickel mine in Labrador to discuss how the increasing prevalence of corporate-Aboriginal alliances is creating important challenges to union engagement that need to be addressed.

Session: R3.7

Millward, H
Spinney, J

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***A Time-Use Perspective on Physical Activity Along the Rural-Urban Continuum: Evidence from
the Halifax Region***

This paper examines variation in levels of physical activity along the rural-urban continuum, within the county-sized regional municipality of Halifax, Nova Scotia. Time-diary data from the Halifax STAR project were used to estimate time durations in all four activity domains (*i.e.*, leisure, active transportation, chores, occupation). Geographic zones were based conceptually on the rural-urban fringe concept: the four zones are the Inner City, Suburbs, Inner Commuter Belt (ICB), and the Outer Commuter Belt (OCB). MET values from the Compendium of Physical Activities were used to classify activity episodes into five effort levels. Light through maximum levels all indicate 'healthy' activity, while moderate through maximum levels indicate 'aerobic' activity. Mann-Whitney difference-of-ranks tests show significant inter-zonal differences in activity-level durations exist for all domains, but are more prevalent for leisure and active transportation. The inner city contrasts strongly with the suburbs, and the suburbs with the ICB, but there are fewer significant differences between the ICB and OCB. The percentage of respondents attaining recommended levels of healthy activity is similar in all zones (75-80%), but durations of both healthy and aerobic activity increase outwards from the inner city.

Session: F2.7

Moldofsky, B

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Canadian Century Research Infrastructure Project: Using the 1911 Census Microdata for GIS Analysis and Mapping

The Canadian Century Research Infrastructure Project has created a microdata sample database of individual census records for the 1911 to 1951 censuses. To enable and enhance the use of the microdata, the project also developed a geographic framework for the historical census data, at the census subdivision level, and a series of tables of published aggregate data linked to the geography. This enables geographic location, selection, aggregation and analysis of sample data, as well as mapping of generalized census data. The 1911 microdata and the GIS files for all years are now being distributed for public use. A series of analyses aggregating and mapping census data from 1911 have been created to demonstrate how these tools can be used to depict characteristics such as household size, family composition, and languages spoken in 1911, at a finer level of detail than has previously been possible.

Session: W3.6

Moorman, B
Whitehead, K
Stevens, C
Wainstien, P
Bode, J
Solomon, S

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Arctic Landscape Evolution in a Changing Climate

Landscape evolution is frequently considered to be a slow gradual process that forms the landscape over thousands or millions of years. However, under some circumstances the rate of change can be accelerated dramatically. We examine two such instances, where rapidly changing climate is impacting permafrost and glacial processes leading to the potential for rapid alteration of the landscape. Permafrost and glaciers – synonymous the Arctic – are dominant influences in northern geomorphology. However, permafrost and glaciers are a function of the climate. While the rate at which climate varies is usually considered to be orders of magnitude faster than that of the landscape, we are observing that the significant impact permafrost and glacier systems have on northern geomorphology enable the rapid imprint climatic changes onto the landscape. On the mostly glacier covered Bylot Island, in the eastern Canadian Arctic, climate warming is impacting the rate at which glaciers are retreating, the rate and character of ice movement, the melt out of ground ice and the rate of deformation of ice-rich permafrost. This not only leads to a rapid transition from glacial to paraglacial to periglacial landscapes, but it also alters the rate and types of processes operating within each of those landscapes. In the western Canadian Arctic, permafrost in the Mackenzie Delta is also experiencing dramatic change as a result of a rapidly warming climate. This includes coastal erosion of ice-rich permafrost to alteration of shallow-water and low-lying permafrost as a result of water level rise.

Session: R3.4

Mora, B
Wulder, M
White, J

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Boreal Forest Characterization with Very High Spatial Resolution Satellite Imagery: A Basic Attribute Approach

In Canada some areas are not characterized on an ongoing basis by operational monitoring programs (e.g., northern areas), yet still have a need for detailed/accurate forest inventory information. Satellite imagery can serve to mitigate logistical and financial constraints imposed by aerial photography to provide information for generating forest inventory attributes. While wall-to-wall coverage may not be feasible, Very High Spatial Resolution (VHSR) may be used in a sampling framework following the systematic grid of the National Forest Inventory. In forest inventory, some attributes are modeled from sets of basic attributes that may be interpreted or generated using automated image processing techniques. The Yukon Territory was chosen as study area to first, evaluate an automated stand delineation technique versus manual delineation; and secondly, to refine semi-automated methods enabling the identification of stand height and leading species as these attributes are required to compute stand volume and

biomass. The stand delineation method provided useful results, requiring only a small level of manual editing. Tree heights were estimated with regression trees using stand level and crown level metrics as inputs (RMSE= 2.8, $R^2 = 0.53^{**}$). Stand level leading species were identified with classification trees using crown shape metrics as inputs. The leading species were identified with an overall accuracy of 78.6%. These results suggest that volume and biomass estimation based on basic forest attributes derived from VHSR images will be of sufficient accuracy and precision, and that the VHSR imagery will serve as appropriate data source for sample-based, wide area, monitoring.

Session: R3.9

Mueller, S

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Reflexive Geovisualization: Visualization Strategies for the Communication of Historical Geographic Information

This poster summarizes research conducted into a variety of methods of visually representing geographic data and concepts relating to the physical, economic and social history of Calgary, Alberta. It provides an examination and evaluation of visualization techniques which may be employed in the visual presentation of historical geographic data, demonstrating that different approaches to presenting the same material can make it accessible and meaningful to the largest possible audience, and to expert and non-expert viewers.

Poster Session B

Muller Myrdahl, T

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What the 'Margins' Can Tell Us About the 'Centre': The Politics of Identity Management and a Geography of Leisure and Sexuality

In this talk, I use research on the lesbian fans of U.S. women's professional basketball (WNBA) to outline how a set of exclusive cultural politics (re)produces a curious form of self-regulation among target consumers. I link leisure geographies and geographies of sexuality through the lens of identity management to examine the ways that identity performance is shaped by the implicit cultural politics at work in WNBA arenas. I use Kenji Yoshino's (2006) adoption of Erving Goffman's (1963) term 'covering' to discuss the ways that normative ideologies are reinforced and contested not just by management-driven practices, but by the self-circumscribing practices of some lesbian fans. I show that covering is noteworthy as both an effect of marginalization and as a mandate that encourages lesbian fans to reproduce the dominant discourse at work in WNBA arenas. Using an intersectional framework affords a sensitivity to the ways these leisure spaces are produced by, and productive of, the gendered and sexualized identities who participate in them.

Session: R3.6

**Mulrennan, M
Scott, K**

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Partnerships in Protected Area Planning: The Wemindji Protected Areas Project

Until recent decades the management of National Parks and protected areas was dominated by the 'Yellowstone Model', an approach that focussed on the preservation of wilderness and often involved the exclusion of Indigenous peoples from their traditional lands. Today, in Canada and elsewhere, Indigenous peoples are major players in the planning and management of protected areas. We examine the recent experience of one such group – the James Bay Cree community of Wemindji – in relation to their efforts to secure protected area status on a portion of their lands and seas. Their remarkable achievements over the past five years, which include the establishment of a biodiversity reserve on two major watersheds and the submission of a formal proposal for a National Marine

Conservation Area in the adjacent offshore area, reflect the success of a community-based participatory research (CBPR) partnership supported by the SSHRC Community-University Research Alliance (CURA) program. This paper provides an account of this partnership, outlining its evolution from an initial collaboration focussed on concerns about the protection of a particular river to a vibrant reciprocal partnership. Strong collaborative relationships have supported extensive research outputs in the form of academic papers and graduate theses. More importantly, they have led to the creation of diverse community initiatives and achievements, including support for an annual Youth Science Camp, a 'mini' museum for artefacts from the archaeology component of the project, and a cultural centre to facilitate the transmission of cultural knowledge and local research projects, build capacity and ensure that the community is at the centre of all projects and decisions.

Session: R4.4

Munski, D

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Infusing Internet Radio-Based Activities into Curriculum for Pre-Service Teacher Education in Social Studies

Radio remains a key medium of communication for learning about different places and even more so is the case with increased access to internet radio. Pre-service teacher education majors at the University of North Dakota pursuing certification in K-12 social studies become exposed to internet radio-based activities as a means to enhance teaching middle school level world regional geography and high school level AP human geography. Undergraduates on the Grand Forks campus in turn practice how to supplement their own particular lesson plans by incorporating internet radio activities for teaching about specific world regions and/or geographical themes such as human-environment interaction. Ongoing usage of this approach to the K-12 social studies curriculum is setting the stage for diffusing this pedagogy into classrooms of student teachers. Such efforts have the potential for providing a low-cost method for bringing the sounds of places and viewpoints of people not usually within the everyday experience of the K-12 pupils being taught by social studies student teachers from the University of North Dakota.

Poster Session B

Munski, D

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Using an OSAE Transect from Grand Forks to Fort Totten to Promote Geographic Perspectives to Field Trips Among North Dakota K-12 Educators

A classic and still effective pedagogy in K-12 teacher education for geography is local application of the OSAE approach. Initially designed for urban field trips, OSAE (Observe, Speculate, Analyze and Evaluate) is a technique which has applications to rural field trips, too. This especially is the case for North Dakota, a state which remains largely rural in terms of its landscape even while its settlement pattern is seeing relative intensification of urbanization. An OSAE transect from Grand Forks to Fort Totten has been created and revised to promote geographic perspectives among North Dakota K-12 educators. A spin-off of this effort is enhanced attention to heritage tourism and community development as a focus for teaching North Dakota Studies in grades four, eight and ten. Consequently, other OSAE transects for sub-regions of the original case study are being generated as examples of the pedagogy for use with pre-service educators taking certification in social studies as related to efforts to increase civic engagement between the communities in this part of northeastern North Dakota and the University of North Dakota.

Poster Session B

Munyikwa, K
Knight, C

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Deep Vertical Coring of Prairie Eolian Dune Structures for Luminescence Dating

Luminescence dating of fossil eolian dune sequences from the Canadian prairies provides temporal constraints for reconstructing postglacial and Holocene paleoenvironments. To date, however, sample collection across the region has been restricted to profiles in open cuttings on dune structures or in specifically excavated shallow pits. With prairie dunes attaining heights of up to 20m, this sampling approach has left the lower sections of most dune sequences undated. To circumvent this limitation, we at Athabasca University have acquired a Dormer Drillmite™ hydraulic auger unit specially equipped with components for extracting core samples for luminescence dating from depths of up to 30m. In this contribution, we present experiences we have had collecting samples from dune structures in Alberta. Advantages and drawbacks of deep core sampling are discussed. To enable the collection of samples without compromising their integrity for luminescence dating, we have fashioned a removable single-use sampling module attached at the end of the drill string. Pre-inspection of a depositional unit to be sampled is performed in the field by extracting a sample core using another detachable module that we have designed. To assess the reliability of deep vertical core sampling using the Drillmite™, we have sampled a parabolic dune structure in central Alberta using both open profile and deep core sampling methods. Preliminary results suggest the data are congruent. The dating of basal sections of Prairie dunes will be particularly imperative in helping ascertain the timing of the initiation of eolian activity following the Late Wisconsinan Laurentide Ice Sheet retreat.

Poster Session C

Najibi, N
Abedini, A

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Analyzing and Simulation of Underwater Digital Terrain Model (UDTM) Using Airborne LiDAR Hydrography (ALH) Technique for Hydrological and Floods Risks Assessment

Simulations of the hydrological risks and the decisions of afterward strategy assessments are crucial in the context of extreme meteorological events due to the consequences of the fast changes in the climate. The remote sensing methods as Airborne LiDAR Hydrography (ALH) back-scatter techniques are allowing the elaboration of a high precision (5 m vertical and 3 points/m horizontal resolutions) Underwater Digital Terrain Model (UDTM) as basis of the hydrological modeling. UDTM is initially applied to analyze of the topology of the under-water's terrain but also for mathematical simulation and spatial data. This is a method for Geospatial Information System (GIS) needed for simulations of the hydrological hazards. DTM refers to a digital representation of a surface through elevation values. This paper presents the ALH techniques in underwater analysis. So with raw data from LiDAR, we could extract very important information such as slope, aspect, contour, profiles. Here, we focus on the commonly slope map, hill shade map profile and in the end on hydrological risk modeling. Using a LiDAR technique correlated with a high GIS platform we can easily predict, model and even emit hydrological forecasts. The useful of the UDTM outputs are for hydrologic applications and the potential application for many organizations against sea floods and making plain assessment strategies.

Session: W2.9

Naqvi, K
Waldichuk, T

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The Potential of Interdisciplinary Studies for Analysing and Describing Place

The outwardly generic landscape of the big box store is examined through geographical analyses of changing human-land relationships, social conflicts over urban planning goals, and the material and symbolic dimensions of production and consumption. Together, they reveal a complex palimpsest of physical and social processes which underlie the visible landscape. Geographical analyses are then compared with the results of three very different methodological approaches from the visual arts, creative writing and a non-traditional method applied in plant

ecology. Each demonstrates new dimensions of the definition and creation of place, as both a cultural and a material phenomenon. Interdisciplinary approaches are found to enhance geographical methods of identifying and describing 'place' by emphasizing its role as part of the human experience.

Poster Session B

Neudoerffer, C

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Social Transformations in Rural Manitoba: Implications for Building Social-Ecological Resilience in the Face of Climate Change

Farmer-led community-based organizations are anticipated to be an instrumental element in any climate change adaptation strategy on the Canadian prairies. A number of key social transformations now underway on the prairies, for example shifting demographics such as aging farmers, rural depopulation, and increasing farm size, threaten the viability of many existing community-based organizations. This presentation will focus on the results of a case study of the key elements of social transformation contributing to social-ecological resilience and responsible for the 25-year success of the Deerwood Soil and Water Management Association (DSWMA) in Miami, Manitoba. Many of these elements, for example social networks and social capital, were based on the farmers' collective history and experience. However, much of this is eroding as children move off the farm and farm sizes increase. The type of farmer-led institution for learning and experimentation that DSWMA created 25 years ago would be much more difficult to establish today because of these changing social realities. Such 'boundary institutions', which provide a venue for social learning and interaction across scales - via membership from federal and provincial government departments and agencies, Rural Municipalities, NGOs, and university researchers - are increasingly recognized as necessary for adaptation. The results of this case study provide a preliminary snapshot of these changing social dynamics, how they affect social-ecological resilience, and some attendant climate change policy implications.

Session: R3.1

Nguyen, N

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Change in RADARSAT-2 Dual-Polarization Backscatter Intensity over the Great Lakes Ice Cover During Winter 2009-2010

The Great Lakes are the world's largest freshwater surface, covering an area of 245 000 km². Ice cover is a critical alteration of the physical characteristics of the lakes, and has a major impact on lake-atmosphere interactions affecting regional climate as well as on shipping industry. The large-scale nature of the ice cover in large lakes requires the use of satellite SAR data to satisfy both the necessary high resolution and the large areal coverage. As Canada's leading source of ice information, the Canadian Ice Service has been investigating the potential of RADARSAT-2 dual-polarization (HH-HV) image products for application to: a) the mapping of lake ice cover characteristics, and b) the monitoring of change in lake ice cover characteristics over the winter season. For the duration of the 2009-2010 ice season, RADARSAT-2 was tasked to image the Great Lakes on a daily basis. Ice extent, type, and concentration were identified by specialists at the Canadian Ice Service. This project studies the change in RADARSAT-2 dual-polarization backscatter intensity from lake ice cover as function of time. RADARSAT-2 sensitivity to the onset of ice formation, the nature of ice cover observed, and the growth of the ice cover over the winter season is also determined.

Poster Session A

Ninglekhu, S

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Democracy and Citizenship Formation in Urban Nepal

This article is concerned with politics of citizenship formation in the city. I take up the notion of subjectivity as the way it is produced and enacted to break open the mainstream categories of citizenship and governance. My study examines self-governance practices of slumdweller communities in Kathmandu as a way to look into the complex ways in which citizenship is constructed and enacted locally. In the absence of any legal status to claim municipal citizenship rights, the slumdweller communities often couch their demand for the right to live in the city in the language of citizenship and democracy that draws its meaning from places extending beyond the city. Through this study, I attempt to stretch the frontiers of many strands of urban studies, coming out of the Right to the City literature, beyond the confines of the urban. I do so to suggest that the Right to the City literature can make more meaningful contributions to our understanding of urban citizenship by examining the ways in which what is understood as the urban lends itself to places that transcend its boundaries.

Session: W2.8

Nugent, J

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“Someone Has to Build it” – Labour’s Response to Climate Change Under Neoliberalism

The concerns and vision of organized labour in Canada are shaping and being shaped through climate change politics. Ideological work by unions has helped linked climate change to ongoing struggles of labour against neoliberalism and for greater democratic control of capital. During the Kyoto Protocol ratification debates, trade unions successfully challenged the ‘jobs versus the environment’ dichotomy used by business to reject Kyoto in favour of voluntarist emission reduction policies. But aside from this ideological work, counterhegemonic labour-environmental alliance-forming has been weak and slow to materialize in practice due to internal disagreement within the labour movement over how to support emission reductions in addition to differing strategies for responding to worsening political-economic conditions. Recent framing of climate change by the labour movement as an opportunity for green job creation has played into a hegemonic shift that recasts climate change as a ‘win-win’ for business and the environment. Some unions have embraced this ecological modernization discourse as a strategic response to job losses under neoliberalism or in an attempt to reconstitute Fordist relations. But the ecological modernist discourse fails to address the transnational dynamics of climate change and goals of realizing global economic and environment justice.

Session: F2.3

Ochoski, N

King, D
Duffe, J

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Phragmites Australis Detection Using Single-Polarized Analysis and Fully Polarimetric Radar (RADARSAT-2) Decomposition

Wetlands are a vital ecological component and protecting them from invasive vegetation species is of paramount importance. This research investigated the capacity for single-polarized and fully polarimetric radar (RADARSAT-2) to be used for the purpose of detecting the invasive common reed (*Phragmites australis*) in southern Ontario marshlands. Using single-polarized radar, it was shown that patches of *Phragmites australis* could be distinguished from neighbouring vegetation types; the best results were achieved using a combination of incidence angles and temporal imagery (spring and summer seasons). The physical characteristics of the wetland vegetation played a role in the detection of *Phragmites australis*; Density (% cover), adjacent cover (heights, density and orientation), condition (standing or broken) and composition (patch purity). Detection accuracy ranged from 60-90% where patches of *Phragmites australis* were greater than 9m across. These results suggest that single-polarized C-band radar is a viable option for wetland vegetation discrimination, based on the above characteristics, in situations where

neighbouring vegetation is structurally distinguishable and patch sizes are sufficient for detection at medium (~3m) resolutions. The all-weather capability of radar imagery makes it suitable for mapping expansive wetland areas over a relatively short period of time. Fully polarimetric radar analysis is underway and results will be available by the time of the 2010 Prairie Summit.

Poster Session A

O'Laughlin, C
van Proosdij, D

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Spring/Neap Variations in Tidal Creek Hydrodynamics, Bay of Fundy

The recent deployment of a submerged tidal power turbine in the upper Bay of Fundy, Nova Scotia, has raised questions about alterations to natural ecosystem dynamics. Changes in the natural range of a macrotidal system in response to energy extraction are anticipated, although the magnitude of change is unknown and may or may not occur within a range of natural variability. Variations in tidal prism, current velocity and turbulence were investigated over the spring/neap cycle in a confined tidal creek on the Minas Basin, to determine if variations in tidal energy were viable for use as a proxy for energy extraction. Acoustic Doppler Velocimeter (ADV) data indicate that for spring, transitional and neap tides that are restricted to the creek (below creek bankfull level), current velocity and turbulence show strong flood dominance. Higher tides (4 metres or more) show a generally even distribution of tidal energy above bankfull level and a strong tendency toward ebb dominance at low water levels (less than 1 metre). Maximum per-tide current velocities range from 10 cm/s to 20 cm/s in the thalweg and up to 30 cm/s on the creek bank. This has implications for the application of spring/neap energy variations as a proxy for energy extraction and demonstrates that tidal prism is potentially an important factor.

Session: R2.4

Oliver, R

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Toronto's Sportsclapes: The Intersection of Sport, Space and Symbols on Toronto's Waterfront

In a 2006 article, *Toronto Star* columnist Christopher Hume used the dismal performance of the city's hockey team – the Toronto Maple Leafs – to characterize the woes of the city's public culture. Calling the team a group of “perennial losers” and suggesting that the team's management was “second rate,” Hume suggested that the City of Toronto, like the Leafs, had an image problem. While it is unlikely that Hume penned his point with the expectation that his words would stimulate a serious debate on the significance of the intersections of sport, space and society, his comment that the city's new hockey arena failed to provide a connective glue between city and waterfront was telling. How could these new “social cathedrals” fail to become good civic spaces? This research explores the spatial locations and social implications of several of Toronto's recent sport stadiums. It specifically examines how the symbolic power of sport has been used in efforts to reconnect the city with its waterfront. A new stadium cannot only secure consent for redevelopment and restructuring, but it can also expose the contradictions within urban processes.

Session: R1.6

Olsen, D

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'Simply the Best': Olympic Medal Winners and Their Economic and Social Impacts on Their Hometowns

Numerous studies have examined the pros and cons related to the social, economic and political ramifications of the Olympic Games on host cities. However, little has been discussed looking at the impacts the Olympic Games have on areas outside of the host city. This presentation goes beyond Vancouver as the 2010 Winter games host city and examines the ways in which hometown celebrations related to the return home of Canadian Olympic medalists have influenced and may improve both the short-term and long-term economic and social prospects of these communities.

Session: S2.5

Olthof, I
Pouliot, D
Latifovic, R

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Subtle Land Cover Trend Detection and Verification Using a Chronosequence from Dated Fire Scars

Many land cover change detection approaches using satellite data have been tailored to identify abrupt changes due to disturbance and land use. These approaches often miss subtle and progressive change due to regeneration, climate change and succession. Although subtle change may be detectable in satellite image time-series, it is often flagged as false change due to a lack of in situ or other information required for verification, and then filtered to reduce commission errors. In this paper, we propose a simple approach to map subtle and progressive change based on robust multispectral trend detection combined with temporal signature extension from a baseline land cover using 250m MODIS data. The magnitude of detected land cover trends is verified with a land cover chronosequence using boreal fire as a stand replacing disturbance, which we hypothesize as having predictable and spatially consistent regeneration that can serve as a template to confirm multi-temporal trends in the 250m MODIS land cover time-series. Results demonstrate generally good agreement between the change magnitude from the chronosequence and MODIS land cover time-series for forest and ground vegetation consisting of herbs and shrub in the southern boreal forest, where temporal information contained in the chronosequence may be reliable due to a reasonable degree of spatial stationarity. In the north, spatial variance in regeneration appears greater, which may limit its use as a chronosequence for temporal trend verification.

Session: W4.8

Organ, J
Furgal, C
Castleden, H

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Community Freezers as a Catalyst Towards Traditional Food Security: Perspectives from Inuit Residents of Nain, Nunatsiavut

Many Inuit of Canada rely heavily on sharing mechanisms among kin and other close-knit groups to access traditional/country foods. Despite the increased availability of market foods, Inuit continue to consume country foods for their nutritional, traditional and cultural value. However, participation in the wage economy, costs associated with hunting, and changes in environmental factors have posed challenges for some to access country foods. Inuit residents of Nain, Nunatsiavut have recently reported challenges to country food access altered by changing sea ice conditions associated with climate change and variability. Nain currently operates a community freezer, a response measure that some Inuit communities throughout the Canadian Arctic have adopted to increase support for food accessibility to residents throughout the year. In the face of increasing pressures on country food accessibility related to climate change and variability, there is interest from the government of Nunatsiavut for research to focus on the community freezer and its support for traditional food security in Nain. Through semi-structured interviews and participant observation during the 2010 spring/summer field season, this project will seek to: 1) understand how the Nain community freezer enables access to healthy country foods for current users; 2) identify barriers/challenges to access; and 3) determine how it can be best managed so that it contributes toward addressing current and anticipated environmental stress on food security among Inuit households in that region.

Poster Session A

Ouellet, M-A
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Hyperconcentrated Flow and Associated Risk: A Hydrogeomorphological Analysis of a Forested Alluvial Fan, Northern Gaspé Peninsula, Quebec

The Gaspé Peninsula is composed of small to medium watersheds in which the fluvial dynamics are very sensitive to climatic and environmental fluctuations. In view of the ongoing and anticipated impacts of global climate change, the spatiotemporal variability of flow patterns, notably of those carrying important sediment loads to alluvial fans, becomes less predictable and can represent a risk for public safety. This risk is particularly exacerbated by the location of the fans at the interface of valley slopes and valley bottoms, which is often heavily populated. From a risk management perspective, proper identification of hydrogeomorphic processes is of utmost importance as it will determine the prediction and mitigation tools to be employed. This study proposes a hydrogeomorphic analysis of a small forested alluvial fan in order to better guide sustainable regional planning initiatives. A retrospective approach based on the historical dimension of high-magnitude events is applied. Sedimentological analyses point to the prevalence of hyperconcentrated flow, an intermediate in the continuum of channelized flow processes between debris flow on one end and water flow on the other. Dendrogeomorphology techniques retrace the geomorphological dynamics in time and space with an annual resolution. These data dress a spatiotemporal portrait of the fan dynamics and allow to calculate the return period of high-magnitude events from the early 1900s to the present, indicating a six to ten year recurrence of the process at the fan scale. The results presented contribute to a better understanding of the activity of small-scale forested hydrosystems in the context of climate change.

Poster Session B

Pankiw, J
Piwowar, J

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The Impact of Texture Analysis on Object-Based Classification of Shelterbelts

In previous research it was indicated that using SPOT-5 2.5 metre panchromatic imagery and object based classification provides an effective resource to identify Prairie shelterbelts. Using spectral and shape features as the basis for classification provided a classification accuracy of slightly over 80%. Despite the effective classification of shelterbelts using these features to classify objects, accuracy was compromised by the lack of multi-spectral data

making it difficult to differentiate between shelterbelts and the surrounding landscape. As a result of the lack of contrast between the trees and the surrounding landscape a high number of objects were falsely classified. A solution to this problem is the use of texture features as means to separate non shelterbelt objects from shelterbelt objects. It is thought that due to the high homogeneity of the surrounding landscape compared to shelterbelts that classification accuracy might become greater than previous classification procedures using mainly spectral data. The objective of this study is to use both spectral features and texture features using SPOT 5 2.5 metre panchromatic images to compare and contrast the two different features to determine differences in classification accuracy.

Session: W3.8

Parizeau, K

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Value Creation and Informal/Formal Sector Interfaces in the Waste Management Industry in Buenos Aires, Argentina

Since the financial crisis of 2001-2002, informal waste collection ('cartoneo' or waste picking) has proliferated in the urban environs of Buenos Aires, Argentina. The economic crash drove up the price of imported materials, thus creating a need for local industrial inputs. Economic changes also led to mass unemployment and a need for income-earning opportunities with a quick cash turnaround. The result was a substantial increase in the informal reclamation of materials from curbside waste. This presentation will address the interplay between formal waste collection systems and the informal sector in Buenos Aires, Argentina. How does the existence of an informal waste collection system affect the valuation of waste materials? This question will be approached with respect to both the resale of reusable/recyclable materials removed from the trash, and the renegotiation of waste service contracts in light of an active informal waste sector. I will address the potential effects of this interface between formal/informal actors on the cityscape, on economic circuits, and on waste management governance processes more generally.

Session: W4.1

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Effects of Street and Body Orientation on Human Absorbed Radiation

Human and animal radiation exchange is affected by posture, body orientation to radiation sources and the surrounding environment. A new model is used to simulate absorbed radiation on a person walking along urban streets running N-S, E-W, NE-SW and NW-SE. A late July, hot summer day in Regina is simulated at 1200 and 1500 true solar time. Body orientation to the solar beam has only a small effect on absorbed direct beam solar radiation by the walking person, about 15 Wm⁻². The major effect of street orientation is shading by buildings. This can alter the simulated person's absorbed direct beam solar radiation by up to 100 Wm⁻². Streets running parallel with the solar beam had up to 45 Wm⁻² more absorbed long-wave radiation than shaded streets. Building height also affects long-wave radiation. The effect of ground and building shading outweighed the proportion of cold sky. Afternoon environmental mean radiant temperature decreased between 25 and 30 oK and absorbed long-wave radiation decreased up to 45 Wm⁻² on street orientations where surface and building shading occurred as the building height to distance away ratios increased from 1 to 3. Human body orientation to the direct solar beam has only a small effect on radiation absorbed by a walking person. Urban areas possess a wide range of radiation microclimates. Shading can play a large role in helping to alter summer thermal sensation from hot to slightly warm or neutral.

Poster Session A

Parvazi, M

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The Relationship Between Inversion and Tehran Air Pollutants by Using Multiple Variation Regression Test (Simultaneous Method) During the Statistic Period of 1375-1385

Air pollution is one of today's most critical societal issues and is especially problematic in some large cities. Tehran serves as an example. It is facing this problem as a result of several factors. Because of the topography and the natural factors in the north and the south and also major winds in the east and the west, temperature inversion during cold period, low falls which can not clean the air, growth of the population on the other hand and the development of industrial activities using million liters of fuels in various resources, increasing number of vehicles and house fuels as well, it has become one of the most polluted cities of the world. The result of the above mentioned problems are heart-failure, respiratory diseases, lung problems, nerve illnesses, chronic headaches and many other diseases. In this survey, the relationship between air pollutants and inversion and its impact on mortality due to heart-failures in Tehran and in the ten-year statistic period from 1375-1385 was reviewed in a daily manner. The statistic related to mortality numbers due to heart-failure and lung diseases, station of Vila, Azadi, Bahman, Pardisan, Tajrish, Gholhak and the Sorkhe Hesar for different days of a year were obtained from the related organizations. They were processed by Excel and Spss softwares and the relationship between heart-failure and inversion and air pollutants was analyzed using statistic methods. The results considerably show that heart failure is meaningfully related to the growth of air pollution like Carbon monoxide (CO), suspended particles (PM), Dust, Nitro oxide (NO), Ozone (O₃) and the inversion day during a ten-year period diseases with CO and NO₂ level, PM and O₃ and lung diseases with NO₂, PM, and Dust. These are present in during 1375-1385 statistical period.

Session: S2.3

Patel, S

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"I Hope You Learn to Paddle Your Own Canoe": White Rugged Settlers of Canadian Wilderness

Informed by themes of the 'True North', wilderness and colonial violence, my paper unmaps the space of wilderness as natural spaces existing outside the law. As Richard Phillips (1997, 143) states, "to unmap literally is to denaturalize geography, hence to undermine world views that rest upon it." This study argues that wilderness is a socio-historical construct embedded in particular histories and practices of colonial violence. I examine the relationship between production of wilderness and the making of settler identities as featured in real and imagined geographies of Canadian nation. In particular, I examine the making of settler subjectivities through unmapping the space of Algonquin Provincial Park as a space of wilderness. Canadian parks are important in promotion of the country as close to nature. Tourists to Canada are invited to "experience the natural wonder of Canada's parks from lush urban forests to a vast wilderness of jagged mountain peaks, alpine valleys, plunging waterfalls, pristine lakes and dramatic wildlife". As embodiments of the national narrative of empty wilderness, parks are important sites for investigating the colonial violences underpinning the notion of nature in white settler society. To visitors of Algonquin Park, land claims by the Algonquins are invisible and the Park exists as the peaceful green space that offers the tired body an escape from the urbanity of daily life. My paper attempts to examine who is this settler-subject who is invited to experience the wilderness and peace of the park.

Session: W2.3

Patterson, K
Smith, D
Niemann, K
Demuth, M

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Examining Glacial Volume Change at Bridge Glacier Using LiDAR Remote Sensing: A Preliminary Assessment

Bridge Glacier is a prominent eastward flowing outlet glacier from the Lillooet Icefield, southern British Columbia Coast Mountains. Within the historical period Bridge Glacier has dramatically downwasted and retreated, releasing meltwater into the Bridge River in sufficient quantity to generate 6-8% of British Columbia's electrical supply. As the

glacier continues to shrink in size, it is important to document its annual volumetric changes in order to provide the insights needed to properly manage this diminishing resource. Although LiDAR imagery potentially provides an accurate means of assessing changes in surface elevation, errors related to the effects of changes in aircraft altitude and slope of the ground surface negatively impact on its accuracy level. LiDAR data processing can be facilitated by using intensity data for land classification purposes and photogrammetric data for landscape interpretation. The purpose of this research is to compare LiDAR and photogrammetric data acquired in 2006 and 2009 at Bridge Glacier. A primary objective of the study is to refine data processing techniques and error correction methods for glaciological studies. Our paper presents the preliminary results of these investigations and offers LiDAR-derived insights into volumetric losses experienced by Bridge Glacier over this three year period.

Session: W2.9

Peddle, D

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The Early Years of Captain James Cook and His Role in 18th Century Cartography and History in Newfoundland: Formative Training for His Three Great Voyages of Discovery

Captain James Cook was a remarkable individual whose contributions to the world in the form of his three great voyages of discovery are well known. However, less is known of his life and explorations that preceded these global voyages of discovery. This paper considers his early years and formative training to explore how his early years and seafaring experiences led to significant contributions during a series of major survey expeditions to Newfoundland in the mid to late 18th century. These surveys not only provided valuable maps of uncharted areas, but also were called to duty for the purpose of preserving treaties and agreements between the British and French during a time of political turmoil and battles over ownership and rights of this land and its valuable land and ocean resources. Perspectives and examples that these experiences had on his subsequent voyages of discovery are provided with respect to survey practise, cartographic protocols, and his naming of distant places based on associations with similar coastal landscapes (e.g. Bay of Islands, Newfoundland and New Zealand).

Session: F2.6

Peddle, D
Boon, S
Glover, A
Hall, F

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Mountain Pine Beetle Structural Change Assessment from Pre-outbreak (1999) and Post-outbreak (2007) Satellite Imagery Using BIOPHYS-MFM Canopy Reflectance Modeling near Prince George, British Columbia

The mountain pine beetle (MPB) has killed over half of the mature pine forest in British Columbia (BC), with significant implications to the forest industry, ecology, and the national carbon balance. Remote sensing provides important survey, change assessment and prediction capabilities over these large areas for inventory, salvage, biomass and carbon reporting. Canopy reflectance models provide an explicit physical-structural basis for estimating biophysical structural information and change from MPB damage. The BIOPHYS multiple-forward mode (MFM) approach provides improved reflectance modeling by enabling direct forest structure output from complex non-invertible models, while having reduced or no user input requirements and retaining full sun-surface-sensor geometry and sub-pixel scale analytical capabilities. Using the MFM-Blind approach that requires minimal user input and model parameterisation, forest structure was derived from pre-outbreak (1999) and post-outbreak (2007) satellite imagery with validation against field data from healthy and MPB damaged stands at a study site near Prince George British Columbia. MPB structural change results from BIOPHYS-MFM were validated for 2007 Landsat imagery against field measurements at MPB-killed stand plots as ± 500 stems/hectare for stand density, ± 0.65 m for crown radius, and ± 0.80 m for tree height, from which change assessment estimates were derived against 1999 image structural outputs.

Session: F2.5

Peddle, D
Hall, F
Huemmrich, K
Masek, J
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Remote Sensing of Forest Structure from MODIS Imagery for Biomass Monitoring in Boreal and Mountainous Terrain Using the BIOPHYS-MFM Algorithm

The BIOPHYS-MFM algorithm provides innovative and flexible methods for the inversion of canopy reflectance models to derive biophysical structural information for monitoring, inventory and quantifying vegetation state and disturbance, and for input to ecosystem, climate and carbon models. The algorithm generates products such as land cover, biomass, stand and crown volume, stem density, height, crown closure, leaf area index (LAI), crown dimension, productivity, topographic correction and validation, structural change from harvest, fire and mountain pine beetle damage, and water / hydrology applications. BIOPHYS-MFM has been applied in different ecosystems across Canada (six provinces from Newfoundland to British Columbia) and USA (NASA COVER, MODIS and LEDAPS sites) using 7 different canopy reflectance models and over 10 different airborne and satellite imaging systems. In this paper we summarise the BIOPHYS-MFM algorithm and results from Terra-MODIS imagery from MODIS validation sites at Kananaskis Alberta in the Canadian Rocky Mountains, and from Boreal Ecosystem Atmosphere Study (BOREAS) sites in Saskatchewan Canada. At the montane Rocky Mountain site, BIOPHYS-MFM density estimates were within ± 380 stems/hectare (ha), with horizontal crown radius (HCR) ± 0.4 m, vertical crown radius (VCR) ± 0.6 m, and height (HGT) ± 0.8 m. At BOREAS, single-date MODIS imagery yielded density estimates within ± 210 stems/ha, HCR ± 0.3 m, VCR ± 0.5 m, and HGT ± 0.9 m. We concluded that good results from MODIS were obtained for both boreal and montane ecosystems, especially given the steep environmental gradients involved at the latter and in comparison with Landsat results. These are useful inputs for deriving biomass and for forest monitoring, inventory, update, and analysis.

Poster Session B

Peddle, D
Selk, R
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Sun Glare Road Hazard Mapping, Lethbridge Alberta: The Fiat Lux Model

The potential hazards of sun glare to road safety are known to most drivers; however, there have been few studies to quantify and predict the nature, timing and severity of this hazard. Sun glare is a significant problem for the project study area Whoop-Up Drive in Lethbridge, Alberta, Canada, a major urban road artery across a large valley and spanning the Oldman River to west Lethbridge. The use of solar position algorithms, Digital Elevation Models (DEMs), digital road networks, Geographical Information Systems (GIS), Global Positioning Systems (GPS), viewshed analysis and slope and direction comparisons are the essential elements in producing sun glare hazard maps along Whoop-Up Drive. These elements have been integrated into the Fiat Lux software model to determine the timing, extent and severity of sun glare as a road hazard. The goal is to provide useful public information on potentially hazardous driving times as well as contribute to municipal transportation planning in terms of potential mitigation strategies for existing roadways as well as urban planning of future road networks. Hazard ratings are based on vertical and horizontal angular offsets with respect to 3-D view (driver) position and sun location vectors, producing five hazard classes: none, low, moderate, high and extreme. Implementation of the model provides the City of Lethbridge with a tool that can be used to describe and potentially predict probable road hazards due to sun glare as well as a potentially useful tool for use with transportation planning.

Session: F1.5

Perez-Valdivia, C
Sauchyn, D

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Groundwater Levels and Teleconnection Patterns in the Canadian Prairies

Thirty three hydrological time series of shallow groundwater levels, precipitation, and moisture-sensitive tree-ring chronologies were analyzed and compared to four climate indices. Pearson's correlation and spectral analyses were used to document the influence of El Niño Southern Oscillation (ENSO), the Pacific Decadal Oscillation (PDO), the Atlantic Multidecadal Oscillation (AMO), and the North Atlantic Oscillation (NAO) on shallow groundwater levels and precipitation records of the Canadian Prairies. Modes of variability in the 2-6, 6-10, and 18-22 year bands were detected and reconstructed. Correlations between these oscillation modes and the climate indices suggest that variability in the 2-6 and 6-10 year bands is highly influenced by ENSO and PDO. The oscillation modes in the 18-22 year band are highly negatively correlated with the PDO index. In addition, shallow groundwater levels in Saskatchewan are reconstructed using moisture sensitive tree ring chronologies from southern Saskatchewan and North Dakota, expanding groundwater records for over 150 years.

Session: W3.3

Peters, E

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Moving Place to Place Makes it Homelessness: Perceptions of Home and Homelessness Among First Nations Hidden Homeless People

This paper explores the meanings of home and homelessness among adult First Nations hidden homeless band members living in an urban centre. Individuals were defined as hidden homeless if they would be absolutely homeless if they could not stay with friends or family. There is an increasing recognition of the complexity of homeless experiences in the literature. There are also diverse experiences of home. Sometimes homelessness has been defined as the antithesis to home and seen mainly in terms of the absence of certain characteristics associated with home. Some studies have found that homeless people contest this categorization, interpreting their own versions of home on the basis of what is achievable for them, given their circumstances. Ideas of home and homelessness are complicated for First Nations people in this study because of the colonial legacy of extreme poverty and housing shortages on reserves, and because they have found shelter with friends and family.

Session: R3.3

Picton, R

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Selling National Urban Renewal: The National Film Board, the National Capital Commission and Post-War Planning in Ottawa, Canada

In the immediate postwar period, two federal institutions, the National Capital Commission (NCC) and the National Film Board (NFB), worked in tandem to disseminate the promise of post-war urban renewal. Using film and archival evidence, this paper draws attention to the importance of historical and archival research in lifting the veil on the connections between film representations, ideology, power and urban politics. This paper investigates how the NFB's promotional efforts complemented the NCC's Canadian post-war urban planning efforts and how film and planning techniques perfected during the Second World War would be used to sell national urban renewal to Canadians. Rather than a model of success of these planning practices, however, the failed redevelopment of LeBreton Flats is an ironic reflection of the failure of Canadian post-war planning practices in the national capital that exemplified the willingness to abandon democracy in favour of modernist dreams. Rooted in centralized planning, steeped in militarist rhetoric, and embedded in authoritarian tendencies, federal plans for a new modern capital had tragic implications for the marginalized and dislocated residents of the inner-city neighbourhood of LeBreton Flats.

Session: W4.2

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MFM Canopy Reflectance Modeling of Forest Stand Height in Mountainous Terrain, Kananaskis Alberta

Forestry applications such as inventory benefit from a variety of remote sensing products over larger areas and for archival and update purposes. Extracting tree height is of particular importance yet poses unique challenges. Passive optical satellite imagery is the only data source at present that has sufficient coverage, lower cost, and potential information content; however, the latter has been problematic using traditional methods. In this paper, a physically-based modeling approach based on multiple-forward mode (MFM) canopy reflectance model inversion was used for deriving tree heights at Kananaskis Alberta in the Canadian Rocky Mountains. Overall MFM height accuracies against field measurements were $\pm 0.9\text{m}$ for *Pinus contorta* and $\pm 1.4\text{m}$ for *Populus tremuloides* from IKONOS 4m imagery. MFM provides a capability for height estimation from passive optical satellite imagery over large areas that are neither feasible nor cost-effective using current LiDAR, aerial photography, radar or field-based surveys. The MFM approach is suitable for independent use, or for integration with existing forest inventories or other applications.

Session: R3.9

Pitman, K
Bingham, C
Demidow, M
Heathfield, D
Mumeni, A
Underhill, B
Ward, S
Smith, D

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Geobotanical Tales from the Asulkan Glacier, Glacier National Park, British Columbia

Geobotanical evidence was used to date the Little Ice Age (LIA) activity of the spillover tongue of the Asulkan Glacier in Glacier National Park, British Columbia. *Rhizocarpon geographicum* and trees found colonizing moraine surfaces were dated using a combination of lichenometric and dendrochronologic methodologies. A local ecesis interval was established from terminus positions shown on historical photographs and compared to those determined in a previous study. Increment core sampling and annual growth ring counts of the oldest trees found growing on the crest provide a minimum moraine age. Where the trees were too small to be cored, the number of stem whorls were counted to provide an estimate of tree age. The diameter of the largest lichen thallus found growing on boulders in the moraines were measured with digital calipers and aged using a lichen curve calibrated at nearby Illecillewaet Glacier. Three intervals of glacier expansion were recorded: a maximum LIA advance in the 16th century, a second readvance in the 17th century, and a minor readvance or standstill in the 18th century. The results of our investigations are comparable those reported from other sites in Glacier National Park and provide a perspective on glacier dynamics in the Columbia Mountains in the late-LIA.

Session: W4.3

Pittman, J

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Watershed Drought and Excessive Moisture Preparedness in Saskatchewan

Extreme hydroclimatic events, such as drought and excessive moisture, are natural and reoccurring features of Saskatchewan's climate, and these extreme events have significant implications for agriculture, communities, municipalities, watersheds and the environment. Climate change is expected to increase hydroclimatic variability in the future, leading to increases in the frequency and severity of drought and excessive moisture, and thus elevating the risk associated with these extreme events. Proactively preparing for drought and excessive moisture can reduce future vulnerability and even provide opportunities. A series of workshops were held in various provincial watersheds that engaged the participation of a wide range of stakeholders, including agricultural producers, NGOs, municipal decision makers, watershed advisory groups, government agencies and scientists. These workshops helped gather information on local drought and excessive moisture vulnerabilities and identified appropriate strategies to manage

drought and excessive moisture risk. This initiative will provide the basis for the development of future preparedness planning initiatives at the watershed level.

Session: S1.3

Piwowar, J

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An Environmental Normal of Vegetation Vigour for the Northern Great Plains

Normalized difference vegetation index (NDVI) data from the Advanced Very High Resolution Radiometer (AVHRR) sensor on board the National Oceanic and Atmospheric Administration (NOAA) satellites were used to create a spatially detailed baseline of vegetation conditions in the northern Great Plains of North America. An environmental normal of vegetation vigour was created from NDVI means and standard deviations calculated over 22 years for each 10-day period during the growing season. Significant vegetation vigour anomalies – differences from the normal – were subsequently identified and associated with concurrent temperature and precipitation data. Growing season vegetation vigour anomalies were found to be most dependent on weather patterns from the previous spring, and in some cases, from the preceding summer. Regions with the densest and most diverse vegetation covers were impacted the most by temperature and precipitation. Statistically significant increases in vegetation vigour over the 22-year period were measured across the entire study area, with the exception of the vegetation communities with the sparsest ground covers. This increase was matched by a similarly significant rise in annual NDVI variability for all of the phenologies. The changes in vegetative cover leading to the increase in NDVI values may be related to warmer winter temperatures.

Session: F1.3

Pottie-Sherman, Y

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Ethnic Food, Electronics and Engagement? Understanding Citizenship and Multiculturalism Through the Chinatown Summer Night Market

This paper presents preliminary doctoral research on the urban marketplace and its role in mediating cultural interaction. Interaction in plural societies has long been an issue for social scientists. Observing colonial Indonesia, the economist J.S. Furnivall wrote that “there is only one place in which the various sections of a plural society meet on common ground – the marketplace” (1939, 449). To others, however, economic interaction between groups is a non-event – the seeming “symbiosis” of the marketplace is accompanied by “mutual avoidance” (Smith 1965, vii). Present day discussions of interaction in plural societies centre on issues of social cohesion, “superdiversity” (Vertovec 2007), and debates concerning the extent to which immigrants lead “parallel lives” within host societies (Phillips 2006) and many sites of engagement are identified within this literature, including the study of immigrant and ethnic entrepreneurship. Most discussions of this type of enterprise, however, have not strayed far from the realm of political economy, and few have considered the intercultural relationships established through ethnic enterprise and what these relationships might mean for citizenship and social cohesion in multicultural societies. My paper aims to contribute to these debates by approaching them from the perspective of citizenship and grounding these theories in Vancouver’s Chinatown Night Markets: seasonal markets that mimic the flea markets of Hong Kong, and bring together buyers and vendors of numerous cultural backgrounds. Besides acting as avenues for business transaction – around ethnic food, electronics, clothing and entertainment – are these Night Markets also sites of social engagement? What kinds of linkages are formed, through formal and/or grey market activity, and how thick are these linkages? Are these interactions between cultural groups characterized by “symbiosis,” “mutual avoidance” or something altogether different?

Session: W3.7

Pouliot, D
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Fernandes, R
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Monitoring Natural Vegetation Land Surface Phenology in Canada: Potential for National Scale Monitoring

Seasonality/phenology is the periodic change in environmental conditions caused by inter-annual climate variation. Phenology refers specifically to the seasonality of living things. Seasonality alters the timing and duration of snow/ice/vegetation covers which can have significant impacts on water availability, wildlife habitat, hazard risk, and climate change. Earth observation (EO) satellite data records have been shown to provide spatially continuous information on seasonal dynamics complimenting existing sparse ground based monitoring networks. In Canada, monitoring EO methods for snow and ice seasonality have been developed and applied at the national scale. Research on phenology methods has been conducted, but has not yet been used for national monitoring. In this research the need, current capacity, and main limitations for national scale phenology monitoring are reviewed and results presented involving analysis of PlantWatch observations for EO phenology validation, optimization of temporal resolution, and AVHRR and MERIS integration for improved phenology retrieval.

Session: R4.9

Pruden-Nansel, K

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Knowledge Sharing by First Nations and Métis Homeless People in Saskatoon

This study, undertaken by the Saskatoon Indian and Metis Friendship Centre (SIMFC), addresses the knowledge gaps related to homelessness in Saskatoon, Saskatchewan. Forty-four Aboriginal homeless individuals who visit the SIMFC shared and interpreted their experiences for the researchers. They identified issues which were vital to their lives. Through in-depth interviews, they spoke to the staff of the world of Aboriginal absolute and hidden homeless in this western Canadian city. Supported by the staff at the Centre, the participants explored their experiences with service organizations, their movement and mobility patterns, their relationships as hidden homeless individuals with the households that gave them shelter, the relationship between their urban homelessness and the lack of and/or the condition of housing in their rural or reserve communities, and particular elements which created homelessness for them and within Aboriginal populations. This presentation describes some of the results of this research.

Session: R3.3

Pujadas-Botey, A
Garvin, T

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Clarifying the Concept of Interdisciplinary Work in Ecosystem Management Research

Ecosystem management is an interdisciplinary field within the broader area of ecology. It addresses environmental problems by supporting and promoting interdisciplinary practice. The present study evaluates the definition of interdisciplinary work among researchers in the field. The goal is twofold: to motivate further discussions about the concept in EM, and to better situate EM in the broader context of interdisciplinarity in science. We identified key EM researchers using a modified systematic review process, resulting in a set of 119 on-line questionnaire responses. Data analysis consisted of hierarchical cluster and logistic regression analysis. Results indicate that researchers differ on the terminology used for interdisciplinary research; however, they share a common understanding of what interdisciplinary research is: both a "way to do research" and a "way of thinking about research." Differences between researchers suggest there is a growing interest in developing deeper engagements with theoretical discussions of interdisciplinary work taking place outside their own EM field. Results are discussed in the context of the contributions that theoretical considerations about interdisciplinary work can make to solving environmental problems.

Session: F2.4

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Creating New Spaces of History in the Cybercartographic Atlas of the Lake Huron Treaty

The project to create the Cybercartographic Atlas of the Lake Huron Treaty involves a web of collaborative working relationships between both Native and non-Native collaborators and reflects a diverse range of knowledge, experience and expertise, including knowledge of traditional Anishinaabe culture and language and critical understandings of history, geography and cartography. This project centres on fostering mutual understanding between cultures in the context of coming to a new understanding of the historical geography of Robinson Huron Treaty-based relationships through the creation of a unique cybercartographic atlas space. As a multidimensional study in critical cartography and an exemplification of the relational space approach, this research provides an ideal working example of “creating spaces for cultural and inter-cultural dialogue.” Cybercartographic atlases are known as being ‘virtual’ spaces within which multiple perspectives can coexist and be expressed through a variety of media. Through the use of geonarrative techniques, they tell stories about people, places and times in new insightful ways with the potential to stimulate intercultural (and intracultural) interest and understanding. As a prime example of this, the geonarratives in the Atlas are being designed to reflect a variety of treaty-based relationships at a variety of scales, tying together a vast range of relevant stories and knowledges in one space. This paper will describe both the potential of the atlas making process as a new knowledge space for learning about and coming to terms with intercultural differences (and similarities), and the challenges that come with trying to reach this potential.

Session: R2.2

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A Global Sensitivity Analysis of DNDC Model on Three Hills' Grassland

Computational ecosystem models are being increasingly used on local and upscale predictions of environmental research. As a process oriented biochemical model, DNDC (DeNitrification and DeComposition) has been widely applied to ecosystem carbon and nitrogen cycling simulation. However, the scenarios of uncertainty and sensitivity analysis (SA) of DNDC vary with different climate and soil properties. Consequently, the purpose of this study is to employ the Bayesian based global sensitivity analysis (GSA) tool by means of GEM-SA to conduct the first time's GSA study of DNDC, and then identify which uncertain inputs are driving the uncertainty of model outputs by ranking their sensitivity indices. DNDC was run 86 years on basis of Three Hill's grassland. We found the Gaussian emulation machine worked well with high efficiency and accuracy on DNDC, but the DNDC outputs (yield, annual change in soil organic carbon (dSOC) and N₂O flux) have comparative large uncertainty during multi-year's uncertainty analysis with mean of CV (coefficient of variation) 78.36%. The summary of 11 input parameters' main effects (SME) and their interactions (first and higher order) (INTER) with respect to given outputs have a dynamic tendency as well as the total effects of 11 inputs with different simulated year in all of the SA experiments. Most sensitive parameters (MSP) for yield and N₂O flux is soil wilting point, for dSOC, its SOCPB (SOC decrease rate below top soil) according to multi year's average main effects and total effects. As a result, the MSP for the whole model is soil wilting point and SOCPB. This work will provide a reference for further model validation and calibration work on DNDC.

Poster Session A

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Environmental Regulation in the Hog Farming Sector: A Comparison Between Catalonia, Spain and Manitoba, Canada

Intensive livestock operations (ILOs) have become the dominant livestock production system throughout much of the western world. This system is not without controversy. This paper examines policies in Catalonia (Spain) and

Manitoba (Canada) that have been enacted to control the management and expansion of the hog sector. Management policies include manure management and mitigating nuisance issues. Controls on expansion are aimed at reducing hog farm concentrations in particular regions of Catalonia and Manitoba.

Session: W3.5

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Effect of Noise on Image Classification: A Controlled Experiment

One factor limiting the accuracy of land cover maps derived from classified, remotely-sensed imagery is the quality of the spectral data used in the classification process. Satellite data is routinely pre-processed to improve both its geometric and radiometric qualities. We implement a factorial design that assesses the individual and joint effects of simulated sensor noise on specific spectral bands and along continua of intensity and spatial configuration; an image with no added simulated noise is our control. Our focus is on the radiometric component of image quality, as we assume that for our single-image controlled experiment, the multispectral bands are all perfectly aligned and that topographic relief insignificantly affects the geometric properties of our data. For each simulated noisy image we produce a detailed land cover classification using identically-defined supervised training signatures, and observe the spatial changes relative to the classification of the control image. We assess the classification accuracy between all noisy cases and the control using traditional error matrices, further assess the configurational uncertainty with the omega statistic, and characterize the class assignment uncertainty using the relative likelihoods of the assigned class and the next most likely class. The objective is to perform a full sensitivity analysis that quantifies the effect of noisy data on image classification, both in terms of the aspatial class area tabulations and their spatial configurations. We link the classification differences with uncertainty metrics as a guide to improving the selection of classifiers and pre-processing techniques.

Session: W1.8

Reyes, A
Froese, D

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Contrasting Glacial-Stage Loess Accumulation and Interglacial Thaw Unconformities in Perennially Frozen Pleistocene Eolian Sediments, Interior Alaska and Yukon

Thick loess sequences are common in lowland areas of eastern Beringia, the region of Yukon and Alaska that remained ice-free during glacial stages. Loess accumulation and aggradation of syngenetic permafrost characterize glacial and stadial periods, while there is evidence for surface stabilization, forest colonization, and shallow permafrost thaw during some interglaciations. Past ground thaw can provide valuable paleoenvironmental information if evidence for thaw can be dated adequately, and if it can be shown that thaw was coeval at multiple sites. The loess sequences of unglaciated Yukon and Alaska are ideally suited to this approach because they are interbedded with numerous distal tephra beds, which provide regional chronostratigraphic markers, and because the fine-grained loessal sediments commonly host ice-rich permafrost that is susceptible to thaw-related mass wasting and thermokarst. We describe stratigraphic relations, from sites in northern Yukon, the Klondike, and central Alaska, between Old Crow tephra (124 ± 10 ka) and overlying wood-rich organic silt/peat dating to the last interglaciation. In most cases, the last interglacial organic-rich sediments represent unconformities marked by ice-wedge pseudomorphs, or accumulations of detrital forest vegetation reworked by thaw slumping or deposited into thermokarst ponds/depressions. Consistent stratigraphic relations between the organic-rich unconformities and Old Crow tephra suggest that thaw of shallow permafrost was widespread during the last interglaciation, and that current ground warming foreshadows widespread near-surface thaw under modest future warming scenarios.

Session: S3.1

Rice, M

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An Exploratory Analysis of Firm Decline, Firm Growth and Headquarters Location Change in Canada, 1991-2006

This study examines the evolving geography of corporate headquarters in Canada, with a focus on two primary factors that characterize the changing fortunes of business: the decline and growth of firms. Economic geography has developed distinct literatures relating to both of these types of firm change, but only one of these change types (business growth) has been linked specifically to headquarters location studies thus far. This paper surveys the literatures relating to headquarters location, business growth, business decline, and the related topic of techno-economic change. The study then proceeds to analyze the business changes that occurred in Canada from 1991 to 2006, linking business decline and growth to the evolving status of Canada's system of headquarters cities. The results indicate that rapid business decline and growth are driven by factors that transcend local conditions, and that business decline and growth are significantly related to each other by location, but not by economic sector. The paper interprets these results and highlights further research needed that relates to headquarters location within Canada's evolving economy.

Session: R4.3

Richardson, K

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Harmonized Data for North America: A Tool to Track Change

Tracking biological and spatially-related economic change at a continental scale requires harmonized, accurate and consistent data. The North American Environmental Atlas, a joint initiative between the US, Canada and Mexico, has recently developed a series of GIS-based data layers and maps, including terrestrial and marine ecoregions, watersheds and protected areas, to respond to a growing need for information on issues across North America. Data from and results generated by the Atlas over the past five years have been used for various initiatives, including conservation planning. A new land cover change monitoring system aims to expand the usefulness of these data by producing annual land cover data at a scale of 250m. These data will assist with tracking change and monitoring various features, including forest cover associated with carbon storage and sequestration. Further examples of the applications of the Atlas are presented. Additionally, the collaborative tri-national approach to acquire, verify and harmonize the data and maps is presented and it is suggested that this approach could be adopted for similar initiatives.

Session: W3.6

Robichaud, A
Young, A
Laroque, C

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Apport de la dendroarchéologie à la documentation d'un site candidat à la liste du patrimoine mondial de l'UNESCO (Grand-Pré, Nouvelle-Écosse)

Grand-Pré est située en Nouvelle-Écosse, dans une région colonisée par les Acadiens au début des années 1680. C'était l'établissement acadien le plus peuplé et probablement le plus prospère d'avant la Déportation de 1755. L'utilisation intensive du système de drainage et d'endiguement par les aboiteaux y a pris des proportions imposantes de sorte que vers 1755, près de 30 km de digues et une trentaine d'aboiteaux auraient été construits pour le drainage de plus de 1000 ha de marais salés. Plusieurs de ces aboiteaux ont été découverts récemment lors de la réfection des canaux de drainage, mais leur âge exact reste inconnu. Pour exporter les surplus agricoles, les Acadiens ont fort probablement utilisé des quais et l'un d'eux (d'âge controversé) subsiste peut-être encore à Horton Landing sur la rivière Gaspereau adjacent aux marais drainés. De nos jours, ce paysage agricole unique a une grande valeur patrimoniale. Grand-Pré est actuellement un lieu historique national commémoratif et est candidat pour devenir un site du patrimoine mondial de l'Unesco. Dans le but de documenter la région, la datation des aboiteaux et du quai mentionnés plus haut est devenu nécessaire et une analyse dendroarchéologique a ainsi été effectuée sur le bois de ces artefacts. Les résultats de l'analyse de trois aboiteaux indiquent un âge de 1688, 1689 et 1691-1692, donc du début de l'occupation du site par les Acadiens. Le quai quant à lui date de la fin des années 1880 et a donc une origine plus récente.

Session: S1.1

Robinson, V

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Integrating Fuzzy Landform Classification into Multi-Scale Modeling of Acadian Flycatcher (*Empidonax virescens*) Habitat

Since geographic information systems and digital elevation models became widely available, modeling of avian habitat as a function of some terrain-related parameters (e.g., slope, aspect) has become common. Incorporating landform information in avian habitat modeling has rarely been attempted. On the other hand, there are several reports of using fuzzy classification techniques to arrive at fuzzy representations of landform classes at multiple scales. This study illustrates how these two approaches can be brought together for multi-scale modeling of acadian flycatcher (ACFL) habitat in the Land Between the Lakes National Recreation Area. Elevation models were constructed for 10 metre, 50 metre, 90 metre and 150 metre resolutions. At each resolution terrain parameters of slope, mean curvature, sun index and topographic wetness index were calculated and used as input for fuzzy k-means clustering. A combination of cluster validity measures are used to determine the number of clusters to use at each scale. Logistic regression models of ACFL habitat at each scale are arrived at using stepwise techniques. Finally, a pooled (all scales) logistic regression model indicates that landform variables from the 10 and 50 metre resolutions provide the best model with an AUC of 0.76.

Session: R4.6

Robinson, V
Proctor, C

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An Experiment on the Niagara Escarpment: Can Terrain Influence Dispersal Behaviour?

This project combines GIS-based data with behavioural biogeography to run simulation experiments. It has been postulated that the anisotropic character of the landscape coupled with limitations of perceptual range may influence dispersal behaviour of small terrestrial mammals. Using the Extensible Component Objects for Constructing Observable Simulation Models (ECO-COSM) to conduct the spatially explicit individual-based simulations. A fuzzy decision model is used to model the dispersal behaviour of grey squirrels (*Sciurus carolinensis*). The landscape is represented as a digital elevation model (DEM) upon which a land cover classification is draped. A comparison is made of simulated behaviour given starting locations at the top of and at the foot of the Niagara Escarpment. The connectivity of forested landscape elements is considered in conjunction with terrain influences. Also investigated is the degree to which results may be sensitive to variations in selected behavioural parameters.

Session: S2.3

Rose, D
Lavoie, J
Burns, V
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Assessing Gentrification's Effects on the Daily Lives of Autonomous Elderly Long-Established Residents: The Case of Montreal's Petite-Patrie Neighbourhood

Little is known about gentrification's impacts on the daily lives of long-established residents who experience the aging process in gentrifying neighbourhoods. The very limited existing literature has not taken housing tenure into account, in spite of the fact that the process stands to benefit homeowners in certain respects while placing private renters at risk of displacement. Also, inasmuch as aging may contribute to a decreased locus of everyday spatial mobility, it seems pertinent to explore whether older long-term residents of gentrifying neighbourhoods experience what the gentrification literature conceptualizes as 'indirect displacement' – meaning that people feel out-of-place in economic, social, cultural and even political terms as the shops and services available locally, as well as the overall neighbourhood ambience, change with the inflow of newcomers with higher incomes and different socio-cultural practices. This paper presents preliminary findings of semi-structured interview based research conducted among autonomous individuals aged from late 1960s to late 1980s in Montreal's Petite-Patrie district. Its location just north of the gentrified Plateau Mont-Royal, as well as municipally-led commercial revitalization and rebranding initiatives for the Jean-Talon produce market and 'La Petite Italie', have recently drawn gentrifiers to this area. Drawing on concepts from the social exclusion/inclusion, displacement and sense of place literatures, we explore what these changes mean for two-subgroups of long-term residents: homeowners from the neighbourhood's longstanding Italian ethnic community and renters, who tend to be French-Canadian. This case study forms part of a larger study also involving another Montreal district and two neighbourhoods in Toulouse, France.

Session: R3.8

Rosenberg, M
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Analysing the Role of the Older Population in Community Development: A Qualitative Case Study

As part of a larger study that examines the current and future challenges communities face as the baby boomers age and retire, a review of the policy literature shows two highly divergent views: one can be labelled 'apocalyptic demography' and the other can be linked to the 'age-friendly community' literature. The authors associated with apocalyptic demography argue that the older population will overwhelm communities driving up municipal costs to unsustainable levels because of their demands and political voting power. In contrast, authors associated with the age-friendly literature argue that the older population is rich in both economic and social capital and through the creation of age-friendly community thinking should be attracted as a way of creating new opportunities for places that are losing the economic activities that supported them in the second half of the 20th century. We test these views through a qualitative study of the Sarnia/Lambton region of Ontario, Canada. Key informants from local government,

economic development agencies, health care services, and seniors' organizations were interviewed to see how they are responding to the challenges of their declining economic base and the role that the older population might play. This is the first in a series of case studies to be carried out in selected places across Ontario to investigate the competing views of the role of the older population, what it means for community development, and what underlies the competing views.

Session: R3.8

Rosenberg, M
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Aboriginal Peoples, Health and Healing Approaches: The Effects of Age and Place on Health

For demographic reasons and as a result of a number of high profile health incidents in recent years, much of the research and policy focus has been on the younger cohorts of Aboriginal peoples in Canada. An examination of recent demographic trends reveals, however, that older cohorts of the Aboriginal population are increasing more quickly than younger cohorts. Yet, there are surprisingly few health studies that have recognized the early stages of an aging Aboriginal population. The goal of this paper is to analyze the differences in health status and utilization of health services between older and younger cohorts of the Aboriginal population. The analysis has three foci – differences in the determinants of health, the importance of place, and the use of conventional and traditional healing. Using data from the 2001 Statistics Canada Aboriginal Peoples Survey these foci are analyzed using contingency tables and logistic regression. The results demonstrate that older Aboriginal people face unique challenges with respect to health and access to health services. This is a result of a colonial past and contemporary contingencies that affect all Aboriginal people and has particularly left health providers ill equipped to provide services to a growing older Aboriginal population.

Session: R2.8

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Geographies of Toponymic Inscription: New Directions in Critical Place-Name Studies

The study of place naming, or toponymy, has recently undergone a critical reformulation as scholars have moved beyond the traditional focus on etymology and taxonomy by examining the politics of place-naming practices. We provide a selective genealogy of the 'critical turn' in place-name studies and consider three complementary approaches to analyzing spatial inscription as a toponymic practice: political semiotics, governmentality studies, and normative theories of social justice and symbolic resistance. We conclude by proposing that future scholarship should explore the political economy of toponymic practices as a step toward expanding the conceptual horizon of critical place-name studies.

Session: R1.7

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Unstable Properties: British Columbia, Aboriginal Title and "The New Relationship"

In the span of a few years, Premier Gordon Campbell went from the number one enemy of Aboriginal peoples in British Columbia to their apparent champion within a 'new relationship.' The subsequent sudden collapse of the alliance is a window into federal-provincial relations, constitutional change, Aboriginal political organization, and the consequences of decisions made more than a century ago. In the end, we argue that Campbell's various efforts to control or support Aboriginal peoples were almost irrelevant. As a result of the collision of Aboriginal political mobilization, the expansion of natural resource development and a series of court decisions, the unresolved nature of Canada's territorial claim to most of the land that is now British Columbia has finally reached a point where it can no longer be ignored, either politically or legally. However, the province lacks the legal authority to recognize or deny Aboriginal title, leaving the provincial government and Indigenous peoples in BC equally held hostage by the federal government.

Session: W2.3

Royer, A
Poirier, S

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A New Database for 30-Years of Daily Surface Temperatures in North America Derived from Satellite SMMR-SSM/I Microwave Data

We have developed procedures for deriving land surface temperature and homogenizing 30 years of daily microwave brightness temperatures from the NOAA/NASA Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) and Defense Meteorological Satellite Program-Special Sensor Microwave/Imager (DMSP SSM/I) Pathfinder EASE-Grid database. Processing includes the land-surface temperature retrieval, normalization of the variable acquisition overpass times, removing the effects of changing satellite orbits, intercalibration of sensors and filling gaps between missing data. The derived new database over North America (above 45°N), limited to snow-free periods, provides the first estimate of the trends of consistent mean daily summer land surface temperature over the last three decades. Compared to near-surface air temperatures derived from ECMWF 40-year Reanalysis (ERA-40), NCEP North American Regional Reanalysis (NARR) and exhaustive ground-based meteorological measurements across Canada, we highlighted significant systematic biases in the satellite-derived surface temperatures for the 1983-1991 period, spanning from the second half of Nimbus-7 SMMR lifetime (1983-1987) to the DMSP-F8 SSM/I lifetime (1987-1991). The biased data were corrected using a relative offset derived from ERA-40 and DMSP-F11/F13 mean difference over the 1992-2002 period. The comparison of corrected data from the 9-day overlap between SMMR and DMSP-F8 SSM/I as well as from ground-based meteorological measurements for the 1983-1991 biased period shows the usefulness of the correction method. The mean difference between corrected satellite-derived surface temperature and in-situ meteorological air temperature is +0.05 (RMSE of 1.85°C) for the whole period (1979-2008). The NARR data appear in general systematically too warm by about 1°C. The satellite-derived homogenized database gives new observational evidence for global warming over North America regions (mean summer temperature trend of +0.018°C/a throughout the studied period) with regional variable trends, in agreement with reanalysis and in-situ measurements trends. However, over the Canadian Arctic tundra, the increase in observed land surface temperatures appears slightly lower than the estimates from near-surface air temperature. The spatial and temporal variability of the land surface temperature change are presented and discussed.

Session: R4.9

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Public Values and Attitudes Towards Irrigation Water Transfers in Alberta's South Saskatchewan River Basin

Most of the available water in Alberta's South Saskatchewan River Basin is now fully allocated. Given the Water For Life Strategy (2003), it is clear that the provincial government sees water reallocation and the use of markets as key instruments to meet new demand. Since the majority of Alberta's fresh water is allocated to irrigators, transfers will necessarily take place from agricultural to municipal, recreational and environmental uses. While water transfer projects have expanded recently, conflicts over the reallocation of water are on the rise and receive significant public attention. The varying values and attitudes of Alberta's non-irrigator majority will determine their willingness to accept such transfers, which in turn will have a large impact on their success. In particular, the attitudes of non-irrigators towards the environment will influence their support for the establishment of minimum environmental flows. Residents within the communities of Raymond, Taber, Strathmore, Lethbridge and Calgary are located at various positions along the rural-urban continuum and present an opportunity to research how non-irrigators with various social and physical distances from agriculture perceive water transfers out of agriculture and into other uses. By determining the principle factors pertaining to water-related environmental concern we hope to build an understanding of how the wider public perceives particular policy suggestions and work to provide solutions that will both accomplish the goals set out in Alberta's Water Act and be in line with the values of Albertans.

Session: W3.1

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Cents and Sensibility: Creating Effective Policies to Support Voluntary Initiatives in Rural Canada

For the past three decades, neoliberal policies have reduced, closed or offloaded rural and small town services in order to reduce senior government costs. In response, service providers and non-profit groups have engaged in voluntary work in order to retain some basic service supports. Economic and social restructuring has created new service pressures from groups ranging from 'functional' lone-parent households to grandparents raising grandchildren. New service gaps created by neoliberal policy decisions, however, have limited community responses to assist youth, residents with addictions, and those living in poverty. Drawing upon 237 key informant interviews with service providers and voluntary groups in 26 communities across northern BC, we explore emerging service gaps stemming from ongoing social, economic and political change. We also explore the lack of local supports that now exist as a result of neoliberal policy and program changes. To support voluntary initiatives that have limited financial and human resources, we suggest that more community-focused supportive policies and programs are needed to create synergies and collaborative approaches across organizations, streamline administrative and accountability procedures, stabilize daily operations, develop leadership and management training supports, enhance business and community development expertise, build capacity and support for volunteers, and develop information management systems.

Session: R1.3

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Transgressing Time, Place, Gender and the Material: The Political Strategies of Moses, Highway and Erdrich

In spite of centuries of systematic displacement and efforts at deculturation through education, the law and assaults on the intimate domains of gender, identity and spiritual belief, Aboriginal peoples have resisted annihilation, often through story telling. Colonial domination can be understood as persistent and systematic strategies to replace local and intimate knowledge with the epistemology of the colonizer. Through its inherent connection with place and local circumstance, storytelling sustains Indigenous cultural vitality and provides a strong critique of colonial ways of

knowing. This paper will identify key colonial binaries, boundaries and categories and explore their transgression and annihilation in the fictional work by prominent American and Canadian authors Louise Erdrich, Tomson Highway and Daniel David Moses. Erdrich is best known for the interconnections of short narratives between and within her novels. Tomson Highway is most famous for his cycles of 'rez' plays detailing life on a fictional Ontario reserve. Daniel David Moses is best known for his parody of non-Aboriginal constructions of the 'authentic Indian' in his work. Storytelling, even when entertaining, can be (and perhaps is always) deeply political: the political impact of Erdrich's, Highway's and Moses' work can be understood in terms of their breakdown and reworking of rigid systems of colonial manipulation and control. Through storytelling, these authors open up space for imaginations of identities on Indigenous terms.

Session: R1.2

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Loess Characteristics and Sources in Recently Deglaciated Landscapes

Contemporary eolian processes in mid and high latitude locations may have several commonalities with those found in proximity to the wasting Laurentide Ice Sheet, during the Late Pleistocene. Research on loess in the northern Great Lakes region, dating to this period of time, has identified several types of loess source areas. The work underscores the importance of short-term transport of silty and coarse loess from these small and temporally constrained source areas. Many landscapes in the region have thin silty and sandy loess mantles, typically on stable uplands that became deglaciated, geomorphically stable, and possibly vegetated, before eolian sediment from the source areas diminished in quantity. In these recently deglaciated landscapes, wind directions were probably highly variable, but strong, across largely unvegetated and unstable substrates. Thus, loess thickness and textural characteristics tend to be more a function of distance from a local source, than cardinal direction from it. Research in the region clearly points to several sources of eolian material, including traditional systems such as valley train outwash deposits, but also (1) broad outwash plains, (2) recently abandoned lacustrine plains, (3) ice-walled lake plains and other unstable landforms within large moraine belts, and (4) landscapes beyond the glacial margin but rendered unstable by permafrost and nivation processes. This work (1) documents the importance of loess as a paleoenvironmental indicator, (2) questions the notion that wind directions were dominantly westerly or easterly during and following deglaciation, and (3) draws attention to the wide range and mix of particle sizes found in eolian sediment deposited during the waning phases of the last glacial period.

Session: S3.1

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C-Band Dual-Pol and Polarimetric Radar Signatures of First-Year Sea Ice During Advanced Melt

The advanced melt season of Arctic sea ice is characterized by a composite of surface types, including liquid water melt ponds, which introduce sub-scale ambiguities in passive and active microwave signatures and confuse the interpretation of imagery. Dual-polarimetric (dual-pol) and fully-polarimetric data from spaceborne synthetic aperture radars (SAR) have potential for improving ice type identification and geophysical parameter retrieval through increased information content. In this study, the response of polarimetric backscattering at C-band frequency from wet snow, bare ice, and melt ponds over first-year sea ice during advanced melt is investigated. Data acquired using a surface-based C-band polarimetric scatterometer deployed over first-year sea ice the Canadian Arctic Archipelago and Beaufort Sea are summarized, together with coincident SAR imagery from ENVISAT-ASAR and RADARSAT-2. Results indicate the co-polarization ratio (VV/HH) is distinct for melt ponds at shallow incidence angles, and useful for the inversion of sea ice melt pond fraction from dual-pol SAR. The cross-polarization ratio (HV/HH) at steep incidence is found to have utility in separating surface melt-freeze events from strong backscattering events caused by wave roughness on melt ponds, illustrating its potential for aiding SAR and scatterometer algorithms which rely on time series inflections is backscattering to detect the onset of ponds in sea ice and climate-related studies.

Session: W3.4

Schmitt, C
Toutin, T

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Spatio-Triangulation of Multiple FRS MERIS Path

This research addressed the spatio-triangulation of full resolution full swath (FRS) Medium Resolution Imaging Spectrometer (MERIS) data. The spatio-triangulation (similar to aero-triangulation) used a block bundle adjustment applying Toutin's 3D physical model (3D-TPM). The block bundle adjustment simultaneously computes the spatial orientation of multiple images/paths from adjacent orbits using ground control points (GCPs) and elevation tie points (ETPs). The 3D-TPM, developed at the Canada Centre for Remote Sensing, Natural Resources Canada, uses collinearity/coplanarity equations to rebuild the viewing geometry taking into account the interior and exterior orientations of each image. This multi-sensor model originally designed for high and medium resolution data was adapted in 2009 to support FRS MERIS imagery. 3D-TPM, well established in the Canadian earth observation community, will provide Canadian users with the tools to geometrically correct multiple MERIS FRS images for their national-based projects. In comparison to single image processing, a block-bundle adjustment can provide improved relative accuracy between images and a more accurate output product. This is an advantage for producing large geographic ortho-mosaics. To test the spatio-triangulation of 3D-TPM, five long path FRS MERIS satellite images (1200km by 1000km) were acquired between 2008 and 2009 across Canada. Using various GCP/ETP configurations, the model was evaluated on independent check point data.

Poster Session A

Schmitt, C
Toutin, T
Berthier, E

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DEM Generation with SPOT-HRS Data over Ice-Covered Northern Canada

Monitoring the change of land ice for climate change requires accurate and repeatable topographic surveys. The SPOT5-HRS (High Resolution Stereoscopic) instrument covers up to 120 km by 600 km in a single pass. A large HRS archive over ice-covered regions was acquired by the French Space Agency (CNES) and SPOT-Image, France during the 2007–2008 International Polar Year (IPY). In addition, a large area of Canada will be covered in the next year by SPOT-HRS in collaboration with the Centre for Topographic Information, Sherbrooke (CIT-S). All these data will enable Canadians to map in 3D the poorly known topography of remote Canadian areas, such as most glaciers and ice caps. HRS stereo-images (120x200 km) were acquired over Clyde River, Quebec, one of the well-controlled study sites of CIT-S. Because control data is difficult to acquire in remote areas, tools available from CNES were used to automatically compute 3D geographic coordinates from stereo collected tie points. PCI Geomatics OrthoengineSE software is thus used with these control points to compute Toutin's stereo model and a digital elevation model (DEM). The DEM is first evaluated through the comparisons of the two HRS ortho-images as well as with digital topographic maps of the area. A second evaluation with the new Canadian Digital Elevation Data (CDED) enabled quantitative errors to be computed. Accuracy of HRS DEM will be then evaluated in different areas: over ice-free bare surface, ice and snow surfaces, on and around the glaciers and at different slopes.

Session: W1.8

Schneider, B
Starchenko, O
Kayseas, B
Anderson, R

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Comparison of Impacts of Urban Reserves and Other Vehicles of Economic Development Used by First Nations in Saskatchewan: A Preliminary Analysis

Urban reserves and other land-based instruments of First Nations economic development are a rather recent phenomenon in the political and economic life of Saskatchewan. As of June 19, 2009, 35 urban reserves have been created in Saskatchewan and more are in the process of being established. Notwithstanding anecdotal accounts of the economic success of reserves established near urban centres, there has been very little analysis on the economic and social impact of urban reserves and how they compare with the benefits of other instruments of economic development available to First Nations. We assert that urban reserves and other land-based instruments,

located in or near urban centres, are providing both policy and economic and community development strategies for First Nations living both on-reserve and off-reserve. Our research focuses on the impact that land-based economic development strategies, inclusive of urban reserve creation and the policies that guide them, are having on First Nations and surrounding communities within the City of Saskatoon Planning District.

Session: R2.3

Schutten, K
Gedalof, Z
Gordon, A

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An Experimental Classification of Sugar Maple Stands Based on Site Characteristics and Climatic Variability Using Principal Components Analysis

Site quality is a term commonly used in forest management that describes the sum of forest responses to site factors that determine the capacity of the land to produce wood. These include moisture, nutrients, and available sunlight. Forest productivity is the response of a stand of trees to inherent site quality as well as management practices. It is important to understand the different site characteristics that influence growth of a forest stand in order to determine the most effective forest management plan. Here we provide a principle components analysis of physical, chemical and biological site characteristics measured at 61 sugar maple-dominated stands in southern Ontario that were sampled in 1977. Sugar maple stands in Ontario tend to be particularly limited by available moisture and pH of the soil, as well as nutrient cycling and local topography. The results of this analysis are consistent with general sugar maple ecosystem dynamics as well as the site-specific results reported by the previous study. The greatest variation in the dataset occurred in the soil chemistry variables, the moisture regime, and basal area increment. The results of this experiment will be the basis of a field research project where twenty sites will be selected based on high correlations to the three principle components so that selected sites will demonstrate a range in variability of site properties. Basal area increment and annual radial growth measurements will be measured to evaluate how biotic and abiotic factors influence the sensitivity of sugar maple annual radial growth to climatic variability and climatic change.

Poster Session B

Schuurman, N
Crooks, V

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Measuring Potential Spatial Access to Primary Health Care in Canada Using GIS

Ensuring equity of access to primary health care (PHC) across Canada is a continuing challenge, especially in rural and remote regions. Despite considerable attention recently by the World Health Organization, Health Canada and other health policy bodies, there has been no nation-wide study of potential (versus realized) spatial access to PHC. This knowledge gap is partly attributable to the difficulty of conducting the analyses required to accurately measure and represent spatial access to PHC. The traditional epidemiological method uses a simple ratio of PHC physicians to the denominator population to measure spatial access. We argue, however, that this measure fails to capture relative access. For instance, a person who lives 90 minutes from the nearest PHC physician is unlikely to experience the same responsiveness to care need as the individual who lives more proximate and has a wider range of choice with respect to PHC services and providers. In this paper, we describe development and use of a modified gravity model to measure this phenomenon. This model incorporates a distance decay function that better represents potential spatial access to PHC in a relative manner. The results of the model illustrating access to PHC are then described with respect to the provinces and territories of British Columbia, Ontario, Nunavut, and Newfoundland and Labrador. Several key themes emerge: 1) clear disparities between urban and rural access to care; 2) the binary nature of access to PHC in extremely remote regions; and 3) east-west differences across Canada. We argue that use of a nuanced spatial model of access to PHC is an important innovation in measuring potential spatial access to PHC physicians in Canada and contributes more broadly to assessing the success of policy mandates to enhance the equitability of PHC provisioning in Canadian provinces and territories.

Session: R1.8

Schwartz, J

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Envisioning Canada: The Photographically Illustrated Book in Mid-Nineteenth Century Nation Building

Photography, that is the two-step negative-positive process which resulted in the production of a paper print, can be traced to the early 1840s in both France and England. However, the ability to reproduce photographs on the printed page alongside letterpress text was an elusive goal and it was not until the late 1880s that a practicable method was realized. Before the advent and commercialization of such modern photomechanical printing techniques, photographs appeared in books as original prints, individually pasted by hand onto blank or pre-printed pages. Viewed thus, in primarily literary contexts, they became an integral part of the act of reading, furnishing visual images not only to anchor but also to amplify descriptions, to conceptualize knowledge, and to visualize fantasies of place, people, events and things. This paper surveys how photographically illustrated books produced in the years leading up to Confederation, contributed to Canadian nation-building, by nurturing the shared sense of place needed to transform the scattered colonies and territories of British North America into the Dominion of Canada. The 1860s were important years in the rise of visual communication and the spread of print culture, when new ways of seeing and knowing changed the way people related to the world around them, and attracted settlers, tourists and investors. In examining the production, nature and popularity of books illustrated with original photographs, this research identifies new sources for historical geographical research into a period of unprecedented political and physical integration, parliamentary change, territorial expansion, social development, economic growth, railway construction, urbanization and industrialization.

Session: S1.1

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Understanding of Spring Phenology over Forested-Dominant Regions: A Remote Sensing Perspective

Spring phenological events (e.g., snow stages, grass greening up, deciduous bud flushing, and coniferous bud flushing) are vital in understanding various forestry related activities. In this paper we intend to review different techniques commonly used in detecting/predicting phenological events over forested landscapes. The most accurate method is the employment of in-situ observations. However, this method is unable to capture the spatial dynamics in particular to remote areas. The phenological events could also be predicted using measurable bio-physical variables (e.g., temperature, soil water content, and incident radiation), but it fails to provide information at landscape level. Remote sensing techniques, on the other hand, are being used in understanding the spring phenological events due its capacity to view the earth surface with a greater spatial coverage. Most of the cases, the temporal trends from remote sensing-based indices of normalized vegetation index (NDVI), enhanced vegetation index (EVI), and normalized difference water index (NDWI) are commonly employed to determine various phenological stages. In some instances, remote sensing-based indices in conjunction with meteorological variables are also used. Both the merits and demerits associated with the above mentioned methods have to be analyzed and evaluated over boreal forest-dominant regions of Alberta, Canada.

Session: F2.5

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Spatial Analysis in Primary Healthcare: An Application to Spatial Accessibility in Saskatoon Neighbourhoods

The objective of this study is to explore the spatial relationships and variations in spatial accessibility to primary healthcare and socio-economic data in urban neighbourhoods. Initially the study is focused on the city of Saskatoon, Saskatchewan with the hope that the technique can be applied to other urban areas in Canada. An index of spatial access to primary healthcare at neighbourhood level, determined through 3-Step Floating Catchment Area (3SFCA)

process, is used along with the demographic and socio-economic variables from the 2006 census. The research considers the following dependent variables: population with high needs for primary medical care services (population groups: seniors with ages above 65, children with ages 0-4 and women with ages 15-44), population in poverty, female headed households and home ownership normalized by per 100 individuals for each neighbourhood. Variation in accessibility to primary health care among and between Saskatoon neighbourhoods is analyzed visually and statistically using GIS and spatial statistical tools. This research contributes to the growing applications of spatial data analysis in health geography and particularly primary healthcare accessibility.

Session: F2.7

Sharma, R
Marshall, P
Leckie, D

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Spectral Response of Selected Conifer Tree Species Across Biogeoclimatic Subzones

Spectral responses of lodgepole pine (*Pinus contorta*), Douglas-fir (*Pseudotsuga menziesii*) and interior spruce (*Picea glauca*, *P. engelmanni* and their crosses) stands, growing in diverse ecological conditions, were studied. The main questions were, i) is the variability in spectral responses significant? and ii) what is the effect of spectral signature extension on species level classification? Mean reflectance (B1-5 and 7 of Landsat-7 ETM+) for 4710 stands, distributed in nine Biogeoclimatic Ecosystem Classification (BEC) subzones/variants over an area of ~19000 km² in central British Columbia were analyzed using a multivariate general linear model and discriminant analysis. The stands (≥ 5 ha, $\geq 80\%$ lodgepole pine, Douglas-fir or spruce, and ≥ 60 years of age) were randomly selected from the provincial forest inventory database. Statistically significant spectral differences were found for the three species at the BEC subzone/variant level. Medium-to-large 'effect size' and a decrease in the overall classification accuracy and associated Kappa statistic of the extension samples, compared to the calibration and validation strongly suggest that site ecology has significant influence on spectral reflectance of these tree species and should be considered in landscape level forestry applications of remotely sensed multispectral data.

Session: F2.5

Sharma, R
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Assessment of Environmental Degradation Caused by Snow Geese: A Case Study in the Wapusk National Park, Manitoba, Canada

Wapusk National Park (11,475 sq. Km, established in 1996) is one of Canada's 42 national parks and is located 45 km south-east of Churchill on the south western shore of Hudson Bay in Manitoba, Canada. About 85% of the park is wetlands, covered with lakes, bogs, fens, streams and rivers. This park is an important staging and breeding ground for various migratory goose populations which have been increasing at the rate of at least 5% per annum. Their increasing numbers have caused extensive damage to the vegetation and soils through their foraging activities. Multi-temporal Landsat-5 Thematic Mapper (TM) and Landsat-7 Enhanced Thematic Mapper (ETM+) imagery with 30m spatial resolution (acquired over the time series 1984 to 2009); and 10-m resolution SPOT-5 multispectral imagery (acquired August 2008) were used to identify and assess historic and ongoing goose damage. A composite approach consisting of Normalized Difference Vegetation Index, Normalized Difference Water Index and Red/NIR ratios, along with ground data collected during a July 12-24, 2009 field campaign, were used to identify and assess goose-damaged areas. Landsat-based Normalized Difference Vegetation Index time series were used to monitor the damage and regeneration of vegetation in the degraded areas. Results from this study will be used to report on the pattern of environmental degradation created by the goose foraging in the context of park ecological integrity.

Poster Session B

Sharpe, B
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Huynh, N
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Workshop on Planning a Professional Development Program in Teaching for Graduate Students and Junior Faculty

With this workshop we would like to embark on a longer-term project to create a professional development certificate program for teaching geography at Canadian universities. Teaching seems to come naturally to a select few individuals but the majority must spend considerable effort and time developing their teaching skills. The purpose of this workshop is to bring together interested faculty and students to discuss and develop a formalized program for providing professional development activities related to teaching for graduate students and junior faculty. The intent of such a program is to offer a series of teaching modules on a semi-regular basis which are endorsed by the Canadian Association of Geographers (CAG). This program will help participants to expand their network of professional contacts, as well as provide a certificate of completion or accomplishment. This workshop will focus on planning for the design and implementation of such a professional development program. The topics for consideration will include: appropriate modes of delivery, potential collaborators, means of assessment and record-keeping, and the number and topics of teaching modules to be offered at future annual national conferences and regional meetings. Examples of some possible teaching modules include: effective assessment, creating meaningful learning objectives, classroom delivery, field trip planning, critical thinking skills, course development, teaching dossiers with geography 'branding', understanding the first year student, academic freedom/academic integrity, and active learning in the classroom. We would like to hear suggestions from those attending the session regarding the content and delivery of possible teaching modules as well as other ideas for such a program.

Session: R1.10

Shen, L
Xu, H

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Ocean Colour of Yangtze River Estuary and the Adjacent East China Sea During an Algal Bloom

The Yangtze River estuary and the adjacent East China Sea (ECS) are increasingly polluted with anthropogenic constituents such as overloading of nutrients, which result in frequent algal blooms. However, the limitation of traditional field measurements cannot meet the demand of marine management and environmental protection. As an advanced technology developed in the 1960s of the 20th century, satellite remote sensing technology serves as a breakthrough in water quality assessment. In this paper, two bands algorithms of water classification based on the spectral characteristics of each water type was introduced. After optimization of the reflection threshold values, the ECS MODIS data were calculated into five major categories, suspended sediment water (SSW), eutrophication water (EW), algae bloom water (ABW), boundary water of algae bloom (BAW), and open ocean water (OOW). This result can distinguish different water types and reveal sharp boundaries between each two as well as macroscopical distribution from the coastal area to the distant ocean, especially the suspended water and algae bloom, which provides basic work for the future ocean water monitoring.

Session: F2.8

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Agnew, T

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Arctic Sea Ice Conditions During the Past Seven Years (2002-2009)

One of the primary consequences of a warmer Arctic climate is the spatial and temporal covering of sea ice types. Although decrease in the summer Arctic ice cover has been reported in previous studies, it has been accompanied by an increase in the proportion of seasonal to MYI. For example, in the Canadian Archipelago, the proportion of FYI to MYI has decreased and the origin of MYI appears to have changed from MYI formed within the Archipelago to more MYI intrusions from the Arctic Ocean. An algorithm has been developed in Environment Canada to identify ice types and estimate their partial concentrations using remote sensing observations. Results were obtained using AMSR-E

passive microwave in combination of QuikSCAT scatterometer over the freezing season (September to May) from 2002 to 2009. Spatial coverage and duration of Young Ice, First-Year Ice and Multi-Year Ice are determined. Rate and direction of First-Year ice expansion is also determined. Changes in ice type cover between regions in the Arctic basin are identified. Effects of weather events on sea ice surface can also be identified. Interannual changes in spatial coverage and composition of sea ice types are linked to climate data in the pre-freezing season. These changes have significant implications for marine transportation within the Archipelago (the NW passage) as well as consequences for local community lifestyles. Some of those consequences will be discussed as well.

Session: W1.4

Siciliano, A

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The Cultural Production of 'Authentic Community': Jane Jacobs Meets Big Bird on the Stoop of a Brooklyn Brownstone

This paper addresses the following questions: How has media helped to transform geographic imaginaries of large North American cities over the past 30 years? How did the cultural production of urban space migrate away from a place commonly associated with crime, racialized violence and urban decay to a place of capitalist reinvestment and gentrification? Looking at how the popular children's television show Sesame Street resonated with the vision of urban utopia imagined by Jane Jacobs and other leading urban intellectuals during the 1960s and 1970s, this paper examines the cultural production of normative ideas of urban life as the site of 'authentic community.' It situates the development and progression of these ideas alongside evidence of structural flaws plaguing American urban society during that time – deindustrialization, racialized revolts and white flight. In doing so it argues that Sesame Street's programming, not unlike the programming of Jacob's ideas into urban planning and reform politics, encompassed part of a culturally produced vision of urban utopia that, even in its progressive articulations, offered a fundamentally apolitical perspective of urban life. I conclude by suggesting that the broad ascendance of this new image of the city as 'authentic community' has propelled the cultural, political and economic valourization of contemporary urban space, largely to the detriment of the urban poor.

Session: W4.2

Siemer, J

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Maps in Emergency Management

The poster summarizes the important role maps play in effective and quick response to natural disasters. Maps are used to support decision-making processes during all four phases of emergency management (*i.e.*, mitigation, preparedness, response and recovery). Effective emergency management requires timely access to up-to-date geographic data and emergency related information. New developments in geographic information technology, digital spatial data bases, GPS, remote sensing, *etc.* offer new possibilities but also challenges for the design and use of maps as decision support tools in emergency management.

Poster Session B

**Silver, A
Conrad, C**

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Public Perception of and Response to Severe Weather Warnings in Nova Scotia, Canada

Hurricane Juan, which struck Atlantic Canada on 29 September, 2003, revealed the full extent of public vulnerability to severe weather events in Nova Scotia. In this study, 130 people were interviewed via a systematic sampling technique to examine their perception of severe weather warnings, and to determine what actions (if any) they are most likely to take when a warning has been posted. It was found that different target groups (*e.g.*, the elderly, students) utilize different modes of media to obtain their severe weather information. It is recommended that

forecasters begin to tailor their advisories for specific media sources so as best to reach various target groups. It was also found that respondents are generally satisfied with the weather warnings they receive, but there is a lack of awareness of the existence and extent of public vulnerability in Nova Scotia. The development of a comprehensive education campaign which will outline various facets of social vulnerability, while also offering recommendations on how best to lower existing social vulnerability, is critical.

Session: S2.2

Silver, J

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If Wishes Were (Shell)fishes: Exploring Some Stated and Actual Outcomes of the British Columbia Shellfish Development Initiative

Guided by political ecology, this paper focuses on initiatives for shellfish aquaculture expansion enacted in British Columbia (BC) over the last 12 to 15 years. First, I describe the background and goals of the 1998 Shellfish Development Initiative, including its central focus on expanding tenured ocean space and engaging coastal Aboriginal communities. Next, I contrast these goals with some actual outcomes, including the case of one First Nations' experience with a band-owned and operated shellfish aquaculture venture. I conclude by illustrating that, rather than achieving initial financial and production objectives, the strongest outcome of the initiative thus far has been the strengthening of institutions surrounding the industry. The paper is part of a larger dissertation research project that documents the role of contemporary Aboriginal-State relations in producing a competitive shellfish aquaculture industry in BC. Findings are based on eight months fieldwork and extensive analysis of related discourse, policy, treaty and funding initiatives.

Session: R2.1

Simandan, D

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Demonic Geographies: Space, Bodies Without Souls, and the Taming of Affect

The recent findings that a) what people in all cultures most want is to be happy, and b) concern with equality and social justice is positively correlated with negative affect, are put together to explore whether they warrant a shift of focus in the social sciences, away from the worship of the ideal of equality, and towards the striving to achieve collective happiness. Using as a platform Nigel Thrift's thesis that space is the very stuff of life, I then appraise the merits and demerits of this shift, pinpointing ways in which the latest research on happiness from neuroscience and psychology could be incorporated and metabolised in geography. In the wake of this incorporation, I show that geography will turn demonic, because the study of space-as-life requires the discarding of the twin illusions of the self and of conscious free will and the acceptance of the fact that we all are bodies without souls.

Session: W2.6

Simandan, D

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The Error Statistical Way of Thinking in Geography: An Articulation and Defense

Contemporary geographical research has become a marketplace for a bewilderingly diverse collection of theoretical stances and methodological approaches. While we generally extol diversity for its power to detect multiple facets of an empirical phenomenon of interest, we should nonetheless remember the price paid for cultivating it. The greater the diversity of theories and methods, the higher the risk of failing to find a common denominator of quality across them and, therefore, the more arduous the task of making sense of, and truly profiting from, diversity. Given this present state of affairs in our discipline, how, then, are we to meaningfully assess quality across such deep and wide

gulfs between perspectives? The purpose of this paper is to articulate and defend one candidate answer to this question. The answer is derived from a staggering, but less publicized advance in the philosophy of scientific induction, known as error statistics or error statistical theory.

Session: S2.3

Simard, M
Chiricota, Y

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Metropolitanization and Urban Fields in Midsized Cities Environments: A Better Understanding Through Geovisualization of Commuting Flows

'Urban field' is a key concept in geography, planning and regional sciences. Metropolization and globalization seem to increase a city's urban fields, a phenomenon which highlights social and spatial changes induced by the market at global and regional scales. More precisely, metropolization involves an increasingly important role for cities in the spatial organization of regions. This geographical process generally associated with large metropolises, may also apply to towns and midsized cities and their surrounding spaces. Certain factors, however, seem to disadvantage the smaller and more peripheral cities and territories. These difficulties appear to be related to the overall location and the nature of their economic bases although the true significance of these factors is not yet established. In this study, we evaluate metropolization in the northern part of the province of Quebec (Canada). We focus our study on the city of Saguenay (150,000 pop.), formerly known as Chicoutimi, and its hinterland. The objective of the research is to measure the intensity, forms and evolution of commuting exchanges within that territory. Thus, daily flows of workers between Saguenay and the 48 other localities of the Saguenay-Lac-Saint-Jean administrative region have been processed (1996 and 2006). Thereafter, we developed innovative GIS and computer graphics tools allowing us to isolate and illustrate specific flows in this evolving complex system, namely the increase of the polarized area over time and the geographical differentiation of urban-rural relationships.

Session: R4.7

Simmons, T

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Epistemology of Climate Change and the Relative Irrelevance of Climatologists

Climate change is a timeless process. Global warming and its consequences are significant, value laden topics developed by climatologists and other scientists since the middle 1970s. By 1987, global warming achieved standing both as climatological research and as environmental policy issues. This was followed quickly by creation of the IPCC by WMO and UNEP, by establishment of the UNFCCC at the 1992 UNCED or Earth Summit in Rio, and by national greenhouse gas inventories, emissions and removal standards, reviewed and refined annually at Conference of Parties meetings, notably by the Kyoto Protocol in 1997 and by the oversold 2009 Copenhagen conference. Scientific research continues under the auspices of the IPCC and various national institutions. Climate change laws, policies and actions are determined by individual nations. Still, climate change did not become an overwhelming set of public policy issues until 2006-2007 with breakthrough public support for IPCC science and for Al Gore's highly successful propaganda film, Inconvenient Truth, culminating with the Nobel Peace Prize. Notwithstanding issues and vocabulary, climatologists no longer control the debates, now fragmented into climate science; energy generation and conservation; carbon taxes, cap and trade or carbon trading economic engineering; subnational and national partisan politics; and fundamental legal, regulatory and economic restructuring. Arguments about hockey sticks, baseball bats or rapid glacial movements are no longer important. Arrogance, zealotry and climategate scandals raise serious questions about credibility, reliability and veracity. Parallel to C.P. Snow's notorious two cultures dilemma, climatologists are being buried by a blizzard of controversies.

Session: F2.3

Sinclair, J
Robinson, L
Spaling, H

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Traditional Pastoralist Decision-Making Processes: Lessons for Reforms to Water Resources Management in Kenya

The purpose of our paper is to consider the vision for public participation in water resources management embedded in Kenya's 2002 Water Act, as it relates to pastoralists. The Act envisions that responsibility for management of water resources at the local level will be devolved to community-level bodies. Our approach was qualitative and included interviews with government officials and Gabra pastoralists, observation of and participation in traditional Gabra korra meetings and focus group discussions. We conclude that the 'institutional model' of participation being pursued through the creation of Water Resource User Associations is particularly problematic for mobile pastoralists such as the Gabra and we suggest an alternative strategy that would focus on the fostering of deliberation processes.

Session: W2.7

Skinner, E
Masuda, J

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Exploring the Variability in the Ways That Youth are Engaged in Research to Address Urban Inequality

Urban children and youth living in poverty experience varying degrees of marginalization and underrepresentation in society as a result of their age and social status. Evidence suggests that young people are just as, if not more knowledgeable of their surrounding living environments as adults, although it is the latter who make most of the decisions regarding their health and well-being. However, urban health studies focus on children and youth as research objects rather than active participants and, among those that do, few studies have documented how to successfully implement and sustain youth-led research projects. This paper provides a systematic review of the state of the literature where youth are active research participants in promoting healthy urban environments. We are focusing on exploring the theoretical and methodological basis for youth engagement in urban health research. Through systematic searching and categorization, we assessed the titles and abstracts of a total of 399 studies focused over the past 31 years, yielding only 17 published studies that adhered to what we consider to be robust community-based participatory research on urban health involving youth. Using these studies as best practice exemplars, we assess the strategies that have been used to provide more meaningful representation of the expertise and leadership of urban youth in research. The low number suggests that youth are not being adequately involved in the research process most likely as a result of the lack of acknowledgement of untapped potential of youth to act as community leaders in resolving persistent urban health inequalities.

Poster Session A

Sloan Morgan, V
Castleden, H

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"If you list the whole community as co-author... that's unethical": Academic Perspectives on the Ethics of Community Co-Authorship in Community-Based Participatory Indigenous Research

Researchers are obliged to publish their findings. However, with increased collaboration and complexity of studies, determining who will share authorship has become a difficult ethical practicality. While many journals have authorship guidelines, researchers and editors are often unaware of context-specific cultural protocols and how to constructively and appropriately respond to Indigenous contributions to community-based participatory research. Although the Canadian Institutes for Health Research's (2007) Guidelines for Health Research Involving Aboriginal Peoples states that, "an Indigenous community should, at its discretion, be able to decide how its contributions to the research project should be acknowledged," (Section 15: 6), interpretations and decision-making regarding "acknowledgement" raise important and complex ethical questions. This paper presents an analysis of a pilot study engaging academic participants (n=15) in qualitative, semi-structured phone interviews to identify and understand their perspectives on authorship decision-making processes in the scholarly dissemination of their collaborative Indigenous research.

Thematic analysis revealed four key ideas: 1) processes regarding placement/methods of acknowledging community contributions; 2) requirements for shared authorship with individual versus collective partners; 3) risks to sharing authorship with community partners; and 4) benefits to sharing authorship with community partners. Findings suggest an emerging but inconsistent practice of sharing authorship with community partners. While participants in this study expressed their underlying concerns with sharing authorship as an issue of representation, it may be – instead – a crisis of publication in the ‘publish or perish’ era.

Session: R4.4

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Siemer, J

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The Geography of Early Childhood Development: Neighbourhood Context in Regina, Saskatchewan

The most critical stage in human development occurs during early childhood. During this period, children's development is shaped by their experiences and interactions, which occur primarily in the context of family and neighbourhood. Through the Understanding the Early Years (UEY) Initiative, an inventory of programs, services and resources for families with young children was developed and combined with key socioeconomic status (SES) variables from semi-custom 2006 Census of Canada data to map the context for early childhood development in municipal neighbourhoods in Regina, Saskatchewan. During the 2008-09 school year, all kindergarten children in Regina were assessed using the Early Development Instrument (EDI), a population-based measurement of school readiness with results grouped based upon neighbourhood of residence. Results of the EDI across Canadian jurisdictions suggest that community assets and neighbourhood SES strongly influence early human development. Regina's maps reveal that the geographic distribution of community assets for families varies according to service model, with privately-run services such as pre-schools and grocery stores, located in higher-SES neighbourhoods, often near Regina's outskirts, and publicly-run or subsidized services, such as libraries and child care centres, more evenly distributed. EDI results show that Regina's kindergarten children are significantly less school-ready than their Canadian peers. While the highest rates of developmental vulnerabilities were found in low-SES neighbourhoods, the majority of vulnerable children lived in middle and high-SES neighbourhoods. Regina's community maps are currently being used as a key resource to support UEY partners in developing a community action plan for families with young children in Regina.

Poster Session B

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Investigating RADARSAT-2 Polarimetric Data for Native Grassland Mapping in Western Canada

The loss of native grasslands, which play an important role in ecosystem function, can contribute to climate change, decreased biodiversity and economic loss; yet quantifiable estimates of the rate and location of native grassland change in western Canada are not readily available. To date optical remote sensing has been explored for grassland mapping but cloud cover limits the availability of timely data and discrimination of seeded as opposed to native grassland has proved difficult. In this study we are investigating the utility of Radarsat- 2 polarimetric imagery for mapping native grassland, seeded pastures and agricultural crops. Fine quad-pol Radarsat-2 data at two incidence angles were acquired over three test sites in southern Alberta every 24 days from 1 April to 31 October, 2009. Supervised decision tree classification of the imagery is being used to separate grasslands from seeded pastures and crops. Preliminary classification of a single Radarsat-2 image acquired in July over the Newell County test site using only the three parameters from a Freeman-Durden decomposition produced similar results to the classification of a Landsat TM image acquired at almost the same time, although the classification accuracy of the radar image was somewhat lower. Indications are however that significant improvement in polarimetric classification may be achieved using more polarimetric parameters (Cloude-Pottier decomposition parameters or the full coherency matrix), multiple incidence angles, or multiple dates.

Session: R1.5

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Kloppenborg, C

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Optical Remote Sensing Tools for Mapping Native Grassland Change in Western Canada

Grasslands form an important ecosystem within the Canadian Prairies and their loss and/or fragmentation impacts biodiversity and water and carbon fluxes at local and regional scales. Over time, native grasslands have been lost to cultivated agriculture, urban development and oil and gas exploration. However, quantitative estimates of native grassland loss are lacking. This study is investigating the use of Landsat optical remote sensing to map native grassland change over time. The Landsat archives offer the potential to map the loss of native grasslands over the last 30 years. Two sites were chosen in southern Alberta, one where considerable change is known to have taken place (Newell County) and one which is relatively more stable in terms of land use change (Pakowki Lake/Onefour). Landsat-5 Thematic Mapper (TM) imagery was acquired for 1999, 2005 and 2009. In the first set of analyses, Landsat TM images from July of each year were classified using support vector machine classification algorithms into native grassland and cultivated cropping. The resulting images were subtracted (2005-1999, 2009-2005, and 2009-1999) to provide a measure of change over time. However, this method relies heavily on the accuracy of the classified images and can lead to over or under estimations in change detected. Hence, a hybrid classification scheme involving change vector analysis and supervised land classification was developed. The change vector analysis highlights areas of spectral change between years, which are then subjected to post classification. The latter method resulted in a lower level of change in native grasslands between 1999 and 2005, 4.3% as opposed to 7.9% with the former method. Based on local knowledge of the area obtained from grassland specialists and wildlife biologists, the latter method appears to provide a more accurate estimate of land use change.

Session: R1.5

Smith, D
Allen, S
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Reyes, A
Clague, J

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Holocene Dendroglaciology in the Lillooet Icefield Area, Southern British Columbia Coast Mountains, Canada

The Lillooet Icefield refers to an interconnected glacier-covered watershed divide that stretches southward from Chilko Lake to Meager Creek in the southern British Columbia Coast Mountains. The Icefield has six major drainages and separates wet coastal rainforests from the much drier Chilcotin Plateau to the east. Numerous glaciers spill into tributary valleys from the Lillooet Icefield, with all showing evidence for significant historical retreat and downwasting. Our paper describes the result of field investigations at over a dozen glacier forefields where recently exposed glacially-sheared tree stumps and glacially-buried detrital wood demarcate multiple pulses of Holocene glacier expansion interspersed with periods of glacier retreat. Dendroglaciological investigations led to the discovery of five distinct episodes of glacial expansion. The earliest episode is a Garibaldi-aged advance recorded by glacially-sheared tree stumps at ca. 5700 14C years BP. This advance was followed by an early Tiedemann-aged advance at ca. 3000 14C years BP, a late Tiedemann-aged advance at ca. 2300 14C years BP; and a widespread First Millennium Age advance at ca. 1500 14C years BP. As with most glaciers in the British Columbia Coast Mountains, glaciers in the Lillooet Icefield area experienced their Holocene glacial maximum during the Little Ice Age following a period of expansion that was underway by ca. 1000-900 14C years BP. The synchronicity of these five periods of glacier expansion in the Lillooet Icefield area suggests a Holocene glacier mass balance history dominated by regional glaciological responses to persistent climate-forcing mechanisms.

Session: W4.3

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Advanced Research Initiatives Using the Mackenzie Delta and Valley Air Photo Project Spatial Data

The Mackenzie Valley Air Photo (MVAP) Project is a multi-year, multimillion dollar mapping project (2003-2008) involving four federal departments (INAC, NRCAN, EC) and Centre for Geomatics and Municipal and Community Affairs of the Government of NWT as partners. This INAC-NT led projects goal is to provide sufficiently detailed mapping to adequately meet the mapping needs of public service regulators. The project provides high quality information for resource inventory evaluation and management and supports broad resource management decision-making for the Delta and Mackenzie pipeline corridor area. From a science perspective, the MVAP data has a general research purpose as framework data and is useful for logistic field work planning. The air Photo mapping Contours and DEM provide essential information for documenting, identifying, and interpreting surface terrain, vegetation and aquatic characteristics for assessment and monitoring of environmental impacts, management and protection of land, wildlife species, and protected areas, lands with special status, permitting and regulation of land uses. The aerial photographs provide a priceless resource by documenting baseline environmental conditions prior and subsequent to major development change in the region. The presented Poster will outline some science research topics employing this data. Four studies or initiatives are highlighted in the poster. These studies employ the high resolution geo-rectified orthophotos for terrain, vegetation or permafrost analysis. In addition, there is an example of Digital Elevation Model tiles (DEM) used to examine in geomorphological studies to remote survey for presence of methane Gas. The numbers of research initiatives using the Mackenzie Delta Air Photo Project spatial data can only increase and its use become more integrated - as the Mackenzie River watershed region is increasingly affected by physical and climatic changes.

Poster Session B

Spaling, H

Montes, J
Sinclair, A

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Best Practices for Community-Based Environmental Assessment: Promoting Learning and Sustainability in Kenya and Tanzania

This paper establishes best practices for community-based environmental assessment (CBEA) in Kenya and Tanzania and examines what participants in community-centred approaches to environmental assessment (EA) have learned using the lens of transformative learning theory, a comprehensive theory of how adults learn. Using a case study approach, three CBEA cases involving water supply projects were studied using interview methods and action research. Findings show that best practices for encouraging meaningful community involvement include providing access and adequate notice to participants, fairer cost sharing, broader representation of women and youth, participant understanding of the CBEA facilitator, and culturally appropriate sharing of findings. Learning outcomes included both instrumental and communicative learning that could be attributable to the CBEA process, such as technical skills for erosion control, new information about EA regulations, and shared values of environmental sustainability and community unity. We found that the use of participatory rural appraisal tools especially allowed community members to actively generate knowledge for the CBEA and gain new skills and knowledge themselves. However, testing selected best practice approaches in a live case in order to encourage greater participation and learning had mixed success. For example, attempts at providing early notice still resulted in it being far too late for most participants and only about one-third of the participants were women. However, a pictograph functioned as an effective tool for reporting CBEA results to the community and demonstrating learning outcomes.

Session: R2.7

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Climatic Signals in Instrumental Streamflow Records and Tree-Ring Chronologies from the Northwest Territories, Canada

Under global warming scenarios, the Canadian Northwest Territories, like all northern boreal regions, are projected to undergo early, major warming, accompanied by increasing river discharge due to glacial and permafrost melting and hydrological cycle intensification. Increasing runoff trends have already been detected in the instrumental hydrometric records for the Northwest and Yukon Territories, and attributed to permafrost decay, as well as in northern Eurasia. However, unlike the ~85-year long Eurasian hydrometric records, the Northwest Territories' records are much shorter (only ~30-45 years long) and longer-term trends, variability, and linkages to climate oscillations (*i.e.*, the Arctic Oscillation, Pacific Decadal Oscillation, ENSO) are relatively unknown. To extend the hydroclimatic record, we constructed a tree-ring network of 27 chronologies, primarily from *Picea glauca*, spanning the Northwest Territories. A relatively long boreal forest record was obtained that commenced in AD 1492. Correlations between the tree-ring indices and river discharge were significant and stronger than those between the indices and temperature or precipitation; therefore the tree-ring data were most suitable for hydrometric inferences. A strong positive correlation exists between the tree-ring data and the Arctic Oscillation. Tree-ring inferred hydrometric data provides a long-term context for the natural streamflow variability in this region, which would be otherwise unavailable.

Session: W2.4

Starchenko, O
Peters, E

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Change in the Settlement Patterns of Canadian Aboriginal Peoples Between 1996 and 2006

The three decades on the cusp of the new millennium saw increasing urbanization of Canada's Aboriginal peoples. The 2006 census found that the majority of Canadians who identify themselves as First Nations or Métis make their homes in larger metropolitan centres. Existing research on settlement patterns of Aboriginal peoples in Canadian cities demonstrates some contradictions. Some accounts suggest the experience of urban Aboriginal residents is that of segregation with all the associated negative outcomes while others question this assessment. This paper explores the change in the pattern of urban Aboriginal settlement in major Canadian cities between 1996 and 2006 using two complementary methodologies – the classical index-based framework developed by US sociologists Massey and Denton in 1988 and a more recent approach proposed by a team of Australian geographers.

Session: R3.3

Starheim, C
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The Changing Hydroclimate of the Central British Columbia Coast Mountains

Mountain watersheds throughout British Columbia are an important source and store of freshwater. Although the Central British Columbia Coast Mountains are located in an important hydroclimatologic transitional zone between higher and lower latitude locations in western North America, there is little understanding of the response of rivers and streams in this region to historical climate changes. Exploratory trend analysis of temperature, precipitation and stream discharge in the Bella Coola area reveals several statistically significant trends. Local meteorological records show significant increases in mean winter temperature and total annual precipitation. However, records from three stream gauges in the Bella Coola area show substantial decreases in melt-season discharge. Possible connections between streamflow, climate fluctuations and basin glacier cover are considered. Temporal limitations presented by the short length of hydrometric records in this area reveal a need to extend hydroclimatic records. Existing tree-ring chronologies in the Bella Coola area are correlated to hydroclimatic records in an effort to identify potential proxy datasets for the reconstruction of these hydroclimatic variables. Significant relationships between historical tree-ring widths and temperature, as well as precipitation and streamflow are recognized. Potential teleconnections to large-scale climate forcings are investigated. Results are compared to related research in the British Columbia Coast Mountains.

Session: W3.3

Stark, G

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Hillshade Digital Elevation Model of Alberta

The use of digital elevation data has been used for several years as a means to 'model' terrain characteristics without having to filter out other information such as vegetation cover or man-made features for example. To further enhance such a terrain view, a hillshade element can be employed to provide the user with an enhanced depth of field. Such techniques have been applied to produce a map of the province of Alberta. This map has been developed through a collaborative effort of both government and private sector institutions. Produced at a scale of 1:1,000,000, this map shows dramatic contrasts in terrain in Alberta. Perhaps one of the most striking features is the Rocky Mountains along the southwest border of the province. Other terrain elements readily apparent are the various 'glacial scars' across the rest of Alberta. Such a map is used by Alberta Agriculture to study drainage basins and also to overlay other themes such as crop type, soil moisture values, weather data, and many more agriculturally related spatial data sets. This map has become a key base layer for the department's soil, water and climate specialists to assist in their research work.

Poster Session A

Stefanik, J

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Squaring Palliser's Triangle: Property, Nature and Modernity

This paper investigates the Palliser Triangle as a contested, fixed, and fluid region, an object of colonial and contemporary science, an environmental discourse, and a (post)colonial space where landscapes of whiteness and 'wildness' meet. It attempts to unravel the complex representations of the Triangle 150 years after the Palliser and Hind expedition reports were first published and a century after the area was settled for agriculture. The Palliser Triangle is argued to be not only a changing physical region, but a shifting symbolic and discursive one as well. It is a geographic entity that has changed in size and character as agricultural science and technology have continued to push the limits of where dry-land agriculture is possible. At the same time, Palliser's namesake is symbolically invoked through an environmental degradation narrative. Political dimensions of the region are also explored through political borders and property regimes, while cultural dimensions are interrogated through the lens of visual

representations of modernity, whiteness and nature. This paper is the basis of a PhD. dissertation proposal and is therefore an initial exploration into ways in which the Palliser Triangle can be interrogated through a critical geography framework.

Session: R4.8

Stefanovic, K
Koster, R

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Railfan Tourism and Its Connection Heritage Tourism

Across North America something is occurring that few have noticed: people are watching and photographing trains. A review of academic and 'grey' literature reveals that although there are many books, websites and magazines dedicated to railfans, virtually no research has been conducted that examines this market. The purpose of this presentation is to examine this tourism market and its connection to heritage tourism. Results from an online survey conducted over three months in 2009 provide a clear market profile of railfans in terms of their age, income, travel preferences and expectations. More specifically, the results from this research illustrate that railfans travel to a particular railfan destination for the number of trains that can be seen in one day and or for a unique view. Not only are railfans interested in watching and photographing current trains in unique environments, many are also avid train historians, keen to visit communities that possess museums and artifacts related to the rail industry. This suggests that communities which possess high train traffic levels, a unique view to photograph trains from and have supporting heritage attractions related to the railway history of the area, have great potential to cater to this tourism niche market of railfans.

Session: F1.2

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Cloutier-Fisher, D

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Building Healthy, Disaster-Resilient Communities in Coastal BC

The health of social, economic and environmental systems is paramount in decreasing vulnerabilities to hazards affecting our coastal communities. Whether these hazards are earthquakes, tsunamis, sea level rise, or increased frequency and intensity of storms and other weather-related events, healthy communities translate to more resilient communities. Looking for ways to enhance social, economic and environmental community health is an important means of enhancing resilience and decreasing vulnerabilities to hazards. By analyzing social and economic indicators of vulnerability from census data for Vancouver Island's Capital Regional District, a Social Vulnerability Index has been created and mapped. These maps identify and display areas of social vulnerability based on the following factors: family structure, education and employment of vulnerable groups, incomes and dwellings, race and ethnicity, and aging population. Using census data to complete such an analysis provides a snapshot of any given population's vulnerabilities. This provides a tool that is useful in community and disaster planning. The maps generated from this research project create a means to visually analyze and address social and health vulnerability. Discrepancies in each area's capacity to cope and recover, relative to their urban, rural or remote nature, are displayed clearly in these maps. However, many of the variables represented in the maps are inextricably linked and connected. This leads, once again, to difficulties in unveiling and addressing the root causes of these vulnerabilities. Addressing social and health vulnerabilities not only enhances preparedness for coastal hazards, but tackles systemic societal, economic and environmental issues of health as well.

Session: S2.2

Stretch, V
Gedalof, Z
Berg, A

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Tree-Ring Evidence for CO₂ Fertilization of Forests

Increased atmospheric CO₂ could increase photosynthetic rates and cause trees to use water more efficiently, thereby increasing overall growth rates relative to climatic limiting factors. Accelerated tree growth in response to elevated atmospheric CO₂ has been seen across a range of forest types, however these results have been inconsistent, and are generally based on short-term studies. Long-term studies based on tree-rings have generally been restricted to a few sites, and have produced conflicting results. Here we analyze the global record of tree-ring width for evidence of increasing growth relative to drought, and for changing sensitivity of radial growth to drought. This analysis shows that a small but highly significant proportion of trees exhibit increasing growth relative to drought over the past 130 years. These growth increases cannot be attributed to increasing water use efficiency, elevation effects, nitrogen deposition, or divergence. These results suggest that while CO₂ fertilization is occurring at some locations and will influence future forest dynamics, it cannot be expected to offset the effects of increasing temperatures, or to substantially slow the rate of carbon accumulation in the atmosphere. The processes causing these different responses are not yet known, but there appear to be differences both within and between species. Continuing research will examine the different growth responses of Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*), coexisting species which dominate the semiarid forest environments of Western North America, to increased atmospheric CO₂, changing climatic conditions, and on differing site conditions.

Poster Session A

Summerby-Murray, R
Campbell, C

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Inherited Landscapes: Retrospect and Prospect for an Environmental History of Atlantic Canada

In preparation for a forthcoming collection of essays, this paper presents the new interests and concerns appearing in the field of environmental history in Atlantic Canada. The paper notes the disparate threads of past scholarship in the Atlantic region, with roots in biological and physical sciences, historical geographies, social and labour histories, and the politics of resource economies. Environmental history is suggested as a means of integrating these earlier approaches as well as a vehicle for informing contemporary policy making. Three key themes emerging in current scholarship are explored in this paper: constructing and conserving historical environments, human responses to environmental change, and ecologies and sustainability. The first theme has a long lineage, from First Nations' resource use and European colonial encounters, to the prominent study of natural history in the mid-nineteenth and early twentieth centuries and the mobilization of an environmental consciousness in recent decades. Human responses to environmental change are conditioned by the resource geographies of this region, particularly local and regional consequences of depletion in the fisheries, forests and mines, and the processes of deindustrialization. The longer term environmental sustainability of Atlantic ecologies is a final theme, especially in terms of social and biotic consequences of climate change. Our paper acknowledges the remarkably creative and interdisciplinary analyses at work in the field today, with evidence ranging from the visual arts to climatic records. The paper, and the collection, use these three themes to synthesize a new 'environmental history' that is both theoretically informed and regionally sensitive.

Session: S1.1

Swales, S
Makar, M
Forsythe, W

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Power Centre Impact on Independent Retailers: Examples from Toronto

There is debate about the impact of power centres on independent retailers. Some suggest power centres have a negative impact on nearby independent retailers; others suggest that there is a generative effect. Distance decay is thought to be relevant for these externalities, be they positive or negative. Using data collected by the Centre for the Study of Commercial Activity (CSCA), this study evaluates the impact of two Toronto power centres from 1999 to

2008. The relative health of independent retail within a two kilometre radius of each power centre was analyzed by number of stores, vacancies and composition. The role of distance decay was also evaluated using different-sized buffers from the power centres. If the independents were in direct competition with power centre stores they suffered or remained stable. In general, however, independents fared well in the vicinity of power centres. Distance decay patterns were varied.

Poster Session B

Sweeney, B
Ekers, M

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(Dis)Organizing Tree Planters: Union Campaigns in British Columbia's Tree Planting Industry

The tree planting industry is culturally, economically and ecologically important to Canada's forest industry. Moreover, tree planting is designed to simultaneously restore timberlands while legitimizing the liquidation of timber by forest companies, and thus represents an intersection between environmental issues, economic sustainability and the labour process. This paper examines two (ultimately unsuccessful) attempts to organize tree planters in British Columbia in the 1990s. These attempts occurred both internally, through CREWS, a grassroots organization, and externally, through the involvement of the Industrial, Wood and Allied Workers of Canada (IWA). In doing so, this paper engages with recent debates in labour geography, particularly Steve Tufts and Lydia Savage's recent call for more emphasis on how workers shape "cultural landscapes," which they suggest "are implicitly beyond material questions." We seek to engage with and expand Tufts and Savage's agenda-setting comment, by addressing the question of how workers shape environmental landscapes. More specifically, we examine how it is necessary for workers to produce environmental conditions that are conducive to their own social and economic reproduction, and the need for the labour movement to give ample consideration to these conditions. In doing so, the paper provides examples of how the labour movement can gain environmental legitimacy whilst establishing material and cultural bases of survival and reproduction.

Session: R3.7

Swinehart, J
Wedin, D
Hiller, J
Dinneen, J
Storper, J
Robbins, C

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Does Fire Trigger the Activation of Grass-Stabilized Great Plains Dune Fields?

Most Great Plains dune fields are currently stable, but have been periodically active during the last 25,000 years. The largest of these dune fields is the grass-stabilized 57,000 km² Nebraska Sand Hills. What are the necessary and sufficient triggers required to reactivate eolian sand under semi-arid grassland? Was fire a likely trigger of dune destabilization prior to European settlement? In January 2006, a wild fire burned 2400 ha of grass-stabilized linear dunes near Halsey, NE. Within three weeks, we established 180 research plots (18 transects with 10 plots each) across burned and unburned dunes. Sand movement (erosion pins), soil moisture, plant species composition and plant production were measured during the 2006 growing season and subsequent winter. Total sand movement varied across the landscape, but averaged less than 0.5 cm gained or lost. More importantly, fire did not significantly effect sand movement even though burned plots were bare during February thru April, the windiest time of the year. Although soil moisture was significantly lower in burned than unburned plots (6.6 versus 7.7 % volumetric soil moisture), there was no effect of fire on plant species diversity or grassland productivity. This lack of dune reactivation is consistent with OSL dating of eolian sand in the Sand Hills. The most recent period of dune reactivation was primarily during the Medieval Climatic Anomaly (700-1000 yrs ago). Localized blowouts and sand movement have occurred in the last 600 years, but none have apparently led to region-wide dune reactivation.

Session: S1.4

Tan, S
Foote, K
Andrey, J
Maclaren, V
Muller Myrdahl, T
Ustundag, E

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A Hitchhiker's Guide to an Academic Career in Geography: Strategies and Advice for Early Faculty

This special session is designed for faculty and graduate students who are beginning their careers in higher education, focusing on key issues and tasks that are most relevant during the first years of an academic appointment. Topics that will be discussed include issues of teaching and learning, course design, issues of diversity and inclusion, and active pedagogy. The goal of the workshop is to help early geography faculty balance the many responsibilities of academic life and to understand how their teaching, research, service, outreach and personal lives intersect and interconnect. This session will provide a forum for discussing problems and challenges commonly encountered when beginning an academic post. Such topics are of mutual relevance to early faculty from all disciplines in geography. Graduate students and postdoctoral students are welcome, as the session may provide opportunities for building networks and facilitating information exchange relevant to the job search process. Topics addressed during the session may include but are not limited to: career planning, tenure and promotion; effective teaching strategies; course design and developing learning objectives; establishing a research program in a new setting; working with

research students; balancing professional and personal responsibilities; and time-management. A Chinese proverb

says "to know the road ahead, ask those coming back." The workshop will include a panel session consisting of faculty members who have reached different stages in their academic careers. Panellists may share their personal experiences, exchange advice and discuss lessons learned. This format encourages a framework of support from mentors and information exchange between peers and colleagues which can help with coping with the pressures that often face early career faculty.

Session: R2.10

Tasker, V
Jollineau, M

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A Geomatics Perspective on Vineyard Management in the Niagara Region

Niagara's vineyards are by nature spatially variable, and a need exists for improved methods of assessment, monitoring and management of vines and their condition. The ability to measure, assess and monitor vine condition over time, and account for spatial variability in both vine quality and yield, allows vineyard managers to quickly respond to changes as they emerge. Based on existing studies, geomatics technologies (e.g., global positioning systems, geographic information systems and remote sensing) can be used to extract detailed and accurate spatial information about vineyard characteristics and grape quality. With increasing emphasis on sustainable management practices, the purpose of this study is to examine the value and use of geomatics technologies, combined with ground-based data, for improved vineyard management in the Niagara wine region. We will demonstrate how geomatics technologies are used to improve wine grape production, from vineyard visualization to sub-block analysis and management. An integrated data management system provides an opportunity for vineyard managers to conduct precision viticulture; making valuable vineyard information available with reduced costs over time. Geomatics technologies have the potential to significantly increase vineyard productivity, production efficiency and profitability over the long term while minimizing the impact of farm operations on the natural environment.

Session: R4.7

Taylor, S
Buffin-Bélanger, T
Arseneault, D
Hétu, B

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An Analysis of the Spatio-Temporal Dynamics of Ice Jams in a Small Eastern Canadian River Using Dendrochronology

Ice jams are an accumulation of fragmented ice impeding flow. Jams can cause major flooding usually accompanied by floating blocks of ice and generating more damages than free-flowing floods. There are many factors involved in jam instigation, making prediction an arduous task. This study aims to identify hydrometeorological and morphological elements leading to jam instigation in a reach of the Ouelle river, eastern Canada. This site has been selected for its jamming frequency and severity affecting the municipality of Saint-Pacôme. The last major event occurred in 2005, causing for more than 500 000\$ in damages. Ice jam years have been identified by the dendrological dating of ice impact scars on 60 riparian trees, sampled in three geomorphically distinct river reaches : linear, meandering, and the transition between the two. Variables included in the analysis contain winter temperatures, precipitations and discharge. Logistical regressions have been used to determine the role of the hydrometeorological variables in jam instigation for the three river reaches. Results indicate that hydrometeorological conditions leading to jam instigation differ according to location in the fluvial system. This emphasizes the need to consider spatio-temporal jam dynamics brought forth by the combination of hydrological and meteorological conditions in predicting and managing ice jams.

Session: W2.4

Teixeira, C

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Housing Immigrants and Newcomers in Central Okanagan, British Columbia

While the Central Okanagan real estate market is one of the most expensive in the country, there is little published data/literature on the housing experiences of immigrants in small and medium-size cities such as Vernon, Penticton and Kelowna. This study examines the housing experiences of new immigrants and the stresses they face in Central Okanagan Valley, as well as the coping strategies of these groups.

Session: W4.7

Thériault, M
Des Rosiers, F
Voisin, M
Dubé, J

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Assessing the Effect of Accessibility to Amenities in the Location Rent Searching for Market Segmentation of Preferences

In previous research, we developed a novel approach for assessing centrality and accessibility to urban amenities distinguishing among city centre, labour market and other types of services, like schools, shopping centres, groceries and health facilities. Complementary indices for each type of amenity derived from suitable opportunity sets (based on willingness to travel) are integrated within a hedonic model of housing markets. Results are highly significant and permit in-depth comparison of the marginal value of accessibility (by car, bus and walking) to several types of amenity within an integrated hedonic framework, while controlling for multicollinearity related to urban form and transportation networks, using principal component analysis. However, there remains significant spatial autocorrelation among the model residuals. The purpose of this paper is to explore ways to get rid of this spatial autocorrelation or, at least, to handle the spatial drift which could be present in the perception of accessibility (and its valuation) among buyers. Building on a comprehensive hedonic model using thousands of single-family house transactions made during the 1993-2004 period in the Quebec Metropolitan Area, this paper compares the efficiency of OLS (ordinary least square), SAR (spatial autoregression) and quantile regression techniques for handling spatial autocorrelation in the hedonic model and, eventually, for identifying factors behind the spatial drift that could influence buyer's valuation of urban centrality and accessibility to amenities. Moreover, assessment of the marginal effects of market segmentation on the valuation of accessibility to specific amenities provides bases for discussing spatial drift estimations in-line with urban economic theory.

Session: S2.3

Thomas, V
Khomik, M
McCaughey, J
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Leaf and Canopy Physiology: Synergistic Use of Field Measurements, Radiative Transfer Modeling, and LiDAR-Hyperspectral Remote Sensing

This work models leaf photosynthetic parameters, foliar biochemistry, and species-specific canopy structure and reflectance characteristics for a boreal mixedwood forest site. Field measurements of maximum photosynthesis, light use efficiency, V_{cmax} , and conductivity were collected with an LI-6400 Portable Photosynthesis System in the summers of 2005 and 2006. Foliar samples were also collected in 2005 and analyzed for chlorophyll concentration and macronutrients to generate representative values for each species. Canopy structural characteristics were modeled from LiDAR data for the site and related to leaf photosynthesis and biochemistry. Species-specific leaf reflectance and hyperspectral indices were also generated. Radiative transfer modeling and a LiDAR-hyperspectral data fusion approach were adopted to map canopy photosynthesis characteristics for the entire site.

Session: F1.4

Tomlins, M
Niemann, K

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Incorporating Topographical Information and the Spectral and Structural Properties of Vegetation for the Remote Mapping of Wetlands

An effective alternative to costly and time-intensive field mapping of wetlands is the use of remote sensing. Traditional photo-interpretation and image classification techniques often lead to inaccurate mapping of wetlands due to the visual and spectral similarity of wetlands to other land cover types. Technological advancements allow increasingly accurate modeling of wetland topography and vegetation structure using Light Detection and Ranging (LiDAR) systems, as well as detailed spectral characterization of wetland vegetation from high spectral resolution (hyperspectral) imagery. A project to develop a classification scheme that incorporated LiDAR derived topographical and structural characteristics with hyperspectral imagery was undertaken in order to make use of the additional

discriminatory information that they provide. The study region for the project is the Gavin Lake block of UBC's Alex Fraser Research Forest (AFRF), located approximately 50 kilometres northeast of Williams Lake, British Columbia. Concurrent hyperspectral and LiDAR data were collected during August of 2008. Field classification of wetland type was conducted during the summer of 2003, as well as an additional field survey during July of 2009. A binary classification-tree approach was utilized that segmented the study area into wetland or non-wetland based on LiDAR derived topographical characteristics (slope, curvature, wetness) and vegetation structure (canopy height, rugosity). A spectral classification was then conducted on those areas determined to be wetlands in order to further refine the wetland type. Preliminary results indicate that the inclusion of topographical and structural information can lead to gains in wetland classification accuracy over traditional photo-interpretation and image classification techniques.

Session: R3.9

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Coops, N

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Modelling and Mapping Rooftop Solar Energy Potential Using LiDAR

According to the Greenhouse Gas Division of Environment Canada, the public electricity and heat generation sector accounts for 17% of Canada's total carbon emissions. Add to this the additional emissions from the residential, commercial and institutional sector and this value grows to almost 30%, or 211 megatons of carbon dioxide emissions per year. From these statistics it becomes apparent that substantial initiatives are required to address the techniques in which communities obtain and utilize energy if Canada is to effectively mitigate carbon emissions. To help investigate pathways towards a clean energy future, the research in this paper examines a geographic approach that integrates active remote sensing technologies for estimating solar energy potential (solar hot water and photovoltaic) at individual building rooftops. Recent advances in laser remote sensing data collection have significantly improved the accessibility and accuracy of high resolution, site-specific spatial data thereby enabling novel opportunities to produce detailed models of solar energy potential. Incorporating LiDAR (light detection and ranging) derived building morphological characteristics and modelled direct and diffuse radiation with cloud cover estimates from geostationary satellites provides for a new generation of radiation models where the spatial variations of both topography and climatology are assessed. This novel radiation modelling technique is applied here, using the District of North Vancouver as an example case study, to demonstrate web-based mapping tools developed in concert with the GIS department that provide local citizens with critical information regarding the solar energy potential in their community.

Session: W2.9

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King, D

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Multivariate Forest Structure Modeling and Mapping Using Quickbird Imagery and Topographic Data in Chelsea, Quebec

Forest and species conservation requires continual assessment and monitoring of forest habitats. This paper presents the development of a remote sensing based multivariate model of forest structure as an indicator of biodiversity. In North American forests, increased horizontal and vertical forest structure complexity is often associated with increased amount and types of habitat, and consequently greater biodiversity. Previous research using 20 cm pixel airborne digital camera imagery and Redundancy Analysis (RDA) developed a multivariate forest structure model using mostly spatial image variables but with additional spectral and topographic information. Scaling analysis showed some variables to be better predictors at fine scales and others at coarser scales. This research follows that work by using coarser scale Quickbird imagery with greater coverage to develop a similar model for mapping biodiversity in Chelsea, Quebec. In 70 field plots over 25 structure variables were measured, including information on leaf area index and canopy openness from hemispherical photographs taken at 1m and 6m height, tree size and spacing, snags, ground and understory vegetation, and coarse woody debris. Image spectral, spatial and topographic variables were derived from the multispectral imagery, panchromatic imagery and DEM, respectively. As in the previous study, RDA is being applied to derive a multivariate forest structure model. This paper presents the model, application of the model in mapping the municipality, and validation of the model using data set aside as well as validation of the mapping results using field biodiversity data collected by the municipality during a 'bioblitz' in June 2008.

Poster Session B

Trede, K

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Advantages and Disadvantages of Presenting Map Content on Small Screens

This paper focuses on the different use of traditional paper maps (street maps/city maps) versus digital maps on small screens such as mobile navigation systems, demonstrated by using continuously variable zoom levels and different language settings. Maps presented will focus on multilingual areas in North America and Europe. The following scenario for presentation on small screens will be introduced: how to get an overview of an area in relatively small zoom levels/scales in relation to the user's position in large scales/zoom levels. This presentation will be based on different examples in Regina, Canada and Europe with a focus on cities and locations with a local name and a translated or transcribed name. Examples presented will be: locations described as an address in multilingual areas (e.g., Brussels (Belgium), Bolzano (Italy), and Biel (Switzerland)). In addition, several locations in Greece and/or Russia will be presented as in those countries other alphabets than the Latin alphabet are used. In addition to an address description, the possibility of presenting points of interest (POIs) will be introduced. The focus will be on the presentation of POI categories with different priorities (airports, ferry terminals, railway stations in relation to tourist attractions, restaurants, and others by use of different zoom levels/scales). The difference between default settings and user settings will be outlined. Furthermore, the relationship between the map in a browser and the moving map/navigation view will be outlined.

Session: W4.5

Treitz, P
Lim, K
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Nesbit, D
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LiDAR Remote Sensing for Forest Management: Modelling Forest Inventory Variables

Forest inventory and management requirements are changing rapidly as forest industries try to satisfy an increasingly complex set of rules, standards, business practices and public expectations (*i.e.*, economic, environmental and social policy goals). To satisfy these expectations, there is a critical need to develop accurate up-to-date inventory systems

that spatially quantify forest structure and related attributes to enable product segregation and resource value maximization across large forested areas. New remote-sensing and data-processing technologies can provide a very detailed three-dimensional representation of the forest, essential to spatially-explicit predictions of forest inventory variables such as basal area, volume and biomass. To demonstrate the feasibility of these technologies for providing enhanced resolution of forest resource inventory information, airborne light detection and ranging (LiDAR) and field data were collected for a boreal forest in northern Ontario. Models for intolerant hardwood, mixedwood, jack pine and black spruce forest types were developed to predict: (1) basal area (BA) ($R^2=0.57-0.82$); (2) gross total volume (SUMGTV) ($R^2=0.74-0.86$); (3) gross merchantable volume (SUMGMV) ($R^2=0.77-0.89$); (4) quadratic mean diameter (QMDBH) ($R^2=0.65-0.83$); (5) total aboveground biomass (SUMBIO) ($R^2=0.67-0.77$); (6) average height (AVGHT) ($R^2=0.74-0.87$); and (7) top height (TOPHT) ($R^2=0.91-0.98$). Although variable by stand type, validation of these models indicate height related models (QMDBH; AVGHT; TOPHT) performed well (*i.e.*, RMSE < 10%) and volume related models (SUMBA; SUMGTV, SUMGMV, SUMBIO) performed moderately well (RMSE approximately 20%). These results, for a range of boreal forest conditions, indicate that LiDAR data offer significant potential for integration into tactical forest resource inventories.

Session: F1.4

Tremblay, J
Shearmur, R

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Modélisation multiniveau des déterminants de la migration interrégionale des jeunes Canadiens entre 1996 et 2006

Dans une perspective de politique publique visant à agir sur des déterminants régionaux pour attirer ou retenir la population en général et les jeunes en particulier, nous posons les deux questions suivantes: 1) Après contrôle pour certaines caractéristiques individuelles (par exemple l'âge, le niveau d'éducation, le statut matrimonial), la région est-elle un facteur explicatif dans la décision de migrer au Canada ? Nous étudions ici quatre échelles géographiques: province, division de recensement, bassin d'emplois et municipalité. Nous élaborons un modèle économétrique multiniveau simple avec des variables de contrôle explicatives au niveau individuel, mais seulement un modèle vide (avec une constante aléatoire par région) au deuxième niveau. En somme, nous voulons évaluer la proportion de la variance attribuable au niveau régional, après certains contrôles individuels, sans toutefois tenter de comprendre à ce stade quels sont les facteurs régionaux qui entrent en jeu. 2) L'effet régional est-il le même pour chaque groupe d'âge ? Quatre cohortes de jeunes sont envisagées pour analyser l'effet de l'âge sur la migration (15-19 ans, 20-24 ans, 25-29 ans et 30-34 ans) ainsi qu'une cohorte d'adultes, en principe moins mobile, soit les 35-54 ans.

Session: R3.6

Tufts, S

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Tourism, Climate Change and the Missing Worker: Uneven Impacts, Institutions and Response

For over two decades, researchers have addressed the issue of climate change and its present and future impacts on tourism related activity. Researchers based in Canada have been at the forefront of international discussions of the implications for tourism as climate change inevitably affects tourist receiving and generating regions as well as the mode of travel between them. This paper reviews the recent literature with a focus on the impact of climate change mitigation and adaptation on tourism related employment in Canada (now reported by Statistics Canada to be over 600,000). Of particular interest is the wide range of impacts climate change will have on employment in a diverse sector which will experience climate change in highly localized ways influenced by different geographic and competitive contexts. It is further noted that workers have largely been absent from analyses as agents of climate change mitigation and adaptation. This relative absence may be a product of the theoretical focus of government and business and/or the relative lack of strong labour institutions in many tourism related industries giving voice to worker concerns. The paper concludes with a call to centre workers in tourism policy responses to climate change. This research is part of a larger sectoral project exploring the impacts of climate change on employment in Canada and the institutional response of organized labour.

Session: R3.7

Turchenek, K
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Derksen, C

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The Impact of Snow Cover Variability on Snow Water Equivalent Estimates Derived from Passive Microwave Brightness Temperatures over a Prairie Environment

Considerable seasonal and inter-annual variation in the physical properties and extent of snow cover pose problems for obtaining reliable estimates of quantities and characteristics of snow cover. In spite of these challenges, the Climate Research Branch of the Meteorological Service of Canada (MSC) has developed a suite of algorithms to derive snow water equivalent (SWE) estimates from passive microwave imagery. The MSC algorithms work well over open prairie environments under the assumption of large areas of consistent snow cover. However, the accuracy in SWE retrievals under variable snow conditions is not well understood. To better understand how variable snow cover impacts remotely sensed SWE retrievals, field-based experiments were conducted over patchy snow covered areas in February 2005 and March 2008. The field campaigns were developed over a 1600 square kilometre area in southern Saskatchewan. Land covers found at the sampling sites included fallow and stubble fields, pastures, and shelter belts. This research verifies that the continuous snow cover assumption embedded in the MSC passive microwave SWE algorithm overestimates SWE over patchy snow cover. Several in-situ observations that appear to play important roles in affecting the passive microwave data over variable snow covers include the presence or absence of ice lenses, fractional snow covered areas, snow depths and ground temperatures. In an attempt to mitigate the impact of fractional snow cover on snow water equivalent estimates, a weighted algorithm is proposed that applies the snow cover percent over a remotely sensed footprint to the SWE estimate derived by the MSC algorithm.

Session: W1.4

Turner, S

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The Green Revolution: Recent Initiatives to Improve the Environmental Sustainability of Social Housing in Canada

Much of Canada's social housing infrastructure was built during the 1960s and 1970s and is now in need of repair or replacement. These older buildings are generally relatively energy inefficient and use construction materials that are environmentally unsustainable. Social housing landlords can apply for federal funding through Canada's Economic Action Plan to upgrade their buildings to ensure that they remain a viable housing option for future generations of low-income Canadians, and to improve their environmental footprint. Landlords are encouraged to adopt innovative new building practices to improve the energy efficiency and environmental sustainability of their buildings with the help of this federal funding. My paper will explore these new building practices by providing specific case study examples, including grey-water recycling, solar hot water heating, green roofs, and 'smart' energy metering. Landlords of large apartment towers on large plots of land are also encouraged to use some their surrounding green space for urban agriculture. While many landlords are only making small changes, collectively they hope to make Canadian social housing a more environmentally sustainable form of tenure over the next decade.

Session: F1.1

Ustundag, E

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Witnessing Social Citizenship

With the current socio-economic changes in global economy and their impacts on Niagara Region, there has been a sharp increase in the number of vulnerable groups who have been socially and spatially excluded. Based on a street-assessment conducted in St. Catharines, this paper explores an emerging agenda of geographies of social citizenship of outdoor female sex-workers in St. Catharines, Ontario. While the effects of current social and legal frameworks on the everyday practices of female sex workers have been already studied by various scholars, these studies lack spatial grounded analysis of social citizenship practices. Critical social and feminist geographers have

underlined “particular ways of being situated within and responding to relations of power through which a community is governed and ruled” (Chouinard 2009). These studies particularly emphasize how various social groups claim, articulate, exercise and contest social, political and civil rights, entitlements as well as obligations. Linking current debates in social citizenship and feminist geographies, this paper offers a critical account of practices of social exclusion of outdoor female sex-workers in St. Catharines. By examining gender and sexuality as systems that also produce value (Wright 2004), the purpose of this paper is to understand various intersections, assemblages and discourses of power relations in contesting practices of social citizenship in and through various material and political spaces of St. Catharines.

Session: W3.7

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Polar Epsilon 2: Preparing DND for the RADARSAT Constellation Mission

The Department of National Defence (DND) is expecting to be one of the largest users of RADARSAT Constellation Mission (RCM) data due to operational requirements to support maritime and Arctic surveillance and Government of Canada interests and Canadian Forces missions abroad. Currently in Options Analysis phase, Project Polar Epsilon 2 (PE2) will build upon Project Polar Epsilon capabilities that are currently being implemented for DND’s operational utilization of RADARSAT-2 data to prepare for the advent of RCM. PE2’s scope currently comprises three key components. The first of these, identifies upgrades to Polar Epsilon’s RADARSAT-2 ground segment infrastructure and capabilities for RCM compatibility, which includes upgrades to the east and west coast Polar Epsilon ground stations, associated network infrastructure, the Arctic Surveillance (Land) capability, and the near-real time ship detection (NRTSD) capability. For NRTSD, new algorithms will be developed and implemented for ship/iceberg discrimination and false alarm rate reduction. The second component involves implementation of a ship identification capability through the integration of Automatic Identification System (AIS) sensor payloads into the RCM satellites. Concurrent collection and fusion of ship AIS data with RCM radar ship detection data will provide a much more tactically relevant maritime surveillance picture than with radar ship detection alone. The third component involves the design and implementation of a northern Canada ground station that will include the capability of receiving satellite sensor data, thus extending near-real time applications well into the Arctic, and the capability to provide telemetry, tracking, and commanding (TT&C) of satellites to support more rapid satellite tasking. Satellite missions that could be supported include, but are not limited to RCM, RADARSAT-2, and future DND satellite missions.

Session: W2.5

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Maclachlan, J
Andrey, J
Sharpe, B

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Field Trip Planning: A Geography Signature Pedagogy

Participants in this session will explore the underlying pedagogies associated with field teaching. In small groups the participants will develop answers to some of the common field trip planning questions. As well, each participant will have the opportunity to commence planning of their own trip. Kolb’s experiential learning cycle and the principles of active learning are tightly entwined in field teaching. These theoretical underpinnings often disconnect with the reality of operationalizing a field trip. How do you ensure that students are engaged during the field trip? What is the appropriate amount of work students should be doing on a field trip? How do you evaluate field work? How do you ensure accessibility of the trip? University budgets are under increasing scrutiny with fewer available funds. How can a field trip program be sustained in this environment? How do you effectively manage the risk associated with a field trip? What logistics need to be considered?

Session: R3.10

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Are There Gender Differences in Sketch Maps?: Illustrations from a Sociology Class on Cartography

This paper examines the experiences of students in a Sociology class entitled 'Map Worlds: Society and Maps' while creating sketch maps during the first day of class. In light of existing literature that specifies significant gender differences while drawing informal sketch maps, I plotted observed map differences in terms of orientation (north, south, etc), scale, legend, fill-in patterns, symbolization of lines or routes, symbolization of buildings, lettering, en-route markers and monuments, and wayfaring instructions. Students created these first-day sketches over a five year period (2002, 2003, 2004, 2005, 2007) before they became acquainted with specific cartographic representations later in the course. In all, some 76 students participated in this spontaneous exercise (39.5% men, 60.5% women). I asked the students to draw a map that covered the distance between the classroom and their place of local residence. The results showed a diminishing correlation with observations issuing from earlier research. More often than not, men and women drew maps with similar features. The paper explores not only these similarities, but also their dissimilarities.

Session: R3.6

Van der Sanden, J
Brisco, B
Buckley, J
Charbonneau, F
DeAbreu, R
Goodenough, D
McNairn, H
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Rapid Re-Visit and Coherent Change Detection with the RADARSAT Constellation

A 1-day rapid re-visit and 4-day coherent change detection capability on the future RADARSAT Constellation will offer new opportunities for exploiting SAR data for Government of Canada (GoC) information requirements. Research teams, composed of various departments of the GoC, are evaluating these enhancements for new applications opportunities and/or to improve existing applications. This paper will present an overview of the new capabilities, the approach developed for the applications evaluation and provide some preliminary results. The implications of the results are also discussed with respect to the future RADARSAT Constellation.

Session: W2.5

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Scott, N

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Characterizing Central Ontario's Forest Ecosystems by Fusing Airborne LiDAR and High Resolution Digital Imagery

A comprehensive description of forest ecosystems, (*i.e.*, species composition, seral stage and disturbance history, *etc.*) is critical to our understanding of ecosystem function (*e.g.* productivity, carbon and nutrient budgets/fluxes), biodiversity and habitat (real and potential). In turn, this enhanced information allows for improved forest ecosystem management (*i.e.*, silvicultural treatment, habitat protection for species at risk, fire protection, *etc.*). Processes of succession and disturbance are dynamic and difficult to incorporate within a mostly static vegetation classification framework. However, the vertical and horizontal structure of forest stands are indicators of these processes that can be included in a classification framework. Passive optical systems have proven to be useful in mapping forest vegetation types at various spatial scales. Active systems such as light detection and ranging (LiDAR) can discern the three-dimensional structure of forest ecosystems. Hence, the objective of this study is to analyze and fuse

airborne digital imagery and LiDAR to respectively characterize species composition, vertical and horizontal forest structure reflective of seral stage and canopy gaps caused by autogenic and allogenic disturbances. Our results indicate that LiDAR derived structural and complexity indices are able to identify distinct seral stages and that a LiDAR derived Canopy Height Model (CHM) can be used to extract and characterize canopy gaps. Subsequently, these data are combined with species composition information derived from digital imagery. Hence, our study demonstrates that the combined use of optical imagery and LiDAR improves forest vegetation classifications by adding forest structure information and may help improve forest ecosystem management decisions.

Session: F1.4

van Proosdij, D
O'Laughlin, C

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Sediment Dynamics of an Intertidal Ecosystem over the Spring/Neap Cycle

The extraction of tidal energy or change in the natural tidal range of the Bay of Fundy by tidal power installations will potentially influence sediment dynamics in intertidal ecosystems. However, the magnitude of this influence is unknown and may or may not occur within a range of natural variability. The dynamics of sedimentation change in a confined tidal creek on the Minas Basin are assessed over the spring/neap cycle to determine if variations in tidal energy are viable for use as a proxy for energy extraction. Per- tide samples of deposited sediment indicate that a comparable amount of material is deposited during spring and transitional tidal cycles, while neap tides show generally less depositional capability. This is despite lower velocities recorded during neap tides. Acoustic data show a sudden decrease in the strength of return signals at high tide during spring tide cycles, indicating a potential clearing of the water column that is not seen on neap tides. Flocculation analysis is currently underway and will be applied to investigate variations in sediment mobility and distribution over the spring/neap cycle.

Session: R2.4

Vanstone, J
Sauchyn, D

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Streamflow Variability in the Souris River Basin, Saskatchewan

Residents of the Souris River Basin have long suffered from extreme variation in seasonal water flow, experiencing alternating cycles of drought and flood severely affecting water users and limiting future development in the area. A major obstacle to the detection of climate change trends in the region is the short length and discontinuity of most instrumental streamflow records and the effect of human impacts. To better understand hydroclimatic variability in the Souris River Basin, a network of tree-ring chronologies has been developed from Saskatchewan, Manitoba and North Dakota for the reconstruction of streamflow in southeastern Saskatchewan. From the spectral analyses (multi-taper and wavelet) of the reconstructed flow we identify common cycles of variability at interannual and multidecadal scales. Results of the reconstruction show that longer periods of low flows have occurred in the past than have been recorded. This study provides new and reliable information for water managers and decision makers developing adaptation strategies to climatic variability within the Souris River Basin.

Session: W2.4

Vaugeois, N

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Expanding Research Methodology with Rural Communities: Participatory Rural Appraisal to Guide Tourism Development

Many rural areas cannot afford to pay for research and, when they can, they often have to rely on the expertise of outsiders who can limit time and engagement with diverse stakeholders. Results of studies can often take a long time to be completed, thereby limiting their impact for timely decision making. Reports are often long, technical and not widely distributed within the community. It is possible for a study to be conducted where residents have no engagement in the process. This can lead to limited buy in of the results which impedes implementation. To counteract some of these limitations, alternative research methods are emerging which fit the context of rural communities much better, and which provide residents with ample opportunity for input. One such method is the participatory rural appraisal (PRA) methodology. According to the World Bank Group, PRA is a label given to a growing family of approaches and methods that emphasize local knowledge and enable local people to make their own appraisal, analysis and plans. PRA processes use the information gathering process and the reporting process to help residents contribute information to decision making and to better understand the issues, choices and concerns in the community. This paper will outline how the PRA method can be useful to guide rural tourism development within Canadian communities. Based on the application of the model in five contexts in British Columbia, the paper will provide insights for further use.

Session: F2.4

Vaugeois, N

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Rethinking Rural Development: Identification and Use of Amenities to Revitalize Rural Areas

The natural and cultural assets of an area are key determinants to human settlement. In Canada's rural areas, these assets have contributed to settlement patterns and a legacy of rich heritage. For many of Canada's rural regions, these assets were utilized to develop economies based on the extraction of natural resources. As time has evolved, numerous external pressures and new global realities have reshaped the relationship that rural residents have with these resources. Now, many rural areas are rethinking how they can utilize their rich natural and cultural heritage to keep their communities alive. The same assets are now being viewed as amenities that have the potential to reshape economic development strategies by bringing people (visitors and residents) into rural areas instead of simply exporting natural resources. An important first step in the support of rural amenity based development is gaining a clear understanding of the types of rural amenities within Canada. Additionally, researchers need to assemble around questions that will ensure that a balanced approach to amenity based rural development takes place. This paper will report on a new typology of Canadian rural amenities and pose questions for researchers to tackle in supporting amenity based rural development.

Session: S2.1

Veronis, L
Ray, B

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The Border and Everyday Life: A Comparative Geography of Four Immigrant Groups and Their Practices in Ottawa-Gatineau

This paper examines the everyday experiences and practices of four immigrant groups (Chinese, Francophones from sub-Saharan Africa, Latin Americans and Portuguese) residing in Ottawa-Gatineau. Canada's capital region is unique in that it is located on the most politically and symbolically charged border within the country: between the provinces of Quebec and Ontario. In the everyday life of the Ottawa-Gatineau population, the border functions simultaneously as an obstacle and opportunity for vulnerable groups such as immigrants and newcomers. While different policies regulate immigration and settlement in each province, we focus on the everyday social and spatial practices of individuals. Our aim is to understand the tapestry of factors that influences the settlement decisions and everyday geographies of the four immigrant groups taking into account their distinct histories and experiences of immigration. Drawing on the findings of qualitative research, we compare and contrast how each group negotiates the city's border geography, specifically how factors such as employment, housing and services, as well as language, culture and social networks shape their distinct spatial strategies.

Session: W3.7

Vincent, G

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Cycling the Earth in a Globalized World: Sponsorship and Professional Cycling from Early 20th Century

Throughout the 20th Century competitive cycling evolved from a regionalized and amateur sport in scattered hearths. Europe, especially France, Belgium and Italy, has traditionally been the main scene where races were held and the bicycle industry established. Consequently sponsors became interested in investing in cycling. Sponsorship evolved from local bike shops and other businesses, (European) bicycle manufacturers to continental manufacturers of a variety of products to, more recently, multinational corporations wanting to promote a wide variety of commodities by throwing in very large amounts of money. Nowadays athletes and their teams look more like advertising billboards whose main focus is to 'show' the sponsors names whenever and wherever they can throughout a racing calendar that now spreads yearlong and covers nearly every region of the world. This paper looks at how sponsorship, the industrial sector, the location and markets of sponsors, evolved, and the effects it may have had on the cycling world.

Session: R1.6

Vincent, G

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Towards an Interactive North-American Hockey Atlas

A large database of cities owning franchises in over 70 hockey leagues of any type (amateur, professional or semi-professional) from 1886 to the present was matched with population data. The main objective of the current project is to use this database to construct an interactive atlas that can perform geographical analysis of the cultural, social and economic factors that relate to the evolution of the North-American hockey landscape. Additionally, the investigation of the database could lead to more thorough interpretations of the developmental trends and impact of 'north skating south' and document the contraction and expansion cycles in various North-American professional hockey leagues and the patterns of their respective development. Research for this project involves management of the data through a GIS to track the spatial evolution of North American hockey over time. This methodology offers tremendous potential for the development of a spatial analysis tool that has been only partly used so far to study this subject.

Session: R1.6

Vitale, P

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Thorncrest Village: Building a Bourgeois Utopia

In the autumn of 1945, Marshall Foss began to develop the subdivision of Thorncrest Village at the corner of Islington Avenue and Radburn Road in Etobicoke. Foss and his partners made Thorncrest Village into a place devoted to the central ideals of suburban living. These tenets – among them conformity, community, privacy, stability, and a careful mixture of nature and city – are essential for an understanding of the history of suburbanization in Canada. Thorncrest Village served as a model for other suburban developments in Canada and was highlighted frequently in a variety of magazines and newspapers, including the Globe and Mail, The Montreal Standard, Chatelaine and the Journal of the American Institute of Planners. The national attention focused on Thorncrest Village was unusual, but its design and social life were not. While Thorncrest Village exemplified the clichés of suburbia, the principles applied there are apparent throughout suburban Canada. Based on an analysis of papers of the Thorncrest Village Homeowners Association, this paper returns to the genesis of these ideals and the search for order and control that motivated them.

Session: R4.8

Vodden, K
Woodrow, M
Smith, D
Khan, A
Furst, B

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Using Local Knowledge to Manage Coastal Environments and Respond to the Needs of Coastal Communities

Residents of Canadian coastal communities are primary stakeholders in fisheries management but continue to have little input into largely top-down and often ineffective management policies and practices. Yet local people have intimate knowledge to share about marine and coastal environments, problems with current practices and regulations, and challenges associated with making a livelihood in the fishery. Through interviews, kitchen table mapping and workshop sessions over two years in the community of Change Islands, Newfoundland and Labrador the authors have documented over 300 new coastal and inshore place names along with local perspectives on the future of the fishery, the distinct heritage and way of life of fishing communities, sustainable use of coastal environments, and the important contribution that inshore fishing makes to community survival. Harvesters suggest several key issues that threaten the viability of the local fishery and their livelihoods, including: over-regulation and regulations that do not take into account local realities; low fish prices and rising fishing costs; barriers to market access; unsustainable fishing practices; and rationalization policies. Lack of communication and collaboration along the fisheries production chain, as well as between policy-makers, contributes significantly to these challenges and serves as a barrier to policy change. Local solutions are offered that provide opportunities for shared stewardship and respond to the needs and concerns of Change Islands and other fishing-dependent coastal communities.

Session: F2.1

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Climate Change Due to Range of Temperature in Babolsar City, Iran

Climate change is a global problem. Climate change occurs over time, and the degree of change depends on the time scale we choose to examine. Changes in the last decade seem insignificant, when compared to those over the past million years. Temperature is one of the weather parameters that varies greatly over space and through time. The present research is aimed at quantifying the change in surface air temperature at Babolsar city. In this study, monthly and annual data for all temperature parameters were obtained. The annual and seasonal mean temperature of Babolsar city was calculated for 54 years (1951–2005). Trends in annual and seasonal temperature series were analyzed by using linear trend and Mann-Kendall test. Most of the trends showed a positive change in temperature

with different rates in different seasons. The maximum temperature during summer and minimum temperature during winter is increasing significantly. During the last 30 years, the increase in the mean temperature was greatest during spring, but during the last 50 years winters have warmed up the most. Also in Babolsar, annual mean temperature has increased significantly during the last three decades.

Session: S1.3

Walton-Roberts, M

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Indirect Pathways to Canadian Practice: The Migration and Education Nexus for Indian Trained Nurses

This paper examines the experiences of foreign trained nurses from India who enter Ontario's nursing profession indirectly via international student streams. This issue has significant policy relevance because indirect entry into the nursing profession adds complexity to: a) labour force planning and practice in the health sector; b) ethical recruitment protocols for international health care workers; c) processes of migrant integration into the Canadian labour force; and d) the assessment of macro structural processes that shape and reproduce female migration as form of state developmentalist policy. This paper offers an initial reading of India's experiences with the Global Nursing Care Chain (GNCC), a concept developed by Nicola Yeates that offers a theoretical and methodological framework for understanding the internationalization of nursing within a critical feminist interpretation of 'care' migration. This paper examines how international education and skilled migration have become intertwined in the operation of the GNCC based on a case study of transnational nurse training programs linking India with Canada. Tracing the spatially of nurse migration circuits originating from India will provide much needed empirical material for academic and policy questions about the distributive impact of the GNCC, and the related consequences for global health and migration governance.

Session: W1.7

Walton-Roberts, M

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State, Space, Society and the Extraction of 'Ethnic Surplus Value': India-Canada Trade and Immigration Intersections

The intersection between the mobility of skilled workers, regional innovation and export market development suggests that nations hosting large skilled immigrant populations might benefit from their cultural and economic competencies in the development of international trade networks. In seeking to benefit from this relationship, however, the state can also be criticized for attempting to 'extract ethnic surplus value', by fetishizing the ethnic immigrant in market terms. These debates are examined empirically in the case of India-Canada immigration and trade using qualitative interviews to elicit the perceptions of traders, officials and immigrant entrepreneurs in British Columbia, Canada. Findings suggest that the arguably positive relationship between trade and immigration is not obvious in the India-Canada case, nor is there compelling evidence of the state managing to successfully extract ethnic surplus value. Rather what appears most compelling in the interview transcripts is evidence of what can be termed a discourse of regional disadvantage circulated by immigrant and non-immigrant business actors alike regarding the nature of Indo-Canadian relations. This discourse of disadvantage is associated with the regional history of Indian immigration to Canada, and it functions to fetishize northern Indian ethnicity both in terms of its position in the larger Indian collective and in regards to the Canadian immigration landscape. The paper highlights how the geography of immigration in the India-Canada case produces competing political, cultural and economic relations that nuance and complicate critical interpretations of the state's effort to extract 'ethnic surplus value'.

Session: W4.7

Wang, K
Franklin, S
Guo, X

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Optical and Radar Satellite Remote Sensing for Large-Area Wildlife Habitat Mapping: An Example of DMC and Radarsat-2

Remote sensing has long been identified as a feasible and effective technology for large-area habitat mapping. The Disaster Monitoring Constellation (DMC), the first successful practice of the concept of an Earth-observation constellation, is considered to be an alternative satellite which can address the issue of large-area habitat mapping, providing a new opportunity for extending the applicability of this satellite imagery. Radarsat-2, the follow-on mission to Radarsat-1, represents a significant evolution from Radarsat-1 in aspects of spatial resolution, polarization and look direction. The images used in this study consist of DMC 32 m multispectral images and Radarsat-2 Standard Dual-Pol and Fine Quad-Pol images. Preliminary results showed that DMC-based classification obtained an overall accuracy of 95.6% in the coarsest Level I and 82.4% in the finest Level III under a hierarchical classification scheme. Therefore, the DMC multispectral imagery was capable of describing the physiognomy of Earth's surface with more than 80% accuracy, especially for large areas. However, clouds and cloud shadows (CCS) notably hinder the applicability of DMC imagery for large-area habitat mapping. Radarsat-2 data shows great potential for fusing with the DMC data in order to improve the accuracy of DMC-based products and diminish the negative impact of CCS.

Session: W3.8

Wang, S
Du, P

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Contemporary Asian Immigrants in Canada

Over the last two decades, the number of Asian immigrants to Canada increased substantially. While coming from the same continent, the Asian immigrants are composed of many groups with diverse cultural backgrounds and socioeconomic characteristics. For that reason, they are expected to exhibit differences in human capital, adaptation experiences, settlement patterns, and level of labour market performance. Contemporary Asian immigrants concentrate in a few metropolitan areas, where they increasingly settle in suburbs, leading to the formation of Asian-dominated ethnoburbs. Despite their improved human capital, the Asian immigrants as a whole still have much lower personal income than do the native borns and the general immigrant population. Among other things, education qualification and official language ability are the key factors for the success of the Asian immigrants in the Canadian labour market. Those from Hong Kong, India and the Philippines have more combined human capital (*i.e.*, high education plus official language ability) than the other Asian immigrants; they are also the highest performers in the labour market. The contemporary mainland Chinese immigrants also have high level of educational attainment, but their level of English proficiency is the lowest among all major groups of Asian immigrants, which should have affected their economic performance. Similarly, the immigrants from Pakistan, Sri Lanka and Bangladesh have the lowest level of high education, and they are the most disadvantaged in the labour market. The Korean immigrants have the highest self-employment rates, but self-employment does seem less rewarding than employment, as other studies have suggested.

Session: W4.7

Wang, Z
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Teillet, M

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A New Goniometer Capability for Image-Based Bidirectional Reflectance Distribution Function Data Acquisition

Most natural surfaces are non-Lambertian and therefore exhibit directional reflectance properties. The bidirectional reflectance distribution function (BRDF) is a broadly used function to describe these surface characteristics. The field measurement of BRDF for terrestrial surfaces requires a scanning or pivoting apparatus and a spatially uniform target. There are many approaches to gathering these data, ranging from simple hand-held devices to more complex goniometer systems. Goniometer systems are preferred as they automate the positioning of the sensor over the

target, however, these systems are seldom used because they are expensive to build and cumbersome to use. The second-generation University of Lethbridge Goniometer System (ULGS) uses a unique quarter-circle arm, which can carry either a light (ULGS-2) or a heavy (ULGS-2.5) payload for non-imaging or imaging sensors, respectively. In our proof-of-concept research, BRDF data of soil samples were acquired under controlled laboratory conditions, with both an Ocean Optics spectrometer (non-imaging) and a V10E Imaging Spectrometer mounted on the ULGS-2 and ULGS-2.5, respectively. The two BRDF data sets were compared and contrasted and the preliminary results are presented in this paper.

Session: F1.8

Warkentin, J

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Professor James Mavor: What Did He Contribute to Canadian Geography?

Scottish-born political economist James Mavor, already experienced in empirical social science research, arrived at the University of Toronto in 1892, at the age of 38, and stayed until his retirement in 1924. He is probably most recognized for his role in helping settle Doukhobors in Canada, but he should be better known to geographers because he contributed significantly to early Canadian geography in three areas. (1) At Toronto in 1906 he introduced the first economic geography course into a Canadian university curriculum, and geography remained in the Political Science program until the Department of Geography was founded in 1935. (2) At the turn of the nineteenth century a new society was transforming the prairies and, in so doing, Canada as a whole. Mavor, a keen observer of long-established European societies, eagerly investigated this process through his social science eyes. He wrote an important report on his findings: ostensibly centred on the grain trade it is in fact a comprehensive regional study of the prairies. Printed by the British government in 1905, the report is scarcely known today. (3) Mavor also published general accounts of the economic geography of Canada in a Handbook of Canada for the British Association for the Advancement of Science (1897), and in the Oxford Survey of the British Empire edited by O.J.R. Howarth and A.J. Herbertson (1914). Why then does Harold Innis (appointed by Mavor) completely overshadow him as a precursor in the canon of Canadian geography? I conclude by examining why this is so.

Session: F1.6

**Warner, K
Barber, D
Isleifson, D**

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C-Band Scatterometer Signatures Displaying Similar Results for Distinct and Different Ice Types

During the late summer of 2009, the CCGS Amundsen traveled through the Canadian Arctic from the Beaufort Sea, up through the North West Passage ArcticNet. This is a very important time for observing ice conditions, as one can differentiate between the floes which are surviving the summer becoming second year ice, or the older surviving pieces of multi year ice, all of which is surrounded by newly forming ice. Ice conditions in the Beaufort Sea were observed to be different than forecasted. Areas normally comprising thick multi-year ice contained open water, new ice types and only small multi-year floes. The C-band microwave scattering properties of two major ice types were measured using a ship-mounted C-Band polarimetric scatterometer. The dates at which the two distinct ice types were scanned were August 31 – September 1, 2009 for the multi year ice and then September 4th for the 'rotten ice' or the remains of what used to be a multi-year floe. In this study, polarimetric signatures of these ice types are compared to coincident RADARSAT(1 or 2?) imagery in order to gain a better understanding of signature differences at the two levels of scale. Early results show very similar signatures from the two very distinct ice types, thus requiring further investigation.

Poster Session A

Watson, L

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Household Energy Consumption and Social Marketing Campaigns

This portion of the session will consider consumers' energy consumption knowledge and how Canadian electricity and natural gas providers promote strategies to reduce household energy usage. Consumers' understanding of their own utility consumption tends to be limited to monthly bill payments going up or down, with little to no sense of personal responsibility for consumption in public buildings or that supply is finite (Lutzenhiser 1993). Social marketing campaigns are intended to educate consumers and encourage them to change their behaviour in some way. Many household energy providers in the electricity and natural gas sectors offer social marketing programs that encourage energy conservation. However, in an environment of deregulation and dwindling supply, it is unclear how prevalent these campaigns continue to be and what form they take in privatized regions. This research considers how social marketing campaigns that encourage reduced energy consumption address consumer understanding and a changing distribution environment.

Session: S1.5

Watt, E

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Engaging in the Politics of Contemporary City Planning: The Case of 629 Eastern Avenue, Toronto

This research examines a contemporary planning case in Toronto where tensions between policy visions and planning practices contribute to our understanding of neoliberal urbanism. Media, policy and interview discourses contribute to developing the nexus between neoliberal urbanism, creative class theory and gentrification in the case of 629 Eastern Avenue. The amalgamation of Toronto's municipalities in 1998 resulting from the 'Common Sense Revolution' and the 'creative turn' in the 2000s are identified as two key evolutionary stages in Toronto's neoliberal urbanism. The City's contradictory positions as 'grassroots' organizers, market actors and market regulators reveals their interventionist role in this case. The analytical imperative presented by this case study to expose the contradictory and contingent nature of 'actually existing neoliberalism' (Brenner and Theodore 2002) leads to challenging our very understanding of neoliberalism in the context of contemporary urban planning practices.

Session: R4.7

White, C
Laroque, C
Smith, D

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A Maximum Density Comparison of White Spruce to Growing Season Temperatures at Two Sites Along the Labrador Treeline

The Labrador treeline is different than most in Canada in that it has both a north/south and an east/west component. The treeline region has had little prior research completed, especially X-ray density of trees. In the summer of 2009, samples were collected in an attempt to initiate X-ray density studies on white spruce (*Picea glauca*) at treeline. We hypothesized that the variation in the response of white spruce to growing season temperature is expected to vary at different locations along treeline. Samples were collected at two sites, one located inland at treeline located near the Quebec border, and the second from a coastal location where the northernmost trees are found in Labrador. The main purpose of this paper is to examine the climatological response of the maximum density parameter as compared to the response of total ring-width. X-ray analysis was completed with the use of the Itrax X-ray Density machine at the University of Victoria, and the samples were then compared with ring-width parameters measured at the Mount Allison University Dendrochronology Lab. Through comparative analysis, climate parameters are identified from both sites that have a much stronger correlation with maximum density parameters than with total ring width parameters. This allowed for significantly stronger models to be reconstructed for summer temperature values at the interior site, and the reconstruction of May temperature for the more northern and coastal location. These results highlight the value of the X-ray density procedure in comparison to the more commonly completed ring-width only analysis.

Session: W1.3

Williams, D

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From Scribing and Peel Coat to Being Part of the Web, 1985 to 2012 and Beyond

Twenty-five years ago the Atlas of Canada was producing maps in a traditional scribing and peel coat method and published on paper. Today Atlas maps are created online using mainly ESRI software. Many facets of publication have changed during this period. The time needed to produce and publish has decreased, the subjects mapped have changed, the number of people needed and their skills has evolved and the mechanisms for publication are more diverse. As we look ahead further changes are imagined with more individuals having the opportunity to publish their own maps. This paper will discuss a number of parallel developments and the interlinkages as we try to imagine the future of Atlas mapping.

Session: R2.6

Wilson, K
Rosenberg, M
Abonyi, S
Lovelace, R

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Aging and Health: An Examination of Differences Between Older Aboriginal and Non-Aboriginal People

While the Aboriginal population in Canada is much younger than the general population, a trend towards aging has emerged over the last decade. In fact, the Aboriginal population aged 65 years and older is increasing faster than other age cohorts. Despite this trend towards aging within the Aboriginal population, very little is known about their health and health care use. Using data from the 2001 Aboriginal Peoples Survey (APS) and the 2000/2001 Canadian Community Health Survey (CCHS) this paper examines differences in health status and the determinants of health and health care use between older Aboriginal and non-Aboriginal populations. The results reveal interesting variations in health and health care and their determinants. The research demonstrates the need for further research and the development of health policy and services that are sensitive to the needs of older Aboriginal people as they grow in number in the coming decades.

Session: R2.8

Wiseman, D
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Evaluation of High Resolution UAV Imagery for Conservation Easement Assessment and Monitoring

The Manitoba Habitat Heritage Corporation (MHHC) conserves habitat by working in partnership with private landowners, farm organizations, corporations, conservation groups and government agencies. MHHC uses conservation agreements as a way for landowners to ensure long-term habitat conservation on their land and conducts aerial monitoring annually to ensure cooperation with the terms of the agreement. The existing monitoring program involves the acquisition of low altitude, oblique aerial photography using a handheld digital camera. Currently, these photos are used for visual interpretation only and no thematic map information is extracted from them. The purpose of this project was to compare various remotely sensed image products in terms of their utility for conservation easement assessment and monitoring. Specifically, land cover classifications derived from the oblique aerial photography were compared to similar classification schemes obtained from 2 metre panchromatic aerial photography and 10 centimetre imagery acquired using an autonomous unmanned aerial vehicle (UAV). Preliminary results indicate that the UAV imagery provides the most accurate land cover information, however, the oblique aerial photography is the most cost effective alternative. The 2 metre panchromatic imagery did not provide the spectral information necessary for a detailed land cover classification and, more significantly, did not provide information on current land cover conditions.

Session: F1.8

Wolfe, S
Bond, J
Lamothe, M

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Eolian Activity in Relation to Late Glacial and Early Holocene Environmental Conditions, Southwestern Yukon and Western Arctic, North America

Eolian deposits of the Yukon consist of loess mantles, stabilized and semi-active dune fields, stabilized sand sheets, active lakeshore and riverside dunes, and some cliff-top eolian deposits. Optical dating in central and southern Yukon reveal that dune fields in river valley settings stabilized as late as 9 to 8.5 ka, well after the retreat of Cordilleran glaciers. Eolian deposition in western arctic North America, including arctic coastal lowland dune fields, cliff-top eolian deposits and loess, show similar responses of activity during the late glacial period into the Holocene Thermal Maximum, with reduced activity after 9 to 8 ka. Continued post-glacial eolian activity throughout the region was most likely related to warm, dry conditions during the Holocene Thermal Maximum caused by peak summer insolation. Early Holocene dune stabilization in river-valley settings was probably due to cooler, moister conditions, and replacement of shrub and forest tundra vegetation by boreal forest cover dominated by spruce; conditions that, in contrast, were conducive to enhanced loess accumulation in southeastern Alaska. In central Yukon, a reduced loess accumulation in the early Holocene may reflect a change in river hydrology from glacial meltwater flow dominated to a predominantly nival flow regime.

Session: S3.1

Wood, C

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Cartographic Production Methods and Tools Before the Computer Age

The last 25 years has seen a revolution in cartographic production. But what methods did cartographers use previous to the introduction of graphic software such as CorelDRAW and other such software. My presentation will highlight some of the materials, instruments and other techniques used before the advent and widespread use of desktop PCs, etcetera.

Session: R2.6

Yang, X

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Detecting Light to Moderate Grazing Effects on Spatio-Temporal Vegetation Pattern Using Satellite Imagery for the Period of 1987-2009

Theoretically, light to moderate grazing is benefiting grassland ecosystem. However, inconsistent results of grazing effects on vegetation were reported due to lacking accurate and repeatable techniques for discriminating grazing effects from both temporal variability and spatial heterogeneity of vegetation. Remote sensing has the potential to be an effective tool for detecting difference in spatial and temporal pattern of grazing impact on vegetation relating to its high frequency and spatial coverage. The purpose of this study is to investigate light to moderate grazing effects on spatio-temporal vegetation pattern using spectral data derived from satellite image as a tool. Three areas, Larson Block (G1), north Gillespie (G2) and Dixon community pasture (G3), with different grazing histories but similar grazing intensity, and one ungrazed area, namely the south portion of Larson Block (UG) in mixed grass prairie were visited. Effects of grazing on vegetation biomass from 1987 to 2009 in the four sites were compared using two indices (NCI/Pr (Normalized Difference Vegetation Index/precipitation index) and RDI (relative difference index)) derived from NCI data from Landsat Thematic Mapper images. The preliminary results indicated that the temporal pattern of NCI highly related to growing season precipitation (March – data of the scenes acquisition). After eliminating the precipitation impact, a slight advantage in NCI improvement for UG over G2 and G3 was found and a reverse result was obtained in G2. Our results suggest that multitemporal satellite data together with climate data allow us to monitor grassland responses to grazing and facilitate management decision-making in the grazed ecosystems of the mixed grass prairies.

Session: R2.5

Yantzi, N
Young, N
Ruddick, S
McKeever, P

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Physically Disabled Children's Assessments of Their Schools

Physically disabled children who use mobility aids are being educated in main stream schools; however, there is little information on how these children function within their schools. The purpose of this presentation is to describe the accessibility and inclusiveness of the interior of community schools from the perspectives of children. Twelve children were interviewed in their homes. During the interview the child was asked to take the interviewer on a virtual tour of their school. A selection of child friendly and innovative tools helped the children to describe the inclusiveness and accessibility of their schools. The children identified significant barriers to their full participation in the school environment. The findings also show that the children had developed creative ways to negotiate these significant barriers. There is increasing pressure to include the perspectives of disabled people in the development of accessibility legislation and policy (e.g., Accessibility for Ontarians with Disabilities Act 2005). This research emphasizes the contributions of the perspectives of disabled children in improving their everyday geographies.

Session: R1.8

Yazdani, L

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La culture du coton en Iran et son role dans l'economie nationale

Le coton a été cultivé dès les temps anciens jusqu'au présent en Iran. Depuis 80 ans, les variétés du coton américain ont été cultivées en Iran. Le taux de production a été environ 2% du coton mondial et le taux d'exportation de cette récolte a été 1% de l'exportation mondiale mais malheureusement aujourd'hui la superficie cultivée de cette récolte a extrêmement diminuée et l'Iran est devenu un pays importateur du coton. La quantité de la production du coton en 1998 a été environ 451,000 tonnes, laquelle ont diminué aujourd'hui à 85,000 tonnes. En raison de l'augmentation des frais de la production du coton en Iran et aussi de la crise économique mondiale, le prix d'un kilo du coton raffiné a diminué de 1.8\$ à 1.2\$ américains, et pour cela, la superficie cultivée du coton et sa production ont diminué et l'Iran a été obligé d'en importer plus de 55,000 tonnes pour sa consommation intérieure l'année dernière. Pour atteindre l'autosuffisance de la production du coton et en diminuer l'importation et donc augmenter de l'occupation humaine il

faudrait une aide gouvernementale au cultivateur et l'achat de la production paysannière à un prix garanti. En ce moment dans les grands pays producteur du coton, comme l'Inde, les États-Unis, le Pakistan et la Chine, les cultivateurs bénéficient de l'aide gouvernementale et pour cultiver un kilogramme de coton, le gouvernement aide 0.10\$ à 0.60\$ aux cultivateurs. Dans les conditions présentes en Iran, il n'y a non seulement l'aide gouvernementale nécessaire, même l'achat de la production paysannière du coton est difficile.

Session: W3.5

Yembilah, R

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“We come for the Grass”: The Territoriality of Fulani Herders in a Section of Northeastern Ghana

The phenomenon of Fulani herders settling in Ghana for protracted periods has become a reality in many parts of the country although historically, Fulani herders have been nomadic. In Ghana's Tallensi-Nabdam district where settled Fulani herders have been present dating back four decades, there has always been simmering tension between herders and local people as they compete for the forest and land for different and similar purposes. Occasionally, violent conflicts occur. Locals argue that the Fulani herders are foreigners and should leave, but the Fulani have persisted. Conducting this research from a geographic standpoint, I investigated the conceptualizations of space and place as held by both herders and locals. I also discovered a variety of ways in which the herders, as 'foreigners', assure themselves territory and resources. These are the insights I shall share in this presentation.

Session: W2.6

Yiannakoulis, N
Scott, D

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Child Pedestrian Injury, Social Inequality and Urban Change

Not long ago, collisions between child pedestrians and automobiles were a major public health concern. Over the past several decades, child pedestrian injury rates have declined considerably in many regions of the world. Curiously, these widespread reductions in pedestrian injury risk may correspond with increasing geographic inequities in the burden of injury risk. Some have argued that while driving one's own children to school decreases their risk of injury, it increases the burden of risk on children who continue to walk to school by increasing the overall number of vehicles on the road. In this study, we use longitudinal data to analyze the changes in child pedestrian injury risk in Edmonton, Alberta Canada. Specifically, we use a generalized linear mixed model approach to quantify the effect of income inequality and urban change on the risk of child pedestrian injury over time. Our results show that injury severity, and to a lesser extent, injury risk, have been increasing in recent years, perhaps as an indirect result of recent economic growth in the region. We also identify a relationship between income inequality and child pedestrian injury. While some neighbourhoods of Edmonton have seen drops in child pedestrian injury risk over the past decade, others have seen increases, suggesting that injury prevention methods need to be geographically specific.

Session: R1.7

Young, A M
Wilson, W

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Maps of the Nipigon: Uncovering History Through Cognitive Cartographics

Lake Nipigon, located north of Lake Superior is the largest freshwater lake entirely within the province of Ontario. Arguably, it is also the final 'Great Lake,' the ultimate end of the chain that starts at the Thousand Islands. These waterways were part of an early route to the west and a favoured route north to Hudson Bay. In addition, the Nipigon was also a popular destination for gentlemen anglers in the late 19th century. Famous for its speckled trout, it attracted many American and Canadian outdoor enthusiasts. However, despite its early fame, the cartographic nature

of Lake Nipigon remained inconsistent: it is recognizable on several early maps, unconventionally located and shaped on others, and, on more than a few maps, entirely absent. By implementing Cognitive Cartographics, a method proposed by Denis Wood and John Fels, we have assessed this 'spotty' cartography, positioning these maps within their proper time and place. Through an inquiry of their consequences, we have explored their social implications and interpreted the knowledge they have constructed of the Nipigon. Comparing these understandings with the existing historiography, we offer a critical history and geography of the Nipigon as it has yet to be revealed – through maps.

Session: F2.6

Zaib, S
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Urban Population Vulnerability to Heat Stress Conditions: The Case of Waterloo Region

The issue of concern is whether certain population groups within the Region of Waterloo are more vulnerable to hot and humid weather conditions (in summer) than others. The assessment of this problem is based on the characteristics of the population which are age (young and old), income, and residence and citizenship status. The mortality data for 2006 to 2008, on the other hand, were obtained from Statistics Canada. Essentially, the analysis, data management and mapping, is on social vulnerability to heat stress conditions. However, the objective of this analysis is not only to bring light to a possible regional issue but also to take actions to reduce vulnerability to heat stress conditions and to improve (or develop) a heat watch warning system for decision support.

Session: F2.7

Zakharov, I
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Statistical and Spectral Parameters to Evaluate Polarimetric Data Pre-Processing in Stereo-Radargrammetry

The application of polarimetric data in the stereo-radargrammetric process was studied using Radarsat-2 Fine Quad data for digital surface model (DSM) generation. First, existing polarimetric algorithms enabled generation of a composite image from polarimetric single look complex data (SLC) for target detection and speckle reduction with the polarimetric whitening filter (PWF) and minimum speckle intensity image (MSII) technique, respectively. Second, the polarimetric decompositions helped to extract additional information about dominant scattering mechanism in the given terrain cover. The dominant scattering mechanism can be determined with H/A/ decomposition for different cover types (Bragg surface, forest canopies, etc.). In some cases the surface backscattering is related to coherent scattering mechanism and can be represented by odd-bounce component of Pauli decomposition. Results of SLC composite images (PWF, MSII) and images synthesised using polarimetric decompositions were compared with multiple image fusion results. The quantitative statistical measures, such as correlation coefficient and textural measures calculated from the grey level co-occurrence matrix, were used for the estimation of image quality, which has impact on stereo matching and DSM accuracy. The spectral parameters based on the calculation of power spectrum and coherency function of SAR signal helped to analyze signal power in the spatial frequency domain. The results showed that the full polarimetric information did not give significant improvement in DSM accuracy (less than 5%) compared to multiple image fusion techniques (non-coherent processing) such as span (total power) and speckle filtering.

Session: R1.9

Zhang, A
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Climate Change Impacts on Prairie Land Resources: A Spatially-Explicit Modelling Approach

The potential impact of climate change on land resources in the Canadian prairies has been identified in several national reports as an important climate change impacts and adaptation issue. To obtain a more quantitative assessment of the magnitude and spatial distribution of such impacts, a modeling study has been undertaken that employed a biophysical model, the best available databases representing agricultural practices in the prairies, and IPCC climate change scenarios to simulate biophysical processes over the 2040-2069 period. The assessment reveals significant regional variability in the impacts on land productivity and water use. It also suggests that the impact will be highly sensitive to the fertilization effect of increased atmospheric concentration of CO₂ on biomass growth.

Session: S1.3

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Huang, G

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Assessing the Uncertainty in Prairie Hydrological Response to Climate Change

Small wetlands in the Canadian prairies play an important role in the prairie hydrology and are crucial to many economic and ecological services such as water supply for rural communities and waterfowl habitat. Most prairie wetlands are located in closed catchments with largely internal drainage. Natural outflows are rare under normal flow conditions. Owing to the unstable and dry prairie climate, these small watersheds are highly sensitive to changes in temperature and precipitation. Downscaled projections from climate models are increasingly used to investigate the impact of climate change on regional hydrological processes. However, few investigations have been made to effectively examine the uncertainties in the integrated downscaling process and related impact modeling. This study aimed to explore the impacts of climate change on prairie hydrology and associated uncertainties using combined downscaling-simulation approaches for a small watershed in south Saskatchewan. A variety of downscaled climate scenarios were developed through integrating different RCMs and stochastic weather generators with specific consideration of the changes in precipitation occurrence. Distributed hydrological modeling was then implemented at the watershed scale based on downscaled climate scenarios to examine the responses of key hydrological processes. Results show that the downscaled future climates are consistent in the prediction of warming throughout the year with high monthly temperature shifts for winter and late summer. Annual precipitation is forecast to be close to the baseline but seasonal variations are expected to be stronger. Changes in temperature and precipitation have complex effects on the hydrology of the study area. Large changes are forecast for the water yield in March where the major snowmelt event occurred. Evapotranspiration and soil moisture are relatively insensitive to the simulated climate change. Reservoir storage is generally decreasing throughout the year particularly in winter and spring. Results indicate that large uncertainty exists in the simulated hydrological variables under future climate. The uncertainty mainly comes from the choice of RCM and is enhanced through the differences between weather generators. The incorporation of precipitation occurrence change facilitates a comprehensive translation of RCM outputs, but also brings additional uncertainty into the downscaled climate downscaling and hydrological simulation. It is thus suggested that the results of any climate change impact study that is based on only one RCM and one weather generator should be interpreted with caution, and that a delicate balance is needed between the information loss and additional uncertainty for effectively utilizing the RCM outputs at small scale.

Session: S1.3

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Estimation of Percent Ground Cover in Grassland from Hyperspectral and Multi-Angle Remote Sensing Imagery

Grassland percent ground cover is an indicator of grassland health and productivity. In this study, we estimated percent cover of grassland components from multi-angle hyperspectral remote sensing imagery. In 2009, three field sites were set up on the southern Alberta prairie. At each site, five 140-metre-long transects were established, with 15 sampling points marked at every 10 metre interval along each transect. Field measurements were conducted at each of these sampling points to estimate percent cover of green and senescent vegetation, and background. Multi-angular hyperspectral remote sensing imagery CHRIS/Proba was acquired near the same time of the ground measurements. The percent cover of green vegetation and background was found to be strongly related to several spectral indices derived from three angular (0, ± 36 degree) CHRIS reflectance images. Both the -36 and +36 degree side-looking CHRIS images provided better estimates of percent ground cover of grassland than the nadir (0 degree) image. Amongst the three angle images, spectral indices from the -36 degree image provided the best estimation, with an R^2 of 0.76~0.83 and RMSE of 3.63%~4.67% for green vegetation, and an R^2 of 0.77~0.88 and RMSE of 4.66%~6.25% for background estimation.

Session: R3.5

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Detecting Invasive Plant Species of Grassland using Multiple Airborne Remote Sensing Products

Leafy spurge, *Euphorbia esula* L., is an invasive plant species that can rapidly spread on native grasslands of the Canadian prairies. It reduces livestock carrying capacity and is toxic to cattle. There are currently no good quantitative estimates available for the total area of the prairies affected by leafy spurge. This research was established to provide remote sensing tools for the detection and assessment of the spread of leafy spurge. A 60 km² study area containing a variety of habitat types with and without leafy spurge was identified near Taber, Alberta. On July 17 2009, AISA hyperspectral remote sensing imagery together with coincident LiDAR and ortho-photography were acquired at nadir view angle over the leafy spurge sites. Ground data including digital images, the density of leafy spurge flowering, senescent, and non-flowering stems, and supporting geospatial data were collected to support interpretation of the airborne data. Distinct patches of local vegetation, that is patches of leafy spurge, sagebrush and buckbrush, were identified from airborne remote sensing images based on their spectral signature and structural information. A significant correlation was developed between yellow pixels associated with leafy spurge flowers and the leafy spurge stem counts in the ground-based digital imagery ($R^2=0.81$). Airborne hyperspectral remote sensing spectral signals were found to be well related to leafy spurge stem counts, the relationship being stronger with flowering stem counts ($R^2=0.86$) than non-flowering stems ($R^2=0.55$). Successful detection of leafy spurge using remote sensing tools will enable an accurate estimate of the cost of an invasive plant and of the value and efficacy of management programs.

Session: R3.5

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Grassland Composition and Percent Cover Estimation Using Digital Hemispherical Photographs

Ground-based quantitative estimation of the composition and percent cover of grasslands can assist in validating grassland health and productivity as measured through remote sensing. Field-based visual estimation has been widely adopted for a direct measurement of these parameters, however this is time consuming and subjective. In this study, we explored the applicability of digital hemispherical photographs. Three field sites were set up on the southern Alberta prairie in 2009. Five transects with 75 sampling points were laid out at each of the sites. In early July, visual estimates of percent cover encompassing green and senescent vegetation and background were carried

out within a 20 x 50 cm Daubenmire frame at each sampling point within the transects. Two sets of digital photographs were taken at each point using a Nikon D90 digital camera coupled with a regular and Nikon fisheye lens respectively. The downward looking hemispherical photos covered a larger ground area than the regular photos and provided a more accurate estimation of the percentage of each cover type. In comparison to the field visual estimation, digital hemispherical photos provided good estimates of green vegetation ($r^2 = 0.77$ and RMSE = 7.9%), senescent vegetation ($r^2 = 0.85$ and RMSE = 6.2%), and background ($r^2 = 0.81$ and RMSE = 4.0%). Given the spatial heterogeneous nature of grasslands, the increased area of coverage provided by digital hemispherical photos offers better representation of grasslands composition. As digital hemispherical photographs are acquired with greater ease and convenience, potentially they can be used to replace the ground-based visual estimation for quantifying grassland biophysical features.

Poster Session B

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An Assessment of the Vertical Accuracy of SRTM and CDED Digital Elevation Datasets in the Province of Saskatchewan

In the past decade a number of high-quality geospatial datasets covering the province of Saskatchewan have become available to commercial businesses and the general public through geospatial distribution websites such as GeoGratis (Natural Resources Canada) and the United States Geological Survey (USGS) Earth Explorer. Among the digital elevation model (DEM) datasets freely available through the internet, the Shuttle Radar Topography Mission (SRTM) and the Canadian Digital Elevation Data (CDED) datasets are perhaps the most widely used. Published vertical accuracy statements for the two datasets tend to represent a national or global mean and may not necessarily reflect the actual vertical accuracy for various parts of Saskatchewan. An assessment of the vertical accuracy of these two datasets for the major topographic regions of the province was carried out using over 15,000 vertical control points from the Saskatchewan Geodetic Dataset v3. The results of the assessment are compared against the published vertical accuracies for the datasets.

Session: W1.8

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Use of Red-Cyan Anaglyph Technology for Terrain Visualization and Analysis Studies

Stereoscopic (3D) examination of terrain features from stereo-pairs of aerial photographs has been a key component of terrain analysis and interpretation studies for decades. Stereoscopes, special glasses designed for stereoscopic viewing of air photos, work by forcing the eyes to simultaneously but independently view pairs of overlapping stereo photographs. The human mind then 'reconstructs' the two images into a single three-dimensional view. Over the years a number of techniques have been developed to duplicate the three-dimensional nature of stereo air photos on a computer screen for integration into soft-copy photogrammetry and GIS software suites. Unfortunately, many of these techniques require specialized and often costly equipment, and do not allow for such views to be exported to hardcopy or to document distribution formats such as PDF. This poster shows how J.D. Mollard and Associates (2010) Limited (JDMA), a private engineering and geoscience consulting company based in Regina, Saskatchewan, uses low-cost red-cyan filter glasses, digital elevation models, and off-the-shelf anaglyph creation software to produce three-dimensional stereoviews from air photos and satellite imagery. Such views can be incorporated directly into JDMA's in-house GIS suite, often with overlays of additional vector data, for further terrain analysis and mapping studies. The anaglyph views can also be exported to paper for inclusion in reports and charts or embedded within PDF documents.

Poster Session B

Zirul, C

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Destruction and Creation? Governing Rural Regional Development in a Neoliberal Policy Environment

Resource sector restructuring has resulted in fundamental and accelerated economic and social change in many rural and small town places in British Columbia. The political response has arguably contributed to increasing uncertainty, as the current provincial government, under the influence of neoliberalism, has withdrawn from participating in rural regional development planning. This presentation highlights my MA case study of the Cariboo-Chilcotin Beetle Action Coalition, a regionally collaborative governance organization that formed in the absence of provincial initiatives to address changes in the rural economy and environment. This presentation argues that, in this case, rural regional development planning has been offloaded to a more 'local' governance organization, but that the organization was not provided with the jurisdiction or authority to effect change. Thus, this case study reveals that the policy approach of the BC government needs to be reconsidered in order to capture competitiveness of place in the next rural economies.

Session: R3.1
