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# **GEODESY AND GEOMATICS ENGINEERING**



**1<sup>st</sup> Annual  
Student Technical Conference**

**March 2002**

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*The Organizing Committee would like to welcome you to the 1<sup>st</sup> Annual Student Technical Conference!*

**Where: Dineen Auditorium  
Room C13 – Head Hall**  
**When: March 26<sup>th</sup> and 27<sup>th</sup>, 2002**

*The Organizing Committee*

*The March 2002 Annual Graduate Seminar Committee:*

*David Mayunga and Samer Diarbakerly*

*The March 2002 Undergraduate Technical Report presentations were organized by:*

*Kevin Pegler*

*Please join us for refreshments after the Conference in the Faculty Lounge,  
Head Hall – Room C 26*

*Samer and David*

## SCHEDULE OF EVENTS

**Tuesday – March 26, 2002**

**1:00            OPENING REMARKS**

**SESSION 1    LIM – Chair – Garret Duffy**

- 1:05 – 1:25    Joe Harvie – Supervisor: J. Secord  
Nova Scotia Land Surveyors and the Hierarchy of Evidence.
- 1:25 – 1:45    Karen Cove – Supervisor: S. Nichols  
Property Rights Regime for Offshore Oil and Gas Development.
- 1:45 – 2:05    Kevin Grey – Supervisor: S. Nichols  
The Economic Effects of Public Participation in the Land-Use Zoning Process with Case Studies from Fredericton.
- 2:05 – 2:25    Mitchell Ettinger – Supervisor: S. Nichols  
Evaluation of the Land Titles Implementation in New Brunswick.
- 2:25 – 2:45    Tyson Newman – Supervisor: J. Secord  
An Investigation Into the Effects of Magnetic Declination on Retracing Compass Surveys.
- 2:45 – 3:05    Jason Bond – Supervisor: J. Secord  
Demographic Study of Licensed Land Surveyors in the Maritimes.

**3:05 – 3:20    Coffee Break**

**SESSION 2    HYDROGRAPHY / GEODESY – Chair – Garfield Giff**

- 3:25 – 3:45    Clint Rumbolt – Supervisor: P. Dare  
An Assessment of Three Types of GPS Satellite Orbits Provided by the International GPS Service.
- 3:45 – 4:05    Jeff Aitken – Supervisor: P. Dare  
Integration of Pseudolites with Ground Based Augmentation Systems for Aircraft Precision Approaches and Landings.
- 4:05 – 4:25    Steven Babstock – Supervisor: M. Santos  
An Evaluation of Trimble's 5700 GPS Equipment in an RTK Environment.
- 4:25 – 4:45    Sean Patterson – Supervisor: M. Santos  
Evaluation of the Bermuda Islands for Beacon Benefits to the DORIS System.
- 4:45 – 5:05    Shawn McFarlane – Supervisor: J. Hughes Clarke  
An Alternative for Tidal Corrections in Acquired Bathymetric Data.
- 5:05 – 5:25    Melissa Condie – Supervisor: J. Hughes Clarke  
An assessment of capabilities of airborne laser bathymetry for mapping the east coast of Canada.
- 5:25 – 5:45    Doug Cartwright – Supervisor: J. Hughes Clarke  
Multibeam Echosounder Surveys on the Fraser River Delta, Coping with an Extreme Refraction Environment.

**Wednesday – March 27, 2002**

**1:30            OPENING REMARKS**

**SESSION 1      INDUSTRIAL METROLOGY / REMOTE SENSING / IMAGING MAPPING – Chair – Sam Ng'ang'a**

- 1:35 – 1:55    Ryan McMahon – Supervisor: J. Secord  
Aligning a Multi-Wire Probe in the UNB Wind Tunnel.
- 1:55 – 2:15    Brian Ross – Supervisor: Y. Zhang  
Accuracy Analysis of Integrated Navigation Systems for Modern Photogrammetry.
- 2:15 – 2:35    Stephen Burbridge – Supervisor: Y. Zhang  
Monitoring Urban Change Using Medium and High-Resolution Satellite Imagery.
- 2:35 – 2:55    Matthew Carey – Supervisor: P. Dare  
Learner Controlled 3D Animation Applied to Geomatics.
- 2:55 – 3:15    Craig Smith – Supervisor: S. Nichols  
Geographical Issues Surrounding the Boundary Dispute Between Nova Scotia and  
Newfoundland and Labrador.
- 3:15 – 3:35    David Long – Supervisor: P. Dare  
Reflectorless EDMs, Is what you see, what you get?
- 3:35 – 3:55    Michael Sutherland – Supervisor: S. Nichols  
In Search of New Brunswick's Marine Administrative Boundaries.

**3:55 – 4:10    Coffee Break**

**SESSION 2      GIS/CADASTRAL – Chair – Boipuso Nkwae**

- 4:15 – 4:35    Ali Ghafan – Supervisor: S. Nichols  
Service New Brunswick and E-Government.
- 4:35 – 4:55    Dwayne Cummings – Supervisor: D. Coleman  
Designing GIS Lesson Plans for First Year Geomatics Engineering & Senior High School  
Students.
- 4:55 – 5:15    Samer Diarbakerly – Supervisors: D. Coleman/A. El-Rabbany  
On the Integration of Sea Ice Information into ECDIS
- 5:15 – 5:35    Kris Jewett – Supervisor: Y.C. Lee  
Evaluation of a GIS Database for Base Gagetown: *Arcview Versus MGEGIS*.
- 5:35 – 5:55    Adam Stewart – Supervisor: D. Coleman  
Functional Examination of Oracle Spatial for use at Geological Survey of Canada (Atlantic).
- 5:55 – 6:15    Marc Rancourt – Supervisor: D. Coleman  
IKONOS-2 Coverage Prediction: Application Development Challenges and Solutions.
- 6:15 – 6:35    Mele Rakai – Supervisor: S. Nichols  
A Framework for Comparing and Analyzing Cross-Cultural Tenure Systems.

**6:35 – 6:40      CLOSING REMARKS**

**6:40            RECEPTION – ROOM C26 – FACULTY LOUNGE**

## Monitoring Urban Change Using Medium and High-Resolution Satellite Imagery

Stephen Burbridge, P.Eng.

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The launch of the first commercial, high-resolution remote sensing satellite, IKONOS, in September 1999 marked a revolution in the remote sensing industry. Capable of 4m multispectral and 1m panchromatic images at a four-day revisit rate, IKONOS quickly became a household name. Awed by its potential, industries and governments at all levels clamored to incorporate these new products and services into their daily business. Among other applications municipalities adopted IKONOS as an effective means of monitoring change in residential and commercial construction, roads and green-space. However, this practice has been hampered by the lack of high-resolution imagery before September 1999.

The purpose of this paper is to examine the extent to which such localized change detections can be performed using a combination of high and medium-resolution satellite imagery. To this end a post-classification change detection was completed using 4m IKONOS data and 30m Landsat-5 data. Since the accuracy of this algorithm is dependant on the compounded accuracies of the two component classifications the selection of an appropriate classifier is of the utmost importance. As such, each image was classified using the maximum likelihood, Isodata and neural network classification schemes. Based on the results of these classifications it was determined that the neural network classifier was most suitable for both data sets. The final result suggests that urban change can be effectively monitored using medium and high-resolution imagery through the application of post-classification change detection and a well-trained neural network classifier.

## On the Integration of Sea Ice Information into ECDIS

Samer Diarbakerly

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Electronic Chart Display and Information System (ECDIS) is a computerized navigation system, consisting mainly of a computer processor and display, a standardized database, and navigation sensors. ECDIS is not only capable of displaying the navigation-related information in real-time but also supporting other advanced functions, such as route planning, route monitoring and automatic alarms.

In ice-infested waters, the use of ECDIS as a standalone information system would not provide sufficient information for safe navigation as it lacks comprehensive and timely information on the sea ice conditions. To enhance the safety of marine navigation in ice-infested waters, the Canadian Ice Service (CIS) produces daily ice charts, which enable the mariners to make critical decisions regarding the selection of the best possible navigation routes.

While highly useful in providing the mariners with comprehensive ice information, ice charts may not fulfill the requirements for safe and efficient marine navigation, even if they are used side-by-side with ECDIS. This

paper discusses a production approach to integrate sea ice objects within ECDIS and demonstrates how Canadian ice chart and standardized ice object attribute data could be integrated into an ECDIS. A prototype production flowchart is explained, and both results and challenges of the proposed approach are described in detail.

## **IKONOS-2 Coverage Prediction: Application Development Challenges and Solutions**

Marc Rancourt

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Competition between companies which own and operate the current generation of high-resolution remote sensing platforms – such as Space Imaging Inc. and EarthWatch Inc. – may eventually lower the cost of imagery acquisition for end users. Sustaining the existing price structure are the companies' business models, which require that profitability be maintained mainly through the sale or licensing of value-added imagery products. Thus, despite the unprecedented availability of high-resolution imagery, research projects continue to be constrained by the associated data licensing costs. Indiscriminate purchasing of vast swaths of imagery, for research or commercial purposes, at current price levels, is not a fiscally viable option.

Therefore, ensuring that the data captured fulfills the needs of the application prior to purchase is an important consideration. As extraction of positional information of dynamic objects within satellite imagery depends on simultaneous ground truthing and data capture, a requirement is established for the coordination of ground truthing activities during probable data capture time frames. In order to coordinate such tasks, a planning tool which can accurately and precisely predict satellite position and coverage is vital. While a myriad number of requirements can be established for such an application, the critical aspects are adequate temporal resolution, and accurate platform modelling. Therefore, this paper will outline the design and implementation of an application to calculate and display predicted IKONOS-2 coverages, focusing on the technical challenges which arose and the associated solutions.

## **A Framework for Comparing and Analyzing Cross-Cultural Tenure Systems**

Mele Rakai

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Most attempts at describing, analyzing and comparing aboriginal tenure systems with colonially introduced tenure systems have tended to be done from the perspective of the colonially-introduced tenure systems. One consequence of this has been that aboriginal tenure systems continue to be misunderstood, underrated or ignored by most land administrations across the world. This in turn leads to the persistence of complex plural legal regimes and their consequent land tenure problems in colonial and post-colonial jurisdictions of the world.

Using a functional perspective of land tenure systems, a multicultural analytical framework is developed to compare and analyze cross-cultural land tenure systems. Such a framework is intended to allow cross-cultural tenure comparisons and analysis to be made from a multicultural perspective – i.e. a perspective that allows

both Euro-centric or Aboriginal-centric perspectives to be considered. The framework is tested using tenure systems in mainland Nova Scotia.

## **Multibeam Echosounder Surveys on the Fraser River Delta, Coping with an Extreme Refraction Environment**

Doug Cartwright

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The Fraser River Delta is a salt wedge estuary on the southern coast of British Columbia that feeds a significant amount of freshwater into the Georgia Basin of the Pacific Ocean. This environment produces a strongly stratified and quickly changing watermass. Hydrographic Surveying under these conditions presents major challenges to oblique incidence echo sounding techniques. This is due to significant acoustic refraction in the water-column. Solutions, both in the data acquisition stage and the processing stage, are required to produce accurate and useful data.

During the summer of 2001, a large area near the mouth of the Fraser River was surveyed for the Geological Survey of Canada in support of their "Georgia Basin Geohazards Initiative". The echosounder used was a Simrad single transducer EM3000 multibeam. A Brooke Ocean Technology Moving Vessel Profiler 30, an underway (instride) sound speed profiling system, was installed just prior to this survey.

In data acquisition, the collection of a large number of spatially dense sound speed profiles is critical. The use of an underway sound speed sensor greatly increased the speed with which samples could be collected. The procedures for taking samples were refined to minimize sounding interruption and maintain the safety of the instrument. In order to increase the accuracy of the data, post-processing methods were also explored to attempt to further correct for the changes.

The extreme conditions encountered in surveying this area force the surveyor to deal with the refraction problem. The knowledge gained will help in dealing with the same issues in areas where their influence may be subtler.

## **Service New Brunswick and E-Government**

Ali Ghafan

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Here at the beginning of the twenty-first century, governments all over the globe and at all levels are finding themselves armed with different tools and technologies to serve their citizens than any other time. Internet is revolutionizing how people live, how they work, how companies do business, and how governments serve their citizens. The miracles of technology are entering into every facet of our lives and in particular in our dealings with governments. The result is the emergence of e-government.

The objective of this paper is to describe and define the concept behind e-government and to touch on SNB's experience with e-government. The paper starts with the definition of e-government and how governments are re-thinking their role in service delivery. Then, it passes over the digital divide concept from a broad perspective. Next, it goes to talk about the history and creation of SNB and its overall services it provides and in particular land/property services that it offers online. Then, it provides two examples of online service delivery and how they differ from SNB.

## **In Search of New Brunswick's Marine Administrative Boundaries**

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Good governance of Canada's oceans is a provincial as well as a federal affair. Good governance is essential for all societies to ensure the provision of public services and the control of behaviours that affect the common good. Good governance of marine spaces, that is more often than not a common good, is therefore of vital importance and requires the management of a range of including information on living and non-living resources, bathymetry, spatial extents (boundaries), shoreline changes, marine contaminants, seabed characteristics, water quality, and property rights among other things. For instance, the governance of a volume of marine space can involve the management of any number of overlapping property rights with each right itself tied to a spatial extent.

However, in order for a jurisdiction to implement good governance of its marine spaces it must first know the maximum spatial extent of the marine space over which it desires to exercise jurisdiction and administration. This paper is about New Brunswick's recent attempt to delineate the possible maximum spatial extent of its administration to support provincial marine policies and the good governance of its marine resources. It is also about the technical, legal and governance implications of the process and product.