



# Message from the Head

Dear Readers,

Time flies when you are in good company! And we sure had a very busy winter semester. We hosted our Geomatics career day, the annual awards night, meetings of the Geomatics Engineering Advisory Committee (GEAC) and the Geomatics Engineering Liaison Committee (GELC). These events gave us the opportunity to meet with our external supporters, recognize their valuable contributions they bring to our success but more importantly a good measure of what we need to do. And on this subject, I cannot thank enough the outgoing GEAC chair Mr. Eric DesRoche of Intermap Technologies for his generous commitment and service to the Department. Words are just not enough for all your

good work Mr. DesRoche. On the same note, please join me in welcoming Dr. Mohamed Abousalem, Hemisphere GPS, as our new GEAC chair. We look forward to working with you.

Starting May 1st, I am re-assigned to spearhead our Department's effort towards kicking off the newly incorporated Integrated Resource Management Centre. This is my last communication as the Department Head and many things are in order. First, I would like to thank staff, colleagues and students for their support. You strive for excellence and continue to maintain a world-class reputation. I have taken pride in representing such a strong Department. Second, I am very pleased to congratulate Dr. Ayman Habib on his

interim appointment as Department Head effective May 1, 2009. Ayman has an outstanding record in teaching and research. We are very fortunate to have him in this new role and I look forward to working under his strong vision and leadership.

But finally, as I sit back and think of all what we have achieved together and reflect on the accomplishments of our faculty, staff and students and how their efforts and successes continue to enhance the quality and recognition of our program, I remain very fortunate to be part of this. Our Department is simply, the most exciting place to work at this time and our future looks very bright. Take care all and thank you!

Dr. Naser El-Sheimy,  
P.Eng, CRC  
Professor and Head

## New Centre of Excellence (IRM)

The application to the Networks of Centres of Excellence (NCE) Centre of Excellence for Commercialization and Research (CECR) program was successful in securing \$11.6 million for funding for a Centre of Excellence for Integrated Resource Management, with Dr. Naser El-Sheimy as lead applicant. The Centre will involve the universities of Calgary, Lethbridge, Alberta, the province of Alberta, other Canadian universities, and Industry partners. The new Integrated Resource Management Centre will be the first of its kind in the world to focus geomatics engineering expertise towards the complex problems of large-scale resource and environmental management.

"We are a resource-based province and without the proper tools we won't be able to maintain and manage these resources in an effective manner," El-Sheimy said. "Proper management of resources is critical to the sustainable development of our economy. Through the Integrated Resource Management centre, we will have the opportunity to proactively manage the increasingly complex and interrelated issues confronting the key sectors of energy, forestry, agriculture and the environment."

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VP (Research) Rose Goldstein, Minister of State (Science and Technology) Gary Goodyear and Naser El-Sheimy, holder of a Canada Research Chair.

photo: Ken Bendiktsen

# Congratulations

- Congratulations to students who completed their graduate studies: Salomeh Abbasiannik MSc; Mahmoud El-Gizawy PhD; Priyanka Aggarwal PhD; Wei Cao MSc.



*Priyanka Aggarwal successfully defended her PhD thesis*



*Wei Cao successfully defended his MSc thesis*

- Dr. Mike Barry is this year's recipient of the Geomatics Engineering Professor of the Year Award. These awards are given to one professor in each of the five departments based on excellence, enthusiasm and personality in teaching engineering students throughout their academic years.

- Professor Gérard Lachapelle, CRC/iCORE Chair in Wireless Location, was presented with The Institute of Navigation 2008 Capt P.V.H. Weems Award for continuing contributions to the art and science of navigation at the International Technical Meeting of the Institute held in Anaheim, CA, January 2009. In presenting the award to Professor Lachapelle, the Institute noted his pioneering efforts related to Canada's successful GPS research and commercial involvement during the past 30 years and his exceptional work in the area of education and R&D training of post-graduate students who are now playing major roles in the GPS industry and academia in Canada and the United States.

The Institute of Navigation is a U.S.-based non-profit professional society dedicated to the advancement of the art and science of



navigation. Founded in 1945, it serves a diverse community including those interested in air, space, marine, land navigation, and position determination. Although basically a national organization, its membership is worldwide, and it is affiliated with the International Association of Institutes of Navigation.

## Alumni Voice

It has been just over a year since I took part in the 2008 Iron Ring Ceremony, and I can't believe how quickly this year has gone by! I have been busy since graduating from the U of C with my Bachelor's Degrees in Geomatics Engineering and Psychology last spring.

In May 2008, I joined twenty-two of my classmates on the 2008 Geomatics Switzerland Trip, which was a great experience and the perfect way to end my last semester at the U of C. After returning from Switzerland, I set off on travels to Vancouver Island to visit family, and a trip to Hawaii, where I took a helicopter tour over the erupting Kilauea volcano.

In July 2008, I returned to CDL Systems as a Systems Engineer, and rejoined the engineering team I had worked with on my internship. CDL Systems provides

control station software for unmanned air, land and sea vehicles. My role at CDL Systems has been to create requirements for new features in the software, and I recently took on the role of chairperson for an internal Human User Interface Group, tasked with addressing human factors issues in the software.

In November 2008, I gave a presentation at the UVS (Unmanned Vehicle Systems) Canada conference in Ottawa on the subject of training soldiers to fly unmanned aerial vehicles using CDL Systems' control station software. From that experience I realized that all of the practice we received in ENGO 500, really came in handy! I will be presenting a paper on the same topic at the AUVSI North America Conference in Washington D.C., in August 2009.

Although my days as an engineering undergrad at U of C are done, I am always learning new things on the job and I am just as busy as ever. I am grateful to the people in the Geomatics department who gave me a strong foundation for future success, and I look forward to an interesting and exciting career ahead of me.



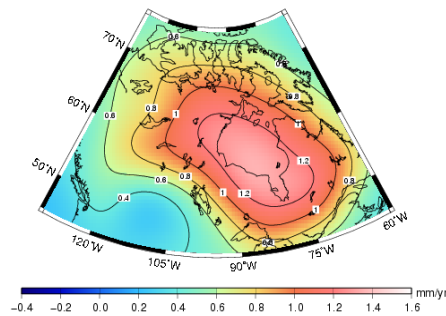
*Amanda Side, B.Sc 2008*

# Research Spotlight

## Towards a Geoid-Based Vertical Datum for Canada

Article by Dr. Michael Sideris (Earth Observation)

Elena Rangelova, a PhD student under the supervision of Dr. M. G. Sideris and currently a Post Doctoral Fellow under the supervision of Drs. J.W. Kim and M.G. Sideris, studied the feasibility of using a dynamic geoid as the vertical datum for orthometric heights in the context of a combined adjustment of ellipsoidal, orthometric, and geoid heights in



Canada. Using the most recent and accurate height data at GPS-on-benchmark points, the effect of incorporating the dynamic vertical reference surface for orthometric heights was assessed. It was shown that the dynamic vertical datum requires accuracy of 1.0–1.5 cm for all three height components, and that the orthometric heights appear to be the limiting factor. By analyzing data from permanent GPS stations, absolute gravimetry and the GRACE dedicated gravity satellite mission, it was found that, for cm-level accuracy, the geoid-based vertical reference surface needs to be corrected for secular geodynamic effects (primarily due to post-glacial rebound, PGR) after 8-10 years from the reference epoch. Vertical crustal motion, which is typical an order of magnitude larger than the geoid rate of 1.5-1.8 mm/year (see figure), causes significant systematic discrepancies among the three height types; therefore, ellipsoidal and orthometric heights need to be corrected every 2 years in areas of significant PGR effects, like around the Hudson Bay.

This work, which was supported by NSERC and GEOIDE NCE grants to Dr. M.G. Sideris, is very timely, given the plans of both the Geodetic Survey Division, NRCAN, and the US National Geodetic Survey to implement geoid-

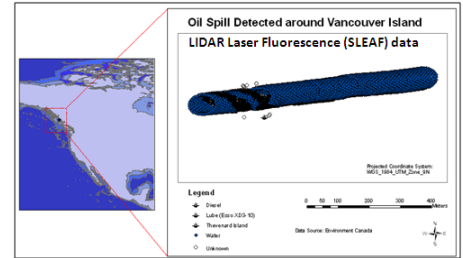
based vertical datums by 2010 and 2018, respectively. Spirit leveling will then be replaced by geoid and GPS heights in both countries, and the vertical datum will be defined by a precise static geoid at an initial epoch accompanied by a model for its temporal variations.

## System for Oil Spill Detection and Emergency Response

Article by Dr. Yang Gao (Positioning, Navigation and Wireless Location)

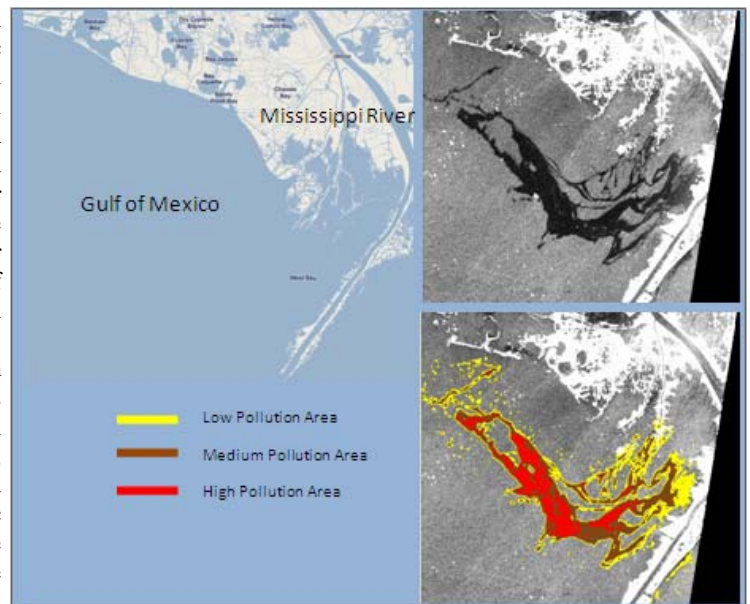
An oil spill disaster is an unexpected accident that occurs through failures in operations, transportations, ship accidents, human errors or due to other disasters such as flood, hurricanes and earthquake. Oil spills happen in all environments that make the emergency response for the accident difficult and complicated. Management needs an organized contribution, covering all procedures of disaster operation from monitoring and detection to mitigation and relief.

The Positioning and Mobile Information System (PMIS) group lead by Dr. Yang Gao has been working with researchers from other Canadian institutions on a NSERC strategic project to develop a Web Based Oil Spill Monitoring and Management System by integrating remote sensing, Geomatics and communication technologies. The system development framework is based on automatic detecting and mapping of oil spills using SAR satellite and LIDAR Laser Fluorescence (SLEAF) data for provision of disaster location and extent map. The system provides information on oil spill type, thicknesses and geographic features along the spill area and the system output can be transferred into spill



Oil Spill Detected near Vancouver Island with SLEAF Data

trajectory simulation model to simulate the next destinations of oil spill. The system output from detection and trajectory simulation can also further be used to create other disaster products such as oil spill risk map, affected area map and emergency response map. Other components of the prototype system currently under development include an alert system to provide early warning information in real-time, disaster models to provide all necessary disaster products and information, a command & control system to enable disaster management and administration, a communication system to support data dissemination and access. Once completed the prototype system will be demonstrated at several national and international conferences and workshops, some of them are organized by the project team.



Oil Spill Detected in Gulf of Mexico (Katrina Hurricane 2005) with SAR Data



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## AWARD WINNERS Awards Night—March 12, 2009



## Department Activities

- Dr. Yang Gao is on sabbatical from Jan 01, 2009—June 30, 2009.
- Career Day—February 12, 2009
- Awards Night—March 12, 2009
- Geomatics Engineering Advisory Committee (GEAC) meeting, March 12 from 8:30am—4:30pm
- Geomatics Engineering Liaison Committee (GELC) meeting, March 13 from 9:00am—12:00noon



Career Day held Feb 12, 2009

## Coming Events

- Final Exams— April 20—30, 2009
- Strategy Meeting—June 05
- Campus Fair 2009—June 06
- ENGO 501: Field Survey Camp, August 17—27, 2009
- ENGO 638 GNSS Receiver Design, August 17—28, 2009

### Sites to Visit:

- [www.ucalgary.ca/news/utoday/jan16-09/geomatics](http://www.ucalgary.ca/news/utoday/jan16-09/geomatics)
- <http://plan.geomatics.ucalgary.ca/>
- <http://www.cdlsystems.com/>
- <http://www.ucalgary.ca/~sideris/>
- <http://www.ucalgary.ca/~ygao/index.htm>