



Message from the Head

Dear Valued Readers:

I hope that you had a chance to relax over the summer and renew your energy. In this message, I would like to update you about what has been going on in the Department over the last three months. Despite the downturn in the economy, the majority of our B.Sc. graduates have been able to secure a job. According to 2009 Schulich School of Engineering survey of its current graduates, 80% of the Geomatics respondents reported that they had secured employment by July 15th of 2009. The outcome from this survey has also shown that internship experience

translated into higher salaries.

On another front, we have 59 incoming Second Year Students to the Department of Geomatics Engineering. The Department has welcomed the students through an Open house where they had a chance to meet the faculty members, the Geomatics Engineering Student Society (GESS) representatives, graduate students, and some members of the industry. The students toured some of the labs in the Department to give them an idea about what Geomatics Engineering is all about. In parallel, the Department has formed a recruitment committee to increase the

interest of high school and First Year Engineering students in Geomatics. We consider our alumni as our best advocates and recruitment tool. Therefore, we will appreciate any input you might have in this regard.

Finally, I am pleased to let you know that the Department as a whole has been quite successful in attracting significant funding from competitive sources. We will be sharing with you more details about that in the Research Spotlight Section of future newsletters.

Dr. Ayman Habib
Professor and Head



GESS Council

Geomatics Engineering Student Society
L to R — Mathew Hamilton (VP External), Bradley Cooper (4th Year Rep), Aaron Hicks (Secretary/Webmaster/Photographer), Katie Hannah (VP Academic), Janice Mollerson (Career Day Commissioner), Mandy Ferrari (President), Amy Hamilton (3rd Year Rep), Katey Cairns (Career Day Commissioner), Bryan Leedham (VP Events), Ben Knoechel (VP Finance), James Chan (Athletic Commissioner)

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Congratulations

• Congratulations to students who completed their graduate studies: Yousif Alghamdi, MEng; Muhammad Azam Khan, MEng; Ali Broumandan PhD; Ala' Shawqi Kassab, MSc; Maya Nand Jha, MSc; Taher Hassan, PhD; Changsheng Cai, MSc.

• Nishad Wijesekara has won a 2009 GEOIDE BEST STUDENT POSTER AWARD at the 11th GEOIDE Annual Scientific Conference in Vancouver, BC. The project is entitled, "Integrating a land-use cellular automata (CA) model with a hydrological model (MIKE-SHE) to simulate the impact of land-use

changes on water resources in the Elbow river watershed in southern Alberta" and was co-authored by: A. Gupta from Alberta Environment, C. Valeo from Department of Civil Engineering University of Calgary. Nishad is supervised by Dr. Danielle Marceau.

Student News



ENGO 103 Block Week



Department Picnic September 2009



Survey Camp August 2009

Visitors

Dr. Achim Roth, from the German Aerospace Centre DLR gave a presentation July 17 on "The TerraSAR-X and TanDEM-X Missions" Dr. Roth is the TerraSAR-X Science Coordinator and presented results from TerraSAR-X and an outlook on Tandem-X, which will follow TerraSAR-X in a tandem mission for the determination of a new and improved global elevation model.



Dr. Naser El-Sheimy with visiting Scientists from the [Agency for Defense Development](http://www.add.re.kr/) (ADD) and Seoul University, South Korea.

<http://www.add.re.kr/>

Research Spotlight

Analyzing Ground Water Mass Change from Satellite Gravity Measurements

Article by Drs. Elena Rangelova and JW Kim (Earth Observation)

The joint satellite mission of US NASA and German Aerospace Center (DLR)'s Gravity Recovery and Climate Experiment (GRACE), in operation since March 2002, provides monthly precise and high-

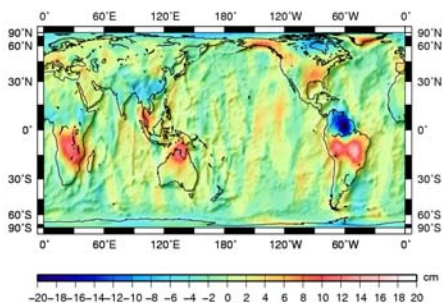


Figure 1. Earth's mass changes inferred from GRACE mission.

resolution information for the gravity field of the Earth [1]. This information is used to infer mass changes from different sources at the Earth surface (see Figure 1), such as continental hydrology, snow accumulation and melting, polar ice sheets and mountain glaciers, and variations of the atmospheric surface pressure and ocean bottom pressure. In addition, GRACE is capable of constraining the secular mass variations in the Earth's interior due to the on-going postglacial rebound in North America and Fennoscandia. The most significant outcome, among all mentioned, of the GRACE-related research is the improvement of the continental water

storage models through observations of the changes in the water content on a global and regional/basin scale.

Continental water storage models solve the water balance equation that links the water content with precipitation, evapotranspiration, and run-off. Changes in water content are very difficult to model or measure in-situ, and, therefore, GRACE monthly/weekly time series are an irreplaceable source of information on large spatial scales. Given precipitation data and modelled run-off, along with GRACE-determined changes in water content, the poorly known evapotranspiration can be estimated for the purpose of improving the global water models.

One of the purposes of our on-going research is to model water mass changes from GRACE using high temporal resolution data. We develop and apply modelling techniques based on the statistical approaches and the use of empirical orthogonal bases. Our techniques allow smoothing of the GRACE random and correlated data noise while modelling persistent oscillations like

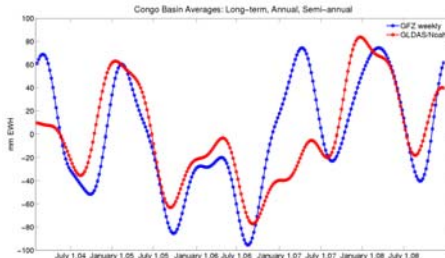


Figure 2. Modelled intra-annual, annual and semi-annual water mass variations for Congo basin from GRACE weekly data and a water storage model.

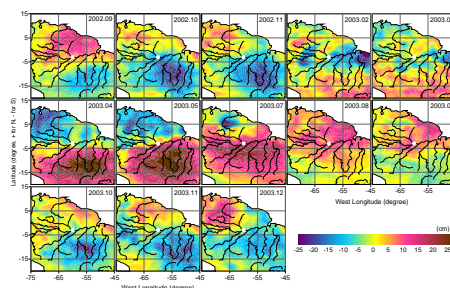


Fig. 3. Terrestrial water thickness model in the Amazon basin from the GRACE and TRMM gravity effects.

annual and semi-annual hydrology cycles. In addition, we are able to estimate any non-periodic inter and intra-annual variations for the major river basins in the world (Figure 2).

Further, to calculate and model the thickness of water in the major river basin from GRACE and TRMM (Tropical Rainfall Measuring Mission) [2] inferred gravity anomalies (representing a surface water storage change), we implement equivalent point source inversion and generalized minimum residual methods. This new modeling approach demonstrates that hydrologic data sets spatially different from GRACE can be mathematically compared and permits a simple dissection of the GRACE anomaly to subtract the effects precipitation (and surface water) (Figure 3)

- [1] Tapley, B.D., S. Bettadpur, J. Ries, P. Thompson, and M. Watkins, 2004, GRACE Measurements of Mass Variability in the Earth System, *Science*, 305, 503-505.
- [2] Simpson, J., R.F. Adler, and G.R. North, 1988, A proposed Tropical Rainfall Measuring Mission (TRMM) satellite, *Bull. Amer. Meteor. Soc.*, 69, 278-295.

Alumni Voice

I came to Calgary from Beijing in Feb 2003, as a Post Doctoral Fellow who just received a PhD.

Besides the heavy snow and the magic Chinooks, I was surprised by the research projects here that are so close to industry. The graduate courses are so up-to-date and the course projects are so real. One can catch the breath of the newest technologies without difficulty. Real projects need real work to be done. Hands-on experience was an every day mandatory course for my

research. Playing with the high-grade GPS/INS systems became something like girls putting on jewelry. Making field tests in the freezing snow is still one of my deepest memories about Calgary. Such hands-on experiences helped me get into product development quickly and smoothly after joining Shanghai SiRF. It will keep benefitting my future careers.

Recalling my four years study in the department, one thing that often pops up my head is a word from Dr. El-Sheimy, "Get your hands dirty". This is also my

wish to all graduate students and post doctors in the department.



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A Passion for Excellence

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Tecterra Takes Alberta's Information Technology Sector to New Levels



Naser El-Sheimy, professor and Canada Research Chair in the Schulich School of Engineering and the inaugural scientific director of Tecterra, holds a grizzly bear collar, Doug Horner, Minister of Advanced Education and Technology, holds an instrument to track bears in the wild, and Andrew Hunter, a researcher in the geomatics department who developed the bear tracking system.

Photos: Ken Bendiktsen

The new centre, Tecterra, is one of five Alberta Ingenuity Centres for Research and Commercialization that focuses technology and research to build more sustainable industry practices. Built on a partnership between the provincial and federal governments, the University of Calgary, the University of Lethbridge and the University of Alberta, Tecterra will tap into the research excellence across the province. It will act as a hub that will allow resource companies to work with innovative technology companies and the research community to develop world-class solutions to industry challenges.

Department Activities

- Dr. Alexander Braun will be leaving his position in the Department to pursue a new opportunity as an associate professor in the Department of Geosciences at the University of Texas at Dallas. Alex will be starting his new position on December 1, 2009. Alex joined Geomatics Engineering in September 2004, and he has made a very significant contribution to the Department at all levels of teaching, research and service. This will be a big loss to the department and we wish him the very best in this new position.
- Every year the department choose two graduate students as representatives in the Graduate Representative Council (GRC). The GRC is a student body organization, which meets with the Graduate Student Association (GSA) executive once a month and discusses certain graduate student concerns to be brought up to the actual university government. This year Rohana Rezel and Jacky Chow are the new graduate student representative for Geomatics Engineering



Annual Stampede Breakfast July 09

Coming Events

- Career Day—Feb 4, 2010. Contact Janice and Katey at geomatic@ucalgary.ca
Awards Night—March 11, 2010 from 5:30—8:00 pm
GEAC—March 11, 2010 from 8:30—4:30 pm
GELC—March 12, 2010 from 9:00—12:00 pm

Sites to Visit:

- <http://gess.geomatics.ucalgary.ca/>
- <http://jwkim.geomatics.ucalgary.ca/>
- <http://www.sirf.com/>
- <http://www.ucalgary.ca/news/july2009/tecterra>
- <http://www.add.re.kr/>