



ALUMNI NEWSLETTER

Number 13 (2010)

Message from the Head



*Greg Dipple, Head
Earth and Ocean Sciences*

Dear Alumni and Friends

It is hard to believe that my first year as Head has already come and gone. This has been a year of incredible change that will continue beyond the occupation of the new Earth Systems Science Building in 2012. A year ago, the plans for the ESSB consisted of a several-year-old “functional program” that did not convey any real physical sense of the new building. As I write this letter, contractors are preparing bids based on the full construction documents that went to tender in early July. Many individuals from EOS and beyond have spent thousands of hours to transform the functional program into concrete plans for a new building that will be the heart of EOS. The ESSB together with the Beaty Biodiversity Centre, located across the main mall, will be the new centre of gravity for the Faculty of Science on the UBC Vancouver campus. It is more than symbolic that UBC Science will be anchored in the Life, Earth, and Environmental Sciences as the most pressing problems facing our civilization are rooted in these complex systems.

This year all of EOS has been physically impacted by the preparations for ESSB. EOS faculty, staff and students vacated the Biosciences Complex last summer and are now housed in temporary digs across campus. EOS-East was likewise evacuated over the winter, with many of the former occupants now housed in a more densely populated EOS Main and EOS South. The long history of EOS East (formerly the Geophysics and Astronomy Building) was celebrated at a wake in February; the building was demolished in June to prepare for ESSB construction that will start in the coming months. A web cam, accessible through the EOS web site, will help those of you from off campus to keep track of our progress. The densification of EOS Main and the changing footprint of EOS have also necessitated reorganization and renovations to EOS Main which are already underway and will continue through 2013.

The renovations to EOS go far beyond the physical spaces which house our teaching and research. This year two major one-time research investments for EOS were announced which together total nearly \$10Million. The Pacific Centre for Isotopic and Geochemical Research (PCIGR) has been awarded \$7.5Mill from the Canadian Foundation for Innovation and the B.C. Knowledge Development Fund. NSERC has partnered with Barrick, Newmont, Teck, Vale, and Xstrata to create an Industrial Research Chair in Computational Geoscience with \$2Mill in funding over five years. Eldad Haber arrived from Emory University to fill the Chair in September. Annual research funding also approached \$10Million for the first time in the history of EOS during the 2008-09 fiscal year, the last year for which the data are compiled. Enrollment in our undergraduate and graduate programs has plateaued at historical highs for the past several years. The one area of substantial growth in teaching this past year was in service courses that are largely delivered using facilities outside of EOS. One interpretation of the flat enrolment in EOS programs is that we simply lack the space to accommodate more students. The space squeeze certainly has not made it easy to expand our offerings, but recent and ongoing curriculum revision is focused on enhancing the quality and relevance of our programs. Environmental science and geophysics have seen recent curriculum reform, and curriculum revision is currently underway in the oceanography, geological engineering, and geological sciences programs. All of these revisions should be complete and in place by the time we expand into the new EOS complex in 2012-13.

If you are visiting campus, please check the EOS website for up-to-date information on where individual offices and labs are located during these changes, and allow a bit of extra time to find us behind the rows of blue construction fencing. EOS reception will remain on the first floor of EOS Main until 2012, and I encourage you to drop in and say hello if you are in the vicinity. Please also consider using the keep-in-touch form at the back of this newsletter to communicate directly with your colleagues and friends.

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**"ADIEU" to EOS-EAST
aka THE GEOPHYSICS/ASTRONOMY BUILDING**



Greg Dipple presenting Paul Smith with the Architectural rendering of the new ESSB building

On April 22 (Earth Day) the department gathered to say thank you to Paul Smith for his time as head and in particular for his vital contributions to the development of the Earth Systems Science Building. Paul was told to attend an 'event' on Thursday afternoon, the details of which were kept from him. After a few words from the current head, Greg Dipple, Paul was presented with a framed architectural rendering of the new building, a hard hat and a large sledgehammer. Paul was then led to EOS-East (The Geophysics/Astronomy Building) and given the honour of being the first to crack the concrete on the outside of the old building. Paul removed a fair chunk from the old building that we will preserve for posterity.



Swinging the sledgehammer.....



and we have contact!



THE END

Spotlight on the Geological Engineering Program

Roger Beckie, Program Director - rbeckie@eos.ubc.ca



The State Of The Program

As our graduates know, the Geological Engineering Program has an unusual academic structure. We are not a department, but an engineering program hosted in the Department of Earth and Ocean Sciences (EOS), in the Faculty of Science. Our students are however registered in the Faculty of Applied Science. The rather complex arrangement reminds me of a quote I have heard about Canada: it works in practice but not in theory. I've always felt that the most interesting perspectives are along the interfaces between disciplines, and our students benefit from a practical engineering mindset and the power of both engineering and geological sciences knowledge.

Roger Beckie in Gotra, West Bengal, India.

Our program is continuously evolving to respond to industry needs, the emergence of other disciplines such as environmental science, and accreditation requirements, which I will discuss later. The undergraduate program as it exists now can be seen in the UBC calendar at this website <http://tinyurl.com/3xnmj6>. The program is roughly balanced in terms of engineering and earth science content, a departure from the past where there was a stronger emphasis on earth sciences and economic geology. Significant changes in the last years include the elimination of program options – all students now graduate simply as Geological Engineers – and the introduction of two new field schools. About 10 years ago under the leadership of Mary Lou Bevier we introduced a second year geology field school into the core of our program. We also run a very popular hydrogeology field school in fourth year at a site in Richmond adjacent to the Fraser River. These two field schools augment the long-standing Oliver field camp in third year.



Caleb Scott and Ricardo Segovia with many supervisors at the hydrology field school

Student enrollment in the program has grown strongly in recent years. We are grateful to many of our alumni for the strong demand for graduates. The table below shows the program enrollments in EOS over the last 5 years. As you can see, Geological Engineers (GEOE) make up the largest group of undergraduates in the department, and have by far the highest total program credit load.

EOS Undergraduate Program Enrollments						
	2005	2006	2007	2008	2009	Total Program Credits
GEOE	96	106	120	134	130	156
EOS Major	100	86	92	93	97	120
ENSC*	-	-	84	86	82	120
ATSC	41	25	20	27	29	120 - 135
GEOL Hons	43	38	21	19	18	135
GEOP Hons	12	9	4	6	7	135
OCGY	14	9	2	1	1	135

*Environmental Sciences



Recent graduates

I am also pleased to say that the quality of the students remains high, and it is always a pleasure for me and other faculty to see them succeed at UBC and later in industry. Women students have continued to be strongly represented in the program, and several recent Geological Engineers, including Heather Stewart, Marisol Valerio and Julianna Martin, have graduated at or near the very top of the entire faculty. There is also a growing number of students who as part of their undergraduate studies are venturing to developing nations to assist communities. Two examples: Ricardo Segovia was part of a team that went to Lesotho under the Go Global Service Learning program and helped develop a sanitation system for local villagers. Abdul Muqet measured arsenic levels in groundwater in a village in rural Bangladesh and developed a bucket filter to remove arsenic. We are very proud of them and all of our graduates.

EOS and the Faculty of Science continue to provide strong support for the program. There are 5 “core” faculty who assume the majority of program workload, although most faculty in EOS contribute to program teaching: Erik Eberhardt, P. Eng., Oldrich Hungr, P. Eng., Uli Mayer, P. Eng., Leslie Smith and Roger Beckie, P. Eng. (Director). In recent years, we have felt the strain of increasing enrollments, particularly in the second year field school and in the fourth year thesis. To put the enrollments in perspective, the following table shows the size of our program compared to other programs and departments in the Faculty of Applied Science.

**Faculty of Applied Science
Undergraduate Enrollments (2nd – 4th year)
2009**

593	Electrical Eng
481	Mechanical Eng
479	Civil Engineering
315	Computer Eng
292	Chemical & Biological Eng
260	Engineering Physics
154	Mining Eng
144	Materials Eng
131	Geological Eng
127	Integrated Eng
41	Environmental Engineering

The size of our program is close to that of full departments such as Materials, with 17 faculty, and Mining with 12 faculty. EOS provides all of our administrative and support services, and devotes a ½ undergraduate co-ordinator position exclusively to the program, in the person of the most capable and incurably cheerful **Teresa Woodley**.

Graduate Studies And Research

In recent years we have also seen an upswing in enrollments in our graduate M.Eng. program. This 30 credit course-work masters can be completed in one year, and is ideal for students with industry experience who want to increase their technical depth. There is also a co-op option for the M.Eng. degree. We continue to also offer research – based M.A.Sc. and Ph.D. degrees, which typically require at least 2 and 4 years respectively of study to complete.

The Geological Engineering faculty members are pursuing research in a wide variety of geotechnical and environmental areas, often in collaboration with industry. Don't hesitate to contact us if you are thinking about graduate studies; we are always looking for good students.

Erik Eberhardt, a Saskatchewan product who arrived to UBC five years ago via ETH in Zurich, is our rock engineering person, with projects in open pit mining, block caving, rock bursting and tunnelling. Study areas include Palabora in South Africa, the Chilean Andes, Diavik, NWT, the Sudbury mining basin and the Karakoram of northern Pakistan. He has injected considerable energy into the program, but now that he has a brand new daughter and a well earned sabbatical coming in 2010, there is a chance that he will be diverting some of that energy elsewhere.

Oldrich Hungr, former program director and mountaineering aficionado, works in natural hazard assessment and modeling. His main interest is studying the spectacular mobility of debris flows and large landslides, both natural and those associated with mining. Recently, he has returned to the study of rock fall hazard, a perpetual problem for highways and railways in B.C. We are glad to welcome him back to UBC after one year of sabbatical during which he sampled many ~~wines and cheeses~~ rock falls in Europe.

Hydrogeology is the research area of **Leslie Smith**, **Uli Mayer** and **Roger Beckie**, who collaborate together on many projects, most significantly at the Antamina Mine in Peru, where they and colleagues from Mining Engineering are studying the hydrology and geochemistry of drainage from neutral-pH waste rock. **Leslie Smith**, our longest serving faculty member and master of classroom comic repartee, is also conducting research on the hydrology of waste pile in permafrost terrain, and in addition, is examining a suite of problems related to surface water – groundwater interactions, including the discharge of contaminants to the near-shore marine environment. **Uli Mayer** studies the release and attenuation of organic substances and metals at contaminated sites and in mine waste. While finding time for “light” 100 km rides up Cypress Mountain and taking care of his two young boys with his wife, he manages a very large group of graduate students and post doctoral fellows.

During breaks from his perpetual “weekend warrior” home renovations, **Roger Beckie**, another product of the fine province of Saskatchewan, is studying the hyporheic zone of the Fraser River and the hydrogeology and geochemistry of naturally occurring arsenic in the Bengal Basin of South Asia. A more complete description of our researcher programs and student funding opportunities is on EOS departmental website.

Accreditation

In fall 2010 we will begin the painstaking process of assembling documentation about our program required for the accreditation review that will take place in the fall of 2011. A review by the Canadian Engineering Accreditation Board (CEAB) happens at least once every six years for each engineering program in Canada, and its importance cannot be understated. Simply put, without accreditation an engineering program is not viable. The CEAB is moving to a new accreditation process; the 2011 review will be the last under the current framework. It is worthwhile for me to explain the accreditation criteria, which are driving some changes in our program.

The CEAB presently assesses a program on what is called an input basis, sarcastically called the “bean counting” approach. Each course in the program is assigned so-called accreditation units (AU), where one unit roughly corresponds to one lecture or lab contact hour (a 3 hour per week lecture course over a 13 week term would have approximately 39 AU). These AU come in five distinct flavours: mathematical sciences, natural sciences, engineering science, engineering design and complementary studies. A program will be accredited if it meets the specified AU criteria in each of these categories. This is called an input based approach, since the assessment only considers what goes into the program; there is no assessment to determine if the program produces appropriately qualified engineers.

By 2014 accreditation will move to an evaluation based upon graduate attributes as measured by competencies. This so-called outcome based assessment (OBA) requires that graduates of the program possess the following 12 attributes:

1. A knowledge base for engineering.
2. Problem analysis.
3. Investigation.
4. Design.
5. Use of engineering tools.
6. Individual and team work.
7. Communication skills.
8. Professionalism.
9. Impact of engineering on society and the environment.
10. Ethics and equity.
11. Economics and project management.
12. Life-long learning.

The criteria for outcome based assessment are set by key stakeholders – our practicing alumni. A critical component of this evaluation process is the development of evidence and measures of competencies – measurable characteristics - to demonstrate that our graduates possess these attributes. The challenge of this approach is that it is difficult to measure competencies in some of these attributes.

The new assessment regime will help to tear down the ivory tower and bring the program into closer contact with industry and alumni. Indeed, some important assessment tools include exit interviews, alumni and employer surveys, industry advisory boards, focus groups, job and graduate school statistics. This outside feedback will allow us to identify areas of strength and weakness, and make adjustments to improve the program. It will critically rely upon the support of our alumni and industry partners, so expect to hear from us more in the future.

Engineering Design Initiative

One area we have already identified for improvement is engineering design. We presently just satisfy the CEAB engineering design criteria, in part because our program has a heavy weighting (appropriately) in earth science. Furthermore, according to CEAB criteria engineering science and engineering design must be taught by so-called conforming faculty, those who are P.Eng.’s or faculty hired with the last 5 years that are demonstrating continuing progress towards a P.Eng. Accordingly, many earth science courses taught by our geologist colleagues cannot be considered as engineering science or engineering design. It is therefore important that the faculty in EOS who teach engineering science and engineering design possess a P.Eng.

To enhance the engineering design component of the program, we are this year replacing our 6 – credit (two courses worth) fourth year thesis with a 6 – credit capstone design course to be taught by a P.Eng. We are excited by this change, since it will ensure more uniformity in the design experience and allow us to develop metaskills that were not possible to incorporate in individual theses, such as communication, project management and team work.

We are turning to industry and alumni to support the design initiative. First, we are looking for projects and real-world examples that are suitable case studies. Under this model, we would ask you to come to UBC and bring your real-world case study into the classroom for us, task students with a design problem, and help us evaluate student projects. The students find industry interactions tremendously invigorating and rewarding. Second, we are beginning to develop strategies to fund engineering design in Geological Engineering. The capstone course is presently funded on a temporary basis only. Ideally, we would like to hire an experienced engineer to lead our fourth year capstone course and also develop geological engineering design courses for second and third years.

In summary, I am glad to say that the Geological Engineering Program is vigorously healthy and anything but static. We thank you for all your support in the past and are looking forward to more contact with you in the future.



Testing tarp bearing strength at the Oliver field school



Thomas Nipen, Dominique Bourdin, and Roland Stull

UBC FORECASTS CLEARER WEATHER PICTURE

By: Heather Amos

For those heading down to Wreck Beach this summer looking to get the perfect tan in all the places the sun doesn't usually shine, Roland Stull has developed the perfect tool for you.

Since 1996, Stull, a professor in the Department of Earth and Ocean Sciences, has been using his expertise and complex computer programs to make extremely accurate, high-resolution weather forecasts for British Columbia. And now, just in time for spring, Stull and his lab have found a way to digest this complex data and make the forecasts available to the public.

And for those looking for a bit of fun in the sun here at the University of British Columbia, there is a forecast available just for the Vancouver campus.

"Sometimes I use it to plan when I should go for a run, in the morning or in the evening," says Thomas Nipen, a 3rd year PhD student in Stull's lab, who has been helping to develop the program that spits out a two-day forecast.

"It shows a little bit more information; you can see the changes during the day. This will tell you when it will be warm and when it will be rainy."

Stull's weather forecasts are more accurate than the ones available from a weather channel or website, he says. To generate a forecast, Stull breaks the province up into a 3-D checkerboard; each square is 1.3 kilometers wide. These areas are smaller than the ones routinely used by Environment Canada and have very detailed information about the mountains. The result is a high-resolution forecast tailored for western Canada.

A computer runs different codes to generate forecasts for each checkerboard square. Each code, or model, gives Stull a different opinion of what the weather will be like. All these different forecasts often get plotted onto a spaghetti diagram, a map covered in loads of thin, colourful lines. For the public to understand it all, Stull and his team summarize the results as diagrams that show the range of possible forecasts.

"We're proud to be in British Columbia making British Columbia forecasts — it seemed a shame that the general public couldn't benefit from them," says Stull.

"It didn't happen by accident though," he says. "I kept working with my students to fine-tune the forecast diagrams. It took a lot of tweaking to get it to the point where it worked."

The easy-to-read weather predictions were not just developed for UBC staff, students and community. Last year, Stull and undergraduate student, Dominique Bourdin, developed a program to generate 14-day forecasts for 60 different geographic locations in the province for an energy company.

Now as a master's project, Bourdin is trying to generate easy-to-read wind predictions for these areas. The company will use this information to make decisions about wind-power development in the province.

"You have to forecast for wind power because you can't store it. The best way to integrate wind-generated electricity is to have really high-quality forecasts," says Bourdin.

Although Bourdin describes generating a forecast as "whipping it up," the process required her to learn five new computer languages.

Stull and his team will continuously improve and tweak the system but overall he's "delighted" that his forecasts are now available to everyone.

To have a look at Stull's forecasts and work visit: <http://weather.eos.ubc.ca/wxfkst/>, and use the links for the "UBC 2-Day Fcst" or the "YVR 2-Week Fcst".

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EOS RESEARCH SUPPORTS THE 2010 OLYMPICS

"Olympic Secrets Revealed" was Maclean magazine's cover story of 18 Jan 2010, where they described the engineering and training advances made by Canadian universities to give our athletes an edge. The public dissemination of this research just before the 2010 Winter Olympics events was carefully timed to give the maximum psychological advantage to Canadian athletes. But not all the secrets were revealed.

Roland Stull's research team in the EOS Dept, like the other research teams on campus, had signed a non-disclosure agreement that was binding through the end of the Paralympics in March 2010. But unlike the other research efforts, Stull's work didn't end before the Olympics started. Instead, his team's 5 years of work on this project reached a climax during the Olympics and Paralympics, when they provided special tailored weather forecasts exclusively for the Canadian teams. This differed from Environment Canada forecasts, which by mandate were made equally available to all participating nations.

PhD student Rosie Howard lead this weather research for the "Own the Podium (OTP)" program. She designed special web-based weather maps, provided email and text forecasts, and gave tailored weather briefings over the phone to Canadian teams at all three outdoor venues: Whistler, Callaghan, and Cypress. To reach this capability, she had spent the past 4 winters on Whistler mountain making field measurements, testing forecast algorithms, working with coaches and technicians, and providing real-time forecasts for other national and international competitions at Whistler. PhD students Bruce Thomson and Thomas Nipen helped to deploy these field instruments and build a research hut for Rosie halfway up the main ski slope.

Meanwhile, back in EOS-main, PhD students Atoossa Bakhshaii and May Wong, along with computer system administrator George Hicks II and research associate Henryk Modzelewski, ran an ensemble of complicated numerical-weather-prediction models every night on a suite of million-dollar high-performance cluster computers in Stull's labs. Each of these fluid-dynamics models would run for 10 or more hours every day, starting about 7 pm each evening, in order to make high-resolution weather forecasts in time for the next day's competitions. George and Henryk also took turns working on shift to keep our computer systems operational 24/7 in the face of power outages and relocation of our computers.

Undergrad co-op student Daniel Casanova spent summer months in the field at Whistler, Callaghan, and Cypress, using a theodolite borrowed from Rob Millar in Civil Engineering to survey trees and mountains that would cast shadows on the ski slopes. He also spent many winter months assisting Rosie with her field measurements at Whistler, and did a lot of work analyzing data, and writing code for our special tailored web page.

Student Dominique Bourdin, starting in this project as an undergrad and continuing as a Masters student, took the medium-range ensemble weather forecasts that were originally conceived by former PhD student Doug McCollor, and modified them using Thomas Nipen's display algorithms to provide weather outlooks 16 days into the future for the mountain venues.

Now that our work is unclassified, we have removed the password protection so you can see some of the weather-forecast products that we produced. Go to URL: <https://weather.eos.ubc.ca/otp2010/>

This web page is divided into 5 strata. The top layer has thumbnail photos of the venues, and if you click on the Cypress or Whistler thumbnails and follow the onscreen instructions, you can see forecasts at key points along the pistes (the groomed ski trails). The second layer has links to Weather-Map Movies, showing QuickTime animations of our computerized forecasts tailored for the venues.

The third layer are Meteograms, which are graphs of weather variables vs. time into the future. These are produced for key points along the pistes. The top portion of this stratum links to those points that happen to be near weather-observing stations. These forecasts are "calibrated" using Kalman-filtering (KF), where past biases are removed from future forecasts. Other uncalibrated point forecasts are produced for locations lacking weather stations.

The fourth layer has our Sun vs. Shade forecasts, where you can pick any time of any day, or can use the <<<< and >>>> arrow buttons to step backwards and forwards in time. Recall that the El Nino conditions caused a string of 7 to 10 sunny days during the Olympics. So this site was used heavily by the technicians responsible for applying the base coats of wax to the skis and snowboards during the night before each event. At the bottom of our web page are the 16-day Medium-Range Forecast outlook meteograms. All of these data were also heavily used by the venue crews who groomed the ski slopes every night for the next day's events.

Roland Stull encourages you to explore and enjoy this web page. After a few months it will become password protected again as it is modified for other clients in the British Columbia winter-recreation industry. Stull thanks his research team for the superb effort they made, and commends the Canadian athletes on their outstanding performance. It was an experience that none of us will forget.

Professor Roland Stull, Earth and Ocean Sciences
Director: Geophysical Disaster Computational Fluid Dynamics Center
Professor: Atmospheric Science Program
<http://www.eos.ubc.ca/about/faculty/R.Stull.html>

A Golden Olympic Moment

One of our EOS Alumnus, **Karl Ricker, (B.Sc. 1959, M.Sc. 1968)**, a very proud dad, reports on his daughter, Maëlle Ricker's Gold Medal win (and the dedication needed) in the 2010 Vancouver Olympics for Snowboard Cross on Cypress Mountain.

The Making of a Gold Medal Athlete



Maëlle Ricker receiving her Gold Medal in Vancouver

The victory was a long moment of relief, coming so close to winning in two previous Olympics (Nagano and Torino), and had been denied entry to the games at Salt Lake City because of a mix-up by Canadian officials in the paperwork in applying for an injury exemption. So it was a long haul, 12 years, and now, hopefully, she will give it a rest and not go to Sochi in 2014.

At age 3, Maëlle was skiing the "cut" on Grouse Mountain and doing "top to bottom" on Whistler. At age 6, she was always the best in her age group of any sport or outdoor activity and by age 10, coaches in her sport of interest had her earmarked as a probable Olympic athlete (track and field, skiing, ringette, field hockey, soccer, gymnastics) if she followed the program of development. At high school age, scouts for university athletic scholarships were keeping a keen eye on her abilities and performance. By this time gymnastics and ringette fell by the wayside and was replaced by basketball. In Grade 10, she dropped ski racing and in Grade 11 took up snowboarding, upon the persuasion of her older brother, who at the time was one of Canada's leading junior snowboarders. She quickly adapted to the sport, winning a bronze medal in the international junior championships in Japan while in Grade 12. Nonetheless, she was the high

school's athletic "hero" in soccer, track and field and field hockey and had three athletic scholarships offered to her from American Universities. Much to her parents' surprise, she turned them all down and set out instead to try out for the National Snowboard Team the following autumn. On her own she made it, entering her first international competition, December 1996, placing second in a World Cup snowboard event (the Half Pipe). She has been on the National Team ever since, competing in FIS World Cup events, the rival organization, ISF (International Snowboard Federation) pro events, and an assortment of local and continental events. Along the way she was victim of several knee injuries, requiring surgery eight times to correct for torn ligaments and cartilage. In the last four years she has avoided further knee mishaps, with four good years of medal performances.

In March 2010, after the Olympics, in the World Cup in Italy and Spain, Maëlle won First prize in Snowboard Cross (Awarded: Crystal Globe) and First Place in the Overall Standings (Awarded: a "bigger" Crystal Globe). She is the first Canadian woman to do so!

Meanwhile, back in Whistler, Dad was being a "Weasel"

Volunteers at Whistler do the Grunt Work, and Love It

"From: The New York Times, By John Branch, February 24, 2010, All rights reserved. Used by permission and protected by the Copyright Laws of the United States."

Please note due to copyright restrictions we are unable to reproduce the NY Times article about Karl Ricker and the Whistler Weasles here on our electronic version of the newsletter.

The full article can be found here: www.nytimes.com/2010/02/25/sports/olympics/25weasel.html#

ENVIRONMENTAL SCIENCES PROGRAM

ENVR 400 - RESEARCH PROJECT IN ENVIRONMENTAL SCIENCE Dr. Tara Ivanochko, Environmental Sciences Instructor

In February the UBC senate passed our revised Environmental Science curriculum, including the addition of a new capstone course: ENVR400 Research Project in Environmental Science. In order to work through the glitches, this year D. Steyn and I ran a pilot ENVR400 course. We based the course on team learning, and designed it to have students work



ENVR 400 students visit the Burnaby Incinerator- hard hats required.

From left to right: Monika Dean, Jessica Macdonald, Helmut (the guide), Anthony Ho, Nan Lu, Joseph Lau, Clement Lam, Nari Sim

together to identify their project topic, prepare a critical literature review, frame research questions, develop a research plan and project timeline, prepare and present interim progress updates and a final project report. This year 7 lucky students enrolled in the pilot and chose to tackle Vancouver's garbage problem.

Currently Metro Vancouver is soliciting feedback on their proposed waste management policy, which includes the addition of new waste incinerators. The ENVR students decided that they would immerse themselves in garbage, learn the issues and determine the environmental impacts of the new Metro Vancouver proposal.

As part of their research, the students independently organized field trips to the Burnaby waste incinerator, the UBC compost facility and the Vancouver/Delta landfill. They also met with industry, political representatives and academics to contextualize their project.

The report they produced, *Waste Solutions for Metro Vancouver*¹, models the pollution produced from waste treatment options, like landfilling, composting, incinerating and recycling, and quantitatively investigates the potential benefits of decreasing garbage production.

They compared measurements of air quality, water quality, land disruption and human health and determined that increased recycling and composting, coupled with waste reduction, produces the best environmental conditions. Their solution did not include additional waste incinerators. The report concludes that garbage take-back programs (like we have for paint and tires) are critical to achieving meaningful waste reduction.

The ENVR400 students fundraised (monies were received from the Science Undergraduate Society and EOS) to support a presentation to the annual conference of the Recycling Council of British Columbia in Whistler. They have also presented their work to the Fraser Valley Regional Council and distributed *Waste Solutions for Metro Vancouver* to our municipal, regional and provincial governments.

A grant from Skylight, UBC's Science Centre for Learning and Teaching, has allowed us to transform *Waste Solutions for Metro Vancouver* into a touchscreen display for the Pacific Museum of the Earth (PME). In the new PME Environmental Sciences Display visitors and school groups will learn about Vancouver's garbage problems and possible solutions. In the future, as ENVR 400 students tackle more local, regional and global environmental issues, we will have the opportunity to add new content to this PME display.

The ENVR400 pilot was great fun to teach. This year's class has set the bar high. In 2012, ENVR 400 will be a required course for all Environmental Science majors at UBC. Look out for our students and their work; they are taking on the environmental challenges of our day.



THE CLAW: garbage to be burned at the Burnaby incinerator.

The following two pages are taken from the report.¹

¹The report can be accessed online at <https://circle.ubc.ca/handle/2429/24466>

About the Authors

This study is a capstone project for an Environmental Science Directed Studies course in the University of British Columbia (UBC). The project team consists of seven senior Science students from a range of academic backgrounds and interests. The topic of study was determined and developed wholly by the students, with guidance from two supervisors: Drs. Steyn and Ivanochko from the Department of Earth and Ocean Sciences, UBC. The primary goals of the project include selecting a topic of study relating to environmental sciences, corresponding with the relevant experts and stakeholders, and presenting our research results to the public.



Anthony Ho is a graduating UBC student pursuing a B.Sc. in Environmental Sciences and a B.A. in Political Science. His field of interest includes the analysis of the creation and implementation of sustainable environmental policy. He is enrolled in the LL.B./MPA concurrent degrees program at the University of Victoria, which will begin this September.

Jessica MacDonald is a graduating UBC Environmental Sciences student. Her interests include environmental psychology, marine pollution and fisheries science. She is currently a research assistant with the “Sea Around Us” project at UBC, and plans to continue her education in an area on the interface between environment and society.



Clement Lam is a graduating UBC student pursuing a degree in Integrated Sciences. His integrations include topics from physiology, ecology, and environmental sciences to investigate how atmospheric and marine environmental pollutants affect human biological systems. His passions include aviation, and exploring and confronting challenges in developing nations.

A fourth-year UBC Environmental Sciences student, Monika Dean has always had a fascination with waste production and reduction; she has been working in the waste management industry for the past 6 years. Currently focusing on the study of ecology and plant systems at UBC, she hopes to continue exploring her curiosity in sustainable management of natural resources.



Joseph Lai is a graduating student from the Environmental Sciences program at UBC, with a focus on environmental chemistry. He is interested in human health ramifications of atmospheric and aquatic pollution, and plans to pursue further studies in public and environmental health.

Nan Lu is a graduating UBC Environmental Sciences student. She wishes to pursue further studies in atmosphere dynamics, meteorology and weather forecast modelling. At present, she is working in the School of Environmental Health laboratory as a student research assistant.



Nari Sim is a graduating UBC Environmental Sciences student. Her interests include climate change and environmental geochemistry, specifically the chemical analysis of water column and sedimentary marine environments involving trace metal analyses. She is enrolled in the M.Sc. program at UBC, which will commence this September.

SUSTAINABILITY FAIR AT BAYVIEW



A Bayview second grader learns about bike maintenance



*Noontime community gathering
Bayview sustainability fair*



Some of the new, student-constructed community garden beds at Bayview



Kidlets with seedlings

Head, Hands and Heart: Transformative Sustainability Learning in UBC Earth & Ocean Sciences Professor Kurt Grimm

Sustainability seems like a really good idea, right? Recycling, driving less, fair-trade coffee, and a hundred other “green” choices... of course, these are all sensible and good, but do they add up to a sustainable future?

For associate professor Kurt Grimm, the answer is no. He’s discovering — and teaching his students — that sustainability is not rebranded environmentalism, nor is it twiddling knobs towards an incrementally brighter future. Sustainability is a vital (Life-centric) and transformative concept; sustainability is an immense entrepreneurial opportunity and can be summarized in two words: authentic abundance. Weaving these elements together while advancing science and climate literacy is the goal of Kurt’s educational innovation.

A crowd of knowledge-laden students with limited engagement and few practical skills? We’ve got stacks of those in the modern university and it’s not very helpful. Transformative Sustainability Learning (TSL; Sipos et al., 2006) engages heads (academic knowledge), hands (practical skills) and hearts (passion and purpose) towards ends that advance individuals and society. Facilitating TSL requires risk-taking, and it never pleases everybody. Nonetheless, for Kurt, some of his colleagues, and many of his former and current students, TSL is a vital ambition.

Unifying ecological and Earth systems concepts with practical — particularly agrarian — skills is a big step in the right direction. Adding passionate engagement with projects that truly matter to real people in local places... these are the ingredients that collectively catalyze transformative change.

Community service learning (CSL) is a sturdy vehicle for accomplishing TSL objectives. CSL unites university students and local communities to accomplish practical community objectives while exercising knowledge and skills for all participants. During the early months of 2010, sixty-five students enrolled in EOSC 312 ([The Earth System and Environmental Evolution](#)) partnered with students, teachers, families/parents, staff, neighbours and friends at Bayview Community Elementary School (7th & Collingwood, Kitsilano) to create a day of creative learning on sustainability themes.

Undergraduates in EOSC 312 prepared to become sustainability educators via classroom learnings and online resources [e.g. learn from Janine Benyus, Paul Hawken and Rick Warren at www.ted.com; read first 46 pages of a (free!) book (“essay”) at www.greattransition.org/], integrating cerebral challenges with personal reflections on lifestyle and ambitions, towards the development of personal sustainability portfolios. High academic standards, community mentorship of student-directed working groups, alongside skillful coordination by graduate student Ileana Costrut brought the students to the gateway of a remarkable success.

The synergy of eager Bayview kids and their UBC student-instructors came alive in a full-day sustainability fair on March 8, 2010; on that day, CSL married TSL, and went on a honeymoon!

People Planet, Bayview Village was a unique and precedent-setting event, a model for broader educational innovation. Students constructed and planted family gardens, planted an apple orchard (the first at a Vancouver school?), and fed over 300 people a delicious and healthy lunch employing “100-mile-diet” and other food-security principles. Workshops on diverse sustainability themes, including bicycle maintenance, wonderful water, ecofootprinting, and healthy play inspired and equipped everyone, including the volunteers who shepherded student groups from station to station. A midday gathering of the entire school community (thankfully, it was a gorgeous sunny day!) celebrated all we were learning and experiencing together, through music, dance, traditional welcoming and thanks.

“Gee whiz”, some may say, “that sounds interesting, maybe a bit hippy-dippy?”. Nope, the academic accountability is rigorous. Nonetheless, some may respond, “Sounds great! But how does this all relate to EOS responsibilities in science education?”. That’s a good question!

Contemporary Earth and ocean sciences are illuminating many facets of a broad underlying process. Earth is wet, requires and perpetuates continuous recycling of rock, water, and carbon dioxide (plate tectonics), while perpetuating an atmospheric envelope that requires and perpetuates Life. Think about that... the nested biogeochemical loops constituting rock/tectonic cycles and ecosystem dynamics, alongside organismal and climate physiologies are not only fascinating subjects for academic research, they are imperative understandings for a sustainable future. To build an effective understanding of sustainability, students must integrate plate tectonics, atmospheric chemistry, the science of climate-changing (Grimm, 2006), sustainability science (e.g. www.storyofstuff.com) and a reconnaissance of human history, in the deep time perspective of coevolving Life and environment on planet Earth. In other words, interdisciplinary EOS has a central role to play in the evolving sustainability sciences!

Machines are designed and described through box models and systems approximations, consisting of objects interconnected by exchange processes. Systems thinking is useful, and underlies much of the technological success (!) we are now experiencing. However, system thinking and logical empiricism alone may not be the most effective perspectives for catalyzing the sustainability transformation that everybody’s talking about.

Very simply, nature is not a machine. Through integrative research grounded in the principles of self-organizing complexity, Dr. Grimm is pursuing novel concepts that encompass the coordinate functions amongst molecules, ecosystems, organisms and climate. One of the fruits of his work is a unified description of Life that is simple, delivers broad explanatory power and a set of unique and falsifiable hypotheses. He is freshly discovering, while being acutely challenged in the process of publishing this unconventional synthesis, yet these ideas are clearly illuminating the principles and practice of sustainable living. Simply stated, nature provides the best models for sustainability.

Dinosaurs died. In our sustainable (?) future, the smart, clever and innovative will persist, evolve and functionally speciate. TSL engages the whole person, and provides incentive to master science and complexity concepts. CSL challenges while enabling these students to study, exercise and model sustainability principles, while inoculating them into their personal and professional lives.

Sustainability learning pushes envelopes, takes risks, requires our best, and nourishes a culture for broader engagement and transformation. The imperatives of innovation and adaptation are keys to successful social and fiscal entrepreneurship, authentic abundance that thrives while fostering regeneration of human communities and renewable nature.

If the students are truly engaged and engaging, if sustainability literacy is evident in their academic work and subsequent careers, you can guess they have engaged with transformative sustainability learning through community service learning. Advancing these interdependent aims while advancing science literacy is a passion for Kurt Grimm and his colleagues. He anticipates a near-future (www.sustain.ubc.ca) where these activities will become business-as-usual for universities — and particularly for Earth and Ocean sciences — to catalyze a robust, resilient, adaptable and sustainable future.



More Bayview students hard at work

Resources:

Grimm, K.A. 2006. Katrina, Wilma and Me: Learning to live with climate surprises?. *Geoscience Canada* 33(2): 76-80.

Sipos, Y., Battisti, B., and Grimm, K.A., 2008. Achieving Transformative Sustainability Learning: Engaging head, hands and heart. *International Journal of Sustainability in Higher Education* 9(1): 68-86.

Thanks to all our friends at Bayview Village, particularly Hugh Hooper (Principal), Catriona Gordon (parent and gardens expert/advocate), Kelsy Wittman (PAC Chair) and Donna Henning (Bayview neighbour and friend). Alumni interested in engaging and/or supporting CSL/TSL objectives are encouraged to contact Kurt 604-822-9258/kgrimm@eos.ubc.ca

ELDAD HABER

NSERC INDUSTRIAL RESEARCH CHAIR PROFILE



Eldad Haber: Department of Earth and Ocean Sciences/Mathematics

Chair Title: NSERC/ Barrick/Xstrata/Teck/Newmont/Vale Industrial Research Chair in Computational Geoscience

Chair Program: Industrial Research Chairs Program

Role: Associate Chairholder since 2010

Summary

The chair area of research is computational geoscience, with applications to electromagnetic imaging and optimal experimental design.

Electromagnetic methods have been used by the industry for the discovery of minerals, oil, underground contamination and, recently, to monitor CO₂. A key component in using the technology is the ability to simulate electromagnetic fields in highly homogeneous media and, given electromagnetic measurements, produce a 3D image of the earth that is consistent with the data. The work proposed by the chair is the development of modern simulation and optimization algorithms and codes to produce a flexible and accurate representation of electromagnetic fields in the earth and the corresponding conductivity.

The key activities of the chair are:

1. Develop 3D codes for electromagnetic simulation and imaging
2. Develop new methodologies for experimental design in electromagnetics
3. Develop new ways to assimilate and fuse electromagnetic data and other geophysical data. The chair's background is computational science with a PhD in geophysics and applied math from the University of British Columbia.

The chair has worked for Schlumberger and for the last seven years has been at Emory University mathematics and computer science department as a computational science faculty member. For the last 15 years, the chair was involved in generating modeling and simulation codes to mining companies worldwide.

Mining and mining exploration represents a large part of the Canadian economy. Improving mining exploration by making it more economical and environmentally friendly is an important economical target. Furthermore, the generation of codes will take the industry to the next technological phase and will require highly qualified personnel that will bring more "high-tech" jobs to the mining industry.

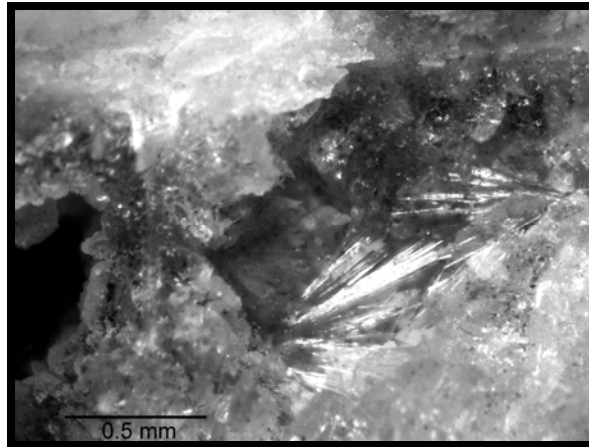
The partners are major mining and exploration companies, not only in Canada but also worldwide, that share similar methodologies for electromagnetic modeling and imaging.

The codes and algorithms developed in this research can improve the accuracy of mineral detection making exploration more profitable and with a smaller environmental footprint.

Industry Partners:

- Vale Inco
- Teck Resources Limited
- Newmont Mining Corporation of Canada Limited
- Xstrata Nickel Canada
- Barrick Gold Corp.

LEE GROAT - "GROATITE"



Groatite

An unassuming mineral hidden away in rock samples collected almost 30 years ago has been named after a professor of Earth and Ocean Sciences at the University of British Columbia. Groatite, a new species of phosphate mineral, was named after Lee Groat, a professor of mineralogy at the university.

Details of the discovery and properties of the mineral were outlined in the most recent issue of *The Canadian Mineralogist* by a team led by researchers from the University of Manitoba. Frank Hawthorne, the principal investigator on the paper, named the mineral after Groat for his extensive contributions to pegmatite mineralogy.

"I was surprised and honoured," says Groat. "I did my PhD under Frank at the University of Manitoba. When he approached me at the 2008 Geological Association of Canada meeting in Quebec City to ask my permission to name a mineral after me, I was very surprised." "I want to say thank you to everyone who was involved, because I know how much work it is." When a new mineral is discovered, researchers must identify its physical properties to prove that it is unique. Density, chemistry, colour, hardness, crystal structure and other traits exhibited by the specimen are examined to determine if the sample is unique. About 60 new mineral species are discovered every year. In the case of groatite, it was years before the research team realized there was a new mineral in the samples that they had collected from the Tanco pegmatite at Bernic Lake, Manitoba in 1980. Found in a phosphate-carbon mass in a spodumen-rich boulder, the newly discovered mineral appears as sprays of colourless to pale yellow crystals on whitlockite, another phosphate mineral, allowing it to go undetected.

The sample turned out to be a new 'phase' of a phosphate mineral from the alluaudite group. An application was then submitted to the Commission on New Mineral Names of the International Mineralogical Association (IMA), where it was assessed and voted on by the commission's delegates. Of the approximately 4,350 known minerals, around 45 per cent are named after people, of which 102 are Canadians (2003 figures). Other UBC faculty who have been honoured in this way are: Henry Cecil Gunning (1901-1991), Robert Mitchell Thompson (1918-1967), and John Arthur Gower (1921-1972). The IMA also judges the acceptability of the proposed name--often a person, locality, institution, chemical composition or distinctive property such as colour or shape.

Dr. Groat received his Bachelor of Science in Geology from Queen's University in 1982 before pursuing his Master's and PhD at the University of Manitoba. He came to UBC in 1989 after completing his NATO Postdoctoral Fellowship at Cambridge University. Groat was an associate editor for *Canadian Mineralogist* and *American Mineralogist* throughout the 1990s, and editor of *American Mineralogist* from 2001 to 2006. He is also an elected Fellow of the Mineralogical Society of America. Currently, Groat is the director of UBC's Integrated Sciences program.



*Lee Groat, Professor, Earth and Ocean Sciences,
Mineralogy, Crystallography*

Below is the complete article in **The Canadian Mineralogist**

Mark A. Cooper, Frank C. Hawthorne, Neil A. Ball, Robert A. Ramik, and Andrew C. Roberts
GROATITE, Na Ca Mn₂₊₂ (PO₄) [PO₃(OH)]₂, A NEW MINERAL SPECIES OF THE ALLUAUDITE GROUP FROM THE TANCO PEGMATITE, BERNIC LAKE, MANITOBA, CANADA: DESCRIPTION AND CRYSTAL STRUCTURE
Can Mineral, October 2009; 47: 1225 - 1235.

HOT CRYSTALS!

by Amy Chan



This picture has not been altered! That's really me, sitting on a giant selenite crystal inside the Cueva de Los Cristales (Cave of the Giant Crystals), inside Naica Mine about 1000 ft under the Chihuahuan desert, in northern Mexico. What was I doing there? I was part of the EOS science team, along with Danielle Winget and Curtis Suttle, participating in the National Geographic film: Naica II: Return to the Crystal Caves. This was not the deepest place I have visited in our quest to find new life forms, but it was the hottest and most dangerous.

On the day this photo was taken the air temperature inside the cave was about 43°C, with 100% humidity. Apparently, under these conditions, one could die after 15 minutes of exposure. The combination of the intense heat and high humidity makes it impossible for the body to cool effectively by evaporative cooling (sweating). Beneath that red jacket, I'm wearing a vest loaded with ice packs as well as an ice pack tucked inside my helmet. The ice provided some 'comfort' as I scrambled over the giant crystals, some as long as 10m, and more than 1 m across. Not shown is the survival gear I had to wear while filming inside the cave. This included wearing a face mask fitted with a hose that was connected to a giant ice-filled backpack. The cool air blown into my lungs provided little relief from the intense heat and humidity as we slowly manoeuvred in the cave. In a way, we resembled astronauts working in a zero gravity environment.

This cave is the largest of several in the mines, and looks like Superman's 'Fortress of Solitude'. Once inside, the incredible sight makes you forget about the intense heat. Translucent white crystals the size of giant tree trunks project from every angle. It's like being inside a giant geode! How were these crystals formed? Naica mines sits on a couple of faults, directly above a magma chamber. The cave was submerged in hot mineral-saturated water, which allowed the crystals to slowly form over half a millions years until its discovery in 2000 during mining excavation. To maintain business operations, giant pumps work constantly, pumping water to the surface at >50,000 litres per minute!!! The water is still steaming at 42°C when it reaches the surface. Some of this hot water is diverted to irrigate a nearby golf course while most of it feeds a lake in the desert.

Watch for the film to air this September. Find out what happens when Danielle and I spend an hour without survival gear venturing to Hell and Back, deep inside Naica mines, in our quest to discover new life forms.



Our long days filming in the mine were fueled by local cuisine such as Grasshopper-Guacamole Tostada and lots of Gatorade, yummy!

PACIFIC MUSEUM OF THE EARTH

Mackenzie Parker, Curator



*Photo: Derek Tan
"Beaty Night"*

*Blue Whale Skeleton
on display at the
Djavad Mowafaghian
Atrium in the Beaty
Biodiversity Centre*

This past year has seen the culmination of many highly anticipated projects and the launch of some exciting new beginnings. From the demolition of Earth and Ocean Sciences East (once the Geophysics and Astronomy Building) to the first stage opening of the Beaty Biodiversity Research Centre, our corner of campus is transforming.

But first, I want to tell you about the projects that we won funding for last year! The first was our summer **Teacher Training Program**, which ran as a two day workshop on the weekend of August 4th and 5th. It was developed for Kindergarten to Grade 7 teachers and drew 17 participants. Each teacher went home with a book (*Vancouver: City on the Edge*), a fossil kit, a mineral kit, and a selection of common rocks. Feedback was extremely positive; my personal favorite comment on our evaluation forms was "*It made me interested -- excited -- to each Earth science*". Many thanks to Erica Williams, Stuart Sutherland, Brett Gilley, and Tara Ivanochko for serving as workshop instructors last summer.

I am pleased to announce that we have been awarded a grant by the Canadian Geological Foundation for a second year of the Teacher Training Program. Funding has been increased, allowing us to grow participation in the workshop. In order to facilitate broader attendance, this year the workshop will run on the Province Wide Professional Development Day (Friday, October 22nd) and the following weekend. We are currently looking for instructors for this year's workshop; contact Mackenzie Parker if you'd like to get involved.

We are also now in the second year of a three year grant from NSERC PromoScience to support the **development of our public programming** (tours & workshops). Raymond Nakamura was hired on a short term contract to document and revise our existing programs and to develop a new weather-based program. These changes will be implemented over the next month, after which a new contractor will be sought for further program development.

As pleased as I am with our work on programming for teachers, the completed project about which I am most excited is the **relocation of the fossil collection**. Thousands of fossils specimens have been languishing at South Campus for years. This past November movers from Salmon's, forklift operators from Plant Operations, and a small but dedicated group of volunteers packed up the fossils and moved them lock, stock, and barrel into brand new storage cabinets housed in the Beaty Biodiversity Museum right across the street from the PME. The move went extremely smoothly; kudos to all those involved!

Although the fossils are now housed by the Beaty Biodiversity Museum, rest assured that the PME retains access to and shares control of the collection. We are already enjoying the accessibility that their new home in the Beaty Biodiversity Museum provides.

Best of all, you will also benefit from this accessibility directly! The **Beaty Biodiversity Centre** and the Djavad Mowafaghian Atrium, which houses the spectacular blue whale skeleton, officially opened on May 13th. Although the Museum portion of the Centre will not open to the public until the fall, as the curator of the Fossil Collection I had the good fortune to be invited to this first opening. The speakers, representing UBC faculty, staff, and students, and major donors to the Research Centre, including Ross and Trisha Beaty and the Djavad Mowafaghian Foundation, spoke eloquently to the importance of biodiversity to humanity and to the world, but I confess that they were all rather upstaged by the blue whale skeleton itself. Seeing that great creature stretched out above you, its massive jaws spread wide, is truly humbling.

For those of you who just can't wait for the fall to check out the Beaty Biodiversity Museum, I have some good news! The BBM will be holding a series of **Preview Events** over the course of the summer. Visit <http://www.beatymuseum.ubc.ca/> for more information

In the meantime, we encourage you to return to the Pacific Museum of the Earth to check out our newest display: It's called "You Be the TV Meteorologist" and uses green screen technology to introduce visitors to weather patterns by inviting them to step into a recording of a genuine TV weather forecast and become the meteorologist. Tour groups have been all over this display--it seems it's hard to walk by without stopping to have a look at yourself on screen!

The Pacific Museum of the Earth is growing in too many ways for the space available here--I encourage all of you to come and see for yourselves!

STUDENT SOCIETIES

G.M Dawson Club's May Size Photo Contest

Undergrad First Place Winner - Hally Keevil



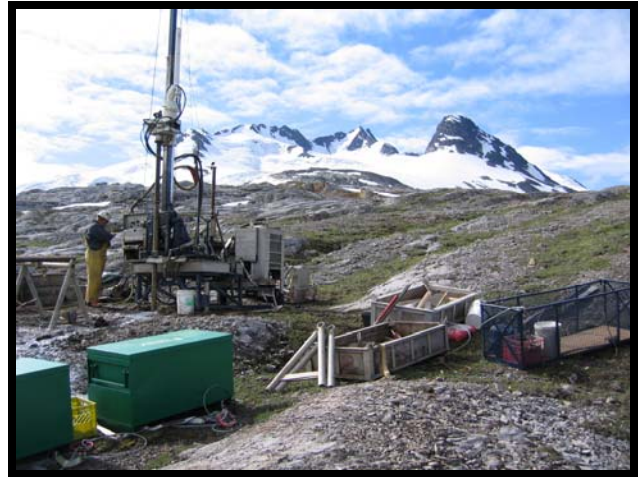
Untitled

Undergrad Second Place Winner - Tao Song



EOS building

Graduate First Place Winner - Mike Belfry



Limestone Drilling

Graduate Second Place Winner - Wren Bruce



Mt. Rainier, WA

GEOROX CLUB

The 2010 Spring Term has been one of many successes for the Geological Engineering Club. The club has hosted the most social events in recent years and still offers the same great services it has in the past.

Events/Services

Many events were hosted this term, a few of which were solely hosted by GeoRox and others as joint events with neighbouring clubs. On January 15th, 2010 GeoRox hosted its first engineering wide event, "On The Rox". The party was a great success with high attendance, but with one major setback. Nearing the end of the event the Modu-lock fencing bordering the beer garden was jimmied open, the tanking pond lid moved, and a ~\$250 keg of beer was stolen. A valuable lesson can be learned from this misfortune to 1) make sure all kegs (or anything being stored outside) are secure and 2) ensure adequate volunteer rotations so there is always at least one watch-person. The GeoRox annual Alumni Dinner was held on January 23rd, 2010 at the UBC Golf Course. This is one of the most important events put on by the club as it helps maintain relationships with alumni and related industry. Many of the clubs' graduating students rely on this event for contacts for potential career employment. This year's annual Distinguished Lecturer was a joint event between GeoRox and the Vancouver Geotechnical Society (VGS). It was held on January 28th and featured Iain Bruce of BGC Engineering, who gave a very interesting talk on karsts and their significance in his career. On March 12th GeoRox and Dawson Club (Geology) held the joint Imports Beer Garden, where imported beer and food was served. The event was successful with no incidences, and funds breaking even.

The second annual GeoRox camping trip took place March 19th to 20th along the Chilliwack River. The club was very pleased with the high attendance and popularity of the event, and hope that it carries over well to next year. This year the second year students took it upon themselves to organize an event called "Dewing the Dew". This consisted of a night out to the Foggy Dew Bar near Burnaby. After its great success, there are future plans to expand the event to include a party bus and potentially t-shirts. On April 1st GeoRox hosted the EUS' Sustainability party the 'Cup-less Beer Garden' (a joint event between Engineering, Forestry, and AgSci). The party ran smoothly with no incidents. A big 'thank you' goes out to the EUS Executive that helped with the after-party clean up. The 2nd Annual EOS Semi Formal took place on March 27th at the Vancouver Law Courts ball room. The event was fun for all those who attended, but it is hoped that attendance can be increased for next year to reduce the losses incurred by the EOS student clubs. As part of the EOSC department's first year recruitment, a pizza and information session was held on April 6th in the EOS Museum where club members attended to promote the club and the department to interested (or not interested) first year engineering students.

In addition to social events the club has been active in other ways as well. Thanks to members of the Engineering First Year PP Council the 'club room improvements' day this term was a great success and the club space is looking well and more organized. This will be the first year that the GeoRox Council has had their photo taken with Evangelo's Photography and the framed picture will be hung in the club room shortly. The club was the proud recipients of the Spirit Award during Engineering Week this year for our good attendance and enthusiasm throughout the week.

As always, GeoRox supplies its students with food and beverages found in vending machines on the first and third floor of EOSM. The club is also very proud of this year's Sports Rep, Nick Wodzianek, for putting together the most number of sports teams, and the most successful sports teams the club has seen in the recent years.

Budget Summary

GeoRox has been able to keep on track with its intended budget this year. Although the Distinguished Lecturer event had a few unexpected cost over-runs, they were able to be worked out thanks to financial assistance from the VGS and the EOSC Department. The club was awarded a part of the EUS Club Aid Fund, which has given the club a much welcomed additional financial boost.



GeoRox Annual Fall Field trip (big thanks to Scott McDougall of BGC Engineering for his excellent tour)



GeoRox Annual Alumni Dinner – classy as always

Future Outlooks

This past term has seen some unexpected successes, but there are still challenges for the upcoming terms. As brought up by our program director, Dr. Roger Beckie, the fourth year cap-stone thesis is no longer adequate as the program continues to increase in popularity and size. This issue has been known of and been worked on since late last semester. Big changes will need to occur in the immediate future to resolve this problem for incoming fourth year students. The club and program is hoping to work with the EUS VP Academic, the Faculty of Applied Science, the Faculty of Science, the Department of Civil Engineering and the Department of Mining Engineering to help in the struggle to ensure proper training of graduating students of 2011.

This year's GeoRox Council photos at Evangelo's Photography



Awards and Honours in EOS



Congratulations to **Dominique Weis** and the **PCIGR team** on being awarded a very large BC Knowledge Development Fund grant (BC-KDF) for new equipment and support.

The PCIGR proposal led by D. Weis, CRC Tier I and Professor in EOS, was approved for full-funding from both the Leading Edge Fund (LEF) of the Canada Foundation for Innovation (CFI) in 2009 and the BC-KDF this year. With the in-kind contributions, PCIGR will receive a total investment of ~\$7.5 million to expand and update its geochemical analytical equipment. The centrepiece of the new proposal is a Nu 1700, a large geometry high-resolution multi-collector plasma mass spectrometer, in addition to other cutting-edge instruments.

A research and development (R&D) project is also being developed with Nu Instruments Ltd. to establish a unique geochemical facility in North America that will allow for new analytical developments and integration with teaching and outreach into EOS and the ESSB. This is all exceptionally good news that will push EOS further to the forefront of research in geochemistry worldwide with applications to the earth and environmental sciences.

FACULTY

EOS went 3 for 3 in Skylight applications this year, hauling in more than 25% of the funding given out within the Faculty of Science. Congratulations to the leaders of the three applications: **Josh Caulkins, Sara Harris, and Tara Ivanochko**.

William Hsieh was made a Fellow of the Canadian Meteorological and Oceanographic Society at the CMOS congress on 3 June 2010 in Ottawa. The Citation reads: "for his internationally recognized leadership in the application of artificial neural networks to the advancement of our understanding of meteorological, oceanographic and climate variability".

Oldrich Hungr will be made a Fellow of the Geological Society of America. All new Fellows will be recognized at the Presidential Address at the GSA Annual meeting in Denver, Saturday, October 30.

Kelly Russell was awarded the 2010 Career Achievement Award in Volcanology and Igneous Petrology by the Geological Association of Canada. This award is in recognition of career achievements in the field of volcanology and/or igneous petrology. Candidates are judged on their lifetime scientific contribution. Awards are not made in all years. Kelly was also interviewed by the CBC and Global TV to comment on the Iceland volcano.

Emeritus Prof. Alastair Sinclair has been named a Fellow of Engineering Canada (formerly Canadian Council of Professional Engineering) in recognition of "exceptional contributions to the engineering profession in Canada."

Curtis Suttle and Kelly Russell, each received CFI funding through the Leaders Opportunities Fund in the most recent round.

Douw Steyn was awarded a Faculty of Science Killam Teaching Prize.

Dominique Weis was awarded \$1,400,000 for the renewal of her Canada Research Chair in the Geochemistry of the Earth's Mantle Natural Sciences and Engineering - Tier 1. She was also elected as a Fellow of the American Geophysical Union. The following is from Timothy L. Grove, President of the AGU: "It is my great

pleasure to inform you that you have been elected a Fellow of the American Geophysical Union. Only one in each thousand members is elected to Fellowship each year. Speaking for the Chair and members of the Fellows Committee, the Officers of the Union, and the entire AGU membership, I would like to extend warmest congratulations to you upon receiving this singular honor..."

EOS Awards presented at the Annual Septemebrr BBQ
Excellence in Administration and Technical Services:

Cary Thomson , Paul de Leon
Undergraduate Instructors of the Year:

Phillipe Tortell , Jim Mortensen
Outstanding Teaching Assistant Award:

Jason McAlister, Brendan Smithyman

GRAD STUDENTS

PRIZE WON AT ROUNDUP!

Katrin Breitsprecher (PhD candidate, EOS) was awarded the first-place prize for best student poster at the Mineral Exploration Roundup meeting in Vancouver (Jan. 18-21, 2010). Katrin's poster was entitled: Breitsprecher, K., Scoates, J.S., Davis, W.J., Friedman, R.M., Anderson, R.G. & Weis, D., U-Pb (zircon) geochronology of Mesozoic intrusions from the southern Quesnel and Stikine terranes: temporal trends in magmatism of the Nicola Arc.

Three of Ken Hickey's MDRU students were awarded SEG (Society of Economic Geologists) Fellowships for 2010. They are: **Moira Cruickshanks, Jack Milton, Will Lepore**

One of Evgeny Pakhomov's MSc students, **Francis Choi**, won first prize for his poster and a cash prize of \$500 at the 2010 CAISN Annual General Science Meeting. The poster was: Choi, F.M., Pakhomov, E.A., Therriault, T.W. Assessing intertidal marine non-indigenous species in Canadian ports.

Awards received by GeoEng grad students:

Kristen Van Esch (MAsc) - Placement in the GeoNatHaz landslide field school (to be held in Italy). The award includes tuition, economy airfare and in-country costs during the course.

Masoud Rahjoo (PhD) - International Association of Tunnelling's ITACET Foundation award to attend the ITA 2-day Tunnelling Training Course (\$500 award).

SHELL GEOCANADA2010 AWARD - Each student listed below received \$833.

Masters: Adeboye Oyeleye, working on the permeability of coals with respect to production of natural gas

Ph.D.s: Evan Smith, energy exploration as a professional engineer

Martyn Golding, studying Triassic oil- and gas-bearing rocks in northeastern BC

Ning Tu, in exploration seismology

Neda Zangeneh, studying numerical modeling of hydraulic fracturing in weak, discontinuous rock mass

At the recent GeoCanada 2010 meeting in Calgary, May 10-14, **Jounada Oueity** (Ron Clowes' PhD Student) was awarded the Geological Association of Canada Geophysics Division Best Student Presentation Award for his poster titled "On the nature of the Moho: Lithospheric-scale seismic refraction and reflection modeling in NW Canada." The Geophysics Division Award is a plaque-mounted certificate, presented along with a cheque for \$300. Jounada's co-author is Ron Clowes.

Jeremy Vaughan a MDRU PhD student supervised by Greg Dipple and Ken Hickey, won best student talk at the Geological Society of Nevada 2010 Symposium. His title was: "Isotopic alteration of carbonate in Carlin-type Au deposits: Implications for fluid flow". He was awarded a trophy and a cheque for \$500.

GRADUATE STUDENT FELLOWSHIPS, NSERC AWARDS AND SCHOLARSHIPS

Four Year Fellowships: \$16,000 a year plus tuition for four years: **Martyn Golding, Neil Swart, Amelia Bain, Kirsten Hodge, Jason McAlister, Evan Smith**

University Graduate Fellowship: \$16,000 for one year **Emma Brownlee, Loryn Bruce, Caroline Chénard**

NSERC AWARDS

David Semeniuk, Brendan Smithyman, Lisa Erven, Trevor Hirsche, Adrian Leitch, David Marchant, Julia Gustavsen, Sharon Blackmore, Kristina Brown, Desiree Tommasi,

SCHOLARSHIPS

Egil H. Lorntzen Scholarship:

Reka Moldovan, Ryane, David Marchant, Jean-Francois Blanchett-Guertin

Thomas and Marguerite MacKay Memorial Scholarship :

Reka Moldovan, Holly Peterson, Dikun Yang

Colin D. Spence Memorial Scholarship in Geology:

Reka Moldovan,

Hugh Nasmith Graduate Scholarship:

Rasouli Pejman

Dr. F.J. Nicholson Scholarship: **Cynthia Starzyk,**

Rutherford Rae : **Bart DeBaere**

George Pickard: **Meagan Wolfe**

Captain Thomas S. BYRNE Scholarship:

Rodrigo Montes-Aste

R. Grant Ingram Memorial Scholarship in Oceanography:

Drew Snauffer

Kit Malkin Scholarship: **Emma Shelford**

UNDERGRADUATES

SHELL GEOCANADA2010 AWARD

Undergraduate: **Jessica Kalynn**, B.Sc. (Hons.) candidate in Geophysics received \$833.

SHELL PRIZE WINNERS - Six undergraduate students were awarded Shell Prizes of \$800 each for exhibiting the highest aptitude and attitude for field geology at the second year Saltspring Geology Field School. **Mike Currie, Stacie Jones, William Matthews, Karly Oliver, Kevin Pinkerton, Reanna Seifert.**



Total enrolment in undergraduate courses offered by EOS. Numbers in brackets (%) indicate increase over preceding year.

	2006	2007	2008	2009
1st Year	1900 (+2)	1938 (+2)	1894 (-2.3)	2285 (+20.6)
2nd Year	693 (+16)	771 (+11)	848 (+ 10)	881 (+3.9)
3rd and 4th Yr	1827 (+4)	1767 (-3)	1839 (+ 4.1)	1799 (-2.2)
Service Courses	604 (+4)	553 (-8)	551 (-.04)	543 (-1.5)
TOTAL	5024 (+5)	5029 (+.1)	5132 (+2)	5508 (+3.7)
Summer	366 (-22)	249	386 (+10)	668 (+73.1)
Distance Ed	321 (-1)	429	466 (+8.6)	1644 (+252.8)
Grand Total	5692 (+1.8)	5707 (+.2)	5984 (+2.9)	7820 (+30.7)

**Number of Major and Honours students
in programs offered by EOS**

	2006	2007	2008	2009
EOS - Major	86	93	93	97
ATSC	25	23	27	27
ENSC		83	86	82
GEOL	35	23	19	18
GEOE	106	121	134	130
GEOP	9	5	6	7
OCGY	9	3	1	1
TOTAL	278	351	366	362

Graduate Enrollment: 2009-2010

Program	ATSC	OCGY	GEOE	GEOL	GEOP	Total
MEng			8			8
MASc			7		0	7
MSc	6	13		34	14	67
PhD	7	23	7	31	16	84
Total	13	36	22	65	30	166

**Graduate Theses Completed in 2009-2010
Supervised by Earth and Ocean Sciences Faculty,
Including Thesis Programs External
to the Department
(Name of Supervisor in Brackets)**

(i) Ph.D.

- Beran, Laurens Sander, GEOP**, Discrimination Algorithms for the Remediation of Unexploded Ordnances, (Oldenberg, Doug)
- Bianchin, Mario Sergio, GEOL**, A Field Investigation Characterizing the Hyporheic Zone of a Tidally-influenced River, (Beckie, Roger)
- Chen, Yaming, GEOE**, Monitoring Contamination in Surface Water and Groundwater in a Catchment with an Unconfined Porous Aquifer Overlying Fractured Bedrock, (Beckie, Roger/Smith, Leslie)
- Finzi, Yaron Moshe, GEOP**, Strike Slip Faults Structure and Fault System Evolution: A Numerical Study Applying Damage Rheology, (Hearn, Liz)
- Fisher, Brendan Robert, GEOE**, Improved Characterization and Analysis of Biplanar Dip Slope Failures to Limit Model and Parameter Uncertainty in the Determination of Setback Distances, (Eberhardt, Erik)
- Halverson, Mark, OCGY**, Multi-timescale Analysis of the Salinity and Algal Biomass of the Fraser River Plume from Repeated Ferry Transects, (Pawlowicz, Rich)

- Henderson, Thomas, GEOL**, Density-dependent Flow and Reactive Transport Modeling of Chlorinated Solvent Oxidation by Potassium Pennanganale, (Mayer, Ulrich)
- Herrera, Paulo Andres, GEOE**, Particle and Streamline Numerical Methods for Conservative and Reactive Transport Simulations in Porous Media, (Beckie, Roger)
- Moss, Stephen William, GEOL**, Volcanology of the A154N Kimberlite at Diavik: Implications for Eruption Dynamics, (Russell, Kelly)
- Poor Moghaddam, Peyman, GEOP**, Curvelet-based Migration Amplitude Recovery, (Herrmann, Felix)
- Wallier, Stefan, GEOL**, The Geology and Evolution of the Manantial Espejo Epithermal Silver (gold) deposit, Deseado Massif, Argentina, (Tosdal, Richard)
- Wang, Caixia Sarah, OCGY**, Geophysical Observations of Nonlinear Internal Solitary-like Waves in the Strait of Georgia, (Pawlowicz, Rich)
- Wilson, Siobhan Alexandra, GEOL**, Mineral traps for greenhouse Gases in Mine Failings: A Protocol for verifying and Quantifying CO₂ Sequestration in Ultramafic Mines, (Dipple, Greg/Raudsepp, Mati)

(ii) M.A.Sc.

- Conlan, Michael Joseph William, GEOE**, Attenuation Mechanisms for Molybdenum in Neutral Rock Damage, (Mayer, Ulrich),
- Ma, Denny, MENG, GEOE**, Non-Thesis

(iii) M.Sc.

- Alhashim, Fadhel Abbas, GEOP**, Seismic Data Processing with the Parallel Windowed Curvelet Transform, (Herrmann, Felix)
- Bay, Daniel S, GEOL**, Hydrological and Hydrogeochemical Characteristics of Neutral Drainage from a Waste Rock Test Pile, (Mayer, Ulrich)
- DeGiuli, Eric, GEOP**, Turbulent Flows in Geophysical Channels, (Clarke, Gary/Schoof, Christen)
- Dockrey, John William, GEOL**, Geochemistry and Microbiology of Neutral pH Waste Rock from the Antamina Mine, Peru, (Mayer, Ulrich)
- Dohaney, Jacqueline Anne Marie, GEOL**, Distribution of the Chilicotin Group Basalts, British Columbia, (Russell, Kelly)
- Hopkin, Emily Kathryn, GEOL**, Late Carnian (late Triassic) Conodont and Ammonoid Palaeontology of Wrangellia, (Smith, Paul)
- Izumi, Ryusuke, OCGY**, Assessing the "Ballast" Hypothesis for Carbon Transport in the Ocean: Global Sediment Trap Data Analysis and Simulation in an Earth System Model, (Tortell, Phillippe)
- Jones, Katherine Lauren, GEOL**, Using Atmospheric Noble Gases and SF₆ as Indicators for Transport and Reaction Processes in Hydrocarbon Contaminated Sediments, (Mayer, Ulrich)
- Kumar, Vishal, GEOP**, Incoherent Noise Suppression and Deconvolution Using Curvelet-Domain Sparsity, (Herrmann Felix and Clowes, Ron)

MacNeil, Kenneth Daniel, GEOL, The Timing and Structural Evolution of the Donlin Creek Gold Deposit, Southwest Alaska, (Tosdal, Richard)
McKinnon, Mika Erin Isabel, GEOP, Landslide runout: statistical analysis of physical characteristics and model parameters, (Hungar, Oldrich-Eberhardt, Erik)

Provost, Heather, GEOL, Non-Thesis, (Mayer, Ulrich)
Schaeffer, Andrew John, GEOP, Nature of a Low-velocity Zone Atop the Transition Zone in North-western Canada, (Bostock, Michael)



Alumni Feedback



Feedback - Reminder: We mail this newsletter to over 2,000 recipients, and we would really like to hear how YOU are doing.

R. Anthony Hodge, B.A.Sc., 1972, M.A.Sc., 1976

Now serving as President of the International Council on Mining and Metals. ICMM is a collaborative of 19 of the largest mining companies in the world. The primary goal is to improve performance on all aspects related to sustainability.



*You never write, e-mail, fax, tweet...
We miss you!
What's been happening?
We want to know, really!*

KEEP IN TOUCH

Enjoy keeping up with friends and classmates in the Alumni News section? Why not return the favour - drop us a line. Please fill in your current address below even if the Newsletter was correctly addressed - it helps us maintain our records, or email us at **alumni-contact@eos.ubc.ca** . Also visit the Earth & Ocean Sciences website at **www.eos.ubc.ca** . Please do not provide any information that you would not want published in the next Alumni Newsletter.

PLEASE PRINT

Name: _____

UBC Degree: _____ Graduation Date: _____

Address: _____

Telephone: _____ Fax _____

Email Address: _____

Has the above changed since last year?

Yes

No

What's new with you?

Married?

New job?

Back in school?

Take a trip?

Promoted?

See a classmate?

Retired?

New Baby?

Other?

Thanks for your response

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