



ALUMNI NEWSLETTER

Number 12 (2009)

Message from the Head



Paul L. Smith,
Earth and Ocean Sciences
Head (2000-2009)

Farewell Message from the Head

As my second and final term as Head of EOS comes to a close, I am astounded to look back at the changes that have occurred over the last 9 years. In 2000, we were just beginning to overcome the significant challenges posed by the merger of atmospheric science, oceanography, geological sciences and geophysics to form EOS. We needed to put these difficulties behind us and seize upon the opportunities created by our new size and breadth. We had certainly become a heavyweight department on campus but our growth from merger was about to be exceeded by growth from success. Graduate enrollments had been on a downward trend, decreasing from 131 in 2000 to 117 in 2002, but we turned this around. This year we have 169 graduate students, more than half of whom are from Canada with the rest coming from 29 different countries, a measure of our growing international research stature. The number of undergraduate students taking our courses rose from 3,371 in 2000 to 5,872 this year while the number of students enrolled in our undergraduate programs increased from 222 to 366 over the same interval. At the same time there had been a staggering turnover of Faculty with 23 people hired and 3 more transferred full-time into EOS from elsewhere at UBC. Our research footprint increased substantially as we developed shared analytical and experimental research facilities. New collaborative research groups also began to spring up. The Centre for Experimental Study of the Lithosphere; the Pacific Centre for Isotopic and Geochemical Research (PCIGR); the Geophysical Disaster Computation Fluid Dynamics Centre; the Seismic Laboratory for Imaging and Modeling; The Environmental Earth Sciences Facility are all examples of new initiatives since the turn of the millennium. The Mineral Deposits Research Unit (see p. 10); the UBC Geophysical Inversion Facility; and the Electron Microbeam and X-Ray Diffraction Facility are examples of long established units that have flourished dramatically in recent years. This impressive increase in activity and personnel was imposing significant strains on our scattered and aging infrastructure. Where to house people and where to put new equipment were constantly looming questions for those of us mired in administration.

Last year I was delighted to be able to tell you that, under the leadership of Ross Beaty, we raised more than \$20 million from the private sector towards the cost of an Earth Systems Science Building. Now there is more good news. At a ceremony in the Pacific Museum of the Earth on April 7th, Premier Gordon Campbell announced that the Provincial government will contribute \$37.5 million towards our new building (see p. 4). While there is still a funding shortfall, the University has given the green light and construction will begin in 2010 with occupation expected in early 2012. This means that, at last, we will have our own lecture theatres and large meeting rooms. The days of nomadic instructors lugging equipment and specimens through the rain in search of adequate teaching space will soon be over. It will also mean that we can capitalize on new research opportunities requiring more space for equipment and personnel. This is none too soon because our talented Faculty are moving from success to success. By way of example, the Western Economic Diversification fund has awarded us \$1.2 million for a Sustainable Mineral Exploration Resource Centre, which will support a visualization centre, a field support unit, and an environmental sciences experimental facility (see p. 5). Most recently we heard that PCIGR is to receive in excess of \$7 million for a Nu mass spectrometer, weighing several tonnes, which will be unique in Canada. We are also on the brink of securing an Industrial Research Chair in support of exploration geophysics.

As you can tell, I am fiercely proud of this Department and all its students, past and present. I would like to thank everyone in EOS who has supported me as Head over the years, particularly the senior administrators Dave Shorthouse (now at the Dean's office) and Paul de Leon; my secretary, Deborah Varley; and all the members of the Head's Advisory Committees. I am also very grateful for the support that the community has given to the Department and to me personally.

It has been a traumatic year for the world's economy but the need for natural resources, hydrocarbons, new sources of energy, and environmental stewardship is increasing not diminishing. As of July 1st, Greg Dipple will be the new Head and I cannot think of a more capable pair of hands for steering the ship. EOS is ready for tomorrow.



Greg Dipple
Earth and Ocean Sciences
Incoming Head

Welcome Message from the Incoming Head

It is hard to imagine EOS without Paul Smith at the helm, and it is an honour for me in my first days as Head to acknowledge all that he has done for the department. EOS has experienced incredible growth and success over the past nine years. These achievements reflect the sustained hard work of many students, staff and faculty, but none have worked as diligently and selflessly as Paul. The first decade of the 21st century will almost certainly go down as the formative years of EOS, now recognized as the largest, most diverse, and most productive Earth Science department in Canada. On behalf of everyone, I would like to thank Paul for his vision and leadership during this time. Paul is, in his own words, “neither dead nor retired” but is enjoying a well-deserved administrative leave. He will be back on the teaching and research “front-lines” next year.

The pace of change and growth in EOS will not slow in the coming years. Thanks to the incredible support of the mineral exploration industry, the Province of B.C. and the University, we are in the thick of planning the new Earth Systems Science Building and anticipate occupation in 2012. For the first time in its history, EOS will be located within a single complex consisting of the ESSB, EOS-Main, and EOS-South buildings. The new complex is an opportunity for us to re-organize and expand our core operations and to take full advantage of the new research and teaching linkages that have developed across the earth, ocean, and atmospheric sciences. In anticipation of an eventual easing of budgetary constraints, we will also be focused in the coming year on defining a new hiring plan to chart the future growth of the Department.

During the construction of the Earth Systems Science Building, much of EOS will be spread across campus in temporary accommodations. If you are visiting campus, which I encourage you to do, please be sure to check the EOS website (www.eos.ubc.ca) for information on where to locate people and labs. The departmental main office will remain on the first floor of the EOS Main building (6339 Stores Rd.), as will the Head’s office. If you are visiting, please drop by to say hello or introduce yourself. I can also be reached by email (head@eos.ubc.ca) or phone (604 822-4107).

Table of Contents

ESSB BUILDING FUNDED

Earth Systems Science Building.....	4
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OTHER FUNDING ANNOUNCEMENTS

PCIGR.....	5
Western Economic Diversification	5

Highlights

Goldschmidt 2008.....	6
Pacific Museum of the Earth.....	8
Earth and Ocean Sciences Clicks in the Classroom.....	9
Mineral Deposit Research Unit.....	11
Environmental Sciences Program	13
♦ Tara Ivanochko, New ENSC Instructor	
♦ Environmental Science Students Society (ESSA)	
Michael Bostock.....	15

In Memoriam

Glenn Everett Rouse	16
William Maxwell Cameron	17

Awards and Honours in EOS.....	19
--------------------------------	----

Student News

G.M. Dawson Club	18
Enrollments.....	20
Theses	21

Alumni Feedback.....	23
----------------------	----

Keep in Touch Form	25
--------------------------	----

Donation Form	26
---------------------	----

Earth Systems Science Building Announced!



Premier Gordon Campbell (centre) joins (from left to right) UBC president Stephen Toope, Science dean Simon Peacock, EOS master's student Ayesha Ahmed UBC chancellor Sarah Morgan- Silvester and Minister of Advanced Education and Labour Market Development Murray Coell at the Pacific Museum of the Earth.

The Province of British Columbia has invested \$37.5 million toward UBC Science's future Earth Systems Science Building, a state-of-the-art new home for the Department of Earth & Ocean Sciences.

"This investment will help ensure BC's continued leadership in the international mineral exploration industry and strengthen research into sustainable mining practices and climate change," said Premier Gordon Campbell at the announcement ceremony in UBC's Pacific Museum of the Earth on April 6.

"EOS has certainly outgrown its 35-year old facilities," noted dean of Science Simon Peacock. "The new facility will not only benefit the students and researchers who learn and work here, but also help BC's mineral exploration and mining industry meet increasing demand for trained geologists and geoscientists."

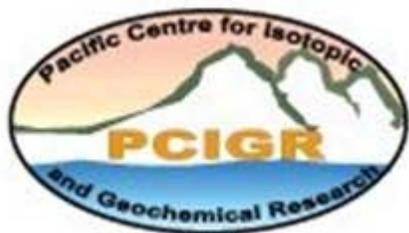
The Province is providing \$37.5 million toward the new \$75-million facility, which will feature high-tech research and teaching labs, classrooms, a lecture theatre complex, seminar rooms, quiet study spaces and common areas. The balance of the funding will be provided by unprecedented support from the minerals industry, UBC and other sources.

"We're grateful to both the provincial government and to our industry partners for their tremendous vision in supporting our students," added Peacock. "UBC's earth science graduates are already held in high regard and have helped make Vancouver an international hub for mineral exploration. This expanded facility will only enhance that reputation and the department's partnership with industry." The building will meet the growing educational needs of 360 major and honours students, 170 graduate students and more than 6,400 undergraduates enrolled in earth science courses at UBC.

OTHER FUNDING ANNOUNCEMENTS

PCIGR Triumph

Congratulations to Dominique Weis and the PCIGR team on being awarded a very large CFI grant for new equipment and support. Here are some of the postings:



The PCIGR proposal led by D. Weis, CRC and professor in EOS, to the Leading Edge Fund (LEF) of the Canada Foundation for Innovation (CFI) was approved for full-funding. PCIGR will receive almost \$3 million to expand and update its geochemical analytical equipment, centred around the purchase of a Nu 1700, a large geometry high-resolution multi-collector plasma mass spectrometer, unique in Canada. The results of a proposal for matching funds from BC-KDF are pending, which together with the in-kind contributions will represent a total investment of ~\$7.5 million.

Money is also being provided for operational funds. This is all exceptionally good news that will push EOS even further to the forefront of geochemical research. It will also help justify and complement the large investment in our new building recently made by the Provincial government.



WESTERN ECONOMIC DIVERSIFICATION FUND

Sustainable Mineral Exploration Research Centre Gets Nearly \$1M Funding For Start-Up

A smart mineral exploration and mining research centre being established within the department of Earth and Ocean Sciences has received start-up funding of \$960,000 from the federal government.

The funding is intended to help strengthen research and industry collaborations and help maintain Canada's global leadership in environmentally responsible mineral exploration and mining, and address pending industry and academic labour shortages.

The new Centre for Environmental Change and Planetary Stewardship will house three inter-related research facilities.

- an environmental interface laboratory to investigate and mitigate industrial impacts on the environment;
- a visualization facility to conduct three-dimensional modelling for mineral exploration and mining research; and
- a field support facility to improve and enhance field-based mineral exploration research and training.

The university says it plans to purchase and install computer hardware and software, scientific analytic instrumentation, and other required equipment for the three new facilities.

"The funding ... will enable the department to build on its strong partnerships with the minerals exploration community, and to expand our work in training the next generation of industry leaders," said Don Brooks, UBC Associate Vice-President Research.



The 18th Annual V.M. Goldschmidt Conference took place at the University of British Columbia, Vancouver, Canada, July 13 - 18, 2008. It was the first Goldschmidt conference held in Canada, and the largest ever in North America. More than 2000 participants from 47 countries made the trip to Vancouver. Student participation was impressive; 488 students represented nearly one quarter of the total number of participants.



The International Program Committee (Chairs: R. Carlson, B. Sherwood-Lollar, D. Weis) crafted a stimulating scientific program, covering the breadth of research interests from "Sea to Sky", with 120 symposia which led to 1211 oral (15 concurrent sessions) and 991 poster presentations.



Beer attracted good attendance to the SRC during the poster sessions

Award ceremonies were distributed over three days, just after the plenary lectures, and included the presentation of the Goldschmidt Medal to Francis Albarède, the Dana Medal to Thomas Armbrust and the Shackleton Medal to Larry Edwards



Goldschmidt Medal winner Francis Albarède with Marty Goldhaber and Marc Chaussidon

The conference began with a well-attended welcome party under the tent and in the surrounding lawn of MacInnes field. Discussions were instantaneously lively, as participants were happy to see their friends and colleagues.



The Museum of Anthropology provided a stunning backdrop for the conference BBQ



Participants enjoyed the refreshments at the Opening Reception

Wednesday evening, the conference barbeque was held behind the Museum of Anthropology; it was a magical setting, highlighted with great food (a salmon barbeque). The space was filled to capacity with 1200 people, including many students. The Paperboys, a local folk music group, performed in the later part of the evening and closed the night on a cheerful note.

On Friday evening, a dinner cruise was organized (Harbour Cruises). The dinner was well attended on a boat that cruised in the beautiful Vancouver Harbour and surrounding environment.



Canada Place and downtown Vancouver



Sunset over Georgia Strait

The organizers of Goldschmidt2008 wanted to encourage student involvement. The student travel support program had a total of ~\$80,000 CAD generously contributed by NSF, GS, the conference itself, MAC, EAG, ESF, and GSJ. The program was very effective and provided a great incentive for students. Out of about 130 applications, 70 students and 10 low-income country researchers from 20 countries were selected.



Student helpers gearing up for on-site registration

46 student helpers from the universities of British Columbia, Simon Fraser and Victoria as well as of Porto and ENS Lyon did an amazing job at ensuring that all oral presentations ran smoothly. At the end of the conference, the 20 purchased Mac computers were given away to these students.

Rising excitement and noise during the computer draw

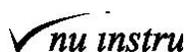


Wrangellia Flood Basalt field trip participants
At Myra Falls on Vancouver Island

Participants benefited from a number of short-courses as well as 3 professional development workshops organized on the free Wednesday afternoon. 5 field trips to various interesting nearby geological locations were also held before and after the conference.

Ecological, social and economic factors entered strongly into the planning and execution of the conference. All conference and delegate items were made of recycled (notepads, pens, bags, lanyards, beverage cups, etc.), recyclable (program volume) or eco-friendly (USB drive) materials; they were designed to be reusable for other purposes, and as much as possible were locally produced.

The conference benefited from the sponsoring of 4 analytical companies (Nu Instruments, Thermo Fisher Scientific, IsotopX and Savillex) as well as from 29 exhibitors (22 commercial and 7 scientific societies).



- Dominique Weis and Diane Hanano for the Local Organizing Committee and Cambridge Publications



Delegates interacting with exhibitors in the SRC

For a full report on Goldschmidt 2008, check out the Geochemical News online at [www. geochemsoc.org](http://www.geochemsoc.org)

PACIFIC MUSEUM OF THE EARTH



Explore Your Planet 2008. Kids enjoy the fluid dynamics demonstrations.

It has been a busy year for the Pacific Museum of the Earth!

In addition to bringing existing infrastructure and display projects towards completion, the Museum Committee is proud to have won grants from NSERC, the Faculty of Science, and the Canadian Geoscience Foundation to support new projects.

Last summer at the Pacific Museum of the Earth was dominated by record numbers of tour groups and by laying the groundwork for fall projects. Thanks to the support of Young Canada Works, we were able to hire an intern to recatalog our paleontology collection. This process, now virtually complete, will make it possible for new research to be done on these collections, as well as expanding our resources for paleontology teaching and display. Many spectacular fossils were rediscovered in the process of cataloging; we look forward to bringing them back into use! On the public front, the late summer brought us *Precious*, a temporary display of rare and spectacular gemstones loaned to the museum by one of our members.

We kicked off the fall term with our annual open house: Explore Your Planet! In our second year our open house grew by fifty percent, drawing a couple hundred new visitors to the museum and bringing geology, oceanography, and atmospheric science to life for kids, their families, and many life-long learners. The demonstration room was definitely the highlight of the open house, featuring fluid dynamics experiments, meteorite impact simulations, shaking tables, a seismometer that read the impact of your footsteps, and miniature fossil digs. Tours and rock, mineral, and fossil identifications were also well attended.

Shortly after Explore Your Planet we also hosted Mineral Mayhem, a sale and small series of talks featuring Rob Belcher and the Aesthetics Underground. Attendance was moderate but something we hope to build on and brought many new visitors to the Museum.

The new year began with two major points of excitement: the acquisition of new gemstones for the "Vault" display and the news that our application for funding from the NSERC PromoScience program had been approved! The new gemstones are now on display and include a large citrine and a sapphire, among others, all of them protected by improved Vault security. The PromoScience funding will support the hiring of an outreach consultant who will help run a K-7 Teacher Training workshop and who will revamp and update our programming to draw increased bookings. Thanks to grant support from the Canadian Geological Foundation, we will also be able to provide teachers with mineral kits and weather gauges, among other tools, to take back to their classrooms and enhance their Earth sciences teaching in the classroom.

Also underway, with the support of a Faculty of Science Outreach Grant, is an update and expansion of the Weather Alley display area. The Weather Forecasts screen is being replaced and we are adding two new displays: an interactive, touch-screen presentation and a green screen area that will allow museum visitors to become TV meteorologists--if only for a moment!

But as exciting as these new programs are, we are most enthusiastic about our new volunteer program. While we have always sought and welcomed volunteers at the Pacific Museum of the Earth, it was a very casual system. If you asked to help, I'd find a task for you. This year we decided if we wanted to expand, we needed to get organized! One of the museum's former volunteers stepped up to become our Volunteer Coordinator and led the charge in designing a formal program. New volunteers benefit from an official orientation, track their hours for references and recognition, and can choose which of several defined task groups they would like to volunteer in, from tour guiding to display maintenance to shop staffing, and more.

We hope all of you will visit us in the upcoming year; we have a lot to share with you!

~Mackenzie Parker, Curator

Active Engagement Enriches the Learning Experience

Earth & Ocean Sciences Clicks in the Classroom



Photo: Daryl Smit



Photo: Martin Dee

The Carl Wieman Science Education Initiative and a curriculum review in the Department of Earth & Ocean Sciences affect the learning experience of thousands of students through interactive tools and innovative teaching approaches.

When **Sara Harris** and **Roger François**, two oceanographers in the Department of Earth & Ocean Sciences (EOS), co-taught a first-year course for non-science students last term, it was the first time François used "clickers" in the classroom. A research scientist, he only began teaching large survey courses when he joined UBC four years ago.

Clickers are remote control-like devices that allow students in the classroom to anonymously answer multiple-choice questions at the click of a button. The results can be tallied and shown to the students immediately.

"The obvious and basic use of the clickers is as a quiz tool," says Harris, who has used this personal response system since 2006. "But when you pose thoughtful questions, they become a powerful facilitator of discussions." Harris, who says using the device was a learning experience for her too, has been working with the Carl Wieman Science Education Initiative (CWSEI) to incorporate clickers and other innovative teaching methods into EOS courses.

Recent surveys show that students are finding the clicker exercises challenging—they provoke students to discuss material both before and after they register an answer. François, a professor and the Canada Research Chair in Marine Geochemistry, notes, "There is definitely more interaction among the students and with me compared to before. Essentially, you see students becoming more interested and more involved." In fact, he says, he often gets bombarded with questions after class by students invigorated by the discussions. "You feel that you're doing a better job. It's gratifying."

"I think it's very inspiring when students collectively have this 'ah-ha' moment," says Harris. "As an instructor, I often work with individual students who come to my office confused. We'll go through a concept together and when they get it, it's great. But that's one student—when it happens with most students in the class, it's so much more satisfying." This infectious sense of satisfaction may be why 62 percent of tenure-track EOS faculty members are currently engaged in some form of pedagogical reform, according to recent statistics compiled by **Brett Gilley** and **Francis Jones**, two of the four CWSEI Science Teaching and Learning Fellows (STLFs) working in EOS.

"Faculty members are involved either as lead instructors in one of 12 currently targeted courses, as members of corresponding workgroups or by receiving specific support from the STLFs," says Jones. "We estimate that out of the more than 6,200 students who enrolled in EOS courses last year, 70 percent were affected by these efforts." STLF **Erin Lane**, for instance, has been providing support to François's class by carefully measuring the degree to which students are paying attention and participating and by documenting what types of teaching activities achieve the most engagement. Her feedback has allowed François to fine-tune his teaching approach.

In addition to activities supported by CWSEI, EOS was the first of the nine Science departments to receive funding for a five-year transformative plan. The department is also undergoing a curriculum review to ensure that its eleven bachelor degree streams are made up of courses that progress logically and meet the needs of the students. "At the best of times, curriculum reform is like pushing water uphill with a garden rake," says EOS department head, **Paul Smith**. "This is because it takes considerable time and energy, both of which are in short supply in the busy lives of faculty. The combined efforts of CWSEI and the universal curriculum review, however, have contributed to a high level of enthusiasm within the department."

Professor and air pollution meteorologist **Douw Steyn** teaches second- and third year courses in the environmental science program and uses a variety of activities to keep his students deeply engaged. "As instructors, our role is to facilitate student learning rather than capturing them by way of lecturing or making them read a particular set of texts for a course," says Steyn. "And we've got to instill in them a sense of responsibility for their own learning."

One deeply engaging activity Steyn employs is having his students conduct a mock town hall meeting on topical environmental issues, such as fish farming. Students explore different perspectives on the issue through role playing: as scientists they present findings on the environmental impact; as government officials they promote economic growth; or as journalists they cover the meetings. “The students have to research not only the technical side of fish farming, but all of the opposing and proposing views,” says Steyn. “Then they have to communicate it.”

What the CWSEI has added to this teaching style, says Steyn, is the scientific investigation of the impact different approaches have on student learning. With the help of STLFs, the department is evaluating student understanding of key concepts, participation in class and overall attitude towards their field of study. Evaluations are done before and after specific courses or modules within a course.

As for François, he is now co-teaching the course he shared with Harris with another instructor who, in turn, is using clickers for the first time.

For more information on the EOSeducation initiatives, visit www.eos.ubc.ca/research/cwsei.

*Source: Synergy > Journal of UBC Science, Issue 1/2009
science.ubc.ca/research/synergy
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Science Teaching and Learning Fellows

Many Science departments have hired Science Teaching and Learning Fellows (STLFs) who work closely with the CWSEI. Combining an expertise in a specific discipline with knowledge of relevant science education methodology, the STLFs assist the departments to implement sustainable educational improvements. They help faculty members with introducing new teaching tools and assess the effect of new approaches on the students' learning. STLFs are also establishing and maintaining a web-based resource of the educational materials developed and tested in courses, along with assessment results. Currently, the Faculty of Science has eleven STLFs supporting department efforts to advance our students' learning experience. The most recent appointment is Joshua Caulkins in the Department of Earth & Ocean Sciences.

The CWSEI is a \$12 million initiative headed by Nobel Laureate and physics professor Carl Wieman and aimed at systematically advancing and scientifically measuring the effectiveness of undergraduate science education at UBC. www.cwsei.ubc.ca



MINERAL DEPOSIT RESEARCH UNIT (MDRU)

MDRU Celebrates 20 Years!



Dick Tosdal and Kevin Byrne chatting about structural deformation, or maybe "the one that got away". Photo taken by Danette Schwab

Although much has changed in the world and at UBC since those first few tentative steps in 1989, the core principles and mission of MDRU remain rock solid: to conduct mineral deposit research of the highest caliber;

to solve exploration problems; to prepare the next generation of highly-trained geoscientists; and to provide professional development for the geoscience community.

To date, more than 50 projects have been formulated, funded, completed, or are currently underway, allowing 68 MSc and PhD students (and numerous undergraduate honours students) to complete advanced research degrees. In addition, several thousand professional geologists have been educated at the 53 short courses, and the numerous technical presentations that have been offered over the years.

MDRU's accomplishments have been recognized. In 2007, MDRU was awarded the *Leo Derikx Synergy Award* from NSERC in recognition of outstanding achievements in industry-university collaborations and as Canada's most innovative collaborative research group. In 2008, a *Special Tribute Award* was presented by the Association for Mineral Exploration British Columbia in recognition of the many years of collaborative research with the minerals industry and the training of geoscientists through graduate and postdoctoral research. And in 2009, the Society of Economic Geologists presented Director Dr. Richard Tosdal with the *Thayer Lindsley Visiting Lecturer* distinction.

Last year (2008) was Richard Tosdal's final year as Director, as he wrapped up the final of his nearly 10 years at the helm, graduating 10 students! Dick has moved on to new challenges but will remain active in MDRU as an Adjunct Professor and continues as Project Leader on the Porphyry Footprints project, and special advisor. Dick has facilitated MDRU's continuing expertise across many disciplines and developed MDRU's strengths in regional framework studies, porphyry systems, geochronology, far-field alteration, and geophysical inversions. Dick was also responsible for the globalization of MDRU with projects on every continent. Thanks for everything Dick!

Leading MDRU into its next 20 years will be Dr. Craig Hart. "We are pleased to appoint Craig as the new Director of MDRU," said Ian Graham, Chair of the MDRU Board of Directors, in announcing the appointment. "On behalf of the Board, we welcome Craig back to Canada, and look forward

to working with him to continue the research and training excellence that has been established at MDRU through the previous Directors", he added.

Dr. Hart was previously a Senior Research Fellow at the Centre for Exploration Targeting at the University of Western Australia in Perth, Australia where he was working extensively on gold metallogeny of East Asia and prospectivity analysis. Prior to that posting, he worked with the Yukon Geological Survey as a regional mapper and on the Tintina Gold Province in the Yukon and Alaska. He completed his PhD at the University of Western Australia in 2004. Craig is well known to the Canadian geoscience community, and is a UBC graduate (MSc 1995).

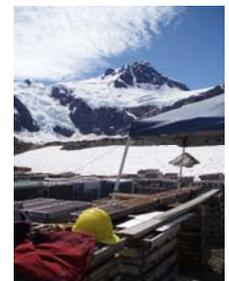
What directions will MDRU go to in the future? What are the next set of challenges?

Clearly the current economic climate and continuing industry consolidation are issues that adversely affect MDRU's operations, and have led towards development of a larger number of smaller projects. The technical directions remain directed by the MDRU corporate members to address the current priorities of the mineral exploration community. In addition, MDRU's Board of Directors and Research Generative Group provide critical input. Future research directions will focus on bridging discipline gaps that have the potential to develop technological breakouts, such as integrating geology with geophysical inversion to generate highly-constrained deposit models that provide testable exploration targets. The second direction will address constraints of the "where" of deposit formation, across all scales, to enhance predictive targeting and increase exploration success.

MDRU currently maintains a diverse roster of projects that include innovative approaches towards understanding kimberlite volcanology and diamond grades, CO₂ sequestration in mine tailings, thermal aureoles of Carlin systems, and far-field porphyry alteration footprints. We have current or recently completed projects in Peru, Chile, Tibet, China, Mongolia, Pakistan, Turkey, Argentina, Alaska, and Australia, as well as throughout Canada and western US. MDRU has top researchers with five Research Associates and Post-Doctoral Fellows, and the best students in economic geology continue to be attracted to MDRU. There are 26 active graduate students and a stack of high-quality graduate student candidates awaiting the right project opportunity.

MDRU started as an experiment, has flourished through adolescence, and has matured to this 20th anniversary milestone moment. There are still challenges ahead, but whatever directions are taken, the fundamental rock solid principles that guide the research unit will be maintained.

Photo taken by Janina Micko showing her self-build core logging station in the Galore Creek core graveyard with the Galore Creek glacier in the background.





Craig Hart was appointed **director of UBC’s Mineral Deposit Research Unit (MDRU)** and grant-tenured associate professor in the Department of Earth & Ocean Sciences January 1, 2009. UBC alumnus Hart returned to UBC from the University of Western Australia (Perth). He completed his PhD at the University of Western Australia

(2004) working on the Tintina Gold Belt in the Yukon and Alaska, research he began as a geologist for the Yukon Geological Survey. Hart succeeds Richard Tosdal, who spent nine years at the helm of MDRU. www.mdru.ubc.ca

Bright Young Minds – ‘Rock’ Star Janina Micko



Logging 750-metre-long core samples in the remote BC wilderness might not be your typical summer job, but for Janina Micko, the rocky terrain of Galore Creek warranted two trips.

Micko—an award-winning PhD candidate with UBC’s Mineral Deposit Research Unit (MDRU)—has spent two summers in remote northwestern British Columbia (BC) working with research collaborators and industry partners to explore the area’s major precious mineral deposits.

“Overall it’s been a fantastic experience,” says Micko, now back at UBC and reviewing the data resulting from the field work. “Taking part in the project has exposed me to real-world exploration, and in particular, to all the economic and feasibility considerations that go in to work on the ground.”

Discovered in the mid-1950s, the Galore Creek Valley site is one of the world’s best examples of a particular type of alkalic porphyry deposit: deposits that promise high yields of copper, silver and gold, and may produce less acid run-off when mined. Due to its high acid-buffering potential and low total sulphide content, mining this deposit is expected to be more environmentally friendly than other types of ore deposits. However, the deposit model isn’t well understood yet, something this project—a collaboration between the MDRU and the University of Tasmania’s Centre for Ore Deposit Research—is trying to rectify.

Micko is linking the results of the geochemical analysis of the core samples with deposit-scale geological features on the surface, trying to paint a clearer picture of the deposit. “It’s a project that could increase our understanding of how these deposits form, and also have implications for how we explore similar deposits in BC and around the world,” says

Micko’s co-supervisor, **Greg Dipple**, a professor with the Department of Earth & Ocean Sciences and MDRU.

Micko is now wrapping up her PhD thesis and weighing her options. “A post-doc has its appeal, but now having some exposure and understanding of industry processes has also opened my eyes to some of those possibilities.” **Richard Tosdal**, former director of the MDRU and Micko’s other co-supervisor on the project, notes: “MDRU students work closely with industry geoscientists, and many go on to employment with the sponsoring company. At the same time, students are able to take a longer-term look at some of the data and produce results that are useful for their scientific research, as well as for the company.” In addition to her experience in the field, Micko has also benefited from a variety of academic awards, including recognition from Geoscience BC, the Society of Economic Geologists Canada, Shell, and the Universitas 21 network. The MDRU-CODES Alkalic Mineral Deposit project is supported by Geoscience BC and industry partners, including NovaGold Resources Incorporated and Teck Resources Limited. www.mdru.ubc.ca



Award-winning PhD candidate Janina Micko worked with industry geoscientists to explore one of North America’s largest undeveloped porphyry copper-gold-silver deposits.

« SYNERGY 1 | 2009



ENVIRONMENTAL SCIENCES PROGRAM



Dr. Douw Steyn, Director Environmental Sciences Program, Professor, Earth and Ocean Sciences

During the 2006/2007 academic year, the undergraduate Environmental Science Program (ENSC) was moved to EOS after many years as a program offered centrally through the Faculty of Science. We took over teaching the program in 2007/2008, with Douw Steyn and Sara Harris teaching ENVR 200, and Douw Steyn and Kai Chan (of the Institute for Resources, Environment and Sustainability) teaching ENVR 300, and Kristin Oriens and Lesley Evans-Ogden teaching ENVR 449. At that stage, these three courses provided the core of ENSC. Since then, the department has appointed Mark Johnson (shared appointment with the Institute for Resources, Environment and Sustainability) and Tara Ivanochko (see accompanying article) who provide additional EOS teaching effort in ENSC.

ENSC has seen steady growth since being offered out of EOS. 30 new students were offered entry for the 2009/2010, and 26 students graduated at the convocation in May 2009. The program presently has a total of 86 students in all years.

A notable development has been the formation of the Environmental Science Students Society (ESSA – see accompanying article). ESSA has been an important focus for students in ENSC, and has been enormously active since initiation a mere two years ago.

Now that ENSC has been established in EOS, and taught for two years, we have begun a much-needed curriculum review. The review is designed to strengthen the program and develop a new coherence to the various options available to majors and honours students. The revised curriculum will be passed through the various university committees for full implementation in 2010.



Tara Ivanochko and Steve Calvert, Professor Emeritus, Earth and Ocean Sciences, on the dock at Bamfield Marine Station, on Vancouver Island, preparing to go to sea.

WELCOME TO TARA IVANOCHKO, OUR NEW ENVIRONMENTAL SCIENCES INSTRUCTOR

Well, I have finally landed my dream job: one that combines my research interests, my fascination with political processes and policy development, my love of farming and local foods and my desire to teach people about all of these things. And it is here in Vancouver, where I have always wanted to stay.

I first came to UBC en route from Memorial University in NFLD, with a brief stop over at the University of Regina. It was the UBC undergraduate oceanography program that hooked me. The professors were inspiring, my classmates were fun, the subject matter was global, and we got to go out on boats. I could not have asked for much more. My first years here were intense. I did an honours degree, while also sitting on the executive of the AMS and the UBC Board of Governors. For the last year of my undergraduate degree, I lived on a small and barely seaworthy 26ft sailboat (a Thunderbird) with a teak deck. I loved it, although some of my old friends remind me that I couch surfed and crashed with friends more than half the time.

I first went to sea in 1997, to Station Papa in the North Pacific, and considered pursuing a career as a sea going technician. But after working as a field assistant in Saskatchewan (in tick season) and two more trips to Papa, I sold my boat, went traveling in Eastern Europe and Turkey and then returned to UBC to do an MSc in marine geochemistry. I got involved with science education through *Let's Talk Science*, and initiated *Science 101*, a program designed to break down barriers to postsecondary education.

My PhD took me to Scotland. Rather ironically, given my new northern latitude, I focused on the tropics, reconstructing variations in the strength of the Indian monsoon over the last 90,000 years. Though I have not yet made it to the Arabian Sea or experienced a monsoon, I have joined a couple of research cruises to the tropics, including a passage through the Panama Canal. And, after crossing the equator on the *RV Melville*, I am no longer a “polywog” (I can’t say any more about it than that). In 2005, I was overjoyed to be able to come back to UBC as a postdoctoral researcher. I continued to investigate the climate system relationships between the tropics and the North Pacific region and I am grateful to Tom Pedersen for supporting my work here at UBC even though he is now housed at UVic. Working with Tom and Steve Calvert has been a real pleasure for me.

Returning to BC has rekindled my extracurricular activities. I now am involved with Community Supported Agriculture, Community Supported Fisheries and local community gardens.

But now I have a new challenge. In January I was given the opportunity to participate in a review of UBC’s Environmental Science curriculum. This process has led to some innovative ideas and I anticipate that the revised curriculum will provide many new opportunities for UBC students. I have also begun to teach in the Environmental Science program. As an instructor, I hope to inspire our students to delve deeply into tough subjects, to develop interdisciplinary approaches to complex environmental problems and to appreciate the strengths of the scientific method.

UBC’s mission statement concludes, “[UBC graduates] will acknowledge their obligations as global citizens, and strive to secure a sustainable and equitable future for all”. I take this statement seriously. If any program can achieve this mission, the Environmental Science program can. This is now my new goal.

Environmental Science Students Society (ESSA)



From Left to Right: Joseph Lai, Allison Thompson, Olive Ojala, Justin Lau, Brian Sullivan (Vice-president, Students), accepting the Helen MacRae Award. This award is granted to recognize a service for students provided by the AMS, GSS, or UBC in honour of her commitment and contributions to community.

The students (and their roles on the executive) are:

President: Elisa Hsieh
Director of Events: Olive Ojala
Director of Fundraising: Joseph Lai
Director of Communications: Justin Lau

Director of Finances: Jessica MacDonald
Director of Administration: Bianca Corlett
Director of Promotions: Allison Thompson

ESSA has become the core of academic life for roughly 125 Environmental Science students currently in the program, just graduated, and accepted into the program since ESSA started, and also roughly 100 students from other programs who attend ENVR 200 and ENVR 300. They organize the usual round of social events, talks by professionals in their field, engagement in environmental organizations and groups (WCWC, IAIA....), but also study sessions focusing on core or difficult courses in their program. They have added the portfolio of 2nd, 3rd and 4th year representatives to their roster, and the 4th year representative has the particular role of helping students in their graduating year meet the rather complex program requirements. Through these activities, ESSA contributes substantially to quality of life and opportunities for many students

ESSA coordinated very effective student engagement in two important recent developments. They were fully engaged in our recent search for a faculty member. ESSA coordinated student attendance at the search seminars, attendance at student meetings with all interviewees, and a very insightful comparative analysis of candidates, and recommendation for the final appointment. More recently, ESSA has coordinated student attendance at meetings with students to inform the ENSC curriculum review presently underway. By their engagement in these two developments, ESSA has ensured that their degree program develops in a way that is informed directly by student experience. In all cases, attendance at the meetings was not only by ESSA executive, but by wide representation of students from the program. ESSA executive has also been active in attending (with faculty members) the Beyond First/Second Year events.

All of this has been achieved by ESSA in its first 14 months of existence. Their successes are almost entirely due to the energy, commitment and professionalism of the seven students who were the first ESSA executive. A new executive has been formed (by the required election), and not surprisingly consists of almost all the original members, with a few additions.

OVERPRESSURED FLUIDS AND EPISODIC TREMOR AND SLIP ON THE CASCADIA MEGATHRUST



Pascal Audet



Michael Bostock



Nik Christensen



Simon Peacock

Water and hydrous minerals play a key role in shaping subduction zones such as Cascadia on which we, as residents of southwestern B.C., go about our daily lives. Water serves to weaken the plate boundary thereby enabling both megathrust earthquakes and, more generally, plate tectonics to occur. UBC/EOS researchers (former PhD student Pascal Audet, Professor Michael Bostock, Honorary Professor Nik Christensen and Science Dean Simon Peacock) recently joined forces to better understand how water is distributed within the downgoing plate.

The researchers employed seismic waves generated by earthquakes around the globe to interrogate subduction zone structure beneath an array of seismometers located across Vancouver Island and the adjacent mainland. Their approach shares some similarity with techniques used to explore for hydrocarbons except that it relies on natural earthquakes rather than man-made explosions or vibroseis. The dominant signals in their analyses originate from the oceanic crust of the downgoing plate. By accurately measuring the traveltimes from different classes of waves scattered from the upper and lower boundaries of the oceanic crust, researchers are able to determine its Poisson's ratio.

Poisson's ratio is an elastic parameter familiar to engineers that measures the ratio of contraction (transverse strain normal to an applied load) to extension (axial strain in the direction of the load) for a given material. Most (dry) rocks are characterized by Poisson's ratios between 0.24 and 0.3; however, the presence of fluids in rocks especially at high pore pressures can dramatically increase this

quantity. Inviscid fluids, for example water, attain the upper limit for Poisson's ratio of 0.5

Audet and his colleagues noted that the subducting oceanic crust beneath Vancouver Island possesses extremely high Poisson's ratios of ~0.4 essentially requiring that it contain overpressured (ie near lithostatic) fluids. These fluids are generated through the dehydration of hydrous minerals as the plate descends and encounters higher temperatures and pressures. The fact that the fluids remain near lithostatic pore pressures implies that the plate boundary (or, equivalently, the top of oceanic crust) is impermeable. Further down dip, however, the situation changes. As the oceanic plate enters the mantle (below the Georgia Strait and Gulf Islands), the plate boundary becomes porous allowing fluids to enter the mantle wedge and alter it to the serpentine mineral antigorite (see figure below). Precisely why the permeability changes along dip is not clear but the distribution of fluids does seem to possess a relation with the recently discovered "episodic tremor and slip".

Episodic tremor and slip refers to motion on the plate boundary that occurs every 14 months or so beneath eastern Vancouver Island. The slip is equivalent to a magnitude 6.5 earthquake; however, no-one (aside from seismologists through their instruments) senses this movement because it occurs over a period of several weeks (as opposed to few seconds) and so does not generate regular seismic waves. The slip is accompanied by a curious tremor that bears similarity to signals that accompany the motion of magmas through volcanic conduits. The spatial coincidence of episodic-tremor-and-slip and changes in plate boundary permeability together with tremor signal suggestive of fluid motions implies an interrelation that scientists are now beginning to investigate. The matter is more than simply academic. A better understanding of the process of episodic tremor and slip will lead to improved estimates of the downdip extent of megathrust rupture and, accordingly, seismic hazard in southwestern British Columbia.

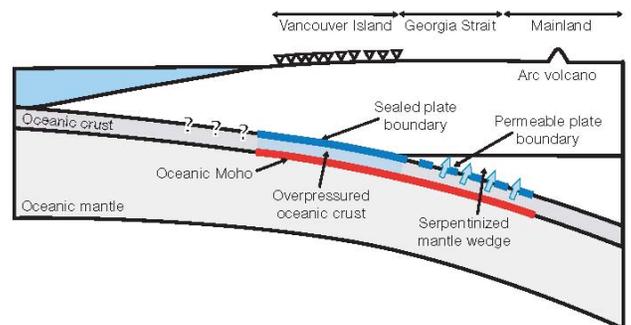


Figure caption: Schematic model of subducting plate beneath Vancouver Island and lower mainland showing change in permeability of plate boundary.

IN MEMORIAM

GLENN ROUSE (1928-2007)

Photo (1964) from UBC archives.



Following a prolonged battle with Parkinson's disease, Glenn Everett Rouse passed away at Arbutus Care Centre in Vancouver on December 9, 2007 at the age of 79. He was a pioneering palynologist and paleobotanist in Canada who left a significant imprint as a researcher, teacher, and colleague at the University of British Columbia, where he held a joint appointment in the Departments of Botany and Geology. Glenn was born in Hamilton, Ontario August 1, 1928 and took bachelor, masters and PhD degrees from McMaster University. His PhD thesis *The disclosure and palaeobotanical evaluation of plant microfossils from selected Cretaceous coal-bearing strata of Canada* was supervised by Norman Radforth. While a grad student, he worked summers as paleobotanist for the Crows Nest Pass Coal Company, in Fernie, BC. There are many stories of his travels to British Columbia and Alberta during his doctoral research, where he sampled Jurassic and Cretaceous rocks after occasionally "riding the rails" in the Rockies with various colourful characters for company. No doubt his weaving of relevant adventure stories into his well-organized lectures played some part in his popularity as an undergraduate instructor. Glenn and his wife Carol came to Vancouver in 1956, and he became an assistant professor at UBC in 1957. He began a variety of innovative research projects in the Vancouver area (stratigraphy and palynology of the Burrard and Kitsilano formations), and also worked on various projects in the Interior of B.C. and in Northern Canada, as well as Alberta. Besides his main focus on Mesozoic and Cenozoic paleobotany, he had an early interest in the Devonian, and co-authored a paper in *Science* (1962) on Devonian plants and another on *Perfosporites* from the Late Devonian of Quebec.

Rolf Mathewes (PhD, UBC Botany, 1973; now in Department of Biological Sciences and Associate Dean of Science at Simon Fraser University) met Glenn while doing a senior undergraduate project at SFU in 1969. Glenn was generous with advice and the loan of hard-to-find publications for identification of plant megafossils from Quilchena, and later Rolf began a graduate program in Botany with Glenn at UBC. Rolf: "Although my project was on plant megafossils, I was somewhat surprised when he told me that the future was in pollen analysis, especially for someone with a more biological rather than geological background. I knew his own specialty was in paleopalynology of Mesozoic to Cenozoic strata, so it surprised me when he convinced me to do Quaternary palynology. Like most of his advice to me, it turned out to be well reasoned and served me well then, and after. Another Quaternary palynologist who later emerged from Glenn's lab is Richard Hebda, who worked on the history of Burns Bog and is now based at the Royal British Columbia Museum in Victoria. Glenn spent a sabbatical in Nagasaki, after which his standard lunch came in a Bento box, and was washed down with Japanese tea (with puffed rice). His international connections were many, and he worked at maintaining a facility with foreign languages. His bountiful correspondence with many notable palynologists and paleobotanists typically rested in stratigraphic piles on his desk.

Glenn collaborated closely with colleagues in Botany and Geology at UBC, notably the geologist W.H.(Bill) Mathews who provided stratigraphy and geochronology to supplement Glenn's palynological analyses of many Interior B.C. localities. Jim Monger relates that Rouse and Mathews identified a Miocene fauna interbedded with lavas in the general vicinity of the Gang Ranch. The flora was 'wet coastal', indicating that Miocene climate was markedly moister than the present climate in the region. Glenn and Bill deduced that the Coastal Mountains had to be much lower in that epoch than they are today. Glenn was co-author of the well reviewed textbook *An Evolutionary Survey of The Plant Kingdom*, by Robert F. Scagel and others. The book was translated into several languages and went through several revisions and editions.

Among palynologists, Glenn Rouse's claim to fame is likely his naming of the important and now extinct angiosperm taxon *Aquilapollenites*. This distinctive pollen type was discovered in the Upper Cretaceous Brazeau Formation of Alberta and formally described in 1957. The "Aquilapollenites province" is a widely recognized biogeographic region of occurrence in western North America and adjacent Asia, but it is less well known that this pollen type is immortalized in stone in the spandrels of the House of Commons Chamber in Ottawa. David Jarzen arranged to have "Eagle-pollen" and other pollen types included in the limestone sculptural elements of the capital along with representations of trilobites, a Devonian fish and other vertebrates. This is a fitting tribute to Glenn's memory. Besides the strictly academic pursuits of teaching and publishing, Glenn used his palynological skills to solve practical problems of coal and oil exploration, geological correlation, and dating of placer gold deposits. I enjoyed trying to interpret palynological range charts and stratigraphic sections that were often tacked up on the walls of his laboratory in Hut 02. While Killam fellow Satish Srivastava worked in the lab with me, I was often tempted to venture into pre-Quaternary palynology, based on beautiful images of Maastrichtian palynomorphs that were always on display around me. Satish and Glenn published papers that were among the first to combine SEM and light images of fossil pollen. Satish also created the genus *Rousea* in Glenn's honour in 1969, following on the 1962 naming of *Rouseisporites* by Stanley Pocock. Glenn liked fly-fishing on the Vedder and Squamish rivers. He was helpful to grad students and younger faculty members. He was a great companion for a stroll in the woods, where he could converse on the origin of every weed and plant encountered. Glenn Rouse was a dedicated palynologist who contributed much to the discipline, and a generous colleague and friend. Predeceased his sisters Marilyn and Patricia, Glenn leaves his wife Carol, his son Clayton (Alla) and his brother, Wayne (Margaret), many nieces and a nephew.

IN MEMORIAM

WILLIAM MAXWELL CAMERON

William Maxwell Cameron, a founding member of the UBC Institute of Oceanography, one of the forerunners of the present department of Earth and Ocean Science, died peacefully in Vancouver B.C. on July 4, 2008.

Bill Cameron was born at Battleford, Sask on 24 July 1914. He studied zoology at UBC (BSc and MSc) with the initial intention of going to medical school. His interests, however, changed and he became a biologist at the Fisheries Research Board, Pacific Biological Station, Nanaimo, B.C. from 1938-41. He then moved to the Meteorological Service as a forecaster at Western Air Command Headquarters, Vancouver. Given his talents in mathematics he collaborated with Jack Tully on modelling work on the Alberni Inlet and they became good friends. It was at this time that he became interested in oceanography as a discipline. He was a graduate student at the Scripps Institution of Oceanography, La Jolla, California, from 1944 to 1948. His Ph.D was conferred by the University of California in 1951. Bill's doctoral supervisor was the Norwegian oceanographer Harald Sverdrup, the Director of Scripps from 1936 to 1948. Bill took the "Sverdrup Curriculum" based on the book *Oceans: Their Physics, Chemistry and General Biology* (1942) by Sverdrup, Johnson and Fleming. This multi-disciplinary approach to the study of the oceans was to have a major influence on his career and on Canadian oceanography. He came first in his class of 18, and became involved in a network of many of the leading oceanographers of the day. His doctoral thesis was on the physical oceanography of estuaries based on data from the Alberni Inlet. Bill took up a position with the Pacific Oceanographic Group in Nanaimo in 1948 and in the following year he took positions with the Defence Research Board in Esquimalt and the faculty of the newly formed IOUBC.

During the early 1950s, as chief scientist of the Canada/US Joint Beaufort Sea Expeditions, Bill made an important contribution to Arctic Ocean oceanography. Dr. Waldo Lyon, who worked at the Naval Electronics Laboratory in the U.S. on polar submarines, was keen to establish a joint USA/Canada series of Arctic expeditions. He recruited Tully and Cameron and joint work was undertaken from 1951 to 1954 (two vessels working together).

Dr. Cameron was one of a team of three who established the Institute of Oceanography at UBC in the 1950s. Wilbur A. Clemens, who as head of the Biological Station at Nanaimo had hired Cameron in 1938, was now Head of the Department of Zoology at UBC. Clemens, Gordon Shrum of the Defence Research Board, and Cameron got together to plan the Institute. Shrum transferred Cameron from the Fisheries Research Board to the Defence Research Board, and made him a faculty member of the new Institute.

Dr. Cameron was instrumental in the establishment of the Bedford Institute of Oceanography under the Department of Energy, Mines and Technical Services. In an interview with Eric Mills (historian and biological oceanographer at Dalhousie University) in November 11, 1991, he related how this occurred. The focus on the need for enhanced oceanographic capacity within the Canadian Public Service happened because "... The (Research Vessel) *Baffin* ran on the rocks." This was the first issue that hit the then new Deputy Minister of Energy, Mines and Technical Services, Dr. Van Steenburgh (who had just been transferred from the Department of Agriculture). It was a significant embarrassment for the government, which led to Van Steenburgh's goal of more oceanographic science within the Hydrographic Service. He recruited Dr. Cameron to take the lead role in establishing the Bedford Institute of Oceanography. When initially asked to take this task on, Cameron refused. He was content back at Nanaimo. Recruitment efforts by Van Steenburgh in the USA kept bringing up the recommendation that Cameron would be the best choice. "So I finally said, well I'll go over and see what I can do, and I never regretted it." His model for BIO involved multi-disciplinary research with oceanographic vessels capable of making state-of-the-art observations. With Van Steenburgh's influence within the Public Service and Cameron's knowledge of oceanography, they were a good team.

William Cameron's vision and leadership were instrumental to the growth and development of oceanography in Canada. In 2004 he was named a Member of the Order of Canada. Bill's son William Lorne Cameron predeceased him. Bill is survived by his wife Ruth Hoyt Cameron, his daughter Robin Craig and five grandchildren.

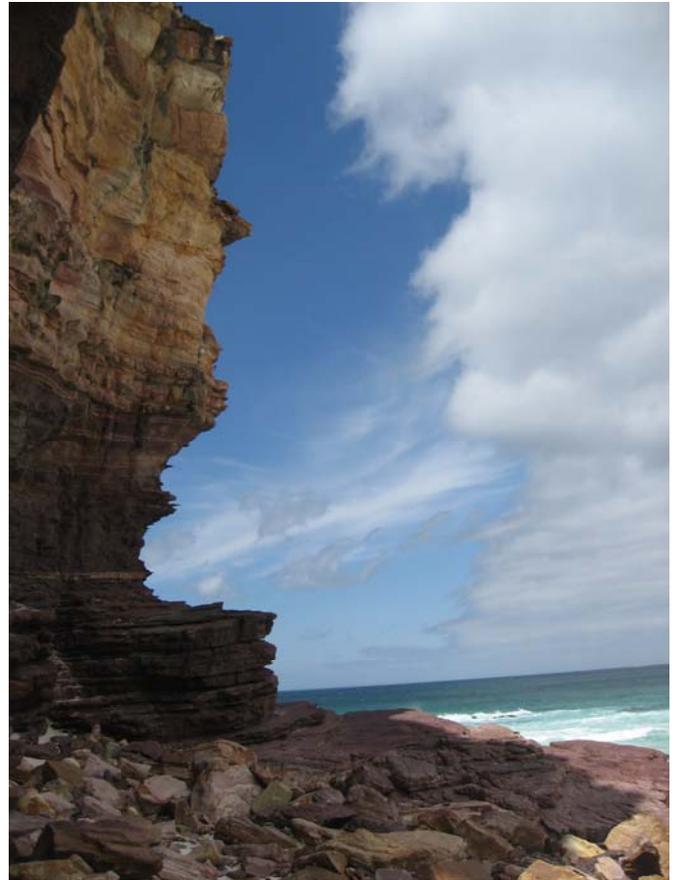
STUDENT SOCIETIES

MAY SZE PHOTO CONTEST WINNERS

The **G.M Dawson Club** ran the May Sze Photo contest for the second time this year with great success. We had several entries in both the graduate and undergraduate categories. The winner in the graduate category was Sasha Wilson with a beautiful canyon shot and second place went to Andrew Schaeffer with a great shot of birds on the seashore. In the undergraduate category, Megumi Taguchi won first with an oceanside cliff shot and Morgan Wittstock took second with a shot from Lake Matheson in New Zealand.



First Place: Sasha Wilson



Undergraduate Category - First Place: Megumi Taguchi



Second Place: Andrew Schaeffer



**Undergraduate Category - Second Place:
Morgan Wittstock**

Awards and Honours in EOS

FACULTY

Neil Balmforth, who holds a joint appointment in EOS and Mathematics, was appointed Director of the Institute of Applied Mathematics.

Michael Bostock and **Rick Thomson** (EOS Adjunct) were made Fellows of the American Geophysical Union.

In recognition of his contribution to LITHOPROBE, Canada's largest Earth science project, **Ron Clowes** (Professor Emeritus) was the Distinguished Lecturer for 2008-09 of the Canadian Society of Exploration Geophysicists. Ron made a speaking tour to most universities and other earth-science organizations in Canada to provide a summary of LITHOPROBE results. The title of the talk was "A New View of the Continent beneath Our Feet – Lithoprobe's Scientific, Economic and Social Contributions".

Mark Bustin was awarded the 2009 GSA Gilbert H. Cady Award of the Geological Society of America for his many outstanding contributions to coal geology.

Alex Canon, a former Ph.D. student of William Hsieh and newly appointed Adjunct Professor in EOS, was recently awarded two prizes for research contributing to his doctoral thesis. Alex received the Tertia M.C. Hughes Memorial Prize from the Canadian Meteorological and Oceanographic Society for "his outstanding and innovative Ph.D. dissertation at the University of British Columbia". Alex was also awarded the World Meteorological Organization's 2009 Research Award for Young Scientists for his paper "Probabilistic multi-site precipitation downscaling by an expanded Bernoulli-gamma density network," which formed part of his dissertation and was published in the December 2008 issue of the Journal of Hydrometeorology.

Roger François was awarded the A.G. Huntsman Medal for 2008. This medal was established by the Canadian marine science community to recognize excellence of research and outstanding contributions to marine sciences by marine scientists of any nationality who have had and continue to have a significant influence on the course of marine scientific thought. Roger, who holds a Canada Research Chair in EOS, was cited for his groundbreaking research and leadership in marine geochemistry. Roger, who obtained his PhD from UBC in 1987, spent the next fifteen years at the Department of Marine Chemistry and Geochemistry at the Woods Hole Oceanographic Institution, where he remains an adjunct scientist. He has been actively involved in large international programs with a biogeochemical focus such as JGOFS and GEOTRACES. Roger's research, centered at the intersection of physical, chemical and biological processes, has influenced our understanding of climate-related changes in ocean circulation and ocean chemistry. He has focused partly on the global carbon, nitrogen and silica cycles (past and present), and more recently on the global biogeochemical cycling of metals. Roger has been particularly innovative in applying novel techniques to investigate processes that have occurred in the past million years. Specifically, he has developed the use of light stable isotopes for understanding algal production and nutrient cycling in the ocean, and for determining past changes in stratification in the water

column. Additionally, he has developed tracers to reconstruct past ocean circulation and its impact on global climate. His innovative techniques for measuring sedimentation processes are being used to explore the history of sediment burial. Dr. François is internationally renowned for his deeply insightful research in marine biogeochemistry, his innovative skill in data acquisition and analysis, and his interpretation of the complex behaviour of the ocean-atmosphere system over long-term climatic timescales.

Oldrich Hungr was awarded the 2009 GSA E.B. Burwell Jr. Award by the Geological Society of America. Established in 1968, the award is made to the author or authors of a published paper of distinction that advances knowledge concerning principles or practice of engineering geology. The award is in recognition of his 2005 book on debris flow hazards.

Alastair Sinclair (Professor Emeritus) was the recipient in 2009 of the Selwyn G. Blaylock Medal from the Canadian Institute of Mining, Metallurgy and Petroleum. The award, established in 1948, is awarded annually to an individual who has demonstrated distinguished service to Canada through exceptional achievement in the field of mining, metallurgy, or geology.

Dick Tosdal, outgoing Director of Mineral Deposits Research Unit, was named Thayer Lindsley lecturer of the Society of Economic Geologists for 2009

Dominique Weis was awarded a UBC Killam Faculty Fellowship to provide travel and other support while on study leave.

Gary Goodyear, Minister of State for Science and Technology, came to UBC to celebrate the allocation of \$3.4 million of new research funding through the Canada Foundation for Innovation. Amongst the recipients were **Uli Mayer** and **Roland Stull**

During Celebrate Learning Week at UBC, several EOS Faculty gave presentations: **Catherine Johnson** talked on the exploration of Mercury; **Douw Steyn** and **Sara Harris** talked on teaching and learning; **Phil Austin** and **Roger François** participated in the Climate Action Research Symposium; **Francis Jones** and **Bret Gilley** gave a presentation on learning goals as part of the Carl Wyman Science Education Initiative.

GRAD STUDENTS

At the 2009 Mineral Exploration Roundup in Vancouver, **Ayesha Ahmed** (MDRU MSc student supervised by Ken Hickey) got first place for her poster entitled "Extending the Hydrothermal Footprint of Carlin Gold Systems: A look into clay alteration using infrared spectroscopy"; **Shawn Hood** (MDRU MSc student supervised by Ken Hickey) was awarded 2nd place for his poster entitled "High-Grade Hydrothermal Copper in Foliated Granites: The Relationship of Mineral Chemistry, Mineral Paragenesis, and Foliation Development to Fluid Flow and Metal Precipitation in the Minto Cu-Au Deposit, Yukon" Shawn's same poster was also awarded best poster at the 2009 Western Inter-University Geoscience Conference in Vancouver. **Ayesha** and **Shawn** were awarded Graduate Student Fellowships by the Society of Economic Geologists.

David Cassis (Ph.D. Candidate with **Maite Maldonado**) won the student research award from the BC Shellfish Growers Association at their annual R&D Workshop and Gala Dinner.

Melissa Grey took the runner-up prize for best student presentation at the 18th Canadian Paleontology Conference in Winnipeg. Her talk, co-authored with **Jim Haggart** and **Paul Smith** was entitled: What affects patterns of evolution?

Stephen Moss won an award for best student oral presentation at the 9th International Kimberlite Conference held in Frankfurt, Germany in August 2008. Stephen's presentation was entitled: "Spatio-temporal evolution of kimberlite magmas at Diavik, Northwest Territories, Canada

Genevieve Robert (MSc, 2008) won the Gelinas Silver Medal for 2009, awarded by the Geological Association of Canada for the best M.Sc. Thesis in igneous petrology & volcanology.

UNDERGRADUATES

Francis MacDonald, graduating geological engineer, was awarded the Leopold Gelinas Bronze Medal by the Geological Association of Canada for the best undergraduate research thesis in volcanology and igneous petrology. Under the supervision of **Lori Kennedy** and **Kelly Russell**, Francis investigated formation of volcanic conduits in kimberlite volcanoes using the experimental apparatus in the EOS Centre for Experimental Studies of the Lithosphere.

Corey Wall, fourth year Honours Geological Sciences, won The Geological Association of Canada (GAC) Student Prize for the University of British Columbia for 2009

The first executive of the Environmental Science Students' Association won the 2009 Helen McRae student development award. The award is in recognition of a UBC student service that has had a significant positive impact on student life and student development. The energy and enthusiasm of the executive contributed in a major way to the success of the Environmental Science Program in EOS, its new home. The students and their roles on the 2007/2008 executive are: President, **Elisa Hsieh**; Director of Events, **Olive Ojala**; Director of Administration, **Bianca Corlett**; Director of Fundraising, **Joseph Lai**; Director of Promotions, **Allison Thompson**; Director of Finances, **Jessica MacDonald** and Director of Communications, **Justin Lau**.



Total enrollment in undergraduate courses offered by EOS.

Numbers in brackets (%) indicate increase over preceding year.

	2005	2006	2007	2008
1st Year	1862 (-5.3)	1900 (+2)	1938 (+2)	1894 (-2.3)
2nd Year	594 (+2.4)	693 (+16)	771 (+11)	848 (+10)
3rd and 4th Yr	1752 (+20.2)	1827 (+4)	1767 (-3)	1839 (+4.1)
Service Courses	580 (-24.8)	604 (+4)	553 (-8)	551 (-.04)
TOTAL	4788 (+.3)	5024 (+5)	5029 (+.1)	5132 (+2)
Summer	474 (+6)	366 (-22)	249	274 (+10)
Distance Ed	326 (-10)	321 (-1)	429	466 (+8.6)
Grand Total	5588 (+.1)	5692 (+1.8)	5707 (+.2)	5872 (+2.9)

Number of Major and Honours students in programs offered by EOS

	2005	2006	2007	2008
EOS - Major	100	86	93	93
ATSC	41	25	23	27
ENSC			83	86
GEOL	43	35	23	19
GEOE	96	106	121	134
GEOP	12	9	5	6
OCGY	14	9	3	1
TOTAL	306	278	351	366

Graduate Enrollment: 2008

Program	ATSC	OCGY	GEOE	GEOL	GEOP	Total
MSc	7	13	-	42	14	76
MASc	-	-	8	-	2	10
PhD	7	20	4	34	15	80
MEng	-	-	3	-	-	3
Total	14	33	15	76	31	169

Graduate Theses Completed in 2008

Supervised by Earth and Ocean Sciences Faculty,
Including Thesis Programs External to the Department
(Name of Supervisor in Brackets)

(i) Ph.D.

- Audet, Pascal**, Seismic and Mechanical Attributes of Lithospheric Deformation and Subduction in Western Canada, (M. Bostock)
- Beranek, Luke Patrick**, Provenance and Paleotectonic Setting of North American Triassic Strata in Yukon: The Sedimentary Record of Pericratonic Terrane Accretion in Northern Canadian Cordillera, (J. Mortensen)
- Cannon, Alex Jason**, Multivariate Statistical Models for Seasonal Climate Prediction and Climate Downscaling, (W. Hsieh)
- Escalante Aramburu, Abraham David**, Alteration Patterns and Linkages Between Intrusion-Related Polymetallic Carbonate-Rock Hosted Mineral Deposits: Examples from the Peruvian Andes, (G. Dipple)
- Greene, Andrew Richmond**, Wrangellia Flood Basalts in Alaska, Yukon and British Columbia: Exploring the Growth and Magmatic History of a late Triassic Oceanic Plateau, (D. Weis/J. Scoates)
- Grey, Melissa**, Exploring Evolutionary Patterns And Processes: A Case Study Using the Mesozoic Bivalve Buchia, (P. Smith and J. Haggart)
- Hennenfent, Gilles**, Sampling and Reconstruction of Seismic Wavefields in the Curvelet Domain, (F. Herrmann)
- Israel, Steve Andrew**, Tectonic Significance of the Atnarko Complex, Coast Mountain, British Columbia, (L. Kennedy)
- Kalenderski, Stoitchko Dimitrov**, Stochastic Modeling of Space-Time Processes. An Air Pollution Problem. , (D. Steyn)
- Lelievre, Peter George**, Integrating Geologic and Geophysical Data Through Advanced Constrained Inversion , (D. Oldenburg)
- Marcoline, Joseph R**, Investigation of Water and Tracer Movement and Uncovered Unsaturated Waste Rock, (L. Smith)
- McCullor, Douglas C**, Improving Hydrometeorologic Numerical Weather Prediction Forecast Value via Bias Correction and Ensemble Analysis,

Mercier, Jean-Philippe, Improved teleseismic Green's functions and Insight on Western Canada Crust and Upper Mantle Structure and Evolution through Receiver Functions and Body Wave Traveltime Tomography, (M. Bostock)

Mitchinson, Dianne Edith, Targeting Archean Orogenic Gold Mineralization Using Physical Properties and Integrated Geophysical Methods, (R. Tosdal)

Morisset, Caroline-Emmanuelle, Origin of Rutile-bearing Ilmenite Fe-Ti Deposits in Proterozoic Anorthositic Massifs of the Grenville Province, (J. Scoates)

Wainwright, Alan J., Volcanostratigraphic Framework and Magmatic Evolution of the Oyu Tolgoi Porphyry Cu-Au District, South Mongolia, (R. Tosdal)

Williams, Nicholas Cory, Geologically-constrained UBC-GIF gravity and Magnetic Inversions with Examples from the Agnew-Wiluna Greenstone Belt, Western Australia, (R. Tosdal/G. Dipple)

Zhang, Changjun, Seismic Absorption Estimation and Compensation, (T. Ulrych)

(ii) M.A.Sc.

- Fournier, Mathew Andre**, Investigation into Shear Strength Reduction Using the Distinct Element Method.
- Moore, David Anton**, Processing and Analysis of Seismic Reflection and Transient Electromagnetic Data for Kimberlite Exploration in the Mackenzie Valley

(iii) M.Sc.

- Barclay, Jordin Alexander**, Groundwater Flow Model of the Merritt Region and Potential Response to Coal Bed Methane Development, (R. Beckie)
- Blevings, Scott**, Geologic Framework for Late Cretaceous Magmatic-Hydrothermal Systems in the Taseko Lakes Region, South-western BC, (L. Kennedy)
- Brand, Allison Aurora**, Mineralogy, Geochemistry, and Geochronology of the Northern Dancer W-Mo Deposit, Yukon and British Columbia, (L. Groat)
- Brett, Richard Curtis**, Kimberlitic Olivine, (K. Russell)
- Byrne, Kevin**, The Southwest Zone Breccia-centred Silica-undersaturated Alkaline Porphyry Cu-Au Deposit, Galore Creek BZ, (R. Tosdal)
- Demerse, Deirdre Kerry**, Sinistral High Strain in the Coast Mountains Near Bella Coola, West Central British Columbia, (L. Kennedy)
- Dewi, Ariyanti Suhita**, Biologically Active Secondary Metabolites from Tropical marine Invertebrates, (R. Andersen)
- Hanano, Diane Wai-Jen**, Geochemistry of Post Shield Lavas from Kea and Loa Trend Hawaiian Volcanoes: Constraints on the Origin and Distribution of Heterogeneities, (D. Weis)
- Henry, Amber Dawn**, Fracture Reactivation and Gold Mineralization in the Epithermal Environment: Structural Evolution of the Endeavour 42 Gold Deposit, New South Wales, Australia, (R. Tosdal)

- Hollis, Lucy**, Cretaceous Porphyry-Style Magmatic-Hydrothermal Systems in the Tchaikazan River Area, Southwest B.C, (K. Hickey)
- Humphrey, Donald Bernard**, Characterizing Ballast Water as a Vector For Nonindigenous Zooplankton Transport, (C. Dibacco)
- Jackson, Meghan Lea**, Evolution of the Northeast Zone Breccia Body, Mount Polley Mine, British Columbia, (R. Tosdal)
- Jago, Christopher Paul**, Metal and Alteration Zoning and Hydrothermal Flow Paths at the Moderately Tilted, Silica Saturated Mt. Milligan Cu-Au Alkalic Porphyry Deposit, (R. Tosdal)
- Leslie, Christopher Dean**, Detrital Zircon Geochronology and Rift-Related magmatism: Central Mackenzie Mountains, Northwest Territories, (J. Mortensen)
- Moccia, Lauren Paul**, Cloning and Characterization of a Novel Ferritin from the marine Diatom Pseudonitzhia Multiseries, (M. Maldonado)
- Neuner, Matthew Edward**, Water Flow Through Unsaturated Mine Waste Rock in a Region Of Permafrost, (L. Smith/U. Mayer)
- Pathi, Venkat Surya Narayana Murthy**, Factors Affecting the Permeability of Gas Shales, (M. Bustin)
- Pittman, Rory Clifford**, Review on Neural Networks in the Atmospheric Sciences, (P. Austin)
- Pizarro, Nicolas**, Magnetic Susceptibility Scaling of Rocks using Geostatistical Analysis: An Approach to Geologic and Geo Physical Model Integration, (R. Tosdal)
- Robert, Geneviève**, Rheology of Porous Rhyolite, (K. Russell)
- Shannon, Andrew J.**, Volcanic Framework and Geochemical Evolution of the Archean Hope Bay Greenstone Belt, Nunavut, Canada, (R. Tosdal)
- Uno, Hideharu**, New Constraints on Mercury's Internal Magnetic Field, (C. Johnson)
- Washburn, Malissa Joan**, Architecture of the Silurian Sedimentary Cover Sequence in the Cadia Porphyry Au-Cu District, NSW, Australia: Implications for Post-mineral Deformation, (R. Tosdal)
- Welkner, Daniela Renate**, Integrated Field Investigation, Numerical Analysis and Hazard Assessment of the Portillo Rock Avalanche Site, Chile, (E. Eberhardt)
- Yarham, Carson Edward**, Seismic Ground-Roll Separation Using Sparsity Promoting L1 Minimization, (F. Herrmann)



Alumni Feedback



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

Wilfrid N. Plumb, B.Eng., 1950 (In Memoriam)

Bill Plumb graduated from UBC in 1950 as a Geological Engineer. His fascination with the natural world flowed through his career in mining and exploration in B.C., the Yukon, and Saskatchewan, including his favourite post as Chief Geologist for Cassiar Asbestos Corporation. He served as information officer at the B.C. and Yukon Chamber of Mines, and in retirement he taught prospecting courses in Kelowna. He inspired all who knew him with his optimism and his passion for learning. He died in Kelowna in 2008 at age 92.

Joseph A. Chamberlain, B.A. Honours Geology, 1955

Long and complex history over 53 years, all in "hard rock" geology, including one year as Associate Professor at UBC.

Bernie Tallon, B.Sc. Geology, 1958

I read with great interest the summary history of the EOS Department, especially references to Dr. V.J. Okulitch and the Dawson Club. Some students referred to Professor M.Y. Williams as the "Connie Mack of the Geology Department" and wondered what "M.Y." stood for. We eventually learned that his initials represented "Merton Yarton" (I hope this is correct). I was also pleased to note contributions to the Pacific Museum of the Earth by R.M. Thompson, W.H. White, V.J. Okulitch and Ted Danner, who were professors of mine. Finally, I found your history of UBC's Geology Field School, under the direction of R.M. Thompson and W.H. White, most enjoyable. "R.M.T." especially would hurry through supper in order to get a softball game in before darkness fell. Kudos to R.L. Chase, et al., for compiling these histories. Your "In Memoriam" to John Jambor was most fitting. His photo reflects why some students called him "Jolly John".

William S. Hopkins, Ph.D., MSc., 1966, 1962

Retired and aging gently! I belong to numerous local boards and committees - i.e. Big Frog in Small Pond.

Karl Ricker, B.Sc. 1959, M.Sc. 1968

Age: 2^0+3^2 ; gearing up to volunteer work at 2010 on the ski alpine race courses. Currently staying out of the line of fire due to this very active avalanche season. I am still monitoring two glaciers at Whistler, amongst other pursuits with the local natural history society and mountaineering clubs. Lets have a good luck cheer for Maëlle Ricker at the 2010 Snowboarding Venue at Cypress Bowl!

Jahak Koo, MSc.Econ.Geol., 1968

After my BSc and two more years of my economic geological work for graduate studies(SNU) and the Geological Survey of Korea, I have been fortunate/ grateful

to accomplish my post-graduate/-doctoral work under the capable geoscientific and humanly merciful supervisions of my professors in Canada.

Since then, I have been able to continue my economic geological R/D and post-graduate teaching work with national government institutes, universities and industrial organizations mainly in Canada and Korea for 35 years.

During the last two decades, I have been dedicating nearly all my efforts to coming up with a comprehensive series of huge volumes of significant HMA results.

HMA(=Hitech Mineral-Material Applications) stands in short for my own initiative multidisciplinary Hitech-oriented Geoscientific Nuclear-Electronic Functional Minerals-Materials Application(=named HIGENEMA) R/D Mega-project. HMA has been validating/establishing already many natural minerals that can be utilized directly in their original natural molecular states and indirectly in their synthetic derivative analogue states as hi-tech functional materials.

Natural minerals can be identified for their hi-tech functional capabilities within the whole range of EM wave-particle spectral activities that the constituent quantum nucleons and electrons of the minerals' molecules carry out.

The HMA minerals and materials are so much diverse in species with a wide variety of economically superlative value-adding and environmentally sustainable hi-tech functionalities.

The hi-tech functionalities consist of advanced innovative nuclear, magnetic, electric, optic-phonic, thermal, and many other subdivided-combinatory capabilities. The HMA mineral-based hi-tech capabilities can be employed to create/produce a wide range of advanced innovative hi-tech-functional components, devices, and systems.

Therefore, natural minerals themselves can become the leading core-functional materials to maintain global hi-tech industry that evolves rapidly/constantly as the principal force of national/international economic growths.

My HMA work still continues to validate/establish more mineral species as hi-tech functional materials for practical applications to enhance the better life of humankind on the Earth. Koo, Jahak. Ph.D., P.Eng.(Ret. Man. Can.)NPL

Chair, Senior Specialist-Global Consultant, HIGENEMA R&D Mega-project: Nuclear-Electronic Functional Minerals, Synthetic Derivative Analogue Materials, Hitech Application Components-Devices-Systems.

James P. Balmer, BSc (Geology Major) 1972

I read the article about the history of the department in the recent newsletter with great interest. One comment - I was working as a Technician's Assistant with Ed Montgomery & his Merry Band during the Great Move during the Fall & Winter of '71 - '72 & was directly involved with some of the preparations around moving "Lambie" (the nickname for our favourite Lambeosaurus) over the Christmas break. Although I do recall some rather creative activities that were used to make it happen, I don't remember Lambie roller skating down West Mall. Rollers were used to get Lambie out through the hole in the wall of the old museum. From there he was hoisted onto the back of a flat-

deck truck in a vertical position, strapped securely in position & very slowly hauled off to the new digs. Our biggest concern was to prevent any twisting of the embedded fossil, as we were afraid that the plaster or concrete (I don't remember now what the medium was) might crack & cause Lambie some damage. I also want to say that my time working with Ed, Duke, Ray, etc. during my last 2 years in Geology at UBC was one of the best & most rewarding experiences of my life & will never be forgotten.

Tuum est!

JP (Jim) Balmer, PGeo, General Manager, Orca Sand & Gravel

Don Grant, BASC, GEOE, 1981

New job with BHP Billiton in Adelaide. Moved from Mount Isa in North West Queensland. new role is Superintendent - Life of Asset Planning and Resource Geology - Olympic Dam Mine.

Jane Petrovich, M.Sc. Oceanography, 1982

After some years teaching college chemistry and working in the pharmaceutical industry, I went back to school to get a B.Ed. in the Math, Science and Technology program at York University (2005) and was happily awarded the Don Galbraith Pre-Service Teacher Award of Excellence by the Science Teachers Association of Ontario. I have also branched out into creative writing. From early beginnings as a story-teller for the appreciative audience of my son, niece and nephews, I have recently published two short stories. Both were inspired by my unforgettable shipboard experiences on the Vector, Endeavour and Pandora and SCUBA expeditions with Ray Andersen's group of intrepid divers.

Power of Eight in the fantasy anthology *Fantastic Companions* - winner of *ForeWord Magazine's Silver Book of the Year Award* in the Science Fiction category 2005, and *Attractions*, the cover story in the science fiction anthology *Polaris* - winner of the 2007 Canadian Science Writers' Association Award for Science in *Society Journalism, Youth Category*. Both books were Finalists for the *Prix Aurora* for Best Work in English, 2006 and 2007 respectively.

Elizabeth Johnson, B.Sc., Honours Geology, 1987

Just graduated with Ph.D. from University of Mississippi in Hydrology and have taken a job as Senior Hydrogeologist for B.C. government Ministry Energy Mines and Petroleum Resources, Oil and Gas Division, Geoscience Branch.

Jeffrey S. Hambleton, B.Sc., Geology, 1995

After Geology at UBC, Jeff finished med school at the American University of the Caribbean, and completed his specialty residency at the Medical College of Georgia. After 9 years in the southeastern US, we moved to Bremerton, WA for his first couple of years in private practice. We moved to Anacortes, WA in Nov. 2007 where Jeff is an anaesthesiologist at Island Hospital. We are enjoying life in a small town with 3 year old daughter Sabine, and expecting another baby in April, 2008.

Justin Vanden Brink, BSc., Geol., 1994

After working in the mining industry out of UBC, Justin made the move to Calgary and soft rock. Working as a wellsite geologist with RPS energy, he helped Canadian based companies find oil and gas in the Western Canadian Sedimentary Basin. After 7 years in Calgary and receiving his P.Geol accreditation, Justin accepted a promotion to become USA Business Development Manager for geological well operations with RPS Energy.

The company's Houston office delivers geological wellsite consultancy services to major oil companies like Exxon, Conoco, and Chevron operating in the Gulf of Mexico and around the world.

Justin is responsible for maintaining and finding new clients in the oil and gas industry. Old friends and classmates are invited to look him up if they find themselves in Texas.

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.

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