# ALUMNI NEWSLETTER
## Number 11 (2008)
### Message from the Head

**Paul L. Smith**
**Earth and Ocean Sciences**
**Head**

Dear Alumni and Friends:

To have a true sense of direction, you have to understand where you have been as well as where you are going. This year has certainly been a time for reflecting upon history because UBC reached the grand old age of 100. Although EOS has grown by accretion over many decades, its roots go back as far as 1915 when the world was sinking deeper into the turmoil of the Great War. Inside your Newsletter you can read accounts written by Dick Chase who has consulted with numerous former and current EOS members to assemble a history of the Department, the Museum, and the Mineral Deposits Research Unit. As you will read, the Department has evolved and diversified in ways that could never have been imagined in the early part of the last century. On the other hand, some qualities are timeless. From landslide studies, the exploration of Mercury, climate change, modelling super-volcanoes and innovations in geochemistry, EOS teams continue to explore the leading edges of Earth Science research.

Having said that, students and teaching remain at the heart of our Department and this year our enrolments continued to climb. I predict that next year the numbers will be higher still as opportunities for Earth Science students burgeon driven by climbing commodity and energy prices, pressing environmental concerns, and the greying of the country's work force. We are still working hard to raise funds for the Earth Systems Science Building to bring together the scattered Department and provide much needed research and teaching space. Teaching facilities in particular have become completely inadequate. The current EOS complex houses only 2 lecture rooms and they each have a capacity of less than 60 whereas nearly 6000 graduate and undergraduate students are taking our courses. We have become a Department of campus nomads in search of adequate teaching space. Encouragingly, the UBC Development Office recently announced that a total of $20.1 million had been pledged towards the new building by the mineral industry and that more than $10 million in other pledges were at an advanced state of cultivation. The key step at the moment is for the government to acknowledge the importance of this initiative by matching the industry donations both directly and indirectly through infrastructure funding initiatives such as the Canadian Foundation for Innovation. What is certain is that EOS is very close to capacity. We cannot significantly increase our enrolment any further nor effectively meet our current research commitments without more space and modernised facilities.

EOS has hosted numerous official visits during the past year, not only the President, Provost and Dean of Science at UBC but, as you will see, also a Prince and a Consul. We have also had the pleasure of giving tours to several groups of alumni and friends who wanted to look over the old place and see the modern research facilities we are developing. As we begin the celebration of our past, we would like to hear more from our alumni because by taking our courses, engaging in research, and contributing to industry, it is you who have all helped build our reputation as one of the world's leading Earth Science centres. Call in and visit if you find yourself in the Point Grey area or simply complete the feedback form at the end of this letter and communicate directly with all your old friends and former colleagues.

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# UBC CELEBRATES ITS 100TH BIRTHDAY

# HISTORY OF EARTH AND OCEAN SCIENCES DEPARTMENT AT UBC

2008 is the one hundredth anniversary of the founding of UBC. This occurred as a result of the signing of an act of the provincial legislature, known as the University Act, on 7th of March 1908. How does Earth and Ocean Sciences fit into this picture? Our department is a newcomer on the scene, having come into being in 1996, but some of its components were in existence long before. In brief, geology dates from 1915, geological engineering from 1921, the museum from 1925, oceanography from 1949, geophysics from 1957 and atmospheric sciences from 1988.

The university took a few years to materialize after the initial signing of the act. The Act stipulated that it replace McGill College, which gave some university level courses and was housed in buildings in the Fairview area of Vancouver. A president of UBC (Wesbrook) was appointed in 1911, and in 1914 he appointed four professors to head various parts of the new institution. One of these was Reginald Walter Brock, appointed to be head of the School of Mines. The school of mines never materialized, but Brock, a geologist and geological engineer, became head of the Department of Geology and Mineralogy and Dean of Applied Science. World War One started in 1914 before any classes had met, and Brock took leave and joined the army that year. Brock had been Professor of Geology at Queens University (1902-07) and Director of the Geological survey of Canada (1907-1914) during which time he had founded the National Museum of Canada. He appointed a former Queens student and geologist of the Geological Survey, Dr Stuart James Schofield (MA BSc Queens, PhD MIT), as professor, and Schofield met the first geology classes of UBC in September 1915, and delivered the first lectures. After the return of Brock and many others from the War in 1919, organization of the new university got underway in earnest, and three faculties emerged in 1921: Arts and Science, Applied Sciences, and Agriculture. The Department of Geology and Mineralogy was in Arts and Science, but gave most of its lectures in Applied Science. In October 1921 the Dawson Club came into being, membership being available to any student who had completed two courses in geology, so that both engineers and scientists could belong. Brock changed the department name to Geology and Geography in 1922. This name persisted until 1958. Physical geography and meteorology were taught by geologists until the 1950s, when geographers were appointed. Meanwhile, degrees in Geological Engineering were being awarded from 1922 onward: all the Heads of the Geology and Geography Department until 1958 were Geological Engineers and directed programs both in geology, for which a BA was awarded, and geological engineering for which a BASc was awarded. The first women in geology graduated in 1923.

After a protest march by students in 1922 (the Great Trek), work on building the Point Grey campus, halted in 1914, was resumed, and in 1925 Brock directed the move of Geology and Geography from Fairview to the newly completed Applied Science Building on West Mall. In 1962, the Faculty of Arts and Science became two faculties, a faculty of arts, and a faculty of science. Geology and Geography split into two departments, Geography in Arts and Geology in Science. Vladimir Okulitch, who had headed the division of geology in the old combined department of geology and geography, became the first Dean of Science. Both departments continued to occupy the original Applied Science Building and two huts on West Mall until 1972 (after World War Two all other departments moved out as buildings were provided for them). In 1971 Geology changed its name to Geological Sciences and in 1972 through 1974 moved into the newly completed Geological Sciences Centre (presently known as EOS Main and EOS South).

The Geological Engineering program, the first in Canada, emerged as a program in the Applied Science Faculty in the 1921-22 session, and the first B.A.Sc (Geol Eng) degrees were conferred in May 1922 on Roy Walter Goranson and John Fortune Walker. The Director of the program was also the Head of Geology, until 1972, when R.Allan Freeze was appointed Director. In the 1970s Geological Engineering students agitated for a separate club and the Georox Club was formed.

Now it's necessary to backtrack to relate the history of the other pieces of EOS. The following is from Pickard, 1974. "In 1948 The Defence Research Board of Canada suggested, in anticipation of developments in the study of the ocean, it would be appropriate for a university in Canada to start work in this field to carry out research and to introduce students to the field. After discussions and as a result of the recommendation by the National Conference of Canadian Universities in 1949 the University of British Columbia elected to make a start and the Institute (of Oceanography) was formed at the graduate studies level. The first lectures were given in the fall of 1949 and the first graduate student was D.C.MacLeod."

Initially the Institute was a headless body, operating under the direction of the President's Committee on Oceanography, which was chaired by the zoologist W.A. Clemens. In 1953 Professor Clemens was appointed the first Director of the Institute and served in this capacity until 1958 when George L. Pickard succeeded him. The Institute was happily housed in congested conditions in huts on West Mall until 1971 when a move began to the basement of the newly completed west wing of the Biological Sciences Building on Main Mall. George Pickard remained Director until his retirement in1979. Each oceanographer was a member of a science department, and the Institute offered only masters and doctoral degrees. In 1979 the Institute became a department in the Faculty of Science. The first head of the new Department of Oceanography was Stephen E. Calvert (BSc Reading, PhD UC San Diego) who came from the Institute of Oceanographic Sciences in the UK to take the post. The Department inaugurated programs of instruction leading to bachelors degrees with major in oceanography or honours in Oceanography and another subject.

Like oceanography, geophysics started out as an institute in Graduate Studies. In 1957, Professor J.A. (Jack) Jacobs took up an appointment at the Department of Physics. An Institute of Earth Sciences was created with Jacobs as Director. Jacobs and members of the institute were in the Physics Department until 1963, when a separate Department of Geophysics was created, with Jacobs as Head. In 1971 the Department name became Geophysics and Astronomy. In 1969 personnel moved from original quarters in the physics and chemical engineering buildings to a building vacated by the BC Research Council on West Mall (the present EOS East). Upon the creation of EOS and incorporation of geophysics, the astronomers moved to Physics, which became Physics and Astronomy.

Development and expansion of Atmospheric Science at UBC in the late 1980s coincided with similar changes at universities across Canada, in response to the need for meteorologists in the Atmospheric Environment Service (AES). Atmospheric Sciences was officially started as an undergraduate program at UBC in 1988, after UBC won a "Funds for Excellence in Education" award from the Province of BC for establishment of a Centre of Excellence in Atmospheric Science. Faculty were in Departments of Geography, Oceanography and later Soil Science. The first director was Gordon McBean, who received his B.Sc. in Physics and Ph.D. in Oceanography (on turbulence in the atmospheric boundary layer) from UBC after an M.Sc. in Meteorology from McGill. Initially the program was administered from Geography. Some members shifted to EOS in 1998, and administration was transferred to EOS in 2003.

This summary history put together by Dick Chase with aid from, Steve Calvert, Don Russell, Bob Ellis, Roland Stull, and others. A typescript by M.Y. Williams and a pamphlet by George Pickard were sources of information on early history of Geology and Oceanography respectively, and documents by Roland Stull gave information on the development of ATSC.

## The Pacific Museum of the Earth: A History

**Lambeosaur in the Pacific Museum of The Earth**

The Geological Museum was founded by R.W. Brock, who had earlier founded the National Museum in Ottawa. The museum, the first at UBC, was included in the preliminary plans of the Applied Sciences Building (now the Geography Building) in 1923. The building was completed and the museum came into being in 1925. Professor M.Y. Williams had been interested in museums from childhood and, with Brock, was the de facto Curator. As the years passed, Williams assumed complete responsibility for the museum. Before joining the UBC faculty in 1920, Williams had had an office in the Peabody Museum at Yale for three years, and subsequently in the National Museum in Ottawa for eight years. Williams and Brock built up the mineral collections by solicitation and purchase from many persons and institutions. All gifts were accepted and suitable materials, including relief maps and models, zoological and anthropological specimens, were exhibited.

As time passed and anthropological and zoological museums became established at UBC, suitable materials and collections were turned over to them, leaving the geological museum with typical collections of minerals, ores, rocks, fossils relief models and a few biological specimens representing conspicuous living forms in contrast with their forerunners. The late Edward Mahon donated a very fine skull and antlers of the extinct Irish Elk. In the 1980s, the late Mrs. Laura Lou Mathews (BA, Chicago; MS, Berkeley), wife of William H. Mathews and a vertebrate paleontologist by training, worked many weeks on the skull and antlers to prepare it for display. Miss Victoria Rendell (BA, UBC) presented three skulls of *Bison crassicon* and teeth and bones of the American mammoth from the gold gravels of the Yukon Territory. In 1950, Dr. F.J. Alcock, Curator of the National Museum of Canada, authorized the permanent loan to the Department of Geology of a fine mounted specimen of the skeleton of a duckbilled hooded dinosaur *Lambeosaurus* sp., which has been a prominent feature of the museum ever since. The specimen was collected in 1913 from the Upper Cretaceous of the Red Deer Valley near Steveville, Alberta by C.H. Sternberg and Sons. The specimen was prepared in Ottawa and mounted at UBC by Charles M. Sternberg. The enterprise was sponsored by Dr. H.R. MacMillan.

A collection of minerals, the W.J. Sutton collection, originally included 728 different mineral species. It was renamed the Sutton-Thompson Collection, to commemorate Professor R.M. (Bob) Thompson, who cared for and donated 36 specimens to the collection. In the original Paleontological Laboratory in Room 119 of the Applied Science Building, glass cases and standing cabinets contained upwards of 500 trays of fossils. M.Y. Williams' fossil collection represented Ontario, the Mackenzie River Valley, northeastern British Columbia, the southern plains of Alberta and Saskatchewan, Churchill Manitoba, and Hong Kong. Dr. V.J. Okulitch's collections included archeocyathids from Australia, Labrador, Mexico, California and British Columbia. A large collection of trilobites from the Lower Cambrian of Fort Steel, near Cranbrook was made by Colonel Pullen and Mr. C. Garratt.

In February 1969, the name of the Museum was changed to the M.Y. Williams Geology Museum. Professor Emeritus M.Y. Williams was the Honorary Curator.

In 1972, the museum was moved from West Mall to the new Geological Sciences Building (now Earth and Ocean Sciences Main). The move was supervised by the Chief Technician, Mr. Edward Montgomery, and the newly appointed Curator, Mr. James Haight, the first non-faculty curator. The *Lambeosaurus* skeleton was moved in one piece from the museum in the Geology and

Geography Building to the new location on the ground floor of the Geological Sciences Centre; part of the south wall of the old building had to be removed to allow egress, and the piece was wheeled to the new building on roller skates.

In 1982 James Haight was succeeded by Mr. Joseph Nagel (MSc, Geology, UBC). Joe Nagel was an outstanding Curator. He created a computer system to catalog the specimens in the collection. Displays of rocks and minerals were created by Nagel and Mr. Carlo Giovanella (BASc Queens; MSc Washington), Senior Instructor, to supplement undergraduate laboratories. Nagel organized innovative displays in the Museum, such as an outstanding gem show and 'Harvard Gold', a display of gold specimens from the Harvard Mineralogical Museum, which attracted widespread attention both inside and outside the University. During Mr. Nagel's tenure, the Museum was given the Colvin Mineral Collection, which provided some outstanding display material. Some of the collection was sold off to raise much-needed funds; thirty-five specimens from this collection remain in the permanent museum collection. Nagel organized the Friends of the M.Y. Williams Museum for interested parties from inside and outside the University and organized an annual series of lectures relating to geology, mineral collecting and various other related topics. He created the Collectors Shop within the Museum, where mineral specimens, fossils, and related items were sold. The stock came from purchases at mineral and fossil shows that Nagel attended, as well as from travelling mineral dealers, local entrepreneurs who collected minerals in the field, and donations and trades. Profits from sales from the shop financed purchase of specimens that were added to the permanent collections. Dr Art Soregaroli commented as follows: "As I remember, Joe formed the Friends of the Geological Museum to widen the scope of the museum by bringing in mineral collectors and other interested parties to UBC for organized presentations on various topics, some of which were travel logs, mineral collecting, geological, slide shows of highlights of mineral show displays, etc. The evening meetings served as a focus on the Collector Shop, especially after he returned from the shows and had new inventory. He had a good sense of entrepreneurship. The membership was eclectic--including professors and students (not just in the Geological Sciences), practising geologists, prospectors, rockhounds, collectors, etc. The meetings provided a venue for communication with people of similar interests--a place to learn, brag, admire, gab with friends, add to collections, admire minerals beyond your reach, etc."

**The Jellyroll**

Professor W.R. (Ted) Danner had identified an unusual feature in slumped early Holocene or late Pleistocene lacustrine sediments exposed in an outcrop in a cliff face in a gravel pit just south of Lytton, B.C. At the time of the slump, a layer of sediment on the sloping bed of a post-glacial lake rolled up on itself as a result of downslope current, likely a turbidity current. In cross section, as observed in the outcrop, the rolled up layer looked like a giant jellyroll. In 1986, under Nagel's direction, resin was applied to the feature in the outcrop to make it rigid, the surface was peeled off the cliff as one piece, placed in a frame, and transported to UBC, where the item was installed in the west wall of the museum. Collection and installation was funded by the B.C. Ministry of Transportation via the Heritage Conservation Branch.

During a time of budget reductions in 1995, the Department of Geological Sciences terminated Nagel's appointment (after he left UBC, Joe had some notable success as a museum consultant, applying the techniques he had developed while at UBC). The museum lacked a curator for the first time since it was founded by Brock and Williams in 1925. The museum was technically closed, but displays were left unchanged. Following Joe's departure, Mr. Mark Mauthner (BSc Geol, UBC) who had worked with Joe Nagel, operated the shop and renamed it The Collectable Earth.

After the closure, Mr. Ross Beaty [B.Sc Hons Geology LLB, UBC; M.Sc (Royal School of Mines, U of London)], CEO of PanAmerican Silver, offered to rebuild the museum in the Geological Sciences Centre, but a suitable arrangement could not be worked out with the University. In January 2000 Mr. Beaty, supported by members of the mining community and other interested parties, opened the 'Pacific Mineral Museum' in downtown Vancouver adjacent to the BC Yukon Chamber of Mines building. Some material from the UBC collection was loaned to the downtown museum, the curator of which was Mr. Mauthner. In December 2002, for lack of footfall in its downtown location, and with the onset of a depressed business cycle, the venture was forced to close its doors. Mr. Beaty donated the cabinetry and displays that Mr. Mauthner had developed to UBC and returned the UBC minerals which were on loan. In addition, he loaned a large part of the minerals in the Pacific Mineral Museum to UBC for display. Mr. Beaty subsequently, with his wife Trisha (M.D., UBC) funded the "Beaty Biodiversity Museum" at UBC, part of the Biodiversity Research Centre to be located across the Main Mall at UBC opposite the EOS buildings. It is planned that the Beaty Biodiversity Museum will house the fossil collection.

The collections of the M.Y. Williams Museum and the Pacific Mineral Museum were merged to form the Pacific Museum of the Earth, with Ms. Mackenzie Parker (B.Sc Earth and Ocean Sciences, UBC) as Curator and General Manager. The merger began in January 2003 and the museum opened under its new name in June 2003. Today the Pacific Museum of the Earth runs 120 programs annually, of which 90 programs cater to some 1,600 schoolchildren and the remainder to about one thousand other visitors. There are also many visitors who don't sign up for organized programming. The mineral collection numbers more than 10,000 specimens. A lecture series is run for the Friends of the Museum, and members of the general public are welcome to attend. The Friends provide expertise to the museum, including helping to price specimens for sale in the gift shop, performing appraisals, helping to identify display quality specimens, and giving talks. The museum shop sells minerals, fossils, relevant books and souvenirs. The merger of Geological Siences, Oceanography, Geophysics and Atmospheric Sciences into one Department has led to broadening of the scope of exhibits in the Museum, which now include seismographic, meteorological and other displays.

This history was put together by R.L.Chase. A typescript by M.Y. Williams gave information until 1959; history for the last half century was compiled with help from Carlo Giovanella, Art Soregaroli, Mackenzie Parker, and others.

# History of Mineral Deposits Research Unit (MDRU)

The Mineral Deposit Research Unit (MDRU) is a collaborative venture between the global mining industry and the University of British Columbia. The unit was established in 1989 with support and financial assistance from the mining industry and the Natural Sciences and Engineering Research Council of Canada (NSERC).

The unit was conceived during a discussion between Peter Bradshaw (then with Orvana Minerals and now First Point Minerals) and Professor Alastair Sinclair, then Head of Geological Sciences. The efforts to establish the research unit were supported by the Dean of Science, Barry McBride.

Today MDRU is part of the Department of Earth and Ocean Sciences and is devoted to solving problems related to mineral exploration. It has grown to be the largest industry-university collaborative research group in Canada and one of the largest in the world.

The Unit is housed within Earth and Ocean Sciences in EOS Main and South, facilities including offices, the Sheahan-MDRU Library, and a resource centre. The resource centre, a shared space for students and researchers, provides an environment for interaction between industry and university. The resource centre contains software, microscopes and ancillary equipment that enable acquisition, analysis and interpretation of data, literature and database searches, and production of reports, maps, and posters.

Dr John McDonald (1989-1990; B.Sc. University of Manitoba; Ph.D., University of Wisconsin) became the interim Director of MDRU after leaving Esso Minerals Canada as Chief Geologist and Exploration Manager for Western Canada. He was succeeded by the first Director, Dr John F.H.Thompson (1991-1998; BA Oxon, PhD Toronto). Dr. Ian Thomson (Ph.D., Imperial College and then of Orvana Minerals) became interim Director in 1998 and was followed by the second Director, Dr Richard M. Tosdal (1999-2008; Ph.D., BA, University of California, Santa Barbara; previously U.S. Geological Survey, Menlo Park).

Projects to investigate characteristics and genesis of and methods of exploration for various classes of mineral deposits are formulated by the Director, the faculty of UBC and corporate members, and research is carried out in field and laboratory by faculty, graduate students, post doctoral fellows and research associates.

Geographic areas covered were initially largely in western Canada, but the scope has broadened and now covers all inhabited continents.

Support, both monetary and in kind, comes largely from sponsoring companies and individuals, who through their annual membership of MDRU provide a significant component of the infrastructure supporting the research unit. An endowment was funded by contributions from the financial institutions and mineral companies headquartered in Vancouver and matched by contributions from UBC. Current Foundation Members, who have committed to the long term financial viability of MDRU, include Barrick Gold, Anglo American, Goldcorp, Kennecott Exploration and Teck Cominco. Minor income comes from continuing education courses. In 1999, a gift from Patricia Sheahan established the Sheahan-MDRU Literature Service for geologists engaged in mineral exploration.

At present, monthly Diamonds & Metals newsletters, distributed electronically, list recent academic literature and technical resources of relevance to mineral exploration geologists. Online Diamonds & Metals databases are available for specialists. The diamonds database contains over 60,000 references related to diamond exploration and mantle rocks dating back to the late 1800's. The metals database contains over 40,000 references specific to exploration for gold, silver, platinum group elements, copper, zinc and uranium dating back to the early 1970's.

Since the inception of MDRU, 49 students have written MSc theses under its auspices, and 7 students have completed Ph.D. dissertations. There have been 44 projects formulated, completed, or underway.

In 2007, MDRU was awarded the Leo Derikx Synergy Award from NSERC and in 2008, a Special Tribute Award from the Association of Mineral Exploration British Columbia, (See Special Tribute, Page 17 for more details) each in recognition of the many years of collaborative research with the minerals industry and the training of geoscientists through graduate and postdoctoral research.'

**Janina Micko standing on the Westrim of the Galore Creek valley, overlooking Galore Creek camp. The photos was taken by Danette Schwab in August, 2006**

# History of the UBC Geology Field School

**Oliver Field School - Kitchen and Sleeping Accommodations**

From the 1920s on a variety of arrangements were made for instruction of geology students in field techniques. In 1949, field school was run from old mine cabins near Twin Lakes, 15 miles NW of Oliver by W.H. White and R.M. Thompson. The area was considered too high and too wet. From 1950 on, the field school was on land leased from George Lundy on Victoria Creek near Oliver. Geology and Geological Engineering students spent three weeks in camp at the end of third year. Land (90 acres) was eventually purchased by UBC on this site, on the west side of the north-south Fairview-White Lake Road, a few hundred metres north of the entrance to the Suzy Mine, at that time an operating mine. The field school was later directed by R.V. Best until his retirement in 1981 and then by a variety of faculty members.

Exercises available in the region around Oliver included underground mapping in the Suzy Mine; surface mapping: highly deformed metamorphic rocks of the Shuswap group, lesser deformed rocks along the Fairview-Cawston Road, Paleozoic and Eocene sediments and volcanics on a ridge above the village of Ollala; section measurement of a sequence of Eocene tuffs and flows near White Lake, engineering projects (siting a dam in Marron canyon, examining unstable slopes at Perpetual Landslide), mine visits (Brenda, Phoenix, Dusty Mac), geophysical and geochemical surveys, "Death March" traverse across Eocene volcanic rocks.

The number of buildings in the camp gradually increased: to the original cook and dining shack were added a drafting hut, ablutions huts and various dormitory huts. Mining & oil companies donated skid shacks before 1970. A wild-fire originating in the Oliver Town dump in summer of 1969 burned down the northernmost building in Field School on the hill above the drafting hut, but a student or local resident beat out a tongue of fire and thus saved the other buildings. Women students, who in early 1970s were few, were obliged to sleep in the drafting hut in a small partitioned space separated from another partition where R.V. Best slept. He snored. Eventually (about 1973 or 4) Linda Thorstad (who years later was elected to the UBC Board of Governors) rebelled and elected to sleep in one of the men's dormitory huts. The increasing percentage of women students as years passed, propelled construction of larger quarters for women. Increasing agricultural settlement in the small valley in which the camp lay led to withdrawal of water for irrigation by settlers and lowering of the water table, so that the original well at the camp, in alluvium near Victoria Creek, went dry. A new deeper well was drilled in about 1990. Meals for the Oliver field-school were initially prepared by students on KP, but eventually professional cooks were hired and trailers provided for their accommodation.

Large numbers of students in the early 1970s resulted in too many students for the Oliver camp to accommodate. At the instigation of R.V. Best, the field school was therefore held in two places, Oliver and Salt Spring Island. One half of the students started at Oliver while the other half started at Salt Spring, and each half transferred to the other site halfway through the field school. Students and instructors at the first field school on Salt Spring (about 1971) were accommodated at Rainbow Beach Resort, on west coast of Island, south of Boothbay Canal. A year later a resort on St Mary's Lake was occupied, then a campsite owned by the YWCA, and finally the students slept in small tents in Mouat Park near Ganges, and drafted up exercises in a church hall near Ganges. Showering was in the YMCA. Exercises at Salt Spring, included mapping of an igneous contact on Mount Tuam, mapping of folded strata at Long Harbour, inspection of an unconformity at Cusheon Lake, and a one-day marine exercise organized by Murray and Chase, utilizing small vessels from the Fisheries Research Board at Nanaimo and the Canadian Fisheries Patrol. The marine exercise, involving about a dozen students at a time, included use of the ship's echo sounder, use of a sextant and nautical chart to obtain position, measurements of water clarity using a Secchi disk, and determination of temperature–depth profiles in straits and inlets with a bathythermograph utilizing smoked glass plates inscribed by a needle whose position changed with temperature and water pressure (depth). Bottom samples were obtained with a Phleger corer and a stainless steel Dietz-Lafond grab sampler. When numbers of enrollees fell, Salt Spring field school was discontinued after 1982.

When the sinusoidal curve of enrolment in the geology program versus time was again at a crest, it was foreseen that numbers of students for the third-year field school would once again exceed the capacity of the Oliver camp. Faculty (W.H.Mathews,M.Bustin, W.C.Barnes, J.V.Ross) conducted a reconnaissance of the Rocky Mountains and planned a one week field trip, to be repeated three times over the duration of the field school, each repetition involving one third of the students: students went in buses and vans from Oliver along Route 3 to Blairmore, then north to Canmore and west back to Oliver. Exercises on the Rocky Mountain Field Trip included a section measurement of a bed of volcanic ash bearing garnets, on Highway 3 west of Blairmore, a three-day map exercise in the Livingstone Range where Paleozoic strata were thrust over Mesozoic coal-bearing strata, with a view across the valley to the Frank Slide, a visit to an enormous glacial erratic on the road up to Calgary, an exercise mapping strata and faults at the Seebee dam near Canmore, a look at the carbonaceous Devonian Exshaw Formation, and an exercise measuring section in Devonian reef carbonates along the road up to the town reservoir in the hills south of Canmore. Personnel stayed in a motel at Blairmore for some nights, and at the Alpine Club of Canada north of Canmore for two nights (courtesy of WH Mathews, leader of the first Rocky Mountain field trip, a member of the Alpine Club). The Rocky Mountain fieldtrip was eventually discontinued in 1992 because of decreasing numbers of students, expense, and long hours spent driving from one site to the next.

In 1994, a one-week field-school was instituted at the end of second year, and in1995, the 3rd year field school was reduced to 2 weeks from the original 3 weeks. The second year field school took place at Salt Spring Island (previously, second year field work comprised mapping exercises at Caulfeild Cove, West Vancouver and a trip south of the border to the San Juan Islands to view fossiliferous Permian limestone and outcrops of components of ocean crust). At Salt Spring, under the direction of Dr. Mary Lou Bevier, the students learned to measure sections, examine an unconformity, map fold structures, and follow a metamorphic-sedimentary contact, etc.

(the above from M.Y.Williams, 1959, p.135-37, personal memories of R.L. Chase, William Barnes, and Carlo Giovanella, records of the Okanagan Historical Society)

**History of other field activities now in Earth and Ocean Sciences.**

Roger Beckie and Leslie Smith introduced a two-week field-school for Geological Engineers interested in hydrology in 1990, the school fieldwork being done on the banks of the Fraser river at Richmond: other measurements and calculations via computer were undertaken on the UBC campus.

The oceanographers were involved in the founding of the fieldschool at Bamfield, on the west coast of Vancouver Island. The following is taken from the website of the Bamfield Marine Station (http://www.bms.bc.ca/university/). “In 1968, the National Research Council asked five western Canadian universities to propose the best location for a marine biology station on the Pacific Coast. A committee of representatives from the universities of British Columbia, Victoria, Calgary, Edmonton and Simon Fraser University in 1969 recommended Bamfield. The former cable station property was purchased in 1969 and a formal structure for the management and development of the station was created in 1970 when the five universities ratified a Constitution and joined the Western Canadian Universities Marine Biological Society (WCUMBS). In 1971, development began. The first summer classes in 1972 (Marine Phycology taught by Dr. Louis Druehl and Marine Ecology taught by Dr. Bill Austin) were conducted from a temporary location, and by the end of 1972, the Bamfield Marine Station began operations as a true marine laboratory.”

**The Bamfield Marine Sciences Centre was originally the site of the Pacific Cable Board (PCB) Cable Station, which served as the eastern terminus of the trans-pacific telegraph cable from 1901 to 1959. In 1901 the cable ship Colonia set out from Bamfield to lay the 4,000 kilometer-long undersea cable line, known as the All Red Cable Route, to Fanning Island, some 1,600 kilometers south of Hawaii.**

**(above picture and annotation taken from the Bamfield Marine Sciences Centre website)**

# CROWN PRINCE OF BELGIUM, HRH PRINCE PHILIPPE VISITS EOS

**Walking to the lab**

On Thursday March 13 2008, UBC was honoured by the visit of the Crown Prince of Belgium, HRH Prince Philippe. One of the goals was to visit the Pacific Centre for Isotopic and Geochemical Research (PCIGR) at EOS.

HRH Prince Philippe first met with UBC President, Dr. Stephen Toope accompanied by the Ministers de Donnea and Ceysens, the Belgian Ambassador Lint and the Canadian Ambassador Glasgow, G. D'Hoop, Serge Jaumain (VP International, Université Libre de Bruxelles) and Craig Klafter (VP International, UBC). This was followed by a stop at the Anthropology Museum and then by an extended visit of the PCIGR, with Dr. Dominique Weis, CRC Tier I (Geochemistry of the Earth's Mantle). The Crown Prince was accompanied by a large press entourage, as well as bodyguards and numerous official representatives.

In the discussions during the visit to some of the PCIGR instruments, the Crown Prince showed a keen interest and asked numerous questions. He was interested in finding out more about:

- our isotopic studies on oysters and mussels in the Western Pacific to trace the origin of the high cadmium contents and the comparison with French oysters,
- what can we find about the origin of diamonds with isotopic studies,
- lead pollution in the Vancouver area and how we trace it by an isotopic study of old trees from Stanley Park,
- what is interesting about mantle plumes and why, where, and when to study them,
- why do we date rocks, among other subjects.

With the two ministers, he also asked Dr. Weis for a comparison between Canada and Belgium in terms of supporting research and if she would consider going back to Belgium after living in such a beautiful city. The group was very impressed by the technology, the team, and the remarkable, high-technology instruments.

At the occasion of this honourable visit, there was also an interview with the main French speaking Belgian TV (RTBf1) for Drs. Weis and Jaumain where they discussed the considerable interest in collaboration between Belgian and Canadian universities including student and research exchanges.

**Counting Isotopes (Dominique Weis with HRH Prince Philippe)**

**Mass Spec Explained in the Nu Plasma Lab**

# SWISS CONSUL'S VISIT

**From left to right: Dick Tosdal, Dominique Weis, Walter Deplazes (Consul), Paul Smith, Thomas Bissig, Stefan Wallier**

The Swiss Consul, Mr. Walter Deplazes visited UBC on March 31st 2008 to meet with Swiss professors and researchers as well as professors interested in European studies. The visit included a stop at the Earth and Ocean Sciences department where he met with Thomas Bissig, a Swiss research associate with MDRU, along with the head of the department Paul Smith, the director of MDRU, Dick Tosdal, and Stefan Wallier, a Swiss PhD student at MDRU.

The main objective of the consul's visit was to acquaint himself with the range of expertise and possible future academic collaboration, both with Swiss universities and Swiss companies operating in BC. Several Swiss companies in BC work in the environmental engineering and technology sector and expertise in environmental sciences and geology will be of interest to these companies.

Dominique Weis, director of PCIGR was present and gave a presentation on some of the outstanding analytical facilities at PCIGR

Thomas Bissig is a board member of the Swiss/Canadian Chamber of Commerce. He is responsible for education and research and the ultimate objective will be to improve collaboration between Swiss companies and UBC academics

# Solid as a Rock?

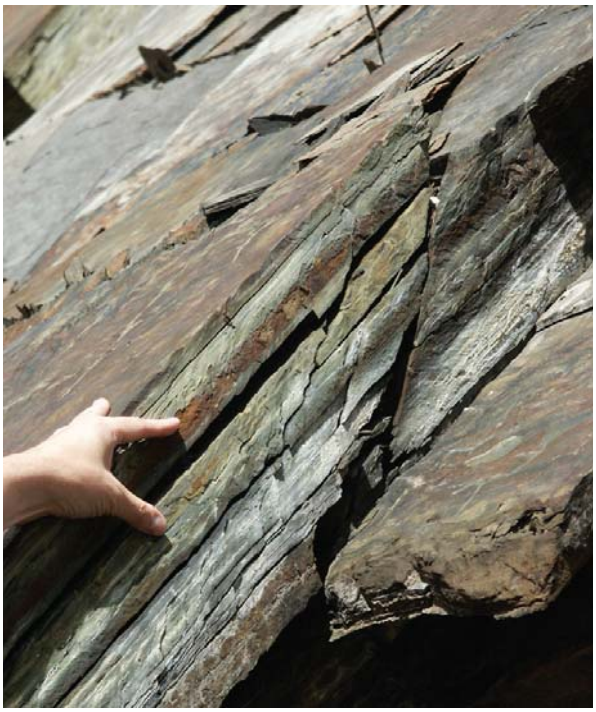
## Predicting Geological Catastrophes

***UBC geological engineer Erik Eberhardt is working to understand and mitigate the complex processes and problems of rock failure. Whether in natural disasters such as landslides, or in the challenge of building tunnels and mines, his research investigates the slippery slopes of rock mechanics and engineering.***

The image of a mountain conjures permanence, solidity and strength. But even the most solid rock is prone to erosion, fracture and failure over time. Erik Eberhardt, **Associate Professor in the Department of Earth & Ocean Sciences**, uses a combination of geotechnical monitoring tools, geological mapping data and numerical modelling to understand how rock responds to engineering or natural activity. His research helps to better predict rock slope hazards and mining and tunnel disasters, as well as provide insight into the effects of human interaction with the environment and changing global climate patterns.

Eberhardt started his geological career with Atomic Energy of Canada, as a doctoral student at the University of Saskatchewan researching potential rock fracture and damage in excavations for storing nuclear waste. If fractures were generated during the excavation process, they could potentially create new pathways for the stored waste to escape. One of Eberhardt's first major contributions to the field was his research on a phenomenon called brittle fracture.

"The rock itself has natural defects. Brittle fracturing occurs along these defects and through the bridges of intact rock in between," explains Eberhardt. "As these fractures progressively link up, the high-strength bridges degrade over time, causing the rock to destabilize along the extended fracture, eventually resulting in a through-going rupture surface and catastrophic failure." He has applied his research and methodology to help solve geological engineering problems around the world—in South America, Europe, the US, South Africa and Canada, including the Kicking Horse Pass and Sea-to-Sky Highway in British Columbia.



**Brittle fracture cutting through solid rock in rock slope near Lake Louise**

**Installation of borehole instrumentation at the Randa In Situ Rockslide Laboratory**

## Bringing the Laboratory to the Mountain

On average, a massive rock slide—greater than 10 to 20 million cubic metres—occurs somewhere in the world every 20 to 30 years. Key questions puzzled Eberhardt. If a slope has remained standing since the glaciers retreated several thousand years ago, why would it come down now? If it was merely triggered by a heavy rainfall or earthquake, why didn't it fail earlier during any one of a number of previous heavy rainfall or earthquake events?

Eberhardt took his theories of brittle fracture and strength degradation to Zurich to study a massive rock slide that had occurred in the southern Swiss Alps in 1991. With funding from the Swiss National Science Foundation and colleagues at the Swiss Federal Institute of Technology (ETH Zurich), he set up the Randa In Situ Rockslide Laboratory on a shifting mass of mountain—rock above the 1991 slide that hadn't failed yet but was moving. It was the first installation of its kind to integrate a variety of multidisciplinary investigation techniques together with qualitative and quantitative analyses in the study of rock and landslide hazards (see photo above).

"These mass movements of earth and rock involve a large number of geological, hydrological and geomechanical processes that occur as the result of a continuous, causal series of events," says Eberhardt. His research on strength degradation has shown that, contrary to popular belief, the strength of the rock itself is not constant, but gradually weakens over time. Heavy rainfall or tremors can act to destabilize a slope, but not through a single large event. Instead, each rainfall or tremor acts to disturb the balance of forces in the slope, enabling brittle fractures to develop, which in turn progressively weaken the rock.

## Multifaceted Observation

One of the problems that geological engineers have faced over the years is that their approach to problem solving has been largely observation based and phenomenological. But measuring events at the surface of a rock slope does not provide information on what is happening at the subsurface where the failure is developing.

When dealing with deep fractures, visual observation is not enough. To accurately measure and model the interconnected events that lead to brittle fracture and strength degradation requires a multifaceted approach. For example, Eberhardt uses microseismic monitoring—similar to that performed for large-scale earthquakes—to listen to the snap, crackle and pop of movement and fractures deep underground.

"The problem is so complex that we try to throw everything at it," he says. "In order to understand the network of fractures in the ground, we monitor displacements, water pressures and microseismicity over time to determine how the kinematics of the failure in the slope is developing. We then use numerical models to try to reproduce some of these effects and gain a deeper understanding of the mechanisms and processes."

Eberhardt credits BC-based consulting companies Golder Associates, BGC Engineering, Piteau Associates Engineering, and mining company Rio Tinto for providing case histories that allow him and his students to further develop their ideas.

**Aerial view of the villages of Campo Vallemaggia and Cimalmotto, located on top of theCampo Vallemaggia Landslide**

## Villages on a Slippery Slope

Imagine an entire community slowly sliding down a mountain, closer and closer to tumbling into the abyss. The villages of Campo Vallemaggia and Cimalmotto in the southern Swiss Alps are situated on top of a deep-seated, creeping landslide of approximately 800 million cubic metres of crystalline rock (see photo). Its movement has been reported for over 200 years. The presence of artesian springs deep below the surface have also been documented, dating back to famed alpine geologist Albert Heim's observations in 1897. Historical belief was that erosion at the toe of the landslide was the primary cause of the instability. However, measures to stop the landslide through erosion control have failed, and the villagers have been on continuous alert for emergency evacuation.

"Our understanding of how water destabilizes a slope didn't come about until the 1920s," notes Eberhardt. Complicating the matter, the rock type wasn't one considered as being permeable. He and former PhD student Luca Bonzanigo used numerical modelling techniques to demonstrate that high water flow pressures within fractures cutting through the rock were responsible for driving the unstable slope movements.

"Many thought that draining the slope wouldn't work, because so little water was coming out of this huge mass of rock. We used numerical models to show that high water pressures don't necessarily mean large volumes of water." Although the crystalline rock the villages are perched upon has very low permeability, the fractures in the rock are permeable, and have the ability to drive up high water pressures at depth. These in turn counteract the frictional forces working to prevent slip, enabling movement along the sliding surface.

Eberhardt's work not only confirmed that deep drainage using a large number of boreholes was the correct method to stabilize the slope, it also helped to show villagers that annual inspection of boreholes was required to maintain drainage.

SYNERGY>>jOURNAL OF UBC SCIENCE, ISSUE 1/2008
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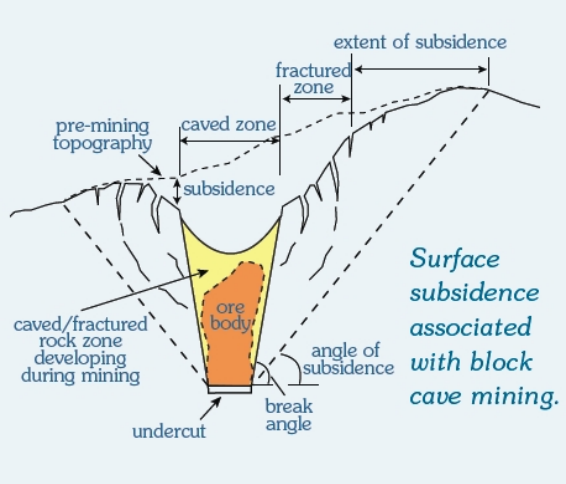
Mari-Lou Rowley, the author, is a science writer, poet and principal of Pro-Textual Communications

**Digging Deeper Mines**

With mineral prices soaring, and many surface mines reaching a depleted state, mining companies need to dig deeper to unearth more difficult deposits. One of the methods currently used in copper and diamond mining is block caving, where tunnels are drilled underneath the ore body. Since the rock is already weak and fractured, little blasting is required to mine the ore (see graphic below). Instead, it collapses under its own weight, and then shovelled and taken to the surface to be processed.

"Essentially, they let the rock mine itself," says Eberhardt. "The problem, as you let it collapse, is that anything from subsidence to a big hole opening up on the surface can happen." He notes that for earlier mines located in remote regions, this was not a critical issue. Now, with mines being built under working surface mines or near to communities, there is more at stake.




Eberhardt and colleagues at UBC, Simon Fraser University, and international partners Rio Tinto and Diavik Diamond Mines are studying the causal effect of geological faults and fractures on mining-induced subsidence patterns, and their effect on sensitive surface structures.

"Again, understanding the influence of geology and fractures, and their potential impact on a design, is critical for helping engineers develop safe, economical and efficient solutions," says Eberhardt.

# Physicist has head in the clouds studying global warming;

## Unlike glaciers, clouds respond immediately to changes in the earth's temperature


**Philip Austin, a physicist at the University of B.C., studies how clouds respond to rising global temperatures.**

When some people look at clouds, they see animals. Others see faces. Philip Austin sees a lot of unanswered questions.

Austin is a cloud physicist in the Department of Earth and Ocean Sciences at the University of B.C. And since 1983, both at UBC and before that at NASA, he has been studying how clouds behave: what makes them form, what makes them disappear and how things like temperature and pollution affect their composition.

All of which might seem interesting, but not terribly important, except for one thing: global warming. It turns out that how clouds respond to rising global temperatures is one of the key factors that will determine the extent of global warming. In 2007, the Intergovernmental Panel on Climate Change predicted that, if $CO_2$ levels are kept below 560 parts per million -- itself a challenge given that we're already at 380 ppm -- global temperatures will likely rise between 2 and 4.5 degrees Celsius. The difference between those two numbers may not seem like much but, in climate terms, it's a huge deal. Even a two-degree rise won't be pretty. The last time the Earth was that hot, about three million years ago, the sea was six metres higher than it it is now. But at least we have some idea what might be in store. "The further you go over two degrees, the further into unknown territory you're moving," said Austin. "At 4.5 degrees, you are going back more than 15 million years ago. The last time it was that hot there wasn't ice at either pole."

The gaps in the IPCC's predictions are the result of a number of uncertainties, such as how much the ice caps will melt and whether the world's oceans will store less $CO_2$. But the greatest unknown? Clouds. "It's the single biggest uncertainty in climate modelling right now," said Austin. And it's also the most important in the short term, because clouds, unlike glaciers or oceans, respond immediately to even small changes in temperature and weather patterns. Clouds impact our climate in two main ways: one that cools things down and the other that warms them up. The blanket of clouds near the earth's surface generally cools the Earth by reflecting sunlight back into space that would otherwise be absorbed by the oceans and converted into heat. "These low clouds are very efficient at essentially being shade umbrellas," said Austin.

In contrast, cirrus clouds in the cold upper atmosphere -- which cover about 30 per cent of the earth's surface -- do the reverse. These clouds, which are made up of ice crystals rather than water droplets, are so thin and wispy that most sunlight passes right through them. But when it comes to trapping heat from below, they function almost exactly like $CO_2$, preventing thermal radiation from escaping the earth's atmosphere. "High clouds are as effective at heating the atmosphere as low clouds are at cooling it," said Austin.

Ironically, one of the few things that has saved us so far from bearing the full brunt of all the $CO_2$ we've pumped into the atmosphere is, of all things, other forms of air pollution. Certain types of emissions -- like sulphur dioxide from coal-burning power plants -- turn into liquid aerosols in the air, causing visible pollution in the form of smog and haze. On their own, these particles cool the planet, by reflecting sunlight back into space. And they also have have an impact on clouds.

Clouds form when water vapour condenses around little particles in the air, forming a water droplet. If there are more particles in the air, water vapour spreads itself over more, but smaller, water droplets, making the top of the cloud reflect more light. "It's like taking a [pane of] glass and breaking it into little pieces. It will actually reflect more," said Austin. "And that's how pollution can change how bright the clouds are."

Scientists have documented this phenomenon by comparing clouds in the northern hemisphere, which has relatively dirty air, with those in the south, where the air is much cleaner. On average, said Austin, cloud droplets in the north are about 20 per cent smaller. Clouds made up of smaller droplets are also less likely to have those droplets collide and form raindrops, meaning they stay up in the air longer before raining themselves out. Scientists estimate that, taken together, aerosol pollution has probably reduced our impact on global warming so far by about 40 per cent. "We're getting a huge break," said Austin. The problem is, it's not clear how long that break will last. Aerosol pollution creates a lot of noticeable problems, like smog and breathing difficulties -- which is why rich countries like Canada have worked hard in recent years to clean up their acts by, for example, requiring scrubbers on smokestacks. As a result, the volume of aerosols in the atmosphere -- which once was rising in lock-step with $CO_2$ -- has started to level off. And that's a problem, because $CO_2$ levels are still rising. "As we remove the aerosols, we're just bringing the day of reckoning closer," said Austin. And while $CO_2$ can stay in the atmosphere for centuries, aerosols only stay up a couple of weeks, meaning once the pollution stops, they're gone.

Figuring out just how big of an impact these aerosols are having on clouds -- and what might happen if they disappear -- is the current focus of Austin's work. It hasn't been easy. One of the key ways experts predict the impact of global warming is by using computerized climate models, programs that create virtual worlds that then allow scientists to see how different factors interact. Unfortunately, getting clouds into

such models has proved fiendishly difficult. That's because while clouds affect the whole climate, what makes any one cloud form or change is based on the very specific environment around it. And while it takes years or decades for any noticeable change in glaciers or oceans, many small clouds appear and disappear within just 20 minutes. "If you ask why clouds are the largest uncertainty, it's because they have a global impact, but they're actually quite a small-scale phenomenon," said Austin. A series of satellites launched between 1999 and 2006 have helped, by using lasers and radar to get a better picture of the composition of the Earth's clouds. Austin and his team with the Cloud Aerosol Feedbacks and Climate Network -- a four-year project funded by the federal government -- are using some of that satellite data to help get clouds into existing climate models. And as tough as that work is, it helps explain only what impact clouds are having right now.

The bigger, and tougher, question is what clouds will do in the future, as global temperatures continue to rise. One theory, said Austin, is that as the oceans get warmer, humidity will increase, creating more low clouds and slowing the effects of global warming.

The other theory is that warming oceans will make the atmosphere less stable, causing low clouds to thin and break up more quickly and providing the earth with less low cloud cover, which could speed up warming. Austin says there isn't enough evidence to accurately predict which of the two scenarios will play out. But the answer will have a big impact on how bad warming gets. Some experts have suggested that one way to deal with global warming would be to pump huge quantities of particles into the air to reflect more sunlight away from the Earth. Austin concedes that, on the face of it, such a plan could work by reflecting sunlight in the same way low clouds or aerosol pollution do now. But he's uneasy with the idea of fixing one pollution problem with another -- and by throwing even more factors into a global atmosphere we only barely understand. "Adding even more stuff into the air at this point is just going to make things more complicated," he said. "And they're already complicated enough."

Reprinted with permission by The Vancouver Sun< Going Green Section, January 26,2008
Byline: Darren Stone, Canwest News Service
Image: Bill Keay/Vancouver Sun

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# UBC professor to help analyse images of Mercury

**Catherine Johnson, Associate Professor, Earth and Ocean Sciences**

A NASA probe with a B.C. connection shot past Mercury in January, 2008, finding evidence of past volcanic activity on the planet as well as a puzzling geological feature scientists have named "The Spider."

The U.S. space agency released some of the first photos and data collected by its car-sized Messenger spacecraft, which flew past Mercury on Jan. 14.

Messenger is an acronym for Mercury Surface, Space Environment, Geochemistry and Ranging.

Some of that data will later be analysed by Catherine Johnson, a professor of Earth and Ocean Sciences at the University of B.C., along with her post-doctoral researcher, **Surdas Mohit**, and **Hide Uno**, her graduate student. Dr. Johnson is one of about 20 scientists worldwide chosen by NASA to be involved in the project.

Surdas Mohit, said that Johnson will be using data from Messenger to help learn about Mercury's magnetic field. While Mercury looks superficially like Earth's moon with a cratered, rocky surface, scientists said that Messenger is showing them something quite different. "We were continually surprised. It was not the planet we expected. It was not the moon," said Sean Solomon of Carnegie Institution of Washington, the mission's lead investigator.

"It's a very dynamic planet with an awful lot going on." Mercury is a mystery in many ways and its proximity to the sun has made it difficult to observe from Earth.

Mercury has been visited by a spacecraft only twice before, in 1974 and 1975 when NASA's Mariner 10 flew past it three times and mapped about 45 per cent of its surface. The latest fly-by covered another 30 per cent of the surface, showing a side of the planet never seen before.

The probe is due to fly by again in October of this year and in September 2009 before beginning a year-long orbit of the planet in 2011.

"The Spider" was the most striking feature described by the scientists Wednesday. It is made up of more than 100 narrow, flat-floored troughs radiating from a central point, much as petals from a daisy or the legs of a spider.

"The Spider" has a crater 40 km wide near its centre, but it is unclear whether this is related to the feature's original formation and scientists aren't sure what to make of it.

"It's a real mystery," said Louise Prockter of Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland, who works on the mission.

"The Spider" is in the middle of Mercury's Caloris basin, one of the solar system's biggest impact craters, formed more

than 3.8 billion years ago when a large space rock hit. Based on the new observations, the diameter of the Caloris basin is now thought to be 1,550 km, larger than a previous estimate based on Mariner 10's data. The basin's interior looks like it was volcanically resurfaced by magma from deep within Mercury's crust or mantle.

Prockter said Mariner 10 data provided some evidence of past volcanic activity on the planet, but Messenger leaves "very little doubt that there has been widespread volcanism on Mercury's surface."

It was launched in 2004 and flew past Venus twice and Earth once en route to Mercury.

With Pluto now classified as a dwarf planet, Mercury is the solar system's smallest full planet, with a diameter of 4,880 km, only a bit larger than Earth's moon. It orbits the sun every 88 days.

## UBC, McGill Researchers Uncover "Stirring" Secrets of Deadly Supervolcanoes

**Mark Jellinek, Assistant Professor in Earth and Ocean Sciences**

**Ben Kennedy, CWSEI Lecturer in Earth and Ocean Sciences**

Researchers from The University of British Columbia and McGill University have simulated in the lab the process that can turn ordinary volcanic eruptions into so-called "supervolcanoes."

The study was conducted by **Ben Kennedy and Mark Jellinek of UBC's Dept. of Earth and Ocean Sciences**, and John Stix of McGill's Dept. of Earth and Planetary Sciences. Their results are published this week in the journal Nature Geoscience.

Supervolcanoes are orders of magnitude greater than any volcanic eruption in historic times. They are capable of causing long-lasting change to weather, threatening the extinction of species, and covering huge areas with lava and ash.

Using volcanic models made of Plexiglas filled with corn syrup, the researchers simulated how magma in a volcano's magma chamber might behave if the roof of the chamber caved in during an eruption.

"The magma was being stirred by the roof falling into the magma chamber," says Stix. "This causes lots of complicated flow effects that are unique to a supervolcano eruption."

"There is currently no way to predict a supervolcano eruption," says Kennedy, a post-doctoral fellow at UBC and lead author on the paper. "But this new information explains for the first time what happens inside a magma chamber as the roof caves in, and provides insights that could be useful when making hazard maps of such an eruption."

The eruption of Mount Tambora in Indonesia in 1815 – the only known supervolcano eruption in modern history – was 10 times more powerful than Krakatoa and more than 100 times more powerful than Vesuvius or Mount St. Helens. It caused more than 100,000 deaths in Indonesia alone, and blew a column of ash about 70 kilometres into the atmosphere. The resulting disruptions of the planet's climate led 1816 to be christened "the year without summer."

"And this was a small supervolcano," says Stix. "A really big one could create the equivalent of a global nuclear winter. There would be devastation for many hundreds of kilometres near the eruption and there would be would be global crop failures because of the ash falling from the sky, and even more important, because of the rapid cooling of the climate."

There are potential supervolcano sites all over the world, most famously under Yellowstone National Park in Wyoming, the setting of the 2005 BBC / Discovery Channel docudrama Supervolcano, which imagined an almost-total collapse of the world economy following an eruption.

# NEW FACULTY

***Kenneth A. Hickey***
***Assistant. Professor***
***Dept. of Earth & Ocean Sciences;***

BSc Geology and Zoology, Auckland University, Auckland, New Zealand; MSc Structural Geology, Auckland University, Auckland, New Zealand; PhD Structural-Metamorphic Geology, James Cook University, Townsville, Australia. Prior appointment: Research Associate, Mineral Deposit Research Unit, Dept. of Earth & Ocean Sciences, UBC. Research: My main research interest is flow of hot metalliferous fluids and the genesis of hydrothermal mineral deposits in the earth's crust. Sensitive mineral thermometers help track the paleothermal signature of fluid flow and better define vectors toward economic concentrations of metals.

***Christian Schoof***
***Assistant. Professor., Dept. of Earth & Ocean Sciences, and***
***Canada Research Chair in Global Process Modelling;***

MSc Physics and PhD Applied Mathematics, Oxford University, Oxford, UK. Prior appointment: Research Associate, Dept. of Earth & Ocean Sciences, UBC. Research: Future sea level change hinges on the behaviour of the ice sheets in Greenland and Antarctica. My research aims to improve models for ice sheet dynamics through the use of mathematics, focusing on their complex flow behaviour.

**The Carl Wieman Science Education Initiative** appointed four Science Teaching and Learning Fellows this summer: **Brett Gilley and Francis Jones, Earth & Ocean Sciences;** Tamara Kelly, Life Sciences (Zoology); and Beth Simon, Computer Science. These Fellows support the department's implementation of evidence-based education improvements. Sharing expertise in both disciplinary knowledge and science education methodology, they help introduce faculty members to new teaching and assessment tools. www.cwsei.ubc.ca

## The Mineral Deposit Research Unit receives a Special Tribute Award from the Association of Mineral Exploration British Columbia

On January 30, the Association of Mineral Exploration British Columbia awarded the Mineral Deposit Research Unit (MDRU) of The University of British Columbia a Special Tribute Award in recognition for its role in mineral exploration research, training the next generation of geoscientists for the mining and exploration community, providing a venue for gaining experience for some of the industry's brightest up and coming minds,and contributing to a vibrant Vancouver-based community. The Award recognizes the founders of MDRU Peter Bradshaw (First Point Minerals) and Alastair Sinclair (The University of British Columbia), current and past Chairs and members of the MDRU Boards Jack McClintock (Savant Exploration), Harlan Meade (Yukon Zinc), and Ian Graham (Kennecott Canada), and past and present Directors of MDRU John McDonald (Diamondex Resources), John Thompson (Teck Cominco), Ian Thomson (Ian Thomson Consulting), and Dick Tosdal (MDRU).

"In the 1980s, governments in several countries established funding programs that helped to create university based research centres for mineral exploration" notes John Thompson, a past Director of MDRU. "Peter Bradshaw, Alistair Sinclair and their supporters in industry and UBC recognized a similar need in Canada. In 1988-9, they set out to create MDRU at UBC. While MDRU has benefited from the financial support of both Federal and Provincial Governments, it was the vision of these individuals and the support of the Vancouver community that built and sustained what is now one of the best mineral exploration research groups in the world."

"Receiving the Special Tribute Award on the 25th Anniversary of the Mineral Exploration Roundup from the exploration community is an honour. It recognizes the integral role MDRU plays in the provincial, national, and international communities that constitute the exploration and mining industry and is particularly concentrated in Vancouver. Furthermore and most importantly, the award recognizes the vision and efforts of the founders, members of the board, and past directors who freely devoted significant time and energy to establishing MDRU and assisting it's growth into an internationally recognized centre of excellence in research and training," said Dick Tosdal, Director of the Mineral Deposit Research Unit.

# IN MEMORIUM

## GRANT INGRAM

In June 2007, the UBC community mourned the sudden passing of Dr. R. Grant Ingram, an internationally renowned Arctic oceanographer. We lost a valued faculty member, a distinguished scientist, a dedicated administrative leader—and a wonderful gentleman, whose optimistic spirit and easy smile made our world a better place. “Many UBC students’ and colleagues’ lives have been touched so marvellously by Grant. His scholarly contributions to the world of earth and ocean sciences, along with truly remarkable administrative service to this university, are accomplishments that bring tremendous pride to all who have known him,” said UBC president and vicechancellor Stephen J. Toope.

Grant was a distinguished scholar widely recognized for his achievements in Arctic oceanography, and his dedication to students and great sense of adventure was an inspiration to all.

From a young age, Grant excelled at school; speaking fluent French and entering McGill University at only 16. After discovering his interest in oceanography, grant spent summers on research icebreaker vessels and in tents on the Arctic sea ice studying the oceans. He brought his many talents to UBC where he shared his passion with fellow enthusiasts.

A devoted University administrator, Grant held a variety of positions during his ten-year UBC career; acting as founding Principal of St. John's College; Dean of Science pro tem; Associate Dean of Science, Strategic Planning and Research; and most recently, as founding Principal for the new College for Interdisciplinary Studies. His enthusiasm for all areas of University life earned him the respect of his many colleagues and students, who remember him as an outstanding leader and mentor with an optimistic spirit and a great joie de vivre.

To commemorate Grant's remarkable and lasting contribution to UBC, family and friends have established the R. Grant Ingram Memorial Scholarship in Oceanography. Each year, this scholarship will be awarded to an oceanography student in recognition of their outstanding academic achievement.

If you are interested in contributing to this scholarship fund, please contact the UBC Development Office at 604-822-5345.

# IN MEMORIUM

# JOHN JAMBOR

## John L. Jambor, 1936-2008, Adjunct Professor, EOS 1999-2008

John Jambor passed away in January 2008 after living with cancer for 10 months. After receiving his Bachelor's and Master's degrees in geology from UBC, John joined the Geological Survey of Canada in Ottawa in 1960. He was initially in the Petrological Sciences Division and later in the Economic Geology Division. He received his Ph.D from Carleton University in 1966.

John's life-long affair with innocuous-appearing supergene minerals started with his bachelor's thesis and his work at Galena Hill in the Yukon. In the early 1980s, when acid drainage from mine wastes was gaining prominence as environmental and economic liabilities for the metal-mining industry, his familiarity with oxidation processes led to collaborative and productive studies with geochemists investigating the generation and attenuation of acid drainage.

In 1993, John returned to the Vancouver area, continuing his work in environmental mineralogy as Adjunct Professor at both the University of Waterloo and UBC, and as the principal of Leslie Research and Consulting. John was an extremely active member of EOS, collaborating on numerous mineralogical and hydrological research projects and helping a broad spectrum of graduate students.

John published widely in the fields of mineralogy, petrology, crystallography, and mineral deposits (134 refereed publications and over 200 other publications). John also undertook editorial duties, which included Scientific Editor of The Canadian Mineralogist (1971-1975) and Co-Editor (1975-1977); New Minerals Editor, American Mineralogist (1989-2007); Consulting Editor for Exploration and Mining Geology (1991-1999). John was editor or co-editor of seven special issues, short courses and related books, and was series editor for five MSA short courses.

John received national and international awards, including, from Mineralogical Association of Canada, the Hawley Award (1970), the Queen's Silver Jubilee Medal (1977), Honorary Life Membership (1982) the L.G.Berry Medal (1991), and the Past Presidents' Medal (2002). He received the Barlow Medal and Life Membership from the Canadian Institute of Mining and Metallurgy and the Julian Boldy Memorial Award from the CIM Geological Society.

John's personal interest in scientific work, whether directed to pure or applied objectives, never waned. His career at the GSC and CANMET (Natural Resources Canada) spanned 33 years followed by 14 years as Principal of Leslie Research and Consulting in BC. John worked as hard in "retirement" as in his first career. He had special relationships with fellow scientists and colleagues including Drs. David Blowes, John Dutrizac, and Louis Cabri along with many others.

His delight in identifying new minerals was a joy to see. His eyes would literally light up and then he was a happy man. He knew in his heart of hearts that freezers in the kitchen were invented to hold core samples and the "good china" was "good" because it was the right depth and shape for evaporation procedures.

John is survived by his son Jay and his wife Lynne; his sisters-in-law Margaret Heenan and nieces Aretha and Madeline, and Janet (John) Davies, nephews on the McCarthy side particularly William (Dolores), and his far away daughters Allison and Leslie Jambor and granddaughter Shizen.

# Awards and Honours in EOS

**Two Achievement Awards for Service were awarded to EOS in 2007 - The recipients are noted below. The Award carries a $2,000 cash prize.**

**Richard Friedman** has worked in the U-Pb geochronology laboratories in the Department of Earth and Ocean Sciences (EOS) for the last 20 years. He currently manages and operates a series of chemical and analytical laboratories within the PCIGR, with a combined replacement value of over $5 million, and ensures their smooth and reliable operation.

Rich's responsibilities literally exploded with the creation of the PCIGR in 2002 and his subsequent appointment as Lab Manager for the entire facility. At the same time, as the number of graduate students increased dramatically in EOS, he began to assist and train an increasingly large number of students who require laboratory support and analytical data for their projects and theses.

The most visible mark of Rich Friedman's remarkable service record is the constant care and attention that he devotes to the facility and to helping students, research fellows, and faculty members of the department, as well as visiting researchers. All of this is always done with a smile on his face and a genuine will to help. Students and researchers are also always made to feel welcome and his availability is seemingly without limits,

**Dr. Sara Harris**' leadership and vision are directly responsible for the development of the Earth and Ocean Sciences Science Education Initiative (EOSSEI). This initiative is a focused effort to improve teaching and learning within the department of Earth and Ocean Sciences (EOS) and was the first project fully funded under the Carl Wieman Science Education Initiative (CWSEI).

In the fall of 2006, Dr. Harris chaired the Teaching Initiatives Committee (TIC) which interviewed the majority of the faculty and organized two department meetings in EOS to solicit ideas and comments for a proposal to CWSEI. Because of this groundwork and the dedication of the TIC, this proposal received unanimous support within EOS and was very well received by CWSEI. Dr. Carl Wieman and Sarah Gilbert of CWSEI were very impressed by the organized, realistic, and well thought out timelines and budgets, and made special mention of the fact that the proposal had the support of the whole department, rather than one or two people. Other departments in the Faculty of Science have now used the EOS model as a template for their own proposal to CWSEI.

To sum up, Dr. Harris was instrumental in the development of the proposal and is crucial to the effective function of the EOSSEI. In the words of one faculty member, "Sara was the heart and driving force for the proposal. Without her leadership, I doubt that we would have been successful." Her exemplary organization, interpersonal, and leadership skills have transformed the department into a world leader in Geoscience Education.

**Faculty**

On January 15, 2008 The Association for Mineral Exploration British Columbia awarded **Alastair Sinclair** the Frank Woodside Past President's award in recognition of his outstanding service to the mineral exploration community.

**Christian Schoof** was cited by the American Geophysical Union for Excellence in Refereeing. The citation is for outstanding service to the authors and readers of the Journal of Geophysical Research - Earth Surface. The purpose of the citation is to express publicly the gratitude of AGU to those whose reviews have been particularly apposite.

**Oldrich Hungr** was made a Fellow of the Engineering Institute of Canada. A quote from the awards notice "EIC Fellows are recognized for their excellence in engineering and their services to the profession and to society at an annual rate of less than .1% of the membership, an award which is recognized as the most prestigious amongst Canada's Engineering Societies". Oldrich also won the 2008 Schuster Medal awarded jointly by the Association of Environmental & Engineering Geologists and the Canadian Geotechnical Society, in recognition of his research on geohazards.

**Kelly Russell** was awarded the Peacock Medal, the Mineralogical Association of Canada's most prestigious award. To quote the announcement: We recognize [Dr. Russell] as one of the most pioneering petrologists who has been able to successfully marry the fields of theoretical modeling, experiments and field work to identify processes relevant to volcanic eruptions, melt generation and transport of silicate liquids. Kelly was also nominated for an NSERC accelerator grant.

**Students**

Students took all three prizes in the poster competition at the Mineral Exploration Round Up, January 2008:

First Prize: High-precision Pb-isotopic systematics of the Quesnel Arc: a potential exploration tool for distinguishing lower versus upper Nicola Group volcanic rocks, by **K. Breitsprecher**, D. Weis, J. S. Scoates, and R. G. Anderson

Second Prize: Controls on Cu and Au mineralization along the Coast Plutonic Complex-Southeast Coast Belt contact, Taseko Lakes Region (NTS 092O/04), southwestern B.C., by **S.K. Blevings**, L.A. Kennedy, and K.A. Hickey

Third Prize: Mineralization and Alteration associated with a hypothesized Cu (-Mo) porphyry system in Taseko Lakes, Southwest B.C., by **L. Hollis**, K. Hickey, and L.A. Kennedy

**Luke Beranek** (PhD candidate with Jim Mortensen) won second prize for poster presentations in Tectonics at the recent Arizona Geological Society "Ores and Orogenesis Symposium", honoring the career of William R. Dickinson, held in Tucson, Arizona, September 24-30, 2007. The title of Luke's poster was, "Triassic Stratigraphic Links between Pericratonic Terranes of the Northern Canadian Cordillera and the North American Margin: A New Tectonic and Paleogeographic Model from Detrital Mineral and Whole-Rock Provenance Data", by L. Beranek and J.K. Mortensen.

**Gilles Hennenfent** won the prestigious Arie Van Weelden Award for young professionals. The Arie van

Weelden Award is presented to a member of the European Association of Geoscientists & Engineers (EAGE), who has made a highly significant contribution to one or more of the disciplines in the Association and who is under the age of 30 at the end of the calendar year in which the contribution is made. The van Weelden Award consists of a medal and a certificate as well as a cash prize. Gilles is Felix Herrmann's student.

**Peter Lelievre** (Ph.D. Candidate - Supervisor: Dr. Doug Oldenburg). Peter Lelievre received the award for best student presentation at the SEG meeting in New Orleans. SEG's Best Student Paper Presented at the 2006. Annual SEG Meeting "3D magnetic inversion for total magnetization in areas with complicated remanence", P. Lelievre, D. Oldenburg, N. Phillips.

**Andrea Cade**, a PhD student of Lee Groat, won the Gold Prize ($1000) in the Jerome H. Remick III Poster Competition at the GAC/MAC meeting in Yellowknife (1st out of 65 posters). Her poster was titled "Corundum in Eclogitic Mantle".

**Kirsten Rasmussen** received a Julian Boldy Certificate Award "for the best mineral deposits paper presented at the Geological Association of Canada - Annual Meeting",in Yellowknife, NT. These are generally awarded to three papers each year that are "the most significant and creative papers presented" in the Mineral Deposits Division session.

**Mark Halverson** received an Outstanding Student Talk Award at the American Geophysical Union's 2008 Ocean Sciences Meeting in Orlando, Florida, for his talk: Tides and salinity in the Fraser River Plume, by Halverson, M. J.and R. Pawlowicz,

**Chris Leslie and Leigh Gurney** were recipients of the 2006-7 Teaching Assistant Awards from EOS undergraduates

**Abe Torchinsky** was awarded the Marvin McDill Memorial Award of the Canadian Yachting Association, also known as the Canadian Sailing Team Rookie of the Year Award, for 2007. This award is presented annually to the athlete/crew with the best results at their first Open World Championship as a member of the Canadian Sailing Team. Abe took the year off from his studies in Honours Geological Sciences at UBC to train for the Olympics in the Laser class. Abe was ranked 5th in North America (Grand Prix points) and 52nd internationally in ISAF ranking in his class.

The DuMoulin Black Awards are scholarships in support of undergraduate thesis research for students in Honours or combined Honours in Geology, Geophysics or Geological Engineering. The EOS recipients for 2007 were **Kim Bell, Edward Nelles, Andrew Pare, Dylan Hedden-Nicely and Nathan Cleven.**

Shell Canada Prizes were awarded to the top twelve students at second year (Saltspring) Geology Field School, based on a combination of their interest, enthusiasm, and aptitude for geologic field work as well as top grades. Shell Canada gave the funds for these prizes because they want to support students and are interested in student development. Winners for 2008 in Geological Sciences: **Kelly Earle, Zuzka Gadzik, Eric Letham, Matt Osborne, Christian Sampaleanu, and Erich Schmitt, and in Geological Engineering: Chloe Crossley, Josh Hurrell, Meredith Kealty, Erika Lewynsky, Jake Mathews, and Graeme McAllister.**

# STUDENT SOCIETIES

## Dawson Club Happenings 2007-2008

The G.M. Dawson Club has been busy this year as usual with social events, trips and help for students. We started off the year with our Back from the Bush event which gave students an opportunity to trade stories about their summers in camp and for new people to meet some of their fellow students. We also coordinated a great trip to Mount St. Helens over Thanksgiving which was a great success. Students got to hike to the peak of the mountain at sunset and see the volcanic activity in the crater. The trip was a hit with many of the exchange students. We hosted many social events throughout the year jointly with Georox and continued to sell rock hammers and mineral kits to students. We also organized a firearms safety course and first aid course for students going into the field.

Dawson club also embarked on two new endeavours this year. We began the exciting process of fundraising and planning the Western Inter-University Geological Conference, WIUGC, which UBC EOS students are hosting next year and we reintroduced the May Sze photo contest. Photos were submitted by undergrad EOS students and judged by faculty and staff members. Framed photos are now on display in the new student space on the second floor. Winners also received a framed copy of their photos. Alexandra Kushnir placed first with an outcrop photo from Petra, Jordan. Celeste Rambaran came in 2nd with a shot from Kilauea in Hawaii and Richard So placed third with a beautiful mountaintop shot. All of the photos submitted were amazing and the contest would not have been possible without the generous May Sze endowment fund set up in honour of past Dawson Club President May Sze. We were thrilled to be able to continue the photo contest in her memory. Dawson Club had an awesome year and part of that is because of the generous donations of Alumni. Thanks to everyone for another great year.

### MAY SZE PHOTO CONTEST WINNERS

**Alexandra Kushnir placed first with an outcrop photo from Petra, Jordan.**

**Celeste Rambaran came in 2nd with a shot from Kilauea in Hawaii**

**Richard So placed third with a beautiful mountaintop shot.**

## UBC Oceanography Society (OSOC)

The UBC Oceanography Society (OSOC) is a fairly new club at UBC for people who are taking oceanography or are interested in the field of oceanography and what we do. One of the best opportunities in OSOC is the chance to meet and socialize with others that are interested or involved in the field. We have members not only in oceanography but also in many diverse fields including marine biology and conservation. This past year we took a trip to the Vancouver Aquarium and hope to include more activities such as this, relating to our common interests, in the future.

We also held a barbeque for Earth and Ocean Sciences and in the past have had other fundraisers such as selling exam packages, UBC OSOC T-shirts, and Krispy Kreme sales.

**OSOC BBQ**

We also have many casual group outings where we can get to know each other and learn more about our common interests and what people are studying or future goals they have. These include going out for dinner or drinks or even a fun night of bowling!

In past years we have also gone hiking and snowshoeing or held oceanography related movie nights! In the future we hope to participate in more outdoor activities and plan to go Scuba Diving, Surfing or organize beach walks or other activities that pertain to the interests of our club members. We are truly a dynamic group of people, and being a new and small club at UBC have the ability to participate in different types of activities, and hope to grow in future years. In OSOC, it is our goal to bring people together of common interest, to meet new people and make connections with future friends or coworkers, and to explore the amazing world of Oceanography!

**Total enrollment in undergraduate courses offered by EOS.**
**Numbers in brackets indicate increase over preceding year.**

| | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|
| **1st Year** | 1966 (+39) | 1862 (-5.3) | 1900 (+2) | 1938 (+2) |
| **2nd Year** | 580 (+25) | 594 (+2.4) | 693 (+16) | 771 (+11) |
| **3rd and 4th Yr** | 1458 (+22) | 1752 (+20.2) | 1827 (+4) | 1767 (-3) |
| **Service Courses** | 771 (-13) | 580 (-24.8) | 604 (+4) | 553 (-8) |
| | | | | |
| **TOTAL** | **4775 (+20)** | **4788 (+.3)** | **5024 (+5)** | **5029 (+.1)** |
| | | | | |
| **Summer** | 446 (-28) | 474 (+6) | 366 (-22) | 249 |
| **Distance Ed** | 363 (-9) | 326 (-10) | 321 (-1) | 429 |
| | | | | |
| **Grand Total** | **5584 (+12)** | **5588 (+.1)** | **5692 (+1.8)** | **5707 (+.2)** |

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

| | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|
| **EOS - Major** | **69** | **100** | **86** | **93** |
| **ATSC** | **35** | **41** | **25** | **23** |
| **ENVR** | | | | **83** |
| **GEOL** | **38** | **43** | **35** | **23** |
| **GEOE** | **85** | **96** | **106** | **121** |
| **GEOP** | **8** | **12** | **9** | **5** |
| **OCGY** | **17** | **14** | **9** | **3** |
| | | | | |
| **TOTAL** | **252** | **306** | **278** | **351** |

**Graduate Enrollment: 2007**

| | ATSC | GEOE | GEOL | GEOP | OCGY | TOTAL |
|---|---|---|---|---|---|---|
| **MASc** | - | 6 | - | 3 | - | **9** |
| **MEng** | - | 1 | - | - | - | **1** |
| **MSc** | 4 | - | 40 | 10 | 12 | **66** |
| **PhD** | 11 | 4 | 39 | 14 | 17 | **85** |
| **Total** | **15** | **11** | **79** | **27** | **29** | **161** |

**Graduate Theses Completed in 2007**
**Supervised by Earth and Ocean Sciences Faculty,**
**Including Thesis Programs External to the Department**
**(Name of Supervisor in Brackets)**

**(i) Ph.D.**

**BAZIW, Erick:** Application of Bayesian Recursive Estimation for Seismic Signal Processing (T. Ulrych/M. Bostock)

**CHALMERS, Gareth:** Geological Controls on Gas Sorption Capacities and Regional Gas Shale Potential of the Lower Cretaceous Buckinghorse Formation, Northeastern British Columbia (R.M. Bustin)

**CREYTS, Timothy:** A Numerical Model of Glaciohydraulic Supercooling: Thermodynamics and Sediment Entrainment (G. Clarke)

**HENNENFENT, Gilles:** Sampling and reconstruction of seismic wavefields in the curvelet domain (F. Herrmann)

**LONGRIDGE, Louise:** The Systematics and Paleobiology of Hettangian Ammonites from the Allochthonous Terranes of British Columbia (P. Smith)

**LU, Beiwei:** Quasi-objective nonlinear principal component anaylsis and applications to the atmosphere (R. Stull)

**PASION, Leonard:** Inversion of time Domain Electromagnetic Data for the Detection of Unexploded Ordnance (D. Oldenburg)

**YE, Zhengqing:** Changes in the El Nino-Southern Oscillation Under Climate Regime Shift and Increased Greenhouse Gases (W. Hsieh)

**(ii) M.A.Sc.**

**MAYSAMI, Mohammad:** Lithology constratins from seismic waveforms: application of OPAL-A to OPAL-CT transitions (F. Herrmann)

**(iii) M.Sc.**

**CHENARD, Caroline:** Phylogenetic Analysis of Genes Encoding Photosynthesis Proteins in Cyanophage Isolates and Natural Virus Communities (C. Suttle)

**CRAWFORD, Evan:** Klondike Placer Gold: New Tools for Examining Morphology, Composition and Crystallinity (J. Mortensen)

**DROST, Helen:** Can Fatty Acids, Found in Sediments From Three Coastal B.C. Inlets, be Used as Biomarkers to Hindcast Harmful Algal Blooms of Heterosigma Akashiwo (C. Suttle)

**JAGO, Christopher:** Metal- and alteration-zoning and hydrothermal flow paths at the moderaly-tilted, silica-saturated Mt. Milligan Cu-Au alkalic porphyry deposit. (R. Tosdal)

**LANE, Erin:** The Interaction Between Cadmium and Iron in Marine Phytoplankton (M. Maldonado)

**MARKOVIC, Goran:** The Age and Origin of Megacrysts in the Jericho Kimberlite (Nunavut, Canada) (M. Kopylova)

**NAPIER, Scott:** Practical Inversion of 3D Time Domain Electromagnetic Data: Application to the San Nicolas Deposit (D. Oldenburg)

**NEMCEK, Nina:** Membrane Inlet Mass Spectrometry: A Novel Approach to the Oceanic Measurement of Dimethylsulfide (P. Tortell)

**RAUTENHAUS, Marc:** Neutral Network Satellite Retrievals of Nocturnal Stratocumulus Cloud Properites (P. Austin)

**ROBERT, Genevieve:** Rheology of porous rhyolite (J.K. Russell)

**ROSCHINSKI**, **Tilman:** Redox Geochemistry in the Hyporheic Zone of the Lower Fraser River (R. Beckie)

**SCHEEL, J. Erik:** Age and Origin of the Turnagain Alaskan-type Intrusion and Associated Ni-Sulphide Mineralization, North-Central British Columbia, Canada (J. Scoates)

**WHITTY, William:** Structural and metamorphic evolution of the Ormsby Zone and relative timing of gold mineralization: a newly defined archean orogenic gold prospect hoseted on the Discovery Property Yellowknife Greenstone belt, Slave Province, Canada (R. Tosdal)

**YARHAM, Carson:** 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.**

**The following letter was received in response to last year's debate in our Alumni Newsletter (2007) between Dr. Roland Stull and Dr. Philip Austin:**
**(reprinted here with permission by Jennifer Black)**

Dear Dr. Stull;

I was very interested in your article in the recent alumni publication. While I agree with you on some of your points, (and I have been thinking about this for some time), I have to disagree with some of your arguments.

First of all, I'd like to say that I appreciate your reminder that correlation does not indicate cause and effect. While I'm thrilled that people are starting to care about climate change, I also cringe when I hear people attributing all current weather patterns to climate change, or asserting with certainty a causal effect. Bad science either way can get us into trouble.

You may not think that you are generating as much $CO_2$ as you did 20 years ago, and you may be correct, but that does not mean that rising $CO_2$ emissions can be attributed solely to population growth. GDP is strongly connected with the resources taken from and waste returned to the environment (including $CO_2$), and our economy has continued to grow over and above our increase in population. If fact, GDP per capita is about 2.2 times greater than it was 30 years ago in Canada. You may drive a more efficient car now, but what about the emissions generated to make that new car? What about the fact that the raw materials come from one part of the world, are processed somewhere else, and the car is assembled wherever the cheapest labour can be found? We're all replacing goods today at an astounding rate. According to Dr. Eric Williams, in the standard 3 year lifespan of a PC and monitor, 81% of the energy is used to create them and only 19% is used to run them. Thus, looking at our daily usage while omitting our purchasing habits and the related production, we are only looking at part of the story.

Even if our cars are more efficient, that doesn't change the fact that we're driving more; average commuting times are up by an average of 42 hours a year in Canada since 1992.

So I think to attribute rising emissions to population increase alone is unfair. You comment on presuming a basic standard of life for everyone on the planet. But this is hardly reflective of what is happening today. Here in the wealthy countries, we have set the bar incredibly high. The question isn't "ought everyone to have food and shelter", but "how can we tell the Chinese and the Indians that as their economies grow, they cannot have two or more TVs, vehicles, etc., per family, because the world will collapse". We all know that in Canada we generate far more emissions than our share, yet our population is not significantly increasing.

You argue that for many second and third world countries, the population is still exploding. I'm not sure this is accurate. For example, in India, the fertility rate is only 2.81 per woman; in the United States, it's 2.09. To me, this is not as vastly different.

That said, yes, population control probably should be part of the solution. You're absolutely right that this is something that no one, and especially politicians, likes to bring up, so I thank you for your candidness. Also, I think you're right in saying that a) solutions will come from the bottom up, and b) the solutions are societal, not technical. New technologies may help, but as one of my professor says "there is enough low-hanging fruit to make a significant difference now".

Is it a mistake for people to care about climate change, given the uncertainty? I don't think so- for two reasons. The first is the precautionary principle; that is, in the face of scientific uncertainty, we ought to act to avert unnecessary risk. Most of us do this every day in our lives, and when the potential effects are global, it becomes even more important. Secondly, the environmental problems we face are not isolated; many of the solutions proposed to help reduce climate change will also help with the crises on your list. For example,

* Driving less, and planning urban areas to reduce the need for driving will improve our air quality, and reduce our dependence on foreign oil.

* Growing and buying local food will simultaneously reduce the carbon footprint of our meals and increase food security.

So I believe that these problems are all connected. Maybe climate change has had more than its share of the limelight, but at least it's getting people to care and talk about the environment. It's a start.

Thanks for your article. I appreciate your insights.
Sincerely, Jennifer Black
B.Sc. Geology and Geophysics 2005
P.B.Dipl. Student,
Community Sustainable Development, SFU

**A Letter from Dave Classen,**
**M.S. Geophysics, 1970**

Upon opening the most recent copy (2007) of the EOS Alumni Newsletter which arrived today, I was very surprised, though somewhat saddened, to see the article on Garry Clarke's retirement party of 10 months ago. Since this was intended to celebrate his "mandatory retirement", I can only assume that additional retirement parties for him will become an annual event for many years to come.

Among Garry's earliest crops of graduate students and as one of his Pre-Trapridge troglodytes, I have always held Garry in high esteem and our Fox Glacier adventures as treasured memories. I cringe to think that our film **Glacier!** was shown in public, that it hadn't crumbled into a pile of dust by now the way most of my mountaineering equipment from those days has. By the way, if EOS has a museum I would be willing to donate my ice ax and crampons to it! Ha!

Had I known in advance, I could have easily attended since, at the time, I was in the neighborhood of the University of Idaho, Moscow, Idaho, and only a 1-day drive from Vancouver.

I surged into retirement well ahead of my mentor. This could also be attributed to basal warming as one or more of my body parts seemed to keep overheating – hot feet, hot rear-end, hot head, even the occasional hot idea. After spending eight years in Indonesia building up Arco International Oil and Gas Company's exploration computing system, and a few years in the Dallas office recovering, I took early retirement in 1992. Having been overpaid and under worked while living in tropical paradise, where I spent most of my time untangling bureaucratic snafus, returning to the US was more than I could take. So, as Arco collapsed, I bailed out when the opportunity presented itself.

I then returned to university as a student to earn an MBA in Finance and International Management Studies at the University of Texas at Dallas in 1994. Since then I've been involved in a wide variety of self-directed activities, that is, when my dear wife isn't directing me!

During the past four years, I divided my time between the Dallas area and northern Idaho while my youngest son did his BS in History at the University of Idaho. Oddly enough, I spent falls, winters, and springs in Idaho and summers in Texas! That's got to change! Most of my time in Idaho was spent exploring the wilderness areas of the state, honing my cooking skills, and reading both history and natural history books. The Missoula Ice-Age Floods became a topic of interest that I visited repeatedly, and traveling to places such as Dry Falls, the Scablands, Lake Pend Oreille (site of the ice damn that created glacial Lake Missoula), Missoula, and the Columbia River reinforced readings in geology texts. Added to this was a focus on the plate tectonics of the Pacific Northwest. As a result, I've nominated the Sawtooth National Recreation Area as the future playground for my retirement years and am toying with the idea of keeping a houseboat on Lake Couer d'Alene to serve as a base of operations for summer fun and games.

I've read a number of books related to Canadian history lately. These have included books on the explorations of La Salle, the French and Indian War, the explorations of David Thompson, the War of 1812, and the early history of Russia along the west coast from Alaska to northern California. I'm looking for a good book on Canadian history, sort of a general survey. Any recommendations?

Best wishes to all.
dfclassen@gmail.com

**Robert Seraphim, M.ASc. 1948, Ph.D., P. Eng.**
Not yet retired from being retired -- Eighty-four years of age and directing the resurrection of a mine of old with silver and gold in Mexico.

**Karl Ricker, B.Sc. 1959, M.Sc. 1968**
2006 was the centennial of the Alpine Club of Canada. I attended their ceremony in Yoho Park, then went to Roger's Pass to rebuild the historic Glacier Circle. 2207 was the centennial of the British Columbia Mountaineering Club. I participated in several of their events including the centennial of the 1st ascent of Mt. Garibaldi. For both clubs, I reviewed their 100 years of scientific research and where science might be headed in the next 100 years. Also, I have joined the VANOC gang to help out with Alpine Skiing events as Whistler Weasel Worker. My daughter Maëlle is in intense preparation for her third and last Olympics in 2010.

**Don Grant, BA.Sc Geol.Eng. (1981), M. Eng. Mining (1986)**
Mine planning superintendent at the Xstrata Copper mine in Mount Isa, Australia.

**Peter Fischl, B.Sc. Geology, 1986**
I'm back to the Russian Far East again, this time with B2 Gold Corp., looking for more gold around the Kupol Deposit.

**Camille Li, M.Sc, Geophysics, 1999**
Bergen is beautiful and after almost 10 years in the Pacific Northwest, I can't believe I'm about to say this - rainy beyond belief! I moved in February, 2007 and I must admit that I've never seen anything like it. Goretex doesn't even work here! Update-wise, I graduated in January, 2007 from the University of Washington (Atmospheric Sciences) and I'm doing a postdoc now at the bjerknes Centre for Climate Resarch. My work deals with large-scale climate dynamics, mostly applied to understanding the variability of past climates, and in particular the large, abrupt warming events that punctuated the last glacial period.

# 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 currect 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***

**Our Mailing Address Below**
**E-mail: alumni-contact@eos.ubc.ca**
UBC Dept. of Earth & Ocean Sciences, Alumni Contact, 6339 Stores Rd., Vancouver, B.C. Canada V6T 1Z4

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☐ Please use my gift in the Dept. of Earth and Ocean Sciences' area of greatest need.

☐ Please direct my gift to the following:

- ☐ Earth and Ocean Sciences Student Development Fund (Student Scholarships)
- ☐ Earth and Ocean Sciences Teaching & Learning Centre
- ☐ Mineral Deposit Research Unit (MDRU) Endowment Fund
- ☐ Pacific Museum of the Earth Endowment Fund
- ☐ Other: _____

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☐ One time (*your receipt will be mailed once your donation is processed.*)

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_____
Signature, Date

**Thank you!**

***Confidential once completed. Please return this form and your donation to:***
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