



From the Chair:

It is my pleasure to bring you up to date on events and highlights in Earth & Planetary Sciences since the last Alumni Newsletter. Great things are happening in the Department as I write this summary. Two field schools are out and about in the Eastern Townships and in California with lots of students. We are interviewing candidates for new professorial positions. Professors and graduate students are planning their summer fieldwork, or are already in the field around the world. Our labs are humming and producing high-quality data for the cutting edge research that gets done here. Let me give you a closer picture of departmental activities and what we're doing.

We have benefitted recently from significant generosity and foresight of donors to the Department. Several years ago we established the T.H. Clark Chair in Sedimentary and Petroleum Geology, to recognize and honour a past giant of this Department, Tommy Clark. Among many others, the contributions of Richard Walls, Uldis Upitis, Shell Canada, and Joan Clark (who is Tommy Clark's daughter) made the Clark Chair a reality, and we were able to hire an inaugural Clark Chairholder, Dr. Michael Riedel, in 2006. This was an exciting moment indeed for us, as the Chair gave us the ability to attract the best and brightest to the Department. We are ever so grateful to Professors Eric Mountjoy and Willy Williams-Jones, who spearheaded the endowment effort over many years.

We have had a very exciting recent development. Bob Wares is a 1979 graduate of our Department who has had brilliant success finding gold in Malartic, Québec. Through the generosity of Bob and Osisko Mining Corporation, we have been able to endow two new positions in economic geology, the Robert Wares Faculty Scholar in Economic Geology and the Osisko Faculty Scholar in Economic Geology. These two new positions will allow us to become the go-to place for economic geology in North America. We are currently interviewing candidates for these positions and hope to have the two successful appointees in place in the very near future. In addition to these endowments, Bob and Osisko have seen fit to endow undergraduate scholarships and graduate fellowships in the Department, as well as the aptly named Dawson Field Study Support Fund, to encourage fieldwork by students. We are truly grateful to Bob and Osisko for these transformative gifts to the Department.

In the past five years we have hired six new faculty members, all of whom bring new and dynamic expertise to the department. Professor Boswell (Boz) Wing is our Canada Research

Chair (Tier 2) who applies stable isotopes to many varied and important earth science problems. Professor Jeff McKenzie is a hydrogeologist who has projects dealing with glaciers, groundwater, and peatlands in field areas ranging from the Arctic to Peru. Professor Bill Minarik is an experimental petrologist specializing in mantle systems and also runs our stellar laser ablation ICP-MS facility. In addition to their important presence in the Department, Boz, Jeff, and Bill make major contributions to our new Earth System Science program, which is described below.

Last year three new professors with complementary expertise in sedimentary systems joined the department. After the departure of Professor Riedel in 2009, Professor Galen Halverson became our new T.H. Clark Chair. Galen's interests are broad-ranging, from Snowball Earth to recent sedimentary environments. Professor Eric Galbraith brings expertise and enthusiasm in the fields of oceanography, paleoclimates, and polar environments. Professor Sarah Hall focuses her research on sedimentary responses to tectonic and climatic processes and uses cosmogenic isotopes for these purposes. Together these three young professors are revitalizing the Department in sedimentary geology, a domain which was developed so well by Professors Eric Mountjoy and Reinhard Hesse. Read more about all six professors further on in this newsletter.

A few years ago we began a new B.Sc. program in Earth System Science (ESS), which we are running jointly with the Department of Geography and Department of Atmospheric and Oceanic Sciences. In addition to drawing the three departments closer together, the ESS program is a fantastic opportunity which allows students to study global systems and global change on Earth in a holistic sense from the viewpoint of geology, surface processes, and atmospheric and oceanic dynamics. The core ESS courses are all team-taught by professors from the three departments. New ESS field schools are being planned in the Arctic and Antarctica. Although a recent program, ESS is making a very positive mark on our Department, as well as for the University.

During the past several years, many of our faculty have won prestigious prizes. Professor Robert Bob Martin won the 2007 J. Willis Ambrose Medal, Geological Association of Canada, for his dedicated service to the Canadian earth science community. Professor A.E. (Willy) Williams-Jones was awarded the 2008 Bancroft Medal, Royal Society of Canada, for his remarkable work in economic geology which has contributed to public understanding and appreciation of earth sciences. Also in 2008 Professor Alfonso Mucci became a Fellow of the Royal Society of Canada, while Professor Jafar Arkani-Hamed was named a Fellow of the American Geophysical Union. Professor Don Francis won the 2009 Peacock Medal, Mineralogical Association of Canada, for his outstanding contributions to mineral sciences in Canada. Professor Don Baker was awarded the 2009 Career Achievement Award, Igneous Petrology & Volcanology Division, Geological Association of Canada, for his long-term and distinguished work in the field of experimental igneous petrology. Last but not least, Professor Reinhard Hesse was given the 2009 Michael J. Keene Medal, Marine Geosciences Division, Geological Association of Canada, for his significant contributions to marine sedimentology. I congratulate each awardee for their seminal work in their respective fields.

In addition to the fellowships and scholarships provided by Bob Wares and Osisko as described above, we have also benefitted from three other scholarship programs which have been established recently, including the Petro-Canada Emerging Leaders Scholarships, Dr. Richard and Carolina Walls Best in the West Scholarship, and the Jeffrey Scholarships in Science. We are most grateful to these donors for their strong support of our students and for Earth Sciences at McGill.

Field trips and field schools constitute an essential element of the EPS student experience. We run an annual mineralogy trip to Bancroft, Ontario, ably led by Professors Jeanne Paquette and Don Baker. Willy Williams-Jones leads an annual trip far afield which is wildly popular with students; this year Willy's group was in Chile when the magnitude 8.8 earthquake struck on 27 February. The students learned about natural hazards firsthand and even observed mini-tsunamis generated by this subduction-related earthquake! We have two field schools always in action in May, and we are planning new field schools in Antarctica and the Arctic, in conjunction with the ESS program. We will be able to enhance these field experiences with newly endowed funds from the Dawson Field Study Fund established by Bob Wares. All our field trips are open to undergraduate and graduate students alike, and this is one way we provide cross-fertilization between the two groups of students. It is a good example of how undergraduate and graduate students in the Department form close intellectual bonds.

Professors Jafar Arkani-Hamed, Tariq Ahmedali and Bob Martin recently retired from the Department. It has been a true pleasure and honour for me to have known and learned from these giants. We are all so grateful for their many and varied contributions to Earth & Planetary Sciences and to the University over many, many years. I look forward to their future contributions to the Department in coming years.

After four years as Chair, I am stepping down and leaving the Department in the very capable hands of Andrew Hynes. I am sure that you will join me in wishing Andrew many successes in his second stint as Chair of the Department. I have enjoyed watching Earth & Planetary Sciences grow and evolve in many wonderful directions. I for one am really excited about our future.

John Stix, Chair

\$4.1 Million Donation to Earth & Planetary Sciences

A gift of \$4.1 million in support of outstanding students and junior faculty members has been given to Earth and Planetary Sciences recently.



Robert (Bob) Wares (BSc'79) and Osisko Mining Corporation have each donated an equal amount of Osisko shares to create a \$4.1-million endowment in support of the next generation of Canadian geologists. A portion of the gift will be matched by the McConnell Challenge Fund, created in 2008 by the J.W. McConnell Family Foundation.

“It’s time to inject some money into replenishing the geological profession,” said Wares, who founded Osisko Mining Corporation in 1998 and is currently its executive vice-president and chief operating officer. Osisko is developing the Canadian Malartic gold project in northern Quebec, slated to become Quebec’s biggest gold mine.

“During the last mineral exploration boom, we had a hard time finding geologists,” explained Wares, who is also president of the Ordre des géologues du Québec, the professional body that controls the practice of geology in the province. “Earth sciences departments across the country have been chronically underfunded for the last 15 years, some departments have even closed, and this has seriously hindered student enrollment. I’m interested in backing dynamic young talent and encouraging students to enroll in earth sciences. New mineral discoveries and the future of the mining industry depend on a steady supply of qualified geologists, and industry leaders in this country need to get more involved.”

Through the McConnell Challenge Fund, McGill will be able to match the donation amounts for the fellowships, scholarships and field study portions of the gift, further increasing the impact of the gift by \$1 million.

The gift will fund four areas in Earth and Planetary Sciences:

- The Robert Wares and the Osisko Faculty Scholars in Economic Geology, two new tenure-track positions to attract and retain top junior faculty.
- Fellowships to support outstanding graduate students in the department.
- Scholarships for promising undergraduates who have completed at least one year of the BSc program in the department.
- The Dawson Field Study Support Fund, a new fund to encourage fieldwork and fieldtrips named after geologist Sir John William Dawson, principal of McGill from 1855 to 1893.

NEW FACULTY HIRES

Earth System Science (ESS)

We have started a new B.Sc. program in Earth System Science (ESS) jointly with the Department of Geography and Department of Atmospheric and Oceanic Sciences. ESS addresses linkages among biological, chemical, physical and human subsystems of the Earth. It focuses on the cycling of energy and matter through the biosphere, the atmosphere, the cryosphere, the hydrosphere and the solid earth, at time scales from days to billions of years. This integrated approach is designed to tackle many complex and challenging global problems facing the Earth today. It draws upon the expertise developed within disciplines such as Ecology, Environment, Geography, Geology, Meteorology and Oceanography. The McGill program in ESS equips students with the skills and knowledge to address a series of "Grand Challenges" that are fundamental to our understanding of the way in which the Earth works. Check out the ESS website (<http://ess.mcgill.ca>) to learn more about this dynamic new program.



Jeff McKenzie, Assistant Professor

(B.Sc., McGill, 1997; M.Sc., Syracuse, 2000; Ph.D., Syracuse, 2005)

I am a hydrogeologist with a research focus on cold regions. My students and I work in high alpine systems in the Peruvian Andes studying proglacial hydrogeology and in northern peatlands in Schefferville Quebec. Additionally, this summer we will be releasing a new groundwater model that incorporates ground freezing and thawing into a groundwater model with heat transport. Not all of my



research involves warm clothing – last summer I spent some time in Indonesia studying the hydrogeology of the Ijen Volcano for a project with Willy and John.

I am also involved in McGill's Earth

System Science program, both as an instructor and as the undergraduate program advisor. The program gives undergraduate students a broad overview of the earth system, and the concentrates on the linkages between the biological, chemical, physical and human subsystems of the Earth.





William (Bill) Minarik, Faculty Lecturer

(B.A., St. Olaf College, 1984; M.Sc., Washington, 1989; Ph.D., Rensselaer Polytechnic Institute, 1994)

I am a Faculty Lecturer within the Earth System Science major, and also the director of the Geochemical Labs, now called the Trace Element Analysis Laboratories (TEAL). I started at McGill in 2003 and took over direction of TEAL in 2007. Prior to McGill I was a research scientist at the Carnegie Institution of Washington and Director of Undergraduate Studies/Assistant Research Scientist at the University of Maryland.

I teach two freshmen-level courses: The Earth System, and The Origin of the Moon.

I'm an experimental geochemist and study the mantle and mantle-derived rocks using a combination of high-pressure experiments, trace element and isotope chemistry, modeling, and field studies. The combination of techniques allows me to pose questions relating to fluid migration, element mobility, and magmatic processes within the lithosphere.



This summer I will be returning to Inukjuak with Ph.D. student Mohadeseh Majnoon to study the metamorphic history of the Nuvvuagittuq complex, Porpoise Cove, which is one of the oldest suites of rocks in the world.

I also run and maintain the department's ICP-MS facility where I develop analytical techniques using both solution and laser ablation methods. These range from measuring the concentration of chromium in the blood of artificial joint recipients, through mercury concentrations in hair, to trace element distributions in coral, pyrite, zircons and pyroxenes.



The Earth System Science program is still relatively young, and much of my time is spent on recruiting and outreach activities. As a result, with luck, some students at McGill will turn from pursuing careers in medicine to those of understanding Earth circulatory systems and the distribution of Earth resources.



Boswell Wing, Assistant Professor

(AB, Harvard, 1996; MA, Johns Hopkins, 1998; Ph.D., Johns Hopkins, 2005)

I came to McGill in January 2006, which makes me the senior citizen among the new profs. If I were as furry as the rest of my cohort this might be immediately obvious, but keeping your hair short and your face clean shaven works wonders to hide any newly-developed gray hairs. I've enjoyed my past four years here, and I look forward to spending many more in the fine company of the new faculty you've met in this newsletter.

Thanks to John Stix's herculean efforts as chair, laboratory renovations are finally finished (perhaps explaining why I'll never be a whiskerando...), and Canada's only sulfur multiple isotope facility is now open for business. As a result I've been able to spin up a host of collaborative projects recently, including a few with past McGillians (Steve Grasby – *M.Sc. '91* and Jean Bédard – *M.Sc. '81*).



Since arriving I've also had a great time collaborating with my faculty colleagues. I've survived fieldwork in the Labrador Trough with Don Francis, enjoyed the most clement field season imaginable on the world's oldest rocks with Don, Andrew Hynes, and Bill Minarik, successfully graduated an MSc student (Kathleen Graham) with Don Baker, and worked on things sulfurous at low temperatures with Michael Riedel (former T.H. Clark Chair, currently at the GSC), at high temperatures with John Stix, and at temperatures somewhere in between with Al Mucci.

What makes this place really special, however, is the quality of the student colleagues who put up with us. I've been fortunate to work with a dynamic group of folks on things ranging from Earth's earliest biosphere (Emilie Thomassot – PDF 2007-2009, currently at the CRPG in Nancy) to the biogeochemistry that sustains methane hydrates (Thi Hao Bui), from experimental evolution of microbial metabolisms (André Pellerin) to the processes responsible for VMS mineralization across the Abitibi Belt (Libby Sharman). There's been a host of exceptional undergrads rotating through the lab, most of them with so much going on that I always feel a little bit sheepish about how I spent my undergraduate days... 'nuff said.

Sedimentary Geology



Eric Galbraith, Assistant Professor

(B.Sc., McGill, 1997; Ph.D. British Columbia, 2006)

I studied geology as an undergrad in the department, and am delighted to be back. The department has changed a lot, with many new faces, but the warm atmosphere and wine and cheese parties are better than ever. My research here will focus on biogeochemical cycles in the world ocean, and how these have changed over earth history. As marine sediments accumulate, they record a tremendous amount of information about the activity of phytoplankton at the ocean surface, the currents that sweep the ocean depths, and exchanges of gas between the ocean and atmosphere.



I compare these geological records to complex computer models that attempt to simulate how the marine ecosystem functions under varying conditions. Understanding how all of these processes have changed during past, natural episodes of climate change will give us much better predictive ability for the future.



Sarah Hall, Assistant Professor

(B.A., Hamilton College, 2001; Ph.D., University of California, Santa Cruz, 2009)

I am honored and excited to join the faculty of McGill in the Earth & Planetary Sciences department. With such bright and motivated students, a strong support staff and an inspiring faculty, I cannot imagine a more comfortable, yet challenging, department to become a part of. McGill University has a reputation of providing students with both excellent teaching and cutting-edge research opportunities. It is my hope that I can contribute to the excellence and diversity of the teaching and research in the Earth & Planetary Sciences.

My research is focused on understanding processes acting on and shaping the surface of the earth. Geomorphic features, such as glacial moraines or surfaces offset by active faults, are important markers that we can use to reconstruct the climate and tectonic history of a region. With a robust absolute dating technique, we can quantify the timing of formation and degradation of these features. I use cosmogenic isotope concentrations (^{10}Be and ^{26}Al) to determine the rates of surface processes and the ages of Pliocene-Pleistocene landscape features in the Andes of Peru. This tool is key to the interdisciplinary and growing field of research investigating how climate and tectonic interactions influence the formation and degradation of mountain ranges such as the Himalaya, Andes, and Cordillera of Western North America.



This is a view of Late Holocene moraine-dammed lakes in the Cordillera Huayhuash, Peru. In this region we reconstructed the Late Glacial – present paleoclimate history by dating moraines and carbon-rich material from lake sediment cores. Combined with other regional datasets, this study helps to refine models of past and future tropical climate fluctuations.

This is a photo of the Purgatorio Fault scarp in southern Peru. This fault is evidence of recent tectonic activity in the forearc of southern Peru. In this study we are mapping unidentified faults, quantifying fault slip-rates, and establishing the timing of last activity. This is useful for seismic hazards assessments and for understanding the role of the forearc in the formation of the impressive Andean topography.



TH Clark Chair in Sedimentary and Petroleum Geology

The Thomas H. Clark Chair was established to recognize the tremendous contributions that Professor Clark made to sedimentary geology and paleontology during his long and illustrious career at McGill. Dr. Clark (1893-1996), known to colleagues and friends as “Tom”, obtained his Ph.D. at Harvard and began teaching at McGill in 1924. He soon earned a reputation as an outstanding teacher and his course ‘Introductory Geology’, which regularly

packed the large auditorium where it careers to the discipline. Tom’s and the geology of the Saint which many of his over one hundred authored with Professor Emeritus Geological Evolution of North Tom gave numerous public lectures companies, and with the Quebec excellence in teaching and graduate contributions, were widely several prestigious scientific



was given, convinced many to devote their main scientific interests were in paleontology, Lawrence Lowlands and adjacent areas on scientific publications were written. He co-Colin Stearn a highly popular textbook on the America. Always keen to share his knowledge, and consulted widely with oil and gas Department of Natural Resources. His student supervision, and his many scientific recognized and earned him membership in societies and a large number of awards,

including the Logan Gold Medal from the Geological Association of Canada. Tom was Logan Professor of Paleontology from 1929 to 1962 and served as Chair of the Department from 1952 to 1959. After retiring in 1962 he was awarded the title of Professor Emeritus, and continued to do research on the fossil collections in the Redpath Museum, where he spent two to three days a week until 1993. He gave his last public lecture in 1990 at Redpath Hall on the subject of the Burgess Shale. Three years later on the occasion of his 100th birthday he made his last public statement observing ‘I was never happier than when I was in front of a class ... I made an effort to look at everyone in the audience ... I wanted to make it a personal affair’. To honour this great teacher and scientist, we have created this Chair in his name. Special thanks to the many outstanding donors whose commitment and generosity made this Chair a reality!



Galen Pippa Halverson, TH Clark Chair and Associate Professor

(B.A., University of Montana, 1996; PhD, Harvard University, 2003)

I started my new position as the T.H. Clark Chair in Sedimentology and Petroleum Geology on January 1, 2010. Though I am originally from Montana, I moved to Quebec with my wife and two children from Adelaide, where we were in the middle of a baking South Australian summer. Therefore, the return to a proper northern winter was a shock to us all. But at the same time, we were all thrilled to be in Montreal. I continue to be excited about my new position and the many opportunities for collaborative research.

I am honored to be taking over Eric Mountjoy’s former office, which I gather was well known for its impressive stacks of papers and books — a symbol of Eric’s encyclopedic knowledge. It did not take me long to realize that I have some big shoes to fill in this position, for Eric was a giant in the field of Paleozoic carbonate sedimentology. But I am honored to take the torch and have enjoyed gracious support from both Eric and Anita as I begin the process of establishing my lab and research group.

If I have unpacked my boxes and organized my papers in my new office at a leisurely pace, my assimilation into the EPS faculty was virtually instantaneous. I enjoy the breadth of experience and expertise in the department and could have not have arrived at a better time. I join a growing department that is balanced by a cohort of young, energetic professors and a group of highly supportive senior professors. The milieu is sure to improve with the two new Osisko-Wares positions set to be filled this year. Not surprisingly, the atmosphere in EPS is infused with optimism.

My first PhD student, Grant Cox, has recently arrived from Adelaide, Australia, and we have already obtained support from the Yukon Geological Survey for a project on the middle Neoproterozoic Mountain Harper Group Volcanics and associated sediments in the Ogilvie Mountains, Yukon. I envision fieldwork focused on the evolution of Proterozoic-Paleozoic sedimentary basins and the northwestern margin of North America will be a central component of my research for many years to come. Like other ongoing field-based projects in Australia, India, Saudi Arabia, and Svalbard, this work is designed to answer compelling regional geological problems at the same that it contributes to filling in the chapters of Proterozoic Earth history.

Aside from research, I will be teaching a range of courses, mostly designed to fill out the curriculum in sedimentary geology. I begin this spring by co-teaching Field School III (EPSC 341) with fellow new hire, Sarah Hall, and continue in the autumn semester with Earth & Life History (EPS 233). Starting next year, I will teach more advanced courses in sedimentology and basin analysis.



Robert F. Martin

A symposium in honour of Professor Emeritus Robert F. Martin was held in the Department on Friday, March 20, 2009. Bob retired from teaching on December 31, 2007.



Martinite

Mont Saint-Hilaire



Invited guests and speakers included:

Professor John Hughes, University of Vermont: “A summary of apatite crystal chemistry”

Professor André Lalonde, (M.Sc. '81), Dean, Faculty of Science, University of Ottawa: “Medical mineralogy – the role of mineralogy in human health”

Professor Frank Hawthorne, University of Manitoba: “Short-range order and the origin of the phase transitions in the scapolite-group minerals”

Professor Elena Sokolova, University of Manitoba: “A topological algorithm: from chemistry to structure in titanium silicates”

Dr. Louise Corriveau, (Ph.D. '90), Natural Resources Canada: “Alteration footprints and zoning model as vectors to iron oxide copper-gold (IOCG) deposits”

Dr. Louis Cabri, (Ph.D. '65), Cabri Consulting Inc.: “New mineral separation technologies (EPD and HS) and their impact for mineralogical characterization”

At the end, Bob gave a talk entitled, “A pot-pourri of threads in my career”

The symposium was followed by a departmental reception and fun dinner at Le Caveau. It was a fine day and fine evening to recognize our most esteemed colleague.



Bob Martin and Vicki Loschiavo



Shirley Jackosn, André Lalonde (*M.Sc. '81*)
and Vicki Loschiavo



Pierrette Tremblay, Andrew Hynes and Tom Clark

Kristy Thornton (*B.Sc. '00*) and
Azin Zangooi (*M.Sc. '03*)



Bob Martin with his daughters Danielle and
Stephanie, and his grandchildren

Emmanuelle Sakoma (Ph.D.), Shil Lang and Tassos Grammatikopoulos



Bob Martin and Vigdis Hardardottir (*M.Sc.* '84)

John M. Hughes, Andreas Ertl and Bob Martin



Giorgio Garuti, Tassos Grammatikopoulos and Federica Zaccarini

KEEP IN TOUCH

Let us know what's new with you ...

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