

ALUMNI NEWSLETTER

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Dr. Edward Ghent's (2nd from the right) retirement part on November 27, 2008. Photograph by Kayla Bonham

45th Anniversary History Book

Under the leadership of Ms. Laura Baird the department plans to publish a photo-rich book about its 45 year history. Although some chapters are in the proof-reading stage (Founding Fathers and Department Heads", "Research Groups" and "Field Work"), other chapters that provide a summary of each decade are still being written. The book will be available for purchase no later than September 1, 2009 and will be sold for about \$20. If you wish to put your name on the list for pre-orders, or have any questions (or have an unusual photograph or historical tidbit to contribute), please contact Laura (labaird@ucalgary.ca). You will be hearing much more about this project in our next newsletter.

Interested in the *department's vision* for the future? The *5-year strategic plan* can be downloaded at:

http://geoscience.ucalgary.ca/files/geoscience/Geoscience_strategic_plan_2008_2013.pdf

Message from the Department Head

The past six months have been turbulent times for all of us. Even the University of Calgary is not immune to the global market crisis, with budgetary belt tightening occurring for all units across campus. Nevertheless, the Department of Geoscience has been very fortunate to continue to grow and thrive. On page 3 of this newsletter, you can read about five exceptionally talented new faculty members who have joined us since the summer of 2008. The department is currently seeking two additional faculty members – the EnCana Chair in Unconventional Gas Research, and an Associate Professor in Applied Geophysics – so you will have the opportunity to read about more new faculty appointments in our next issue.

With all of the new faces around the department, you may be left wondering about the whereabouts and activities of the senior members of the department. With this in mind, this issue marks the launch of a new feature called "Faculty Spotlight", which will describe the activities of a well-established department member. In this issue, we will look at the Applied Geochemistry group (AGg), which operates under the dynamic leadership of Dr. Bernhard Mayer.

If you have been watching the news recently, you may have noticed a number of prominent stories about research activities of members of this department. For example, Dr. Alan Hildebrand, who holds a Canada Research Chair in Planetary Science, made headlines (along with his graduate student, Ellen Milley) for the recovery of numerous pieces of a 10-tonne meteorite that fell on November 20, 2008 near the hamlet of Lone Rock, Saskatchewan. Dr. Darla Zelenitsky was featured several times for recent publications on nesting behaviour and the sense of smell for various types of dinosaur. Dr. Andrew Leier (a new faculty member, introduced in the previous newsletter) was featured for his work on prominent coverage and worldwide attention. You can find out more on the department's webpage (look under the news archives, right beneath "Hot off the Press").

In terms of events and celebrations around the department, we are very proud of Dr. Cathy Ryan, who was awarded the Distinguished Community Service Award by the Faculty Association on March 3, 2009. In addition, the career accomplishments of Dr. Ed Ghent were celebrated in style at a department retirement party held on November 27, 2008. And, of course, venerable departmental traditions continued as usual, such as the student/faculty Christmas party (complete with skits and a visit from Santa) and the annual photo contest organized by the graduate students, at which many members of the department demonstrated hidden artistic talent.

I'd like to draw your attention to some important upcoming events and ongoing activities. The Department will be hosting its annual student awards ceremony and reception on April 8, 2009. This event acknowledges and congratulates our undergraduate and graduate students who have received awards in the past year. New this year, we will also be presenting two new faculty awards based on teaching and research. During the week of May 16, we will be hosting the Gallagher Visiting Scientist (Dr. Ian Bastow, from the University of Bristol). Finally, we plan to organize an Open House and BBQ in September, at the same time as the annual Tom Oliver lecture. Be sure to check our website (www.ucalgary.ca/geoscience) for updates on these events.

If you find yourself near campus, members of the Department would truly enjoy the chance to see you and reconnect. Feel free to attend any of our seminars (every Friday at 4:00, and often on Wednesdays at 4:30) or drop in at one of our regular department coffees on Thursday morning at 10:00. Or, simply contact me by email through our department home page.

Wishing you a healthy and prosperous spring and summer.

David Eaton



Recent Theses

Adams, Jennifer, PhD, The Impact of Geological and Microbial Processes on Oil Composition and Fluid Property Variations in heavy oil and bitumen reservoirs

Aitken, Julie, MSc, Exploring Maya Ruins in Belize, Central America Using Ground Penetrating Radar

Alcudia Leon, Alejandro, MSc, Microphone and geophone data analysis for noise characterization and seismic signal enhancement

Al-Duhailan, Mohammed, MSc., Field mapping and seismic analysis of fractures

Al-Dulaijan, Khaled, MSc., Near-surface Characterization using Seismic Refraction and Surface-wave Methods

Allen, Matthew, MSc., Exploring a Maya pyramid ruin using seismic and radar tomography

Floyer, James, PhD, Validating a force-resistance penetrometer for assessing snowpack variability

Heagle, Dru, PhD., Surface-subsurface solute cycling in wetlands receiving groundwater discharge

Hons, Michael, MSc., Seismic sensing: Comparing geophones and accelerometers using lab and field data

Hua, Yong, MSc., Seismic imaging through surface carbonates: a case study from the Canadian Rocky Mountains

Jackson, John, MSc., The hydrologic role of prairie upland environments in Calgary, Alberta

Lynch, Steve, PhD., More than meets the eye—A study in seismic visualization

Ma, Yongwang, PhD., Seismic depth migration using the Garbor imaging theories

McCrank, Jason, MSc, Seismic detection and characterization of a CO₂ flood in Ardley Coals, Alberta, Canada

Spotlight on Faculty: Dr. Bernhard Mayer

The Applied Geochemistry group (AGg) in the Department of Geoscience applies physical, chemical, isotopic, and modeling approaches to enhance sustainable practices in the fields of energy and the environment. Bernhard Mayer, three research associates, and nine graduate students in the group specialize in applying tracer techniques to derive novel and unique information about the water cycle and the fate of anthropogenic carbon, nitrogen, and sulfur in surface and subsurface environments.

One of the major research themes in the AGg is the assessment of the fate of CO₂ injected into saline aquifers and mature oil fields during enhanced oil recovery (EOR). The AGg uses chemical, isotopic, mineralogical and modeling approaches to monitor the movement of CO₂ in sequestration projects and to assess the solubility and mineral trapping potential due to gas-fluid-rock interactions in the subsurface. The group has conducted geochemical monitoring programs at the International Energy Agency Greenhouse Gas Weyburn CO₂ Monitoring and Storage Project in Saskatchewan, and at the Penn West Pembina Cardium CO₂-Enhanced Oil Recovery Monitoring Pilot in Alberta. Currently, the AGg is also involved in collaborative CO₂ sequestration research with Penn West, ARC Resources, and is part of UofC's Wabamun area CO₂ sequestration project (WASP).

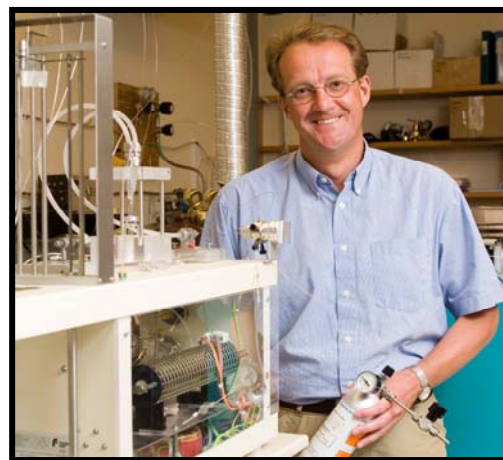
Another area of intensive research focuses on the fate of nitrogen (N) and sulfur (S) emissions in the Athabasca oilsands region. The cumulative impact of these N and S emissions from all currently operational oilsand projects on the surrounding terrestrial and aquatic environment is of some environmental concern. The AGg has initiated a 3-year study that evaluates to what extent stable isotope ratios constitute a suitable tool for tracing the fate of anthropogenic N and S emissions from the oilsands operations in surrounding terrestrial and aquatic ecosystems. This will be achieved by comparing the isotopic characteristics of N and S compounds in industrial emissions to those in environmental receptors including wet and dry deposition, lichens, foliage, soils, and surface waters. Environmental monitoring will play an increasingly important role in the sustainable development of the energy reserves in the Athabasca Oilsands Region of northeastern Alberta. This work is funded by the Wood Buffalo Environmental Association (WBEA) with matching support being provided through a NSERC CRD grant. In order to conduct these and other research projects, the Applied Geochemistry group maintains state-of-the-art laboratory facilities for aqueous geochemistry and stable isotope analyses. In 2008, a new Dionex ion chromatograph and a laser

absorption water isotope analyzer were installed to enhance the analytical capabilities of the group. Currently, the AGg is seeking funds to equip a mobile tracer laboratory that would be capable of conducting chemical and isotopic analyses on fluids and gases obtained during CO₂ sequestration projects, CBM operations, and in-situ bitumen upgrading on-site. This novel approach would make highly essential chemical and isotopic monitoring data available within hours, rather than weeks (as is currently the case), for assessment of gas movement in reservoirs (e.g. CO₂ enhanced recovery, CBM) and for assessing potential gas leakage into the environment (groundwater, soils, atmosphere).

Contact: Dr. Bernhard Mayer, phone: 403 220 5389. e-mail: bmayer@ucalgary.ca



Graduate student and research associate Michael Nightingale sampling oil, gas and water at a CO₂ sequestration pilot study site in Alberta.



Bernhard Mayer at work in the Isotope Laboratory.



Recent Theses (cont'd)

McNeil, Paul, PhD., Bones and Tracks at Wally's Beach Site (DhPg-8): An Investigation of the latest Pleistocene Mega-Fauna of Southern Alberta

Miong, Soo-Kyung, MSc., Borehole Geophysical methods for Near-Surface Characterization

Motz (Johnston), Kimberley, MSc., Paleoenvironmental and stratigraphic significance of a Burgess Shale-type biota from the Middle Cambrian, Middle Chancellor Formation (Vermilion sub-unit, Duchesnay unit), southeastern British Columbia

Moubarak, Hesham, MSc., Seismic Illumination: 2D Forward Numerical Seismic Modeling study to evaluate imaging complex structures

Parker, Erik, MSc., Stratigraphy, structural and metamorphism of the Explanade Range, southeastern British Columbia

Radmonski, Mark, MSc., Sedimentology and Tectonic Controls on Preservation of the Middle Triassic Halfway Formation, Elmworth and Wapiti Fields, west-central Alberta

Robinson, Cindy, MSc., A Multidisciplinary Approach to Evaluating Shale Gas Potential in a Biogenic Gas System: Upper Colorado Group, Southeastern Alberta

Seeley, Timothy, MSc., A Multidisciplinary Approach to Evaluating Shale Gas Potential in a Biogenic Gas System: Upper Colorado Group, Southeastern Alberta

Smith, Amanda, MSc, Evaluating Tile Drainage Systems as a method of Salt Remediation in Alberta

Spray, Graham, MSc., Structure, Metamorphism, and Tectonism in the Soards Creek area, British Columbia

New Faculty



Dr. Sytle Antao

Antao is a mineralogist with research interests in the structural arrangement of atoms in materials and the processes that govern their stability under ambient and non-ambient conditions.

Structural changes under varied conditions create different responses to physical, mechanical, thermodynamic, elastic, and chemical properties. Her research is based on detailed characterization of solid-state materials under extreme pressure and temperature conditions using a variety of techniques and applying the results to Mineral Physics. This research utilizes in-house and a few world-wide national facilities.



Dr. Bernard Guest

I am fundamentally a field geologist interested in crustal processes involved in creating and destroying continents, particularly the link between the long-term deformation

record preserved in orogens and basins and the real-time deformational processes observed with modern geodetic networks. I am also interested in processes that control the style and distribution of strain at intracontinental plate interfaces. Currently projects include the Tarim block in Tibet, the Caspian block north of Iran, and the Sierran block and Colorado plateau in western North America. I have become interested active tectonics systems (Neotectonics) where instantaneous strain rates (from GPS and INSAR) can be compared with geologic strain rates (from geo- and thermochronology) to evaluate the way in which deformation varies across a broad range of time scales (days to millions of years). Lastly, I am branching out to studying the interaction of surface processes (erosion) with deformation and topography.



Dr. Rajeev Nair

My research interests are focused on understanding the evolution of Earth's crust. I study phase equilibrium of igneous and metamorphic rocks to understand their origin. My primary approach

is to study phase equilibria in synthetic and natural materials by experimentation under controlled conditions in the laboratory. The results of these high-pressure/high temperature experiments are then applied to understand the

petrogenesis of rocks in natural settings. My goal is to apply experimental results to better understand many processes of crustal evolution including magma generation, magma differentiation, metamorphic mineral evolution etc. The knowledge gained from these studies can provide important insights into the link between petrogenetic and geodynamic processes.



Dr. Per Pedersen

Per Kent Pedersen's research is within the applied field of petroleum geology, with a focus on reservoir architecture and characteristics of unconventional oil and gas

reservoirs. Research integrates sedimentology, sequence stratigraphy, reservoir characterization, basin analysis, and hydrocarbon generation and migration to achieve better understanding of the sweet spots within these commonly lateral extensive hydrocarbon accumulations. On a larger scale, a research is to achieve a better understanding hydrocarbon systems spanning from shallow gas over shale gas to tight oil including timing of hydrocarbon generation by either biogenic or systems spanning from shallow gas over shale gas to tight oil including timing of hydrocarbon generation by either biogenic or thermogenic processes, and the migration and entrapment of generated hydrocarbons. Research project is often carried out in collaboration and sponsored by the petroleum industry.



Dr. Adam Pidlisecky

I am a geophysicist focused on imaging Earth's near surface (to depths of roughly 100m). In particular, I am concerned with using geophysics to investigate the "critical

zone" where interactions involving the geosphere, hydrosphere, atmosphere and biosphere regulate habitats and determine the availability of life-sustaining resources. Using geophysical methods, such as electrical resistivity tomography, we can acquire non-invasive images of important processes in this region. The data I collect are processed and interpreted in collaboration with other earth scientists to advance our understanding of near-surface dynamics. Currently, I am leading the geophysics component of an inter-disciplinary research project, in Santa Cruz, Ca, to study the practicality of subsurface water storage.

Recent Theses (cont'd)

Suarez, Gabriela, MSc., Full-wave seismic analysis: source comparisons, land streamer tests, and converted wave processing

Wang, Tingge, MSc., Seismic monitoring of wormholes and foamy oil for a heavy oil cold production reservoir at Plover Lake, Saskatchewan

Did you know?
The department publishes a weekly newsletter during the term.
Back issues can be found at:
<http://geoscience.ucalgary.ca/Newsletter>



Department of Geoscience
University of Calgary
Calgary, AB
T2N 1N4

For further information visit:
www.geoscience.ucalgary.ca/

Developments on Campus

If you have driven past campus on 32 Ave. NW any time recently, you will have noticed the two giant cranes located close to the Earth Science building. This is the building site for a new facility called the Energy, Environment and Experiential Learning (EEEL) building, scheduled to open late in 2010. The Department of Geoscience will be acquiring state-of-the-art teaching space in the new building, including Core and Digital Microscopy laboratories. Most of our first-year teaching will take place in EEEL, providing incoming students with an exciting start to our programs. Plans call for a Geoscience theme for much of the landscaping around the new EEEL building. See www.ucalgary.ca/eeel for details.

The University of Calgary also plans to open a new downtown campus. The new site, located at 906 8th Avenue S.W., in the western end of the core, will house students in a variety of programs. The Department of Geoscience has proposals submitted that, if successful, will provide a significant presence there. See <http://www.ucalgary.ca/news/utoday/feb6-09/downtowncampus> for details of this planned facility.

Staff Retirements

In January 2009, several senior members of the department took retirement. Dr. Ron Spencer, one of Canada's leading geochemists with expertise in sulphate minerals, fluid inclusions, the evolution of seawater chemistry and paleoclimate studies, has retired after 28 years with the department including 4 years as Assistant Department Head. Ron has been appointed as a Faculty Professor, a type of emeritus position that allows him to continue to maintain an active research program, including graduate student supervision and external funding. In addition, Malcolm Bertram retired after 29 years with the Department as a Senior Geophysical technician. Fortunately, the Department has not entirely lost access to Malcolm's technical expertise as he will remain working here on various applied research projects.



Photograph from Iceland by PhD student, Christian Kuehn. This photo won this year's department photo contest in the category of "Geology & Geophysics"

Grant Mossop Graduate Scholarship

We are pleased to announce that for the first time during the 2009-2010 academic year the ***Grant Mossop Graduate Scholarship in Geology*** will be offered to a student entering or enrolled in a full-time thesis based program in Sedimentary Geology in the Department of Geoscience. **This award was established through the generosity of the Friends and Family of Grant Mossop.**

For further information please contact Leslie Bergin at 403-210-5455

Gallagher Visiting Scientist

Each year the Department of Geoscience invites a scholar for a one-week visit, to present an evening seminar on a topic of general interest to the wider geoscience community in Calgary, as well as a more technical short course (two half days) in his/her area of expertise. This program is funded from an endowment donated by the late Mr. Jack Gallagher. We are very pleased to announce that Dr. Ian Bastow (University of Bristol) will be the Gallagher Visiting Scientist for 2008/2009. He will be visiting Calgary during the week of May 22, 2009 to give a short course on "Seismic Anisotropy and Tomography". His public lecture will be entitled "The Sierra Nevada EarthScope Project (SNEP): Insights into incipient lithospheric foundering". Please watch the department's web page (www.ucalgary.ca/geoscience) for details of the time and date.



Artists concept of the interior of the new EEEL building, currently being constructed adjacent to the Earth Science building.