To investigate the processes responsible for dynamic frictional weakening in antigorite serpentinite, we conducted single-velocity and velocity-stepping friction experiments. These experiments demonstrate an approximately \(1/V\) dependence of friction on velocity above a characteristic weakening velocity \(V_w = 0.1\) m/s, consistent with theoretical predictions for flash heating and subsequent weakening of asperities. X-ray diffraction analyses of fault gouge from the sliding surface document the formation of significant talc. In contrast, no talc is observed in samples for which \(V\) remained significantly below \(V_w\). The observed value for \(V_w\) is consistent with published microphysical models for flash weakening when independent constraints on the thermal stability and contact strength of antigorite are considered. Finally, while serpentinite displays velocity-strengthening behavior at plate-tectonic slip rates, our results indicate that seismic ruptures propagating into serpentinized regions in the shallow lithosphere may trigger seismicity or slow earthquakes, after limited amounts of displacement.

We also conducted a series of high pressure deformation experiments at temperatures above the thermal stability of antigorite to directly test the dehydration embrittlement hypothesis and its potential link to intermediate-depth earthquakes. The experiments were designed to maximize the possibility for instability; however, stick-slip instabilities (unstable fault behavior) did not develop. Rather, we find that weakening occurs stably at a rate that depends on the ratio of the temperature ramp rate to the strain rate, resulting in laboratory slow slip or stress relaxation events. These results have important implications for interpreting the origin of earthquakes in subduction zones. Indeed, we are intrigued by the possibility that the stable unloading we observe during dehydration may be important for understanding the spectrum of slip behaviors observed on the subduction interface.
News and Announcements

Upcoming Weeks Lectures – see our website

http://geoscience.wisc.edu/geoscience/newsandevents/weeks-lectures/

The Writing Center at the University of Wisconsin-Madison
writing.wisc.edu

More workshops to spice up your college writing!
  • Senior Thesis Workshop
  • Writing In-Class Essay Exams
  • Writing Research Posters
  • The Basics of APA Documentation
  • Writing Peace Corps Application Essays

Wednesday, November 16th @ Memorial Union (9am-4pm)

The GIS Day Expo at the UW-Madison is a bi-annual education event about geospatial science and technology. This includes Geographic Information Systems (GIS), Global Positioning Systems (GPS), Cartography, and Remote Sensing. The Expo features 50 organizations from the private and public sectors demonstrating a wide-array of geospatial technology applications in such areas as conservation, emergency management, urban planning, public health, transportation, economic development and much more!

The theme of this year's GIS Day event is ‘Mapping the Wisconsin Idea’. We will draw attention to UW partnerships with outside agencies and organizations that use geospatial technologies to benefit our state and its people. This is the 'Year of the Wisconsin Idea' at the UW-Madison.

The event will host two tracks of presentations (lighting talks around various application areas and more in-depth technical presentations), exhibitor booths, a map gallery and other special exhibits. Students can learn about educational and career opportunities in this rapidly growing field. It's a fantastic place to network with people in the profession. The Expo is FREE and open to the public. Drop in anytime between 9am and 4pm to explore the map gallery and exhibitor booths, or see the speaker schedule to catch presentations of interest.

GIS Day is an international day of education and outreach. It is part of National Geography Awareness Week. (UW Geospatial Alliance, Sponsored by the Geography Department)

Geoscience Currents #55: U.S. Field Camp Attendance Continues Upward Climb

Attendance at U.S. field camps reached 2,525 in 2011, up 10 percent from 2010.

Recent increases in field camp attendance are attributed to both increased overall attendance as well as the addition of new and existing field camps to the U.S. Field Camp database. Overall
Attendance has increased steadily for those departments who have consistently reported data for the past five and 10 years: +37 percent over the past five years and +53 percent over the past 10 years.

Read more in Currents #55 at [http://www.agiweb.org/workforce/currents.html](http://www.agiweb.org/workforce/currents.html).

**For Students**

**Get SMART, Get Paid, and Get Ahead**

We want to make you aware of a tremendous scholarship-for-service opportunity for your students to fully fund their undergraduate or graduate education at your institution, and request that you make them aware of this opportunity. The SMART (Science, Mathematics, and Research for Transformation) Program will pay for all educational expenses for a B.S., M.S. or Ph.D. program, and then provide scholars unique opportunities to work as research scientists or engineers on cutting edge technology in world class Department of Defense facilities. A comprehensive list of facilities can be found on the SMART website: [http://smart.asee.org/](http://smart.asee.org/)

This is a highly competitive, national program, open to U.S. citizens only, so please ask your best students to apply. The SMART program will pay all educational costs and a stipend while they are in school from as little as one (1) term up to 5 years.

Specifically the program pays for:

- Full Tuition - to any accredited U.S. University
- A very generous stipend while in school ranging from $25,000 - $41,000 per year
- Book allowance - $1,000
- Health insurance contribution
- Paid Summer internships
- Travel fees for internships
- All required student fees

For more information, see our webpage at [http://smart.asee.org/](http://smart.asee.org/)

The application deadline is December 1, 2011, so please let your students know about this program as soon as possible. We would also like to invite you to register to be a potential panelist for the 2012 SMART Evaluation Panel to be held January 19-21, 2012 in Washington, DC. If you are interested in serving as a panelist, please register at [https://panelists.asee.org/program_info/smart](https://panelists.asee.org/program_info/smart).

The SMART Scholarship Team

[mailto:smart@asee.org](mailto:smart@asee.org)

(202) 331-3544

[http://smart.asee.org/](http://smart.asee.org/)
The American Museum of Natural History MAT Program - Change lives. Teach science.

We are pleased to announce the new Master of Arts in Teaching Program at AMNH - the first urban teacher residency program offered by a museum. Behind the scenes at the Museum, and immersed in an urban classroom: degree candidates learn to teach Earth and Space science in New York State in this paid full-time Masters program with science and pedagogy coursework and real-world teaching experience.

Next Friday, November 11th, we are hosting an Open House at the Museum, where guests will meet faculty and staff, have questions answered, and go on a behind-the-scenes tour of the Museum campus. (For those who cannot attend next week, there will be a third and final Open House on Saturday, January 7, 2012 - join our mailing list to stay updated.)

Open House at the Museum! Friday, 11/11/11, 4-8 pm

Who should attend: Prospective students, their friends and family, and others interested in learning more about the pioneering AMNH MAT Program.

Please feel free to share this information with colleagues, students, and alumni. The AMNH MAT Program seeks a student body with diverse life and career experiences, such as recent college graduates, veterans, former participants in volunteer corps, and career changers. Application to the program is open to all candidates meeting the eligibility requirements.

The American Museum of Natural History MAT Program
Change lives. Teach science.
Phone: (212) 313-7464
Fax: (212) 769-5329
mat@amnh.org
http://www.amnh.org/education/mat/
Mailing list: http://www.amnh.org/education/mat/signup.php
Application: http://www.amnh.org/education/mat/application.php

Concho Resources Inc. is seeking applicants to fill a summer 2012 geoscientist intern

Concho Resources Inc. is seeking applicants to fill a summer 2012 geoscientist intern position. Qualified applicants should have a BS in geology/geophysics by spring 2012, with a minimum 3.0 GPA overall; and be enrolled (or accepted) in a graduate Geoscience related degree program. The intern will focus on a project of material significance to the company, with the opportunity/expectation of integrating with a fully functional exploration and/or production team (including engineers, landmen, and various support staff). The level of discipline integration will be commensurate with the individual’s academic and/or industry experience.
Learning opportunities/expectations may include:

- Geoscience role
  - Play and prospect analysis
  - Subsurface mapping
  - Reservoir evaluation
  - Petrophysical log interpretation
  - Seismic interpretation
- Field operations
  - Wellsite operations
  - Well logging
  - Commercial economic analysis
  - Risking of plays and prospects

Mentoring will be provided by one or more experienced senior geoscientist(s). At the end of the summer, the intern will present the results of their project (as well as their recommendations) to senior management. The goal of the internship is to expose the intern to the same type of projects, expectations, and environments that they would encounter upon full employment with the company.

Concho Resources Inc. is a rapidly growing public company headquartered in Midland, TX, with a market cap of $8.6 billion dollars and over 550 full time employees. Concho is one of the most active players in the Permian Basin, with excellent opportunities for future growth. Please visit www.conchoresources.com for more information.

Contact:
Fred H. Behnken
Mgr, Geosciences Technology
COG Operating LLC (aka Concho Resources)
Phone: 432-818-2313
Email: fbehnken@concho.com

**Jobs, Postdocs, Etc.**

**Deep Carbon Observatory postdoctoral fellowship, University of Toronto**

Postdoctoral Research Fellow sought for Deep Carbon Observatory (DCO) project (with funding through the Alfred P. Sloan Foundation) based at University of Toronto with collaborating PIs in Finland, South Africa and the United Kingdom.

We invite applications for a Deep Carbon Observatory postdoctoral fellowship related to field and laboratory investigations of the role of reduced carbon in the crust and the relationship to the generation and flux of hydrogen from deep Precambrian Shield fracture waters.
At 3 km below the Earth’s surface in saline fracture waters in the Precambrian rocks of South Africa, the planet’s most isolated ecosystems have only recently been discovered (Lin et al. 2006, Science; Chivian et al. 2008, Science). Like the hydrothermal vents, these deep fracture waters are some of the most H2-rich environments on the planet (up to 7.5 mM dissolved H2), and are repositories of other products of extensive water-rock reactions, including abiogenic hydrocarbons and radiogenic noble gases (Sherwood Lollar et al. 2002, Nature). Recent results indicate components of the noble gases are more than 2 Billion years old - attesting to isolation of these waters from the surface photosphere on a previously unrecognised timescale (Lippmann et al., 2011; Holland et al., 2011). Yet even on this deep isolated frontier – life persists. These waters host some of the deepest microbial communities yet identified on the planet: a low biomass, low biodiversity ecosystem subsisting at maintenance rates far from the photosphere - dominated by H2-utilizing sulphate-reducing bacteria utilizing H2 derived from radiolysis of water (Lin et al. 2005; 2006).

An emerging international and multi-disciplinary network of scientists funded through the DCO provides an unparalleled opportunity to explore these systems through a coordinated field and laboratory program. Field work will take place at subsurface sites in the Canadian Shield (Canada), the Fennoscandian Shield (Finland) and the Witwatersrand Basin (South Africa) to sample the geochemistry of dissolved gases and fracture-hosted groundwaters. Specific objectives will depend on the interests and expertise of the PDF selected but may include:

- the use of conservative noble gases and stable isotope geochemistry to provide a basis to model the global flux of H2 and hydrocarbons from ancient Precambrian terrains
- investigation of carbon sources sustaining hydrocarbon generation and microbial communities in the deep terrestrial biosphere.
- determination of the relative importance of microbial versus abiogenic sources of hydrocarbon gases, and of the sources of hydrogen (e.g. serpentinization, radiolysis).
- establishing the relationship of the chemosynthetic H2-powered deep biosphere to different biogeographic regions of the Earth's subsurface on a global scale.

Candidate must have a Ph.D. in Geology, Chemistry, Physics, Geochemistry or a closely related field. The candidate should be able to work independently and participate creatively in refining project directions and team-building between the three nodes of field activity and research at University of Toronto, and colleagues in Scandinavia, the UK and South Africa. Start date is January 2012 but position will remain open until filled.

Applicants should send a CV, description of current research activities and interests, and contact information for 3 references to: Prof. B. Sherwood Lollar, Dept. of Geology, 22 Russell St., University of Toronto, Toronto Ontario Canada M5S 3B1 (bslollar@chem.utoronto.ca).

In subject heading please reference: DCO-PDFs-2011
Department of Physical Sciences, Faculty of Science, The Open University

A Senior Lecturer or Reader is required to strengthen and enhance the research profile of the Department of Physical Sciences and to contribute to teaching across the broad area of physical sciences. Your research should complement existing areas in our Centre for Earth, Planetary, Space and Astronomical Research (CEPSAR), particularly those in Planetary and Space Sciences and in the field of Astrobiology. We particularly welcome applications from candidates whose research includes laboratory studies of fluid-rock-microbial interactions and the study of biosignatures. You will also contribute to the design and delivery of OU modules at undergraduate and postgraduate level in the Physical or Geo Sciences programmes.

Candidates should also have a strong track record in research and research management, with a recent history of winning funding. They should be familiar with recent developments in space exploration missions within and beyond the Solar System. They must be committed to principles of equality and diversity in the teaching of science, and should preferably have some experience of distance education.

Closing date: 2 December 2011.


Iain Gilmour
Centre for Earth, Planetary, Space and Astronomical Research
The Open University, Milton Keynes, MK7 6AA, United Kingdom
T: +44 (0) 190 865 5140
M: +44 (0) 7429 227758
Skype: i.gilmour

Department of Energy Carlsbad Field Office Fellowship Program, Postdoctoral Appointment in Science or Engineering (US Citizenship Required)

Application closes November 30, 2011
Visit CBFO Fellowship Program to apply!

The Department of Energy (DOE) Carlsbad Field Office (CBFO) Fellowship Program provides a postdoctoral fellow the opportunity to conduct mission oriented research in DOE’s CBFO in Carlsbad, New Mexico. Under the guidance of a mentor, the appointed CBFO Fellow will study the engineered barrier system in use in the Waste Isolation Pilot Plant (WIPP) repository. The CBFO Fellow will become familiar with WIPP operations through guided tours to observe the working facility and through interviews with key personnel. The Fellow will also become familiar with key system-optimization recommendations by external, independent review organizations and will study the implications of several internal recommendations regarding the use of alternative MgO purities or magnesium hydroxide, Mg(OH)2 as a way to cut costs without sacrificing performance or safety. The CBFO Fellow will review optimization changes and may offer new optimization suggestions as time allows.
For more information on WIPP, visit DOE-WIPP.
Open to U.S. Citizens only. Applicant must have completed a doctoral program of studies in a discipline related to science or engineering that provided exposure to the manner in which technical trade-off studies are conducted. A postdoctoral participant must have received their degree no more than five years prior to entry into the program. Applicant must have strong oral and written communication skills.

USGS seeks field-oriented high-temperature geochemist, High-temperature fluid geochemist, GS-12 or GS-13.

The U.S. Geological Survey seeks a field-oriented high-temperature fluid geochemist to participate in the USGS Volcano Hazards and Geothermal Programs. This permanent full-time position is located in the Menlo Park, California, Office and is administered by the National Research Program. The research group is largely funded by the Volcano Hazards and the Geothermal Programs and is responsible for conducting basic and applied research investigations on: 1) the geologic, hydrologic, and geochemical manifestations of volcanic unrest and 2) the potential for development of geothermal energy and the actual and predicted impacts of that development. Project personnel make field measurements and collect samples for later laboratory analysis. The primary purpose of this position is to improve techniques for field and laboratory geochemical measurements, evaluate and refine statistical methods of data reduction, establish monitoring networks, collect and analyze samples of gas and water, and relate the findings to assessment of volcanic unrest and/or geothermal energy potential. At the GS-12 level, the level of knowledge required would be reached through successful completion of a relevant PhD program or equivalent doctoral degree in the field of Earth Sciences, or through equivalent experience and knowledge. At the GS-13 level, the level of knowledge required would be reached through successful completion of a PhD program in the field of Earth Sciences and at least one year of specialized work sufficient to demonstrate expertise and leadership in: fluid geochemistry and its application to natural systems, field hydrologic studies of moderate scope, and advanced field and laboratory techniques for chemical and isotopic analysis of gases, waters and rocks. The capability to envision and carry studies through to completion and successfully synthesize the results must be demonstrated by publication of technical reports and published articles in respected scientific journals. Volcanoes threaten population centers throughout the western United States; thus the incumbent must be able to conduct and track several ongoing investigations that may be geographically dispersed over a wide area while still being able to focus major effort on any area that presents an immediate concern. Salary $81,460-$96,867. For details on the vacancy announcement, including specific qualification requirements and application procedures, go to http://www.usajobs.gov and refer to Vacancy Announcements ATL-2012-0025 (for current status employees or reinstatement eligible) or ATL-2012-0026 (for candidates who have never worked for the Federal Government). Address other inquiries to William C. Evans (wcevans@usgs.gov). Applicants must be U.S. citizens. The deadline for applications is November 30, 2011. The U.S. Geological Survey is an Equal Opportunity Employer.
Three Post-Doctoral Research Scientists in Paleoclimatology and Paleoceanography:

The Lamont-Doherty Earth Observatory of Columbia University invites applications for three full-time post-doctoral research scientist positions in the field of paleoclimatology and paleoceanography. The successful candidates will join a dynamic and interdisciplinary group of scientists working on a wide range of interrelated problems examining Earth's past climate history, ocean chemistry and circulation, ice sheet stability, sea level, and the interactions of the solid Earth, ocean, and cryosphere. The positions are full-time 1-year appointments, with the opportunity for continuation and growth depending on progress and availability of funding.

We seek qualified, highly motivated candidates for the following research activities:

**Past sea level changes.** The successful candidate will undertake field work and related analyses leading to a better understanding of Plio-Pleistocene sea level history. This work will be part of the larger collaborative PLIOMAX project, and target locations in the circum-Indian and Atlantic Ocean regions; field experience and dating expertise in carbonate sedimentary environments and coral reef ecology and structure is essential.

Contact: Maureen Raymo (raymo@ldeo.columbia.edu)

**Sediment geochemistry.** The successful candidate will investigate the history of the Laurentide ice sheet over the Plio-Pleistocene through analysis of Gulf of Mexico sediment cores; investigation of multiple proxies and innovative application of new proxies to core material is anticipated; expertise in foram geochemistry, clay mineralogy and/or XRF techniques desirable.

Contact: Maureen Raymo (raymo@ldeo.columbia.edu)

**Foraminifer shell geochemistry/paleoceanography.** The successful candidate will work on one of several potential research areas including coretop calibrations of planktonic foraminifera and pteropods with oceanic carbon chemistry and physical parameters, Pliocene changes in the composition and ventilation of upper ocean waters, and high-resolution records of Holocene SST variability. The candidate will have experience with species identification, stable isotope geochemistry and analysis, and trace element analyses using quad ICP-MS (mid-2012 delivery).

Contact Peter deMenocal (peter@ldeo.columbia.edu)

Requirements:
A recent Ph.D. in Earth Sciences or a related discipline is required. Experience directly relevant to the research activities described above desirable.

To apply:
Applicants should submit a personal statement describing research experience and interests, including specific reference to the projects listed here, a curriculum vitae, and the names and addresses of three references, to:

https://academicjobs.columbia.edu/applicants/Central?quickFind=55431
Only online applications will be accepted.

Columbia University is an Equal opportunity and affirmative action employer.

**Fenneman Research Assistant Professors in Quaternary and Anthropocene Science, University of Cincinnati**

As part of a new initiative developed by the Department of Geology and the College of Arts and Sciences, the University of Cincinnati seeks geoscientists for two non-tenure-track research positions in Quaternary and Anthropocene science. The positions are fully funded for the first two years. Appointees will be expected to generate at least 20% of their salaries in the third year and at least 30% of their salaries in the fourth and fifth years. Appointees will be expected to focus their research on one or more aspects of the Quaternary or Anthropocene. These could include, but are not limited to: paleolimnology, paleontology; paleoecology; landscape evolution; paleoclimatology; glacial geology; geochronology; biogeochemistry; and global change. Successful candidates will be expected to generate external funding as part of their research programs, collaborating with faculty in the Department of Geology. Applicants are encouraged to browse the research interests of departmental faculty at [http://www.artsci.uc.edu/geology/](http://www.artsci.uc.edu/geology/), and to contact potential collaborators or research groups of interest.

Only online applications will be considered. Applicants should have completed their Ph.D. by December 30, 2011, and should apply online at [https://www.jobsatuc.com](https://www.jobsatuc.com) (search for Position #: 211UC754) submitting a letter of application; a curriculum vita; a short summary of research interests (2-3 pages); and contact information for three references. Complete applications will be reviewed starting January 2, 2012, and the search will remain open until the position is filled. For additional information please e-mail Professor Arnold Miller ([Arnold.Miller@uc.edu](mailto:Arnold.Miller@uc.edu)). The University of Cincinnati is an equal opportunity / affirmative action employer. Women, people of color, the disabled, and veterans are encouraged to apply.