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Land transformation by humans: A review

Inside:

Preliminary Announcement and Call for Papers: 2013 GSA Cordilleran Section Meeting, p. 22

Preliminary Announcement and Call for Papers: 2013 GSA Rocky Mountain Section Meeting, p. 24

Final Announcement and Call for Papers: 2013 GSA Northeastern Section Meeting, p. 26



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GSA TODAY STAFF

Executive Director and Publisher: John W. Hess

Science Editors: Bernie Housen, Western Washington Univ. Geology Dept. (ES 425) and Advanced Materials Science and Engineering Center (AMSEC), 516 High Street, Bellingham, WA 98225-9080, USA, bernieh@wwwu.edu; R. Damian Nance, Ohio University Dept. of Geological Sciences, 316 Clippinger Laboratories, Athens, OH 45701, USA, nance@ohio.edu

Managing Editor: K.E.A. "Kea" Giles, kgiles@geosociety.org, gsatoday@geosociety.org

Graphics Production: Margo McGrew

Advertising (classifieds & display): Ann Crawford, +1-800-472-1988 ext. 1053; +1-303-357-1053; Fax: +1-303-357-1070; advertising@geosociety.org; acrawford@geosociety.org

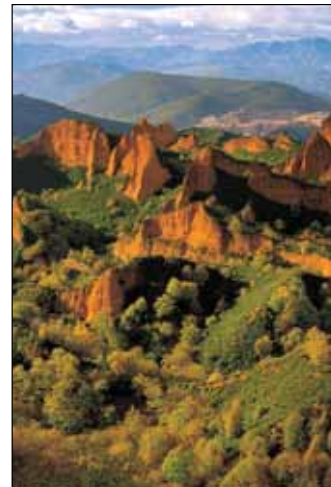
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4 Land transformation by humans: A review Roger LeB. Hooke, José F. Martín-Duque, and Javier Pedraza

Cover: Hydraulic gold mining by Romans nearly 2,000 years ago left this dramatic example of human modification of the landscape at Las Médulas, Spain, a UNESCO World Heritage Site. Water obtained from surrounding mountainous watersheds was used to undermine the >100-m-thick Miocene alluvial fan sediments here until they collapsed—a process called *ruina montium*, loosely translated as ruin the mountain—and then washed to separate the gold. Tailings total ~90 Mm³. Photo by Justino Diez. See related article, p. 4–10.



- 12 **2013 GSA Grants, Awards & Recognition Deadlines**
- 13 **John C. Frye Environmental Geology Award**
- 14 **Call for Nominations: GSA Division Awards**
- 15 **Inaugural International Section Honorary Fellow**
- 16 **Joint Penrose-Chapman Conference: Coastal Processes and Environments under Sea-Level Rise and Changing Climate: Science to Inform Management**
- 18 **MEGA EarthCache!**
- 19 **About People**
- 19 **Call for Proposals: 2013 GSA Annual Meeting & Exposition**
- 22 **Preliminary Announcement and Call for Papers: 2013 GSA Cordilleran Section Meeting**
- 24 **Preliminary Announcement and Call for Papers: 2013 GSA Rocky Mountain Section Meeting**
- 26 **Final Announcement and Call for Papers: 2013 GSA Northeastern Section Meeting**
- 29 **GSA Foundation Update**
- 30 **Classified Advertising**
- 37 **Call for Applications: 2013–2014 GSA-USGS Congressional Science Fellowship**



Land transformation by humans: A review

Roger LeB. Hooke, School of Earth and Climate Sciences and Climate Change Institute, University of Maine, Orono, Maine 04469-5790, USA, rogerhooke@gmail.com; **José F. Martín-Duque**, Dept. of Geodynamics and Geosciences Institute (CSIC-UCM), Complutense University, 28040 Madrid, Spain; and **Javier Pedraza**, Dept. of Geodynamics, Complutense University, 28040 Madrid, Spain

ABSTRACT

In recent decades, changes that human activities have wrought in Earth's life support system have worried many people. The human population has doubled in the past 40 years and is projected to increase by the same amount again in the next 40. The expansion of infrastructure and agriculture necessitated by this population growth has quickened the pace of land transformation and degradation. We estimate that humans have modified >50% of Earth's land surface. The current rate of land transformation, particularly of agricultural land, is unsustainable. We need a lively public discussion of the problems resulting from population pressures and the resulting land degradation.

INTRODUCTION

"Global Change" refers to changes that alter the atmosphere and oceans, and hence are experienced globally. It also refers to local changes that are so common as to be, collectively, of global importance; these include changes in climate, in composition of air and water, in biodiversity, and in land use (Vitousek, 1992; Rockström et al., 2009). Herein, we focus on land use (Fig. 1). Vitousek (1992, p. 7) remarks that this may be the "most significant component of global change" for decades to come.

Many changes in land use are a consequence of the increase in human population and the resulting demand for more resources—among them, minerals, soil, and water. This demand now exceeds that which Earth can provide sustainably. The long-term sustainability issue is more serious than, but exacerbated by, climate change.

By the middle of the nineteenth century, the extent to which humans had already modified the landscape was recognized by George Perkins Marsh (1864). Marsh understood that Earth's ability to provide the many ecosystem services upon which we depend was exhaustible.

Over the last half century, numerous impacts of changes in land use have been identified (Lambin and Geist, 2006, p. 1). In the 1970s, it was recognized that changes in albedo and evapotranspiration due to clearing and overgrazing had led to local decreases in rainfall. In the 1980s, the role of land-use changes in the carbon cycle was highlighted. Many papers since the late 1990s have drawn attention to the effects of land use on biodiversity, ecosystem services, and soil degradation.

Humans are likely the premier geomorphic agent currently sculpting Earth's surface (Hooke, 1994). Earth is moved and the

landscape modified, commonly degraded, by many of our activities. Mining, infrastructure expansion, and urban development are obvious ones. Plowing moves huge amounts of earth and leads to accelerated erosion. Grazing and logging also increase erosion. Much of the eroded sediment ends up as colluvium on hillslopes and as alluvium in floodplains (Trimble, 1999; Wilkinson and McElroy, 2007), thus subtly altering the shape of the land. The rest is carried away by streams and rivers.

We are land animals. The resources upon which we depend come largely from the land. The land and the other inhabitants it supports, its biodiversity, provide us with food, fiber, mineral resources, medicines, industrial products, and innumerable ecosystem services like cleansing our waste water, dampening flood peaks, breaking down rocks into productive soil, maintaining the supply of oxygen in the atmosphere, and supporting pollinators for many crops and predators that control many agricultural pests (MEA, 2003 [see esp. chapter 2, p. 49–70]; TEEB, 2010). The diversity of species contributes to the stability or resilience of this life support system, facilitating continuation of services despite disturbances (Rockström et al., 2009). Degrading the land degrades our life support system. The land is an essential resource for future generations.

LAND AREA MODIFIED BY HUMAN ACTION

Assessments of the percentage of ice-free land affected by human action vary from 20% to 100%. Humans appropriate 20% to 40% of Earth's potential net primary biological production (Haberl et al., 2007; Imhoff et al., 2004; Vitousek et al., 1986). Nearly 24% of Earth's surface area likely experienced decline in ecosystem function and productivity between 1981 and 2003 (Bai et al., 2008). As of 1995, ~43% of Earth's surface area had experienced human-induced degradation (Daily, 1995). Ellis and Ramankutty (2008) concluded that more than 75% of Earth's ice-free land area could no longer be considered wild. Of Earth's ice-free land area, 83% is likely directly influenced by human beings (Sanderson et al., 2002). Our pollutants affect plant and animal physiology worldwide (McKibben, 1989, e.g., p. 38, 58).

The amount of earth moved by humans and the history of human earth moving have been discussed previously (Hooke, 1994, 2000). Herein, we consider the *area* of the landscape we humans have reconfigured.

Changes through Time in Cropland, Pasture, Forest, and Urban Land

In pioneering studies, Ramankutty and Foley (1999) and Klein Goldewijk (2001, and pers. comm., March 2010) assessed the land area used as *cropland* or *pasture* (Klein Goldewijk, 2001, only) and that covered by *forest* (supplemental data¹), during the past 300 years. Recently, they have updated some of their estimates (Ramankutty et al., 2008; Klein Goldewijk et al., 2011), and Pongratz et al. (2008, and pers. comm., Jan. 2012) have presented



Figure 1. Land transformation: Before New York (top: reproduced from *National Geographic Magazine*, September 2009, with permission of the National Geographic Society; bottom: New York, USA, © Robert Clark/INSTITUTE for Artist Management).

new ones. All of these studies are based on data collected by the Food and Agriculture Organization of the United Nations since 1961 (<http://faostat.fao.org>). The authors then hindcast and sometimes forecast using satellite, ground-truth, and historical data (Fig. 2). Ramankutty et al. (2008) give values only for 2000. Thus, we adjusted the Ramankutty and Foley (1999) values for cropland in earlier years downward by the percent difference between the Ramankutty et al. (2008) and projected Ramankutty and Foley (1999) values for 2000 (see the supplemental data, Sec. C, for additional details [footnote 1]).

Noteworthy in Figure 2 are the increases in cropland and pasture over the past 300 years, the corresponding decrease in forest, and the recent decreases in the rate of change of all three.

Recent estimates of the global *urban* area range from 0.3 to 3.5 Mkm² (Potere and Schneider, 2007). The wide range is due to differences in the definition of “urban” and in the methodology for identifying areas that are urban. An urban area is one in which the population density exceeds a minimum value. Different

countries, however, use different minima, ranging from <200 to 4000 people/km². Methodologically, the problem is the lack of a standard remote sensing technique for identifying urban areas. Common approaches use either the intensity of night lights or the extent of impervious ground. The former varies spatially, because more affluent countries use more power. The latter overlooks open space around houses that, nonetheless, has been modified by human action.

We think of “urban areas” as expanses of contiguous land, divided into parcels (≤ 1 ha) with different owners, and modified for residential or commercial purposes. This includes land covered by structures or pavement as well as intervening land modified to form gardens or parks. The estimate of 3.5 Mkm² (CIESIN, 2010) best reflects this description. It is based on night lights, censuses, and a variety of supplementary data, and is as of 2005. We projected backward and forward using CIESIN’s population density (796 people/km²) and estimates of urban population from UNPD (2004, 2007a, 2007b) and Kelley and Williamson (1984).

¹ GSA supplemental data item 2012340, supplemental information, definitions, figures, tables, and references, is online at www.geosociety.org/pubs/ft2012.htm. You can also request a copy from *GSA Today*, P.O. Box 9140, Boulder, CO 80301-9140, USA; gsatoday@geosociety.org.

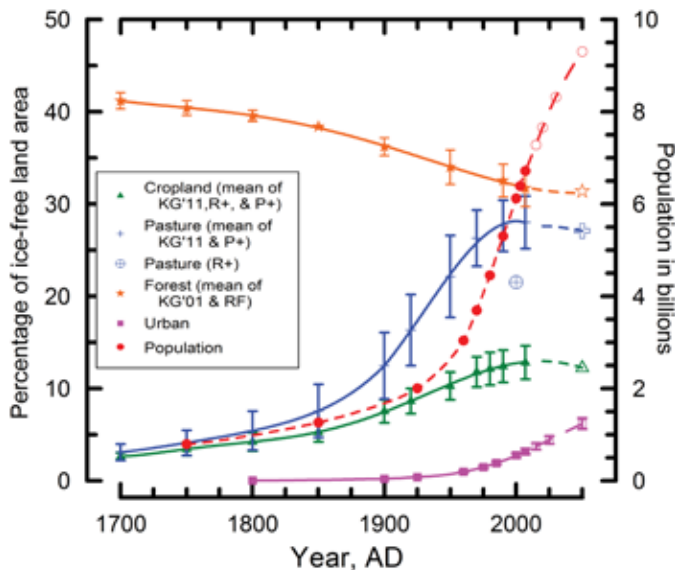


Figure 2. Changes in land use through time with extrapolations to 2050 AD. Population data and projections are from UNPD (1999). See text and supplemental data (Sec. C; see text footnote 1) for other sources and estimates. KG'01—Klein Goldewijk (2001); KG'11—Klein Goldewijk et al. (2011); P+—Pongratz et al. (2008); R+—Ramankutty et al. (2008); RF—Ramankutty and Foley (1999).

Land Modified by Human Action as of 2007

In Table 1, we present a more comprehensive estimate, as of 2007, of the land area modified either directly by human earth moving or indirectly by actions causing changes in sediment fluxes.

To obtain the areas of *cropland* and *pasture* in Table 1, 16.7 ± 2.4 Mkm² and 33.5 ± 5.7 Mkm², respectively, we first adjusted the Ramankutty et al. (2008) value for pasture in 2000 downward by the mean decrease between 2000 and 2007 in the FAO (2009) and Pongratz et al. (2008) estimates. We then fit a 4th order polynomial through the Klein Goldewijk et al. (2011) and Ramankutty et al. (2008) cropland data and extrapolated them to 2007. Finally, we then averaged these values with those of Pongratz et al. (2008).

Erosion rates are higher on agricultural land; typical estimates are $15 \text{ t ha}^{-1}\text{y}^{-1}$ for cropland and $5 \text{ t ha}^{-1}\text{y}^{-1}$ for pasture (e.g., USDA, 1989; Pimentel et al., 1995; Montgomery, 2007). Of this, ~70% is likely redeposited nearby on slopes and floodplains (Wilkinson and McElroy, 2007). Using population estimates, the per capita need for agricultural land, and a mean deposition of 1 ± 0.5 m, we estimate that the area thus reshaped in the past five millennia is $\sim 5.3 \pm 2.0$ Mkm² (see supplemental data, Sec. D [footnote 1]).

Logging operations disturb forest soils and thus also increase erosion (Elliot et al., 1998). Unlike agricultural land that is reused annually, however, logged areas recover as regrowth occurs. Furthermore, part of the logged land may not be degraded. We estimate the global area logged annually by dividing the production (3.5 Mm^3 in 2007) by an estimate of the yield per hectare ($15 \pm 5 \text{ m}^3 \text{ ha}^{-1}$). We assumed that 50% of the area would have been disturbed during the year in which it was cut and that due to regrowth half of the area remaining disturbed in any given year would have recovered by the next. This calculation yielded a disturbed area of 2.4 ± 1.2 Mkm² in 2007. The uncertainty is based on uncertainties of 50% in the regeneration rate, 25% in the

area initially disturbed, and 33% in the yield per hectare (see supplemental data, Sec. E [footnote 1]).

For *forested* area, we extrapolated the Ramankutty and Foley (1999) time series using a 4th order polynomial and averaged it with the FAO (2009) estimates, yielding 41.3 ± 2.6 Mkm². This is identical to the Pongratz et al. (2008) estimate for forest plus shrubland. As this includes both natural and planted forests, we subtracted the latter, 2.7 Mkm² (FAO, 2009). We also subtracted the area disturbed by logging, yielding 36.2 ± 2.9 Mkm².

To estimate the area of *urban* development in 2007, 3.7 ± 1.0 Mkm², we extrapolated the CIESIN (2010) estimate of the area in 2005, using an annual growth rate of 2.1% (UNPD, 2007a).

The area occupied by *rural housing and businesses*, 4.2 ± 1.4 Mkm², is assessed from the rural population in 2007 (UNPD, 2007b), assuming that 8_{-2}^{+4} people would disturb a hectare of rural land.

To calculate the land area affected by *roads in rural areas*, we used data for 2002–2007 on the total lengths of roads of various classes in 188 countries (IRF-WRS, 2009). Other data suggest that 70% of these roads are rural. We assigned widths to these various road classes, based on standards in the United States (supplemental data, Sec. F [footnote 1]). Assuming an uncertainty of $\pm 15\%$ in road widths and in the percentage of rural roads, we obtained 0.5 ± 0.1 Mkm².

A comprehensive list of reservoir volumes has been compiled by the International Committee on Large Dams and updated by Chao et al. (2008). They sum to $\sim 10,800 \text{ km}^3$. B.F. Chao (pers. comm., 2011) thinks the mean reservoir depth is ~ 50 – 100 m. Noting the large number of small reservoirs, we chose the lower number, yielding a total surface area of 0.2 ± 0.1 Mkm².

Table 1. Land area modified by human action (as of ca. 2007)

Activity	Area involved 10 ⁶ km ²	% of Earth's land surface
Human-modified land		
Cropland (mostly cultivated or plowed land ≡ FAO's arable land and permanent crops)	16.7 ± 2.4	12.8 ± 1.8
Permanent meadows and pastures (mostly uncultivated)	33.5 ± 5.7	25.8 ± 4.3
Land area modified by deposition of eroded sediment	5.3 ± 2.0	4.1 ± 1.5
Land area modified by logging operations	2.4 ± 1.2	1.8 ± 0.9
Forest area (planted)	2.7	2.1
Subtotal agriculture and forestry	$60.6 \pm 6.5^*$	46.6 ± 5.0
Urban areas (including urban roads)	3.7 ± 1.0	2.8 ± 0.8
Rural housing and businesses	4.2 ± 1.4	3.2 ± 1.1
Highways and roads in rural areas	0.5 ± 0.1	0.4 ± 0.1
Reservoirs	0.2 ± 0.1	0.2 ± 0.1
Railways	0.03	0.02
Mining and quarrying	$0.4 + 0.4/-0.1$	$0.3 + 0.3/-0.1$
Subtotal human infrastructure	9.0 ± 1.7	6.9 ± 1.3
Total land area modified by humans	69.6 ± 6.7	53.5 ± 5.1
Natural land (mostly)		
Forest area (natural but not necessarily virgin)	36.2 ± 2.9	27.8 ± 2.2
Other land (largely high mountains, tundra, and deserts, unsuitable for agriculture)	24.3	18.7
Total natural land	60.5	46.5
Total land area (exclusive of ice sheets)	130.1	100.0

Note: FAO—Food and Agriculture Organization of the United Nations.

*Apparent errors in some sums are due to accumulated round-off errors.

Data on the global length of *railways* are from IUR (2008). Widths are from ADIF (2005). The product is 0.03 Mkm². We have no basis for estimating an uncertainty.

We found summary data on the area disturbed by *mining* for 14 regions or countries representing 22% of Earth's ice-free land area, all continents except Africa, and the two principal economic powerhouses of today's economy, China and the United States (supplemental data, Sec. G [footnote 1]). The weighted mean is 0.3%. Assuming that this percentage applies globally, we obtain $\sim 0.4_{-0.1}^{+0.4}$ Mkm². For comparison, Norse et al. (1992) suggest that the area is between 0.5 and 1.0 Mkm², but the basis for this estimate is unclear.

Our subtotal for land disturbed by human infrastructure (Table 1) is $\sim 9.0 \pm 1.7$ Mkm². We believe this is a conservative estimate because we have not evaluated the land area modified by coastal or river engineering projects; by construction of infrastructure like levees, electric power grids or wind farms; or by infrastructure from the distant past (e.g., prehistoric archaeological sites).

DISCUSSION

The data in Table 1 suggest that ~ 70 Mkm², or $>50\%$ of Earth's ice-free land area, has been *directly* modified by human action involving moving earth or changing sediment fluxes. Many of these activities have *indirect* consequences well beyond the area directly affected. Converting land to agriculture leads to local extinctions of biota in adjacent areas, the insecticides and herbicides used diffuse into the surroundings, killing non-target species (Ehrlich and Ehrlich, 1981), and fertilizers foul our streams and rivers, leading to dead zones in the ocean (Halpern et al., 2008). Invasive species commonly find footholds on surfaces disturbed by agricultural activities, and can severely reduce the usefulness of large areas (e.g., Tobler, 2007). Toxic chemicals spewed into the air from urban centers rain out over vast areas downwind. Others, like CO₂, diffuse over the entire globe. Roads and railways fragment ecosystems, a key element of habitat destruction and a principal cause of loss of biodiversity (Vitousek et al., 1997; Sala et al., 2000), and runoff from them carries pollutants. The land area ecologically impacted by roads may be tens to hundreds of meters wider than the area physically disturbed (Forman, 2000). Runoff from mining areas is commonly contaminated and has a high sediment load, affecting hundreds of kilometers of riparian ecosystems. Dust raised by plowing and other human activities is deposited over distant surfaces. Dust commonly contains pathogens (Prospero et al., 2005) or heavy metals (Herut et al., 2001; Reynolds et al., 2010) that can have adverse effects on people and other organisms. Dust also accelerates melting of snow and ice on mountains, affecting water supplies downstream (Painter et al., 2010). Levees on rivers prevent natural water storage during floods, thus increasing damage downstream (e.g., Pinter et al., 2008). Deforestation and construction projects involving earth moving on steep slopes too commonly result in catastrophic failures and in human deaths (Kellerer-Pirklbauer, 2002). Thus, the impact of land transformation is much larger than suggested by the numbers in Table 1.

These impacts reduce the ecosystem services we receive, *seemingly for free*, from the plants, animals, insects, and microbes with whom we share the planet (MEA, 2005; TEEB, 2010). The global annual value of these services is roughly twice the global GNP

(Costanza et al., 1997; Daily, 1997). They are essential for human survival. Some are likely irreplaceable.

Cropland

The data in Figure 2 suggest that the rate of change in area of cropland and pasture has decreased in the last few decades. Projected into the future, these trends suggest a peak and then a decline in the areas of both. Let's focus on cropland, because that is the land use for which data are most robust and the one of most concern, given our swelling population (Fig. 2).

At least three trends are contributing to the decline in the rate of increase in cropland:

- 1. Urban area is increasing, commonly at the expense of agricultural land.** Between 2000 and 2030, worldwide, the loss of agricultural land to urbanization may be as much as $\sim 15,000$ km² *annually* (Döös, 2002).
- 2. There is a dearth of additional land suitable for agriculture.** Of Earth's land area, 70% to 80% is unsuitable for agriculture owing to poor soils, steep topography, or adverse climate (Fischer et al., 2000, p. 49; Ramankutty et al., 2002). About half of the rest is already in crops (Table 1), and a large fraction of the other half is presently under tropical forests that beneficially take up CO₂. Tropical-forest soil loses fertility rapidly, once cleared.
- 3. Some existing agricultural land has deteriorated so much that it is no longer worth cultivating.** As of ca. 1990, soils on nearly 20 Mkm² of land, or $\sim 40\%$ of the global agricultural land area, had been degraded (Oldeman et al., 1991, p. 28). Of this, over half was so degraded that local farmers lacked the means to restore it.

Partially offsetting these trends may be increases in efficiency of farming and food distribution. Rudel et al. (2009), however, could not find correlations that supported this hypothesis.

PROGNOSIS FOR THE FUTURE

Looking ahead a few decades, land suitable for agriculture will likely continue to diminish as urban areas expand, soil is degraded, fertile soil is washed down rivers and blown away ten times faster than it is replaced (Montgomery, 2007), and water tables decline in areas dependent on groundwater for irrigation (Gleick, 1993). Foreseeing a shortage of arable land, global investors are, in fact, buying huge tracts in Africa and South America (De Castro, 2011). In addition, despite foreseeable future technological developments, agricultural productivity is likely to decrease as (i) the supply of phosphate for fertilizer decreases (Rosmarin, 2004); (ii) petroleum (used to run farm machinery and as feedstock for fertilizer) becomes more expensive and less available; (iii) pollution adversely affects pollinators, plant growth, and predators that control agricultural pests (Peng et al., 2004; supplemental data, Sec. H [footnote 1]); and (iv) climate changes.

Will Earth be able to support the projected 2050 population of 8.9 billion? Fischer et al. (2000, p. 88) believe that it can. Döös and Shaw (1999), considering climate change, water availability, irrigation, salinization, pests, farm management, and access to fertilizers, think it likely that the demand for cereals could be met in the more developed countries, and *highly unlikely* that it would be met in less developed ones. Seto et al. (2010, p. 95) conclude that it is unlikely that Earth's land resources can support current

and future populations sustainably without a “breathtaking” change in our way of life. Wackernagel et al. (2002) estimate that, as of ca. 1978, the land area needed to grow crops, graze animals, provide timber, accommodate infrastructure, and absorb waste, *all sustainably*, already exceeded Earth’s available area, and that as of 2002, we needed 20% more land than is available. If this is the case, we are in a period of overshoot.

Overshoot

Overshoot occurs when populations exceed the local carrying capacity. An environment’s carrying capacity for a given species is the number of individuals “living in a given manner, which the environment can support *indefinitely*” (Catton, 1980, p. 4). Only a population less than or equal to the carrying capacity is sustainable.

A sustainable population is one that (i) consumes renewable resources at a rate less than the rate at which they are renewed; (ii) consumes non-renewable resources at a rate less than the rate at which substitutes can be found; and (iii) emits pollution at a rate less than the capacity of the environment to absorb the pollutants (Daly, 1991, p. 256).

It is axiomatic that, on a finite planet, there *is* a limit to growth. The question is, “Are we now bumping up against that limit?”

Several observations suggest that, with *our present lifestyles*, we are, indeed, now living in a state of overshoot. We struggle to supply the food needed by the present population. Groundwater tables are declining. Our way of life is based on non-renewables like fossil fuels, phosphates, and ores, accumulated over millions of years, with no clear plan for adequate substitutes once natural sources are exhausted. We discard many chemicals (e.g., CO₂, N, plastics) faster than they can be absorbed by the environment.

When the number of individuals exceeds the carrying capacity, overuse of the environment sets up forces that, *after a delay*, first reduce the standard of living and then eventually the population (Catton, 1980, p. 4–5). Initiation of the correction may be manifested by stagnant or negative economic growth rates, by famine and/or water shortages, by increases in disease resulting from undernourishment (Pimentel et al., 2007), and by increases in conflict. Sound familiar? Fifty-four nations with 12% of the world’s population experienced economic declines in per capita GDP from 1990 to 2001 (Meadows et al., 2004, p. xiv; World Bank, 2003, p. 64–65). Famine, disease, and conflict are frequently in the news.

SOLUTIONS

If we are in a state of overshoot, here are three ways to bring the human impact on Earth back to sustainability:

1. **Reduce demand.** Demand can be reduced by improving building insulation or mandating energy-efficient vehicles and appliances. Recycling reduces demand for primary materials. Tempering our impulse to buy things that we don’t really need or of which we will soon tire also reduces demand.
2. **Develop technological solutions.** Existing technology can mitigate our impact. Adoption of efficient building and farming practices limits degradation, and ecological restoration can partially reverse it (Rey Benayas et al., 2009). Technological breakthroughs are also possible. Simon (1996) argued that a larger population increases the likelihood of

spawning the brain power needed to achieve such breakthroughs. But without well-fed bodies, brains don’t function well.

Our technological skills have enabled us to support an ever increasing population. They have also exacerbated some problems. Use of oil as an energy source in agriculture has increased efficiency, but at the expense of leaving us presently dependent on a non-renewable resource. Mechanical well drilling and pumping facilitate irrigation, but now groundwater tables are dropping unsustainably (Gleick, 1993). Given present usage, more than half of the U.S. High Plains aquifer will likely last for 50 to 200 years, *but* significant parts will be exhausted in <~25 years while others are already effectively spent (Buchanan et al., 2009). Use of bioengineered wheat in Punjab, India, and rice in Bali, Indonesia, increased crop yields, but also led to a variety of economic, pest, and health problems (Tiwana et al., 2007, p. xxii–xxiii; Lansing, 1991, p. 110–117).

3. **Reduce the population.** Increasing the availability of health care, education, and microfinancing, particularly for women in developing countries, reduces fertility. Reduced fertility reduces poverty, because available resources are distributed among fewer people. Couples worldwide can be urged to have only two children and to delay having them so there will be fewer people on Earth at any one time. These steps would first slow population growth and then lead to a long-term decline.

Reducing demand is a critical component of the solution, but in itself is not sufficient, given the magnitude of the problem. Technological progress, particularly in the energy field, is essential, but we also think it unwise to bet too heavily on unspecified future breakthroughs. Reducing and eventually reversing population growth needs to be a large part of the solution. Eventually, difficult decisions will have to be made about the size of an optimum population and how to achieve it.

CLOSURE

We would like to leave the reader pondering three questions:

1. **Are natural resources (such as land, soil, water, ecosystem services, ores) the fundamental basis for a comfortable life?**
2. **Above a certain threshold regional population, is comfort inversely proportional to population?**
3. **How much of the unrest in the world is a consequence of insufficient natural resources to support local populations at a tolerable level?** Periods of inadequate food production during the past millennium have led to unrest, war, and migration (Zhang et al., 2007). The Arab Spring is, at least in part, a consequence of high food prices and unemployment (Roubini, 2011).

We have shown, herein, that many of the problems now facing humanity will be gravely exacerbated if the population continues to increase and the land continues to degrade; many would be vastly easier to solve with a reduced population. The transition to a truly sustainable society (*sensu* Daly, 1991) requires more than a population policy though. Unqualified growth can no longer be our mantra. Thus, drastic changes in our economic philosophy and, hence, in the controlling legal structure are required. The needed changes are, indeed, breathtaking.

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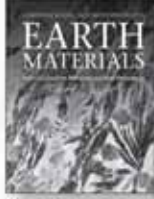

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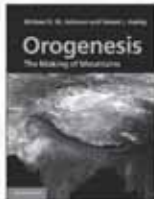
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The Gilbert H. Cady Award recognizes outstanding contributions that advance the field of coal geology within and outside North America. Send three copies of the following to **Jack C. Pashin**, Energy Investigations Program, Geological Survey of Alabama, P.O. Box 869999, Tuscaloosa, AL 35486-6999, USA; jpashin@gsa.state.al.us: (1) name, office or title, and affiliation of the nominee; (2) date and place of birth; (3) education, degree(s), honors, and awards; (4) major events in his or her professional career; and (5) a brief bibliography noting outstanding achievements and accomplishments that warrant nomination. *Supported by endowment income from the GSA Foundation's Gilbert H. Cady Memorial Fund.*

■ ENVIRONMENTAL AND ENGINEERING GEOLOGY

E.B. Burwell, Jr., Award

Nominations due 1 Feb. 2013

The Edward Burwell, Jr., Award honors the memory of the first chief geologist of the U.S. Army Corps of Engineers. This award is made to the author or authors of a published paper of distinction that advances knowledge concerning the principles or practice of engineering geology, or the related fields of applied soil or rock mechanics where the role of geology is emphasized. The paper that receives the award must have been published no more than five years prior to its selection, and there are no restrictions on the publisher or publishing agency of the paper. Send nominations to **James McCalpin**, GEO-HAZ Consulting, Inc., PO Box 837, 600 E. Galena Ave., Crestone, CO 81131, USA; mccalpin@geohaz.com.

Richard H. Jahns Distinguished Lecturer

Nominations due 28 Feb. 2013

The Richard H. Jahns Distinguished Lectureship, established in 1988 by the Environmental & Engineering Geology Division and the Association of Environmental & Engineering Geologists (AEG), promotes student awareness of engineering geology through an annual series of lectures at academic institutions. The award is given to an individual who, through research or practice, has made outstanding contributions to the advancement of environmental and/or engineering geology. The awardee will speak on topics of earth processes and the consequences of human interaction with these processes, or the application of geology to environmental and/or engineering works. Send nominations to **Dennis Staley**, U.S. Geological Survey, Box 25046, MS 966, Denver, CO, 80225, USA; dstaley@usgs.gov. *Award funds are administered by the GSA Foundation.*

■ GEOPHYSICS

George P. Woollard Award

Nominations due 15 Feb. 2013

This Geophysics Division award recognizes outstanding contributions to geology through the application of the principles

and techniques of geophysics. A highlight of the presentation is the honorary George P. Woollard Technical Lecture. To submit your nomination, go to gsageop.org, click on "Awards" in the main menu, and then select the George P. Woollard Award. Nominations should include a description of the nominee's specific contributions and their scientific impact. *Award funds are administered by the GSA Foundation.*

■ GEOSCIENCE EDUCATION

Biggs Award for Excellence in Earth Science Teaching

Nominations due 1 Feb. 2013

The Biggs Award recognizes innovative and effective teaching in college-level earth science. Earth-science instructors and faculty members from any academic institution engaged in undergraduate education who have been teaching full-time for 10 years or fewer are eligible (part-time teaching is not counted in this requirement). Both peer- and self-nominations will be accepted. Submit nominations via link at www.geosociety.org/divisions/ged/biggsAward.htm. Any supplemental materials should be sent by e-mail to Julie C. Libarkin, libarkin@msu.edu. This award, *administered by the GSA Foundation*, is made possible by support from the Donald and Carolyn Biggs Fund, the GSA Geoscience Education Division, and GSA's Education and Outreach Program. An additional travel reimbursement is also available to the recipient to enable him or her to attend the award presentation at the GSA Annual Meeting.

■ HISTORY AND PHILOSOPHY OF GEOLOGY

Mary C. Rabbitt History and Philosophy of Geology Award

Nominations due 1 Feb. 2013

This award recognizes exceptional scholarly contributions of fundamental importance to the understanding of the history of the geological sciences. Achievements deserving of the award include, but may not be limited to, publication of papers or books that contribute new and profound insights into the history of geology, based on original research or a synthesis of existing knowledge. Send nominations to **Jane P. Davidson**, University of Nevada, Reno, NV 89557-0001, USA; +1-775-747-2252; jhexen@unr.edu. For more information, please see <http://gsahist.org/HoGaward/awards.htm>. Neither the nominator nor the nominee need be a member of the Division or of GSA. *Award funds are administered by the GSA Foundation.*

■ QUATERNARY GEOLOGY AND GEOMORPHOLOGY

Farouk El-Baz Award for Desert Research

Nominations due 2 Apr. 2013

This QG&G award recognizes excellence in desert geomorphology research worldwide. It is intended to stimulate research in desert environments by recognizing an individual whose research has significantly advanced the understanding of the Quaternary geology and geomorphology of deserts. Although the award primarily recognizes achievement in desert research, the funds that accompany it may be used for further research. The

award is normally given to one person but may be shared by two people if the recognized research was the result of a coequal partnership. Any scientist from any country may be nominated, and nominators and nominees need not be GSA members. Self-nomination is not permitted. Submit nominations, including (1) a statement of the significance of the nominee's research; (2) a curriculum vitae; (3) letters of support; and (4) copies of no more than five of the nominee's most significant publications related to desert research to **Alan R. Nelson** via e-mail at anelson@usgs.gov (unless hardcopy previously approved). *Supported by endowment income from the GSA Foundation's Farouk El-Baz Fund.*

■ SEDIMENTARY GEOLOGY

Laurence L. Sloss Award for Sedimentary Geology
Nominations due 20 Feb. 2013

This award recognizes the lifetime accomplishments of a sedimentary geologist that best exemplify those of Larry Sloss—i.e., achievements that contribute widely to the field of sedimentary geology as well as service to GSA. Send (1) a cover letter describing the nominee's accomplishments in sedimentary geology and contributions to GSA; and (2) a curriculum vita to **Paul Link** via e-mail at linkpaul@isu.edu. *Supported by endowment income from the GSA Foundation's Laurence L. Sloss Award for Sedimentary Geology Fund.*

Announcing...

Inaugural International Section Honorary Fellow



Sospeter Mwijarubi Muhongo

The International Section is pleased to announce the selection of their first Honorary Fellow, **Sospeter Mwijarubi Muhongo**, who is a professor at the University of Dar Es Salaam in Tanzania.

The section's Honorary Fellowship is presented to an international geoscientist who has distinguished him- or herself in geoscience investigations, promoting

environmental awareness, linking science and society, providing notable service to implementing public policy in natural resource managements, or otherwise making outstanding contributions to science. The inaugural award was presented at the International Section's Reception at the 2012 GSA Annual Meeting in Charlotte, North Carolina, USA.

Muhongo is an international figure who has dedicated well over 30 years to advancing geoscience knowledge through teaching, research, and various consulting assignments. He is well-known for bedrock mapping of Tanzania and various international projects connected with the International Union of Geological Sciences (IUGS), the International Year of Planet Earth (IYPE),

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[www.geosociety.org/
educate/cds.htm](http://www.geosociety.org/educate/cds.htm)



and Gondwana Research. Muhongo, a native of Tanzania, earned his B.S. from the University of Dar Es Salaam and his Ph.D. from Technische Universität Berlin (FRG). He has published more than 75 refereed papers in international journals and presented numerous talks dealing with hard-rock geochemistry, tectonics, economic mineral resources, and environmental aspects pertaining to the African craton; he has also served as editor for *Gondwana Research Journal*. In recognition of his outstanding contributions to promoting geosciences to the African nations, Muhongo was elected as Fellow of the Geological Society of London in 2005.

GSA's International Section Management Board members had the privilege and honor of assessing Muhongo's candidacy for Honorary Fellow, and International Section Councilor Víctor Ramos was enthusiastic, having personally known Muhongo since their years in the IUGS. The International Section deeply appreciates Muhongo's notable service in preparing the next generation of geoscientists and his relentless efforts in bringing about environmental awareness among African scientists.

Joint Penrose-Chapman Conference



THE
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Coastal Processes and Environments under Sea-Level Rise and Changing Climate: Science to Inform Management

14–19 April 2013 • Galveston, Texas, USA

CONVENERS

John B. Anderson, Dept. of Earth Science, Rice University, Houston, Texas 77005, USA; johna@rice.edu

Margaret Davidson, Coastal Services Center, National Oceanic and Atmospheric Administration, Charleston, South Carolina 29412-9110, USA; margaret.davidson@noaa.gov

John W. Geissman, Dept. of Geosciences, The University of Texas at Dallas, Richardson, Texas 75080-3021, USA; geissman@utdallas.edu

Gary J. Hampson, Dept. of Earth Science and Engineering, Imperial College, South Kensington, London SW7 2AZ, UK; g.j.hampson@imperial.ac.uk

Denise J. Reed, The Water Institute of the Gulf, Baton Rouge, Louisiana 70825, USA; dreed@thewaterinstitute.org

Torbjörn E. Törnqvist, Dept. of Earth and Environmental Sciences, Tulane University, New Orleans 70118, Louisiana, USA; tor@tulane.edu

Cosponsors: Society for Sedimentary Geology and the Geological Society of London



Society for Sedimentary Geology (SEPM)



Geological Society of London (GSL)

OBJECTIVE

This joint conference is intended to increase scientific and public awareness of the realities of global change and its impacts on coastal environments. This will include talks describing short-term and long-term impacts of accelerated sea-level rise, climatically induced alteration in sediment delivery to coasts, increased frequency of severe storms, and anthropogenic exacerbation of coastal change.

PRELIMINARY AGENDA

The five-day schedule includes an afternoon field trip on day three.

Day 1: Factors Influencing Coastal Evolution

- Sea-level rise, past, present and future;
- Natural and anthropogenic controls on sediment supply;
- Numerical models for predicting coastal response to accelerated sea-level rise and variations in sediment supply; and
- Natural versus anthropogenic influence on coastal subsidence.

Day 2: Coastal Response to Accelerated Sea-Level Rise and Variations in Sediment Supply (Case Studies)

- Deltas;
- Wetlands;
- Bays and lagoons;
- Barrier islands;
- Tidal inlets and deltas;
- Reefs, atolls; and
- other carbonate settings.

Day 3: Morning Session Focusing on Gulf Coast Issues in Preparation for Afternoon Field Trip

Day 4: Using Combined Field Results and Numerical Models to Predict Coastal Change at Decadal and Century Time Scales

- Global change and impacts on severe storm formation and magnitude;
- The sedimentary record of severe storm frequency and magnitude;
- Other impacts related to climate change and anthropogenic influence; and
- Bridging models with field studies.

Day 5: Reaching Scientific Consensus and Conveying Science to Policy Makers

ATTENDEES AND ESTIMATED COSTS

The registration fee will cover hotel lodging for five nights (double occupancy), breakfast and lunch for five days, handouts, and transportation for the field trip during the meeting. Airfare is not included, and participants must make their own travel arrangements to Galveston, Texas, USA. Registration fees have not been finalized. Please check the GSA and/or AGU websites for more information.

TRAVEL

Participants should plan on arriving in Galveston on Sunday, 14 April. The conference will conclude midday on Friday, 19 April. There are two airports in Houston: George Bush Intercontinental Airport and Hobby Airport. Shuttle service is available for both airports; the shuttle cost is not included in the registration fee.

APPLICATIONS AND REGISTRATION

Application deadline: 23 January 2013

Registration deadline: 28 February 2013

The conference is limited to 80 participants. Participants will have to commit to attending the full five days of the conference.

To apply: please contact the conveners via johna@rice.edu with a letter of intent that includes a brief statement of interests, the relevance of the applicants recent work to the themes of the conference, the subject of a proposed presentation, and contact

information. Interested graduate students are strongly encouraged to apply. Once you have been selected to participate, you will be sent registration information.

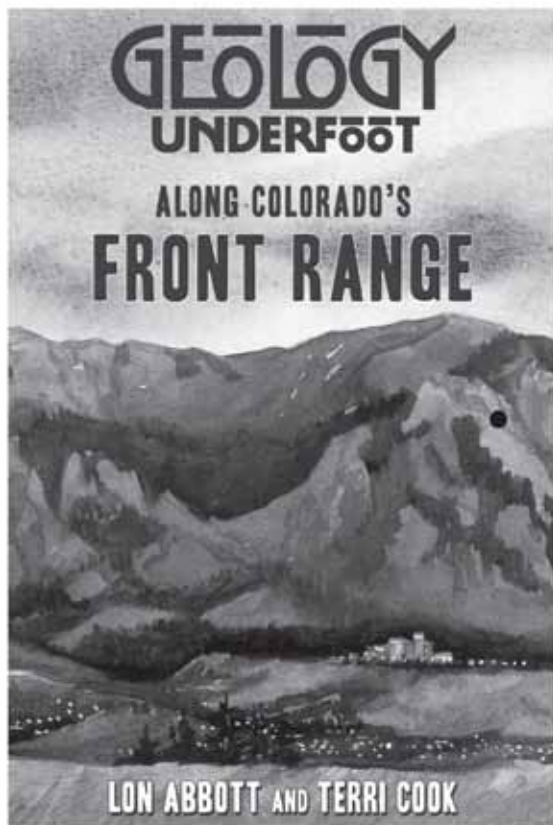
GSA website:

www.geosociety.org/penrose

AGU website:

<http://sites.agu.org/meetings/>

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EARTHCACHE!

GSA Runs Highly Successful 1st International EarthCache™ Mega Event

On 2 Sept. 2012, at the Pineland Farms in New Gloucester, Maine, USA, more than 700 earth-science enthusiasts from around the globe gathered at the newest meeting run by The Geological Society of America. But this wasn't your typical GSA meeting. Few of the participants were professional earth scientists or earth-science educators. In fact, only a very small fraction of attendees were even GSA members. This unique GSA meeting was the 1st International EarthCache Mega Event, which was created by GSA's Education and Outreach Department to highlight its global EarthCaching program.

EarthCaching is an educational form of geocaching, a high-tech treasure-hunting game played throughout the world by adventure seekers equipped with GPS devices. Instead of searching for actual geocaches—containers that include a log-book and sometimes small trinkets—EarthCachers use GPS devices to find locations that provide unique, field-based geoscience lessons. Learn more at www.earthcache.org.

The 1st International EarthCache Mega Event provided opportunities for participants to discover new EarthCache sites, meet EarthCache reviewers, share stories with like-minded explorers, and learn more about earth science. More than 200 "geo-kids" participated in fun activities like "fossil making" and scavenger hunts. The kids (and adults) also enjoyed a visit from "Signal the Frog," geocaching's official mascot. Other popular activities included GPS-based games and a rock identification contest.

The highlight of the event was a series of learning sessions led by EarthCachers, volunteer EarthCache reviewers, GSA staff, educators, and representatives from government agencies. Sessions covered topics like EarthCaching in education, geocaching with children, how to use GPS devices and related technologies, EarthCache trails in the Arctic, understanding the EarthCache guidelines, and more. Davida Buehler, GSA's Teacher Advocate Program Officer, led a workshop about mineral identification skills, which was followed the next day by a trip to nearby Mount Apatite, where participants practiced their skills in the field. The State Geologist of Maine explained the role of state geological surveys in geoscience research and education. The Chief Ranger of Acadia National Park provided a general overview of the National Park Service's structure and mission and offered insights about how EarthCachers can work with parks to develop

EarthCaches highlighting the nation's geological treasures. Participation levels in these learning sessions were high, and the feedback has been very positive. The lively question-and-answer sessions that followed many presentations demonstrated how enthusiastically the community embraces the EarthCache mission of earth-science education.

The event was run by the GSA Education and Outreach Department, with assistance from Geocaching Maine and SoME (Southern Maine) Geocachers, two local geocaching organizations. Support for the event was also provided by Groundspeak, Inc., the organization that runs geocaching.com and is GSA's major partner for the EarthCaching program.

Event sponsors included DeLorme, L.L. Bean, Landsharkz, GIS Etc., Poland Spring, and the Penobscot County Conservation Association. A number of individual EarthCachers provided financial support by becoming "Friends" of the event, and others volunteered their time and services.

The 2nd International EarthCache Mega Event will take place on Saturday, 7 Sept. 2013, at the Dixie Center in St. George, Utah, USA. Mark your calendars and join us as we celebrate EarthCaching amidst the beautiful red-rock scenery of southern Utah. If you are interested in running a learning session on a geoscience topic of general interest or in leading a local field trip, please contact GSA. There is already a great buzz about the next event, which will present an even bigger opportunity to educate the public about earth science and further raise awareness about EarthCaching, one of GSA's most unique Education and Outreach programs.

Information and Contacts

- www.earthcacheevent.org
- www.earthcache.org
- www.facebook.com/earthcache
- www.geocaching.com
- earthcache@geosociety.org

Gary Lewis, Senior Director of GSA Education and Outreach, +1-303-357-1043, glewis@geosociety.org

Matthew Dawson, Education Program Officer, +1-303-357-1025, mdawson@geosociety.org





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<http://community.geosociety.org>

About People

President Obama recently announced his intent to appoint the following GSA Fellows to key administration posts as members of the Nuclear Waste Technical Review Board: **Jean Bahr**, Univ. of Wisconsin; **Susan L. Brantley**, Penn State; and **Mary Lou Zoback**, Stanford University. Learn more at www.kcautv.com/story/19609938/president-obama-announces-more-key-administration-posts.

Two GSA members were recently named as honorees by SEPM (Society for Sedimentary Geology). **Paul Enos** of the University of Kansas will receive the 2013 Twenhofel Medal for career excellence in sedimentary geology; **Kyle M. Straub** of Tulane University will receive the 2013 Wilson Medal for outstanding contributions in sedimentary geology by a young geologist. Learn more at www.sepm.org/pages.aspx?pageid=293.

GSA Fellow **Terry A. Plank** of Columbia University has been named a MacArthur Fellow by the MacArthur Foundation, which recognizes extraordinary originality and dedication to creative pursuits. Learn more at www.macfound.org/videos/357/ and <http://news.columbia.edu/oncampus/2902>.

GSA Fellow **Gordon E. Brown Jr.** has been awarded AGI's 2012 Ian Campbell Medal for "superlative service to the geosciences." Brown is the Dorrell William Kirby Professor of Earth Sciences and professor of photon science at the SLAC National Accelerator Laboratory at Stanford University. Learn more at www.agiweb.org/news/IanCampbell_2012.pdf.

Former GSA President **Sharon Mosher** (2001) has been named president of the American Geosciences Institute (AGI). Mosher serves as both Dean and William Stamps Farish Chair at The University of Texas at Austin's Jackson School of Geosciences.

Call for Proposals



2013 ANNUAL MEETING & EXPOSITION Celebrating Advances in Geoscience

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2013 Short Courses
Proposals due **1 Feb. 2013**

Short courses make a great start to the annual meeting. Offer a short course to help your colleagues, peers, students, and K–12 teachers develop professional, teaching, and research skills at all levels, and be a part of the action. Questions? Contact Jennifer Nocerino, jnocerino@geosociety.org.

Help shape the 2013 Annual Meeting and be a part of the 125th Anniversary Celebration!



Red Rocks Amphitheatre. Photo by Ron Ruhoff. Photo courtesy Denver Metro Convention & Visitors Bureau.

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Toroweap Point, Grand Canyon, Arizona Coordinates. Photo by Bret Webster.

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CORDILLERAN

109th Annual Meeting of the Cordilleran Section, GSA

Fresno, California, USA

20–22 May 2013

www.geosociety.org/Sections/cord/2013mtg/



Shaver Lake, an artificial lake in the Sierra National Forest, is situated about 50 miles northeast of Fresno, California, USA. Shaver Lake is part of the Big Creek Hydroelectric Project, the first such project in the U.S., begun in 1911. Photo by Kjkolb/Pictures 12 Sept. 2003. Used with permission from Wikimedia Commons, http://en.wikipedia.org/wiki/File:Shaver_Lake_1.jpg.

LOCATION

Fresno is ideally located for exploring the best of Cordilleran geology—nestled at the foot of the Sierra Nevada, and yet still within a short driving time of the geologic wonders of the California Coast Ranges. The field trips for this meeting fully exploit these advantages. The Radisson Hotel and Conference Center serves as both the conference hotel and the convention facilities. This venue is within easy walking distance of great restaurants, pubs, live music, and Fresno Grizzlies AAA baseball. Guest activities are expected to include tours of Yosemite and Sequoia–Kings Canyon National Parks.

REGISTRATION

Early registration deadline: 15 April 2013

Cancellation deadline: 22 April 2013

Online registration begins February 2013. For further information, or if you have special requirements, please contact the local committee chair, John Wakabayashi, jwakabayashi@csufresno.edu.

CALL FOR PAPERS

Abstract deadline: 19 February 2013

Please upload your abstract via link at www.geosociety.org/Sections/cord/2013mtg/. An abstract submission fee of US\$10 for students and US\$15 for professionals will be charged. If you cannot use the online system, please contact Nancy Wright at +1-303-357-1061 or nwright@geosociety.org.

Theme Sessions

- T1. **Tectonic Processes that Build the Stratigraphic and Structural Record of Ancient and Modern Convergent Margins.** David Scholl, USGS, dscholl@usgs.gov; Roland von Huene, Univ. of California–Davis, rhuene@mindspring.com; Trevor A. Dumitru, Stanford, tdumitru@stanford.edu; John Wakabayashi, California State Univ.–Fresno, jwakabayashi@csufresno.edu. Relevant field trips: 3, 5, and 7.
- T2. **Mélanges: Comparison and Contrast between Circum-Pacific and Tethyan Chaotic Rock Bodies and Modern Submarine Analogues.** Yildirim Dilek, Miami University, dileky@muohio.edu; Andrea Festa, Università di Torino, andrea.festa@unito.it; Yujiro Ogawa, Century Tsukuba–Miraidaira, fyogawa45@yahoo.co.jp. Relevant field trips: 3 and 7.
- T3. **Oceanic Petrogenesis of Pacific-Type Convergent Margins.** Tatsuki Tsujimori, Okayama Univ.–Misasa, tatsukix@misasa.okayama-u.ac.jp; W.G. Ernst, Stanford, wernst@stanford.edu; John Wakabayashi, California State Univ.–Fresno, jwakabayashi@csufresno.edu. Relevant field trips: 3, 7, and 5.
- T4. **Ophiolites and Suture Zones.** Yildirim Dilek, Miami University, dileky@muohio.edu; John Wakabayashi, California State Univ.–Fresno, jwakabayashi@csufresno.edu; John Shervais, Utah State Univ., john.shervais@usu.edu. Relevant field trips: 3 and 7.
- T5. **Critical Zone: Where Rock Meets Water and Life at Earth's Surface.** Clifford S. Riebe, Univ. of Wyoming, criebe@uwyo.edu; Leonard S. Sklar, San Francisco State Univ., leonard@sfsu.edu; Kate Maher, Stanford, kmaher@stanford.edu. Relevant field trip: 1.
- T6. **Using Detrital Zircon Age Data to Reassemble the Cordilleran Jigsaw Puzzle.** Trevor Dumitru, Stanford, tdumitru@stanford.edu; Elizabeth Miller, elmiller@stanford.edu. Relevant field trips: 3, 5, and 7.
- T7. **Hydrogeologic Issues of Irrigated Agricultural Regions—Problems and Solutions.** C. John Suen, California State Univ.–Fresno, johns@csufresno.edu; Dong Wang, USDA Agricultural Research Service, dwang@fresno.ars.usda.gov.
- T8. **Quantitative Approaches in Sedimentology and Stratigraphy.** Mara Brady, California State Univ.–Fresno, mebrady@csufresno.edu.
- T9. **AFC Processes in the Formation of Intermediate Magmas from Mantle to Crust.** Michael Farner, Rice Univ., mfarner01@gmail.com; Cin-Ty Lee, Rice Univ., ctlee@rice.edu. Relevant field trips: 2, 3, and 5.

- T10. **Reconstructing the Pacific–North America Plate Boundary through Late Cenozoic Time.** Scott Bennett, Univ. of California–Davis, sekbennett@ucdavis.edu; Rebecca Dorsey, Univ. of Oregon, rdorsey@uoregon.edu; Michael Oskin, Univ. of California–Davis, meoskin@ucdavis.edu; Michael Darin, ConocoPhillips, mike.h.darin@conocophillips.com. Relevant field trips: 1, 3, and 6.
- T11. **The Engineering Geology of Transporting Water in the Western United States.** *Cosponsors: GSA Environmental Engineering Geology Division and Association of Environmental and Engineering Geologists (San Joaquin Valley Chapter, Sacramento Section).* Jerome V. De Graff, USDA Forest Service, jdegraff@csufresno.edu. Relevant field trips: 2, 6, and 8.
- T12. **Quaternary Environmental Change; The Cordilleran Record and Its Implication for Our Future in a Changing World.** Peter K. Van de Water, California State Univ.–Fresno, pvandewater@csufresno.edu; Mathieu Richaud, California State Univ.–Fresno, mathieu@csufresno.edu. Relevant field trips: 1, 2, and 6.
- T13. **Irvingtonian Paleocology of Western North America.** Robert G. Dundas, California State Univ.–Fresno, rdundas@csufresno.edu; Eric Scott, San Bernardino County Museum, escott@sbcm.sbcounty.gov. Relevant field trip: 8.
- T14. **Quaternary Geology of California’s Central Valley and Its Relevance to Water Infrastructure.** Justin Pearce, j.pearce@fugro.com; Janet Sowers, j.sowers@fugro.com; Jennifer Wilson, jm.wilson@fugro.com; Cooper Brossy, c.brossy@fugro.com—all with Fugro Consultants Inc. Relevant field trip: 3.
- T15. **Undergraduate Research Posters.** Chris Pluhar, California State Univ.–Fresno, cpluhar@csufresno.edu.

FIELD TRIPS

- Critical Zones in the NW Sierra Nevada.** 18–19 May; if two days, or 17–19 May if three days. Beth Weinman, California State Univ.–Fresno, bweinman@csufresno.edu. Relevant theme sessions: T5, T10, and T12.
- Granite, Glaciation, and Rockfall in Yosemite Valley, California, USA.** 18–19 May. Allen Glazner, Univ. of North Carolina, afg@unc.edu; Greg Stock, NPS Yosemite National Park, greg_stock@nps.gov; Roger Putnam, Univ. of North Carolina, rputnam@live.unc.edu; John Bartley, Univ. of Utah, john.bartley@utah.edu. Relevant theme sessions: T9 and T12.
- From Deep to Modern Time along the Western Sierra Nevada Foothills–San Joaquin to Kern Drainages.** 18–19 May. Jason Saleeby, jason@gps.caltech.edu; Zorka Saleeby, zorka@gps.caltech.edu; Frank Sousa, sousa@gps.caltech.edu—all with Caltech Tectonics Observatory. Relevant theme sessions: T1, T2, T3, T4, and T6.
- Middle Irvingtonian Fairmead Landfill Fossil Site and Fossil Discovery Center of Madera County, California.** 19 May. Robert Dundas, California State Univ.–Fresno, rdundas@csufresno.edu. Relevant theme session: T13.
- LOCKED ROCKS: Hard-to-Access Outcrops of the Mesozoic Metasedimentary Framework and Gabbroids of the Early Cretaceous Sierra Nevada Batholith.** 23 May. Diane Clemens-Knott, California State Univ.–Fullerton, dclemensknott@fullerton.edu; Jason Saleeby, Caltech,

jason@gps.caltech.edu. Relevant theme sessions: T1, T3, T6, and T9.

- New Views on the Evolution of the San Andreas Fault Zone in Central California and the Carrizo Plain.** 23–25 May. Sinan Akciz, Univ. of California–Irvine, sakciz@uci.edu; Ramon Arrowsmith, Arizona State Univ., ramon.arrowsmith@asu.edu; Robert Zatkun. Relevant theme sessions: T10 and T12.
- Mélanges, HP Metamorphism, Subduction Accretion and Erosion, Subduction Megathrusts and Ophiolites: The Franciscan and Related Rocks.** 23–24 May. John Wakabayashi, California State Univ.–Fresno, jwakabayashi@csufresno.edu. Relevant theme sessions: T1, T3, T4, and T6.
- Debris Flows in Recently Burned Watersheds in the Southeastern Sierra Nevada.** 23–25 May. Dave Wagner, California Geological Survey, dave.wagner@suddenlink.net; Jerry DeGraff, Sierra National Forest, jdegraff@fs.fed.us; Jeremy Lancaster, California Geological Survey, jeremy.lancaster@conservation.ca.gov. Relevant theme session: T11.

Housing Information

A large block of rooms is being held for the meeting at the Radisson Hotel & Conference Center Fresno, 2233 Ventura Street, Fresno, CA 93721, USA. Rates are \$109/night (up to quadruple occupancy), plus tax. This is also the conference facility where all meeting activities will take place.

Local Committee Members

Local Committee & Technical Program Chair: John Wakabayashi, jwakabayashi@csufresno.edu

Field Trip Chair: Keith Putirka, kputirka@csufresno.edu

Student Volunteer Coordinator: Robert Dundas, rdundas@csufresno.edu

Community Liaison: Stephen D. Lewis, slewis@csufresno.edu



The U.S. Sierra Nevada. Photo by Jeffrey Pang, 2008, used with permission via Wikimedia Commons, http://commons.wikimedia.org/wiki/File:Sierra_Nevada_aerial.jpg.

ROCKY MOUNTAIN

65th Annual Meeting of the Rocky Mountain
Section, GSA

Gunnison, Colorado, USA

15–17 May 2013

www.geosociety.org/sections/rm/2013mtg/



The Laramide Elk Range thrust north of Crested Butte. The thrust (to right) places Pennsylvanian and Permian strata on an overturned syncline (to left) of Permian and Mesozoic strata. Rocks of the Capital-Snowmass stock in background. Photo courtesy Robert Fillmore.

The geology program at Western State Colorado University (WSCU) is pleased to host the 65th Annual Meeting of GSA's Rocky Mountain Section in Gunnison, Colorado, USA. The meeting will take place at the University Center located on the WSCU campus.

The Gunnison Valley is positioned in a rich geologic environment, featuring a broad age of geologic materials, structures, and surface and geologic processes. Features that dominate the upper valley include structures and stratigraphy of the high Colorado Rockies that are exposed by fluvial and glacial processes, which have created a complex and spectacular landscape. The upper valley is also a key boundary between the stratigraphy and structures of the Colorado plateau and West Elk Mountains and the much more deformed rocks of the Elk Range to the east. Regional exposures of the volcanoes of the San Juan Mountains, the Colorado Plateau, and features related to the northern Rio Grande Rift and the Colorado Mineral Belt are all within a few hours' drive from Gunnison.

CALL FOR PAPERS

Abstract deadline: 12 February 2013

Please upload your abstract via link at www.geosociety.org/Sections/rm/2013mtg/. An abstract submission fee of US\$10 for students and US\$15 for professionals will be charged. If you

cannot use the online system, please contact Nancy Wright at +1-303-357-1061 or nwright@geosociety.org.

Theme Sessions

- T1. **21st-Century Geoscience Education for K–16 Students: Novel Approaches and Current Research.** Amy Ellwein, Western State Colorado Univ., aellwein@western.edu; Matt Nyman, Oregon State Univ., matt.nyman@oregonstate.edu.
- T2. **Advances in Chronology, Correlation, and Stratigraphy of the San Luis Valley and the Rio Grande Rift Zone.** Andrew Valdez, NPS Great Sand Dunes National Park, andrew_valdez@nps.gov; Cal Ruleman, USGS, Denver Federal Center, cruleman@usgs.gov; Shannon Mahan, USGS, Denver Federal Center, smahan@usgs.gov.
- T3. **Quaternary Glaciations, Paleoclimates, and Landscape Evolution of the Greater Rocky Mountains.** Keith Brugger, Univ. of Minnesota–Morris, bruggeka@morris.umn.edu; Dave Marchetti, Western State Colorado Univ., dmarchetti@western.edu.
- T4. **Basement Structure in the Colorado Rockies: Assembly and Reactivation.** Colin Shaw, Montana State Univ., cashaw@montana.edu; Joseph Allen, Concord Univ., allenj@concord.edu.
- T5. **Ancestral Rockies to the Laramide: Developing Structural Styles of the Southern Rockies.** Dave Lageson, Montana State Univ., lageson@montana.edu; Tim Wawrzyniec, Western State Colorado Univ., twawrzyniec@western.edu.
- T6. **The Late Paleozoic Structural, Stratigraphic, and Climatic Evolution of Ancestral Rocky Mountain Basins.** Gary Gianinny, Fort Lewis College, gianniny_g@fortlewis.edu; Tim Lawton, New Mexico State Univ., tlawton@nmsu.edu.
- T7. **Tectonic Evolution of the Rio Grande Rift, Southern Rocky Mountains.** Rachel Landman, Univ. of Colorado–Boulder, rachel.landman@colorado.edu; Daniel Feucht, Univ. of Colorado–Boulder, dwfeucht@gmail.com.
- T8. **Cenozoic Evolution of the Rocky Mountains: Toward an Improved Understanding of Mantle–Surface Processes Interactions.** Andres Aslan, Colorado Mesa Univ., aaslan@coloradomesa.edu; Magdalena Sandoval-Donahue, Univ. of New Mexico, magdalena.donahue@gmail.com.
- T9. **Reconstructing the Paleogene Topography of the Rocky Mountains.** Emmett Evanoff, Univ. of Northern Colorado, emmett.evanoff@unco.edu.
- T10. **Cenozoic Magmatism of the San Juan Mountains: Plutons to Volcanoes.** Dave Gonzales, Fort Lewis College, gonzales_d@fortlewis.edu; Allen Stork, Western State Colorado Univ., astork@western.edu.
- T11. **REEs and Related Deposits in the Rocky Mountain–High Plains Region and Beyond.** Kevin Mahan, Univ. of Colorado–Boulder, mahank@colorado.edu; Julien Allaz, Univ. of Colorado–Boulder, julien.allaz@colorado.edu; Chuck Stern, Univ. of Colorado–Boulder, charles.stern@colorado.edu; Lang Farmer, Univ. of Colorado–Boulder, lang.farmer@colorado.edu; Rebecca Flowers, Univ. of Colorado–Boulder, rebecca.flowers@colorado.edu.

- T12. **Basement Structure in the Colorado Rockies: Assembly and Reactivation.** Colin Shaw, Montana State Univ., cashaw@montana.edu; Joseph Allen, Concord Univ., allenj@concord.edu.
- T13. **Dust and Soil Geomorphological Research of the Intermountain West and Colorado Plateau: Applications and Approaches.** Les McFadden, Univ. of New Mexico, lmcfadnm@unm.edu; Amy Ellwein, Western State Colorado Univ., aellwein@western.edu.
- T14. **Climate Change, Water Resources, and Hydrologic Partitioning Throughout the Upper Colorado River Basin.** Chris Shope, USGS Salt Lake City, cshope@usgs.gov.
- T15. **Mapping in the Rocky Mountains: Results from STATEMAP and EDMAP Projects (Posters).** Dave Noe, Colorado Geological Survey, dave.noe@state.co.us.; Michael Timmons, New Mexico Bureau of Geology and Mineral Resources, mtimmons@nmbg.nmt.edu; Grant Willis, Utah Geological Survey, grantwillis@utah.gov.
- T16. **Undergraduate Research in the Rocky Mountains (Posters).** Kim Hannula, Fort Lewis College, hannula_k@fortlewis.edu; Steve Semken, Arizona State Univ., semken@asu.edu.

FIELD TRIPS

1. **Ignimbrites and Calderas of the Northeast San Juan Mountains.** Peter Lipman, USGS, plipman@usgs.gov.
2. **Unconventional Mesaverde Gas System in the Piceance Basin.** Todd Dallegge, WPXEnergy, todd.dallegge@wpxenergy.com.
3. **Pleistocene Glacial History of the Taylor River Basin.** Keith Bruegger, Univ. of Minnesota Morris, bruggeka@morris.umn.edu.
4. **Geoarchaeology of the Tenderfoot Mountain Site.** Mark Steiger, Western State Colorado Univ., msteiger@western.edu.
5. **The Powerhorn/Iron Hill Carbonate Complex.** Brad Von Gosen, USGS, bvangose@usgs.gov; Kevin H. Mahan, Univ. of Colorado–Boulder, kevin.mahan@colorado.edu.

ACCOMMODATIONS

Blocks of rooms have been reserved for meeting attendees at several hotels in the Gunnison area. The primary hotel is the Holiday Inn Express, which is located near campus at 910 E. Tomichi Street, +1-970-641-1288; room rate: US\$89 per night, plus tax. Rooms at the Holiday Inn can be booked online using this link: www.hiexpress.com/hotels/us/en/gunnison/gucad/hoteldetail?groupCode=RMG. The deadline for booking rooms at the Holiday Inn is 1 April 2013.

Lodging is also available at the Quality Inn, 400 E. Tomichi Street, +1-970-641-1237, for US\$65 per night plus tax; and the Water Wheel Inn, 37478 U.S. 50 Gunnison, +1-970-641-1650, for US\$70 plus tax. The Water Wheel Inn is about three miles east of Gunnison.

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LOCAL COMMITTEE

General Co-Chairs: Amy L. Ellwein, aellwein@western.edu; Timothy F. Wawrzyniec, twawrzyniec@western.edu

Technical Program Chair: Allen Stork, astork@western.edu

Field Trip Chair: David Marchetti, dmarchetti@western.edu

Student Involvement and Outreach: Rob Fillmore, rfillmore@western.edu

Alumni Relations Chair: Bruce Bartleson, brucebartleson@msn.com

Exhibits and Sponsorships: Shannon Mahan, smahan@usgs.gov; Timothy F. Wawrzyniec, twawrzyniec@western.edu



Curecanti National Recreation Area west of Gunnison, which includes Blue Mesa Lake, Colorado's largest body of water. Photo courtesy U.S. National Park Service.

NORTHEASTERN

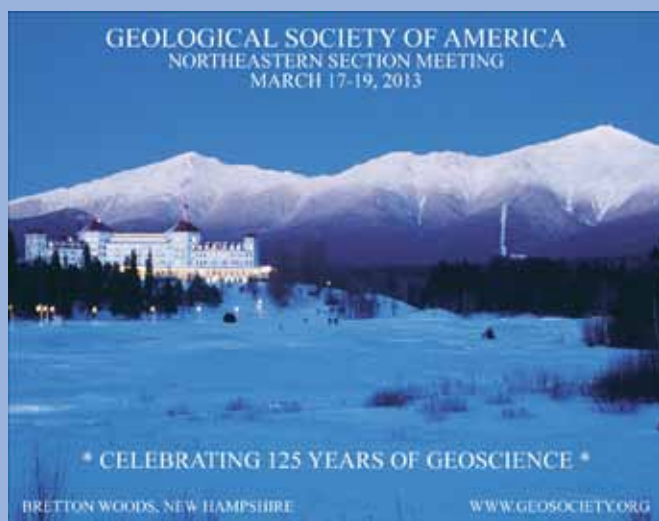
48th Annual Meeting of the Northeastern
Section, GSA

Bretton Woods, New Hampshire, USA

18–20 March 2013

Celebrating The Society's 125th Anniversary

www.geosociety.org/Sections/ne/2013mtg/



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LOCATION

The 2013 Bretton Woods Organizing Committee invites you to attend this very special Section Meeting celebrating GSA's 125th Anniversary at the spectacular Mount Washington Resort, whose historic and graceful atmosphere has fostered intellectual exchange and reflection for more than 100 years. The venue is like no other for the Northeastern Section and, with the Resort's generous cooperation, represents a unique, attractively priced chance for relaxed connection, learned exchange, and celebration.

Interest in this meeting is developing rapidly, and we strongly recommend early registration and accommodation arrangements, especially for students. (Students—Learn about more opportunities on the meeting website.)

REGISTRATION

Registration deadline: 11 February 2013

Cancellation deadline: 19 February 2013

You must register for the meeting first in order to be eligible for its special accommodation rates and packages.

ACCOMMODATIONS

To help celebrate the Society's anniversary, the **Omni–Mount Washington Resort** has made unusually attractive “first come, first served” accommodation options available on its resort campus beginning Friday, 15 March, through Thursday, 21 March. Professionals can reserve rooms in the Mount Washington Hotel and the adjacent Bretton Arms Inn at the substantially discounted rate of US\$149 per room/night (+9% tax). Students can reserve rooms in the lodge that comfortably accommodate four persons at the special rate of US\$89 per room/night (+tax). Larger groups of students can reserve two- or three-bedroom townhomes that comfortably accommodate four to six people at US\$149 per room/night (+tax). These town homes include fully equipped kitchens, making it possible for student groups to minimize overall per-person costs. The resort also includes free wireless Internet; free self- or valet parking; a 10% discount on 2013 tickets to ski/snowboard at Bretton Woods; free 24/7 on-demand/on-resort van transportation; and dining at 10 on-resort restaurants and “grab & go” breakfast & lunch kiosks.

CALL FOR PAPERS

Abstract deadline: 11 December 2012

Please upload your abstract via link at www.geosociety.org/Sections/ne/2013mtg/. An abstract submission fee of US\$10 for students and US\$15 for professionals will be charged. If you cannot use the online system, please contact Nancy Wright at +1-303-357-1061 or nwright@geosociety.org.

Symposia

- S1. **Climate Change in Space and Time.** P. Thompson Davis, Bentley Univ., pdavis@bentley.edu; David Gillikin, Union College, gillikid@union.edu; Donald Rodbell, Union College, rodbell@union.edu.
- S2. **History of Geology in the Northeast: A Symposium to Mark the 125th Anniversary of the Geological Society of America.** Noel Potter, Dickinson College, pottarn@dickinson.edu; Woodrow Thompson, Maine Geological Survey, woodrow.b.thompson@maine.gov.
- S3. **The Northern Appalachians: What Have We Learned in the Past 40 Years? A Symposium in Honor of Chris Hepburn.** Yvette Kuiper, Colorado School of Mines, ykuiper@mines.edu; Doug Rankin, USGS (retired), dwrain@usgs.gov; Paul Karabinos, Williams College, paul.m.karabinos@williams.edu.

Theme Sessions

- T1. **Paleoenvironmental Records in the Northeast from the Late Pleistocene to the Anthropocene.** Michael Retelle, Bates College, mretelle@bates.edu; Tim Cook, Worcester State Univ., tcook3@worchester.edu; Andrea Lini, Univ. of Vermont, alini@uvm.edu.
- T2. **Lakes as Sentinels for Climate Change: Monitoring and Sedimentary Records at the Junction of Paleo- and Modern Limnology.** Lisa Doner, Plymouth State Univ., ladoner@plymouth.edu; Craig E. Williamson, Miami Univ., craig.williamson@muohio.edu.
- T3. **Salt Marsh Ecogeomorphology.** Beverly Johnson, Bates College, bjohnson3@bates.edu; Kristin Wilson, Allegheny College, kwilson@allegheny.edu; Susan Adamowicz, U.S. Fish and Wildlife Service, susan_adamowicz@fws.gov.
- T4. **Nearshore and Coastal Processes and Environments in the Northeast.** Joseph Kelley, Univ. of Maine, jtkelley@maine.edu; Daniel Belknap, Univ. of Maine, belknap@maine.edu.
- T5. **Critical Zone Processes.** Amanda Albright Olsen, Univ. of Maine, amanda.a.olsen@maine.edu; Andrew S. Reeve, Univ. of Maine, asreeve@maine.edu; Sean M.C. Smith, Univ. of Maine, sean.m.smith@maine.edu.
- T6. **State and Fate of Urban Watersheds in the Northeast.** Jonathan R. Gourley, Trinity College, jonathan.gourley@trincoll.edu; Suzanne O'Connell, Wesleyan Univ., soconnell@wesleyan.edu.
- T7. **Naturally Occurring Contaminants in Groundwater Used for Water Supply in the Northeastern United States.** Joseph D. Ayotte, USGS, jayotte@usgs.gov; Yan Zheng, Queens College-CUNY and Lamont Doherty Earth Observatory, Columbia Univ., yzheng@ldeo.columbia.edu.
- T8. **Naturally Occurring and Synthetic Fibers Including Nanofibers and Nanotubes.** Brooke T. Mossman, Univ. of Vermont, brooke.mossman@uvm.edu; H. Catherine W. Skinner, Yale Univ., catherine.skinner@yale.edu.
- T9. **Geomorphic Impacts of Tropical Storm Irene.** Frank Magilligan, Dartmouth College, magilligan@dartmouth.edu; Shane Csiki, New Hampshire Geological Survey, shane.csiki@des.nh.gov.
- T10. **Glacial History of the New England-Canadian Border Region.** Woodrow Thompson, Maine Geological Survey, woodrow.b.thompson@maine.gov; Michel Lamothe, Univ. du Québec à Montréal, lamothe.michel@uqam.ca.
- T11. **Dates and Rates: Two Decades of Cosmogenic Studies in Eastern North America, the Canadian Arctic, and Greenland.** Paul R. Bierman, Univ. Vermont, pbierman@uvm.edu; Lee Corbett, Dartmouth College, ashley.corbett.gr@dartmouth.edu; Meredith Kelly, Dartmouth College, meredith.a.kelly@dartmouth.edu.
- T12. **Unconventional Natural Gas Plays in the Eastern U.S. and Canada, with Emphasis on the Marcellus Shale and Potential Impacts of Hydraulic Fracturing.** Brett McLaurin, Bloomsburg Univ. of Pennsylvania, bmclauri@bloomu.edu; Cynthia Venn, Bloomsburg Univ. of Pennsylvania, cvenn@bloomu.edu.
- T13. **Bridging the Curriculum Divide: Using Geochemical, Geophysical, and Geologic Data and Field Methods in Undergraduate Courses to Anchor Theory and Application.** Sean Cornell, Shippensburg Univ., srcornell@ship.edu; Joseph Zume, Shippensburg Univ., jtzume@ship.edu.
- T14. **Natural and Induced Seismic Hazards in Intraplate Regions.** John E. Ebel, Weston Observatory, Boston College, ebel@bc.edu; Margaret Boettcher, Univ. of New Hampshire, margaret.boettcher@unh.edu.
- T15. **Past, Present, and Future of Mining in the Northeast USA and Adjacent Canada.** Jeri L. Jones, Jones Geological Services, jonesgeo@comcast.net; Brian Skinner, Yale Univ., brian.skinner@yale.edu.
- T16. **Rheological Information from Structures and Microstructures.** Chris Gerbi, Univ. of Maine, gerbi@umit.maine.edu; Scott Johnson, Univ. of Maine, johnsons@maine.edu.
- T17. **The Contributions of Geochemistry towards our Understanding of the Appalachian Orogen.** Adam Schoonmaker, Utica College, adschoonmaker@utica.edu; Mike Dorais, Brigham Young Univ., dorais@byu.edu.
- T18. **Mesozoic Igneous Features of Northeastern North America: Magmatic Origins and Links to Tectonic Events.** J. Gregory McHone, Grand Manan, New Brunswick, Canada, greg@earth2geologists.net; John H. Puffer, Rutgers Univ., jpuffer@andromeda.rutgers.edu; G. Nelson Eby, Univ. of Massachusetts-Lowell, nelson_eby@uml.edu.
- T19. **Tectonic-Climate System Links: Insights from the Appalachian Orogen and Elsewhere.** Doug Reusch, Univ. of Maine-Farmington, reusch@maine.edu; John Garver, Union College, garverj@union.edu; Will Amidon, Middlebury College, wamidon@middlebury.edu.
- T20. **The New England-Canadian Bedrock and Tectonic Connections.** Keith Klepeis, Univ. of Vermont, keith.klepeis@uvm.edu; Jon Kim, Vermont Geological Survey, jon.kim@state.vt.us.
- T21. **Metamorphic Petrology and Thermodynamic Modeling: Progress and Practice.** Kurt Hollocher, Union College, hollochk@union.edu; Matt Manon, Union College, manonm@union.edu.
- T22. **Innovations in Geoscience Education and Research Using Google Earth and Related Digital Technologies.** Steve Whitmeyer, James Madison Univ., whitmesj@jmu.edu; Declan De Paor, Old Dominion Univ., ddepaor@odu.edu.
- T23. **Getting the Work Done: State Geological Surveys, Partnering, and Progress.** Robert Marvinney, Maine Geological Survey, robert.g.marvinney@maine.gov; Laurence Becker, Vermont Geological Survey, laurence.becker@state.vt.us; Jonathan Kim, Vermont Geological Survey, jon.kim@state.vt.us; Rick Chormann, New Hampshire Geological Survey, frederick.chormann@des.nh.gov.
- T24. **The History of Exhumation in the Appalachians, From Orogenic to Glacial Rebound.** Robert P. Wintsch, Indiana Univ., wintsch@indiana.edu; Mary Roden-Tice, SUNY Plattsburgh, rodentmk@plattsburgh.edu.
- T25. **Environmental Geochemistry of Contaminants.** Rudolph Hon, Boston College, rudy.hon@bc.edu; Melissa Lombard, Keene State Univ., mlombard1@keene.edu; Douglas Allen, Salem State Univ., douglas.allen@salemstate.edu.
- T26. **The Syn-Rift and Early Post-Rift Sedimentary, Tectonic, and Biotic Record of the Late Proterozoic/Cambrian Transition, Northeastern North America.** Gary D. Johnson,

- Dartmouth College, gary.d.johnson@dartmouth.edu; David A. Franzl, Plattsburgh State Univ., franzida@plattsburgh.edu.
- T27. **The Emerging LiDAR Landscape: Applications of Digital Terrain Data in Research, Mapping, and Design.** Rick Chormann, New Hampshire Geological Survey, frederick.chormann@des.nh.gov; Fay Rubin, Univ. of New Hampshire, fay.rubin@unh.edu.
- T28. **Connecting Students with Place: Technology-Enhanced Teaching Using Local Resources.** Tarin Weiss, Westfield State Univ., tweiss@westfield.ma.edu; Bruce Rueger, Colby College, bfrueger@colby.edu.
- T29. **Refining the Iconic New York Devonian: A New Time-Rock Synthesis.** Charles Ver Straeten, New York State Museum/ Geological Survey, cverstra@mail.nysed.gov; Carlton Brett, Univ. of Cincinnati, carlton.brett@uc.edu; Gordon Baird, SUNY-Fredonia, gordon.baird@fredonia.edu; D. Jeffrey Over, SUNY-Geneseo, over@geneseo.edu.
- T30. **Ground-Penetrating Radar Investigations of Geologic Formations.** Steven Arcone. U.S. Army ERDC–Cold Regions Research and Engineering Laboratory, steven.a.arcone@erdc.dren.mil; Seth Campbell, Climate Change Institute, Univ. of Maine–Orono, seth.w.campbell@erdc.dren.mil.
- T31. **The New England Legacy of Jim Thompson: Stratigraphy, Tectonics, Phase Petrology, and Crystal Chemistry.** Peter Robinson, Geological Survey of Norway, peter.robinson@ngu.no; Charles W. Burnham, Harvard (emeritus), and Fort Lewis College (adjunct), burnham_c@fortlewis.edu.
- T32. **Mineral Transformations in the Environment: Geobiological and Geochemical Aspects.** Dawn Cardace, Univ. of Rhode Island, dawn.cardace@gmail.com; Amanda Olsen, Univ. of Maine, amanda.a.olsen@maine.edu; Nishanta Rajakaruna, College of The Atlantic, nishi.rajakaruna@gmail.com.
- T33. **Watershed Management: Bio-Geo-Chemical Perspectives.** John Rayburn, SUNY–New Paltz, rayburnj@newpaltz.edu; Shafiq Chowdhury, SUNY–New Paltz, chowdhus@newpaltz.edu.
- T34. **Engineering Geology in the 21st Century.** Brad Miller, Haley & Aldrich, bmiller@haleyaldrich.com; Nicholas Strater, Brierly Associates, nstrater@brierlyassociates.com.

FIELD TRIPS/EXCURSIONS

1. **Bedrock Geology and Tectonics of the Presidential Range on Nordic Skis.** J. Dykstra Eusden, Bates College, deusden@bates.edu. Half-day trip runs on both Sat., 16 March, and Sun., 17 March, and departs the Nordic Center at 8:30 a.m. both days.
2. **Type Localities of Marland Billings' 1935 Paleozoic Bedrock Stratigraphy near Littleton, New Hampshire.** Douglas Rankin, USGS (emeritus), dwrankin@usgs.gov. Trip runs on Sun., 17 March, and departs the hotel at 8:30 a.m.
3. **Glacial Geology and Archeology, Northern White Mountains.** Woodrow Thompson, Maine Geological Survey, woodrow.b.thompson@maine.gov; Richard Boisvert, New Hampshire Division of Historical Resources, richard.a.boisvert@dcr.nh.gov. Trip runs on Sun., 17 March, and departs the hotel at 9 a.m.

4. **Landslides in the White Mountains.** P. Thompson Davis, Bentley Univ., pdavis@bentley.edu. Trip runs on Sun., 17 March, and departs the hotel at 8 a.m.
5. **Mount Washington: Its Summit & Observatory.** Michelle Cruz, Mount Washington Observatory, mcruz@mountwashington.org; Mark Van Baalen, Harvard, mvb@harvard.edu; Timothy Allen, Keene State College, tallen@keene.edu. Trip runs on Sat., 16 March, and Sun., 17 March, and departs the hotel at 7 a.m. both days.
6. **Nature and Culture in Northern New Hampshire.** Catherine Amidon, Museum of the White Mountains, camidon@plymouth.edu. Trip runs on Sun., 17 March, and departs the hotel at 8:30 a.m.



- T35. **The Geomorphic Impact of Hurricane Sandy: Predictions Made, Damage Done, Clean-Up & Mitigation.** David Wunsch, Delaware Geological Survey, dwunsch@udel.edu; Rick Chormann, New Hampshire Geological Survey, frederick.chormann@des.nh.gov; Stephen Pollock, Univ. Southern Maine, pollock@usm.maine.edu.

This newly organized session will describe and analyze coastal, riverine, and slope impacts generated by Hurricane Sandy from the important point of view of those near its “front lines”—the region’s state geologists and others closely associated with the unprecedented storm. Favored presentations will be preliminary “case histories” and other similar observation-based talks. It’s important to recognize that our meeting occurs too soon after the event for much systematic science to yet be generated, but documenting the storm’s impacts is the best way to stimulate that sort of science in the months and years ahead.



GSA FOUNDATION UPDATE

P. Geoffrey Feiss, GSA Foundation President

It's that time of year again...

With the GSA Annual Meeting a success and in our rearview mirror, it is time to wrap up 2012. This is the busiest time of year at the GSA Foundation—close to 25% of our gifts arrive in November and December. This is not a surprise because many of us take stock of our giving at year's end in order to make donations to organizations that mean a great deal to us in our personal and professional lives.

We sincerely hope that GSA is one of those organizations. For many, a GSA meeting was the first professional meeting we attended as a student, and many of us gave our first talk or presented our first poster at a GSA meeting.

My first real taste of what it meant to be a practicing geoscientist came when I was a graduate student. With significant support from GSA, I was able to attend the inaugural GSA Penrose Conference in 1968 in Tucson, Arizona, USA. The subject was porphyry copper deposits. Looking into my first open pit copper mine and hearing the gurus of hydrothermal ore deposits debate its origin affected my interests for the next twenty years. And I could not have attended without the private support that allowed GSA to fund the participation of a number of students at that seminal meeting.


Today, private support to GSA through the GSA Foundation still allows students to attend all kinds of GSA meetings through travel grants. This year, the GSA Foundation was able to support student attendance at the 34th International Geological Congress in Brisbane, Australia, in addition to the Annual Meeting and each of the six sectional meetings. The Foundation is able to invest in the development of young scientists through GSA research grants, now leveraged with National Science Foundation support, which have funded thousands of theses and dissertations for over a half century. If you ever received such support, please consider paying back now.

The list of opportunities for members to engage and support those aspects of our profession that mean the most to them is long, and includes GeoCorps™ America, which supports students and professional interns on public lands; the Bromery Fund for Minorities and the Curtis Women in Science Fund, which help increase the diversity of our profession; the Teacher Advocate Program, which offers workshops to K–12 teachers in order to introduce them to modern curricular materials; GSA Division distinguished speaker programs; the GSA-USGS Congressional Science Fellowship program; funds held by the Foundation for each of the GSA Sections, which support, in many cases, undergraduate and graduate research and travel grants to meetings; and more!

So we hope, as 2012 winds down, that you will join the thousands of GSA members—including more than a thousand student members(!)—who support either their favorite programs or GSA's Greatest Needs Fund. Please use the coupon below or go online to www.gsafweb.org/makeadonation.html to make your year-end gift. Online, you will be able to peruse the many funds that you can support. New this year: the 125th Anniversary Fund—help GSA celebrate its birthday in style next year!

If you have already made a gift this year, thank you—and consider another. It will be just as appreciated. Please contact me at gfeiss@geosociety.org or at +1-303-357-1011 if you have any questions or concerns about supporting GSA through the Foundation.

Best wishes for a prosperous new year,
P. Geoffrey Feiss, President



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Positions Open

ASSISTANT PROFESSOR OF GEOSCIENCES TEXAS A&M UNIVERSITY-KINGSVILLE

The Dept. of Physics & Geosciences at Texas A&M University-Kingsville invites applications for a tenure-track, field-oriented Assistant Professor of Geosciences with primary expertise in mineralogy/petrology, and supporting interests in at least one of the following: ore deposits, petroleum geology, regional tectonics, hydrogeology, geochemistry or geospatial analysis, beginning August 2013. Review of applications will begin January 15, 2013, and continue until the position is filled. Primary responsibilities of the faculty member will be to (1) offer undergraduate courses in mineralogy, petrology (igneous and metamorphic), physical geology and/or earth science, and other courses relevant to his/her research interests; (2) help coordinate a rapidly growing field camp program; (3) help sustain a successful recruiting program for undergraduates in all areas of the geosciences; and (4) develop and maintain a robust, widely recognized research agenda. Candidates must be comfortable working across disciplines, teaching introductory and advanced courses to a diverse student body, and mentoring undergraduate research projects. The ability to obtain external funding for faculty and student research is vital, as is an overall commitment to excellence in teaching, research, and service. A Ph.D. in geology is preferred, although applicants with a doctoral degree in a related area and significant expertise in the relevant fields of expertise will be considered. Following a period of release from at least one course per semester, the faculty member normally will teach one or two upper division courses as well as two courses in introductory physical geology or earth science each semester. Salary and benefits are competitive.

The full advertisement of this position is on <https://javjobs.tamuk.edu/>.

ASSISTANT PROFESSOR GEOLOGICAL SCIENCES UNIVERSITY OF IDAHO

The Assistant Professor of Geological Sciences will be expected to develop a strong, externally funded research program and act as advisor to graduate students, as well as teaching an average of three courses per academic year, one of which would be an undergraduate upper-division introductory course in sedimentology/stratigraphy and the other a varying selection of graduate/upper-division courses in his/her area of specialty. The candidate must have a PhD in geosciences or a geoscience-related field at the time of application and must have sedimentologic and stratigraphic expertise. Salary Range: \$60,000/yr. For more information and to apply, visit <http://apptkr.com/296703> by 2/28/13. AA/EOE.

TENURE-TRACK POSITION IGNEOUS/METAMORPHIC GEOLOGY UNIVERSITY OF NEVADA-LAS VEGAS

The Dept. of Geoscience is seeking candidates for a full-time, 9-month, tenure-track appointment at the Assistant Professor level in Petrology, commencing Fall 2013. Preference will be given to applicants with research interests in one or more of the following areas: igneous/metamorphic petrology, volcanology, geochemistry, and/or a closely allied field. The suc-

cessful applicant is expected to establish a vigorous externally funded research program that integrates with our existing strengths in igneous/metamorphic petrology, volcanology, mineralogy, mineral physics, planetary geology, and/or structural geology. The successful candidate is expected to teach effectively at the undergraduate and graduate levels, participate in the teaching of undergraduate field courses, and perform service duties at all levels. The applicant must have a Ph.D. in Geology from a regionally accredited college or university.

The department (<http://geoscience.unlv.edu/>) has an enthusiastic faculty of 21, undergraduate and M.S./Ph.D. degree programs, and state of the art laboratory facilities including stable isotope, argon geochronology, XRF/XRD, soils, and electron microprobe/SEM labs.

Application materials must include a cover letter, curriculum vitae, proposed research plans (five page limit), statement of teaching philosophy and interests, and contact information for five referees. To receive full consideration, application materials should be received by January 22, 2013. Materials should be addressed to Dr. Terry Spell (terry.spell@unlv.edu), Search Committee Chair, and are to be submitted via on-line application at <https://hrsearch.unlv.edu>. For assistance with UNLV's on-line applicant portal, contact UNLV Employment Services at (702) 895-2894 or hrsearch@unlv.edu.

Salary competitive; contingent upon labor market and contingent upon funding.

UNLV is an Affirmative Action / Equal Opportunity educator and employer committed to excellence through diversity.

TWO TENURE TRACK APPOINTMENTS AT THE ASSISTANT PROFESSOR LEVEL SAM HOUSTON STATE UNIVERSITY

The Dept. of Geography and Geology at Sam Houston State University invites applications for two tenure track appointments at the Assistant Professor level. The ideal candidates will have a commitment to a high quality undergraduate teaching program that values both field and laboratory instruction, involve undergraduate students in research, and the ability to work with a diverse student body. Appointments would begin August 2013. Candidates must have a Ph.D. in geology, geophysics, other closely related field by the time of appointment. Prior teaching experience at the college level and evidence of developing a strong, independent research program is desirable.

Sedimentology & Stratigraphy: Teaching and research specialty in stratigraphy/sedimentology. Ability to teach stratigraphy/sedimentology, oceanography, introductory geology courses, and possibly an upper level course in paleobiology, paleontology, or the candidate's area of expertise.

Geophysics: Teaching and research specialty in geophysics. Ability to teach undergraduate level geophysics, introductory geology courses, and specialty courses related to the application of geophysics in petroleum and/or environmental geology.

Sam Houston State University was founded in 1879 and named after Texas' greatest hero, General Sam Houston. With a total enrollment of approximately 18,000 students, SHSU is classified as a Doctoral Research Institution by the Carnegie Commission on Higher Education and offers 79 undergraduate degree

programs, 54 masters programs, and five doctoral programs. The department has approximately 100 geology majors and offers degrees in geology and geoscience. More information is available on the department's website at www.shsu.edu/~gel_geo.

Interested applicants should submit an online application through Human Resources via PeopleAdmin (www.shsu.edu/~hrd_www/apply.html) and include a letter of interest, current vita, contact information for three professional references, and statements of teaching philosophy and research interests. The contacts for each position are as follows:

Sedimentology: Dr. Pat Harris, Chair of Sedimentology Search (email: pat-harris@shsu.edu)

Geophysics: Dr. Joseph Hill, Chair of Geophysics Search (email: geojoe@shsu.edu)

Mailing Address: Dept. of Geography and Geology, Box 2148, Sam Houston State University, Huntsville, TX 77341-2148.

Sam Houston State University is an Equal Employment Opportunity/Affirmative Action Plan Employer and Smoke/Drug-Free Workplace. Sam Houston State University is an "at will" employer. All positions at SHSU are considered security sensitive requiring background checks in accordance with Education Code 51.215. SHSU is a Member of the Texas State University System. Applications from underrepresented minorities are strongly encouraged. Review of applications will begin December 10, 2012 and continue until the position is filled.

ECONOMIC GEOLOGY/GEOCHEMISTRY UNIVERSITY OF NEVADA-LAS VEGAS

The Dept. of Geoscience invites applications for a tenure-track position in Economic Geology/Geochemistry at the assistant professor level. Preference may be given to applicants with research interests in one or more areas including isotope geochemistry, geochemical modeling, experimental petrology, geochronology, or igneous or sedimentary petrology.

The successful applicant will have an active, field-based research program that will complement existing departmental strengths in igneous petrology, sedimentology, volcanology, mineralogy, mineral physics, planetary geology, and structural geology, and a strong commitment to teaching at both graduate and undergraduate levels. The successful candidate is expected to develop a rigorous externally funded research program and to supervise graduate students at both the master's and doctoral levels.

Qualifications include a Ph.D. in an appropriate earth science discipline from a regionally accredited college or university. Demonstrated teaching experience is desirable but not required. The appointment will begin August 2013.

The department (<http://geoscience.unlv.edu/>) has an enthusiastic faculty of 21, undergraduate and M.S./Ph.D. degree programs, and laboratory facilities including stable isotope, argon geochronology, XRF/XRD, soils, and electron microprobe/SEM laboratories. Las Vegas is surrounded by spectacular geologic diversity in a premier exploration and mining state.

Application materials must include a cover letter, curriculum vitae, proposed research plans (five page limit), statement of teaching philosophy and interests, and contact information for five referees. Review of applications will begin on January 22, 2013 and continue until the position is closed. Materials should be ad-

dressed to Dr. Jean Cline (jean.cline@unlv.edu), Search Committee Chair, and are to be submitted via on-line application at <https://hrsearch.unlv.edu>. For assistance with UNLV's on-line applicant portal, contact UNLV Employment Services at (702) 895-2894 or hrsearch@unlv.edu. Salary competitive; contingent upon labor market and upon funding. UNLV is an Affirmative Action / Equal Opportunity educator and employer committed to excellence through diversity.

**ASSISTANT PROFESSOR
GEOLOGICAL SCIENCES**

UNIVERSITY OF IDAHO—IDAHO FALLS

The Dept. of Geological Sciences at the University of Idaho (UI) is seeking applications for a 9-month, tenure-track position in hydrogeology and groundwater hydrology to be located at UI-Idaho Falls Center in Idaho Falls, Idaho. The successful candidate must have solid experience in either laboratory or field studies and have an interest in quantitatively integrating theory with field or laboratory data. The position provides opportunities for cross-disciplinary research and teaching through the Idaho Water Resources Research Institute and the UI Environmental Science and Waters of the West programs. A Ph.D. in geosciences or a geoscience-related field at the time of hiring is required. Salary Range: \$65,000 DOE. For more information and to apply, visit <http://apptrkr.com/296504> by 1/7/13. AA/EOE

**PETROGRAPHER/CONSULTANT
SIMPSON GUMPERTZ & HEGER (SGH)
WALTHAM, MA OFFICE**

Simpson Gumpertz & Heger (SGH) is actively recruiting an experienced candidate for a position as Petrographer/Consultant in our Waltham, MA office. SGH is a nationally known civil and structural engineering firm that works in all aspects of design, investigation, and rehabilitation of structures. At SGH, petrographers provide front-line collaborative support to our investigative teams as well as for external clients, including other engineering firms. The successful candidate will work on investigations of concrete, masonry, stone, and related construction materials.

Applicants should have at least 10 years of experience with stone and concrete petrography; meet the requirements of ASTM C856 and C295; and understand the use of supplemental testing and analytical techniques such as XRD, IR, SEM/EDS, and chemical testing. Exceptional communication skills, experience in research and investigations, and a demonstrated ability for managing and developing staff are also required skills.

To learn more about SGH and to apply for this position, please visit our website at www.sgh.com or email your resume to [Stella Mereves-Carolan](mailto:smereves-carolan@sgh.com), Corporate Recruiter at smereves-carolan@sgh.com or Apply online at www.sgh.com.

Equal Employment Opportunities Employer.

**ASSISTANT PROFESSOR, EARTH
SYSTEM SCIENCE, COLLEGE OF SCIENCE
DEPT. OF GEOLOGICAL SCIENCES
UNIVERSITY OF TEXAS AT EL PASO**

Position Description: The Dept. of Geological Sciences at the University of Texas at El Paso (UTEP) invites applications for a full time tenure-track assistant professor in Earth System Science to begin in Fall 2013. The Department seeks applicants with strong

interdisciplinary research and teaching interests that include biogeochemistry, geobiology, limnology, low temperature isotope geochemistry, soil science, or other interactions of lithosphere, hydrosphere, biosphere, and atmosphere; and is particularly interested in candidates intrigued by the environmental challenges stemming from land use and land cover change in a bi-national arid region. The Department supports undergraduate, master's, and doctoral degrees in Geological Sciences as well as undergraduate and master's programs in Environmental Science. The successful candidate will teach introductory, upper division, and graduate classes that serve both the Environmental and Geological Sciences.

The Department: The UTEP Dept. of Geological Sciences has a faculty of 16 and includes over 160 undergraduates and 70 graduate students. The Department is housed in an attractive 90,000 sq. ft. building that contains faculty and student offices and laboratory and classroom space. Research infrastructure includes wet chemical laboratories, a clean room, and a variety of analytical facilities, including a multi-collector (MC)-ICP-MS, an ICP-OES, and an electron microprobe. More information about the activities and facilities in the Department can be found at www.geo.utep.edu. In addition, the collaborative research environment at UTEP affords easy access to a variety of analytical equipment in the Departments of Biological Sciences and Chemistry. The Dept. of Geological Sciences also participates in interdisciplinary Ph.D. programs in Materials Science Engineering, Environmental Science and Engineering, and Computational Science. Applicants interested in co-advising students in the Ecology and Evolutionary Biology doctoral program are encouraged to apply.

About UTEP: The University of Texas at El Paso is an emerging national research university at the heart of the U.S.-Mexico border region committed to the ideals of access and excellence. A leader among Hispanic-serving institutions, UTEP enrolls more than 22,000 students—about 77 percent of them Hispanic—and is the only doctoral research university in the nation with a student body that is a majority Mexican-American.

UTEP offers 70 bachelor's, 79 master's, and 19 doctoral programs—with more in development. UTEP's nearly \$70 million in research spending a year ranks the University among the top 200 universities in the nation; and its more than \$35 million in federal research spending ranks fourth among all Texas public universities.

The center for intellectual capital in the region, UTEP awarded its 100,000th degree since its founding in 1914 at the May 2011 commencement. A major economic engine in the Paso del Norte region, UTEP generates \$438 million in local business volume and contributes over 6,900 jobs and \$423 million in household income. UTEP offers exciting Division I athletic programs; award-winning theater, dance, and music programs; several art galleries and a museum; and continuing and lifelong education programs open to the public.

Required Qualifications: The successful candidate must have a Ph.D. degree in a relevant field at the time of appointment. Candidates capable of building active research programs and who enjoy collaborative research are especially encouraged to apply.

Application Procedures: Review of applications will begin immediately and applications will be accepted until the position is filled. Applicants are encouraged to apply by January 10, 2013. Applications should be sent via email to jhurtado@utep.edu and include the following: (1) letter of application, (2) curriculum vitae, (3) description of teaching and research interests, and (4) complete contact information for three references. Please include "Earth System Science Position: YOUR NAME" in the subject block of the email submission.

Dr. José Hurtado, jhurtado@utep.edu, Chair of the Earth System Science Search Committee, Dept. of Geological Sciences.

The University of Texas at El Paso is an Equal Opportunity/Affirmative Action Employer. The University does not discriminate on the basis of race, color, national origin, sex, religion, age, disability, genetic information, veteran status, or sexual orientation in employment or the provision of services.

**FULL-TIME, TENURE-TRACK
ASSISTANT PROFESSOR POSITION IN
GEOSPATIAL TECHNOLOGIES
MISSISSIPPI STATE UNIVERSITY**

The Dept. of Geosciences at Mississippi State University invites applications for a full-time, tenure-track Assistant Professor position in geospatial technologies with geology background. Anticipated start date is August 16, 2013. A Ph.D. degree in the geosciences or a closely related field in natural sciences with emphasis in geospatial technologies, and geology is required at the time of appointment. Evidence of peer-reviewed journal publications and potential to develop an externally-funded research program are required. The candidate will teach introductory through graduate-level courses in remote sensing, image processing, web GIS, and advanced spatial analysis. The candidate's area of expertise within geology is open, but we welcome candidates with a background in environmental geology, structural geology, sequence stratigraphy, paleontology, oceanography, geophysics, and/or software use in subsurface analysis.

The successful applicant will be expected to develop courses in their area of expertise to support the department's Ph.D. program in Earth and Atmospheric Sciences. The successful candidate will be expected to be active in mentoring of graduate students through teaching, course development (both traditional and distance learning technology), and scholarly research activities (including publishing peer-reviewed manuscripts and acquiring external funding). He or she must be willing to collaborate with existing faculty. The department has a collaborative relationship with HPC² in parallel processing and visualization environment; maintains a GIS laboratory, biogeochemistry laboratory, and sample preparation facilities. The university supports a broad spectrum of state-of-the-art analytical facilities through the Institute for Imaging and Analytical Technologies (www.i2at.msstate.edu).

The Dept. of Geosciences currently has 15 tenure-track faculty members and 11 instructors. The department offers B.S. and M.S. degrees in geoscience and a Ph.D. degree in Earth and Atmospheric Science within five areas of emphasis: atmospheric sciences, geology, environmental geosciences, geography, and geospatial sciences. In addition to the on-campus programs, our distance learning programs enroll more than 700

undergraduate and graduate students. Further information about the Dept. of Geosciences can be found at www.geosciences.msstate.edu.

Candidates should submit a letter of application, curriculum vitae, and names and e-mail addresses of three people who may be contacted for letters of recommendation. Applicants must also complete a Personal Data Information Form (PARF # 6982) online at www.jobs.msstate.edu.

We will begin reviewing applications upon submission. Mississippi State University is an Affirmative Action/Equal Opportunity Employer. Phi Beta Kappa members are encouraged to apply.

For submission or further information please contact: Dr. Shrinidhi Ambinakudige, Chair of the Search Committee, Mississippi State University, Dept. of Geosciences, P.O. Box 5448, Mississippi State, MS 39762, Phone: (662) 325-3915, email: ssa60@msstate.edu, Website: www.geosciences.msstate.edu.

CHAIR, DEPARTMENT OF GEOLOGY STEPHEN F. AUSTIN STATE UNIVERSITY

The Dept. of Geology at Stephen F. Austin State University (SFA) invites applications for the department chair position. We seek an individual with strong management, communication, and interpersonal skills to provide innovative and energetic leadership. Duties include managing curricula, budgets, student enrollment, personnel, program and unit assessment, and developing strong, mutually beneficial relationships with industry and alumni. The incumbent will teach a reduced load of courses and develop a research program in his/her area of expertise. Applicants must have credentials for appointment at the associate or professor rank.

Submit a letter of application, CV, and a list of three references online at <https://careers.sfasu.edu> (posting 0602010). Also submit all official transcripts by mail to: Dr. Kenneth Farrish, Search Committee Chair, (936-468-3701), Dept. of Geology, Stephen F. Austin State University, Box 13011 SFA, Nacogdoches, TX 75962. Review of applications will begin on January 15 and will continue until the position is filled. Equal Opportunity Employer; Security-sensitive position; this position will be subject to a criminal history check.

POSTDOCTORAL RESEARCH ASSOCIATE OR MORE SENIOR POSITION IN THE DEPARTMENT OF GEOSCIENCES PRINCETON UNIVERSITY

Persons with a background in computational geoscience (programming, automation, optics and graphics) and/or material science are invited to apply for a Postdoctoral Research Associate position in the Dept. of Geosciences to work in the lab of Professor Adam Maloof. This individual will play a leadership role in the development of the new Automated Serial Grinder and Imager for digital fossil reconstruction at Princeton University. Familiarity with Matlab, Avizo, Amira, C++, OpenGL, Open inventor and TCL, precision grinders, CNC machine code programming and optical digital imaging is a plus. The position offers the opportunity to work with a range of specimens, from meteorites to fossils to carbon sequestration experiments, with the goal of creating quantitative 3D models of embedded objects hidden in these samples. PhD is required; some background in Earth science is preferred but not required. The initial appointment will be for one year, with the possibility of renewal contingent

upon satisfactory performance and funding. Applications will be reviewed as they are received. A February 2012 start date is preferred, but there is some flexibility. Applicants should include a one-page statement of interest, their curriculum vitae, and contact information for three references by applying on the Princeton University job site at <https://jobs.princeton.edu/>. The position's Requisition Number is 1200703 so please refer to that number when applying on the Princeton University job site.

Princeton University is an equal opportunity-affirmative action employer and complies with applicable EEO and affirmative action regulations.

GEOLOGY FACULTY, OPEN RANK UNIVERSITY OF ST. THOMAS

Job Summary: The University of St. Thomas Geology Dept., St. Paul, MN, invites applicants for a tenure line faculty position, open rank. We seek an applied geoscientist that complements our department's current strengths in environmental geology, sedimentation and tectonics, and paleoecology. Evidence of experience with geographic information systems and applied aspects of geology and/or environmental science is preferred. You will be expected to teach introductory and upper-level geoscience courses and develop an undergraduate research program, as well as to support an interdisciplinary environmental science program. You should be able to fully support our departmental mission and vision by demonstrating (1) strong teaching capabilities and a deep commitment to undergraduate education and (2) the capacity to undertake or have a proven track record in collaborative undergraduate research. For department information, including a statement of our department's mission and vision, visit: www.stthomas.edu/geology.

The geology curriculum has been designed to provide students with a solid core, but with sufficient flexibility to allow students with particular interests to pursue a more customized program. At the heart of this program is the field laboratory experience and a strong commitment to active learning techniques.

Established in 1885, the University of St. Thomas is located in the major metropolitan area of Minneapolis-St. Paul, and is Minnesota's largest private university. Its 11,000 students pursue degrees in a wide range of liberal arts, professional, and graduate programs.

Inspired by Catholic intellectual tradition, the University of St. Thomas educates students to be morally responsible leaders who think critically, act wisely, and work skillfully to advance the common good, and seeks to develop individuals who combine career competency with cultural awareness and intellectual curiosity. The successful candidate will possess a commitment to the ideals of this mission.

The University of St. Thomas has a strong commitment to the principles of diversity and inclusion, to equal opportunity policies and practices, and to the principles and goals of affirmative action. In that spirit the University strongly encourages applications from women, persons of color, and persons with disabilities.

Qualifications: Ph.D. in geology or related field preferred. ABD will also be considered, with initial appointment at rank of instructor. Evidence of experience with geographic information systems and applied aspects of geology and/or environmental science is preferred. Apply online: <https://jobs.stthomas.edu/postings/13748>.

ASSISTANT/ASSOCIATE PROFESSOR OF GEOLOGY AND GEOPHYSICS, MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

The Dept. of Geological Sciences and Engineering invites applications for a full-time tenure-track faculty position in Geology and Geophysics at the Assistant Professor level, with exceptional candidates considered at the Associate Professor level, in either Tectonics or Economic Geology to begin August, 2013. The successful candidate will be expected to develop an externally-funded research program integrated with excellence in teaching at both the graduate and undergraduate levels with a commitment to interdisciplinary work. Teaching responsibilities will include service courses as well as courses in the individual's area of expertise. The Department currently has 20 full-time faculty, and 318 undergraduate and 241 graduate degree-seeking students with established B.S., M.S., and Ph.D. programs in Geology & Geophysics, Petroleum Engineering, and Geological Engineering. Closely associated departments include Environmental Engineering and Mining Engineering. Local area establishments with active research include the U.S. Geological Survey (Mid-continent Geospatial Mapping Center), Missouri Dept. of Natural Resources, Fort Leonard Wood, the Missouri S&T Rock Mechanics and Explosives Research Center, Materials Research Center, and Energy Research and Development Center. Visit our department web pages for more information on faculty and research (<http://gse.mst.edu/>). Questions regarding this position should be directed to the chair of the search committee, Dr. John P. Hogan (jhogan@mst.edu). To apply please visit <http://hraadi.mst.edu/hr/employment/faculty/> and click on the link "prospective employees" and then click on the link for Assistant/Associate Professor #00031149. Review of applications will begin on January 7th, 2013 and continue until the search is completed. Missouri University of Science and Technology is an affirmative action/equal opportunity employer.

TENURE-TRACK PROFESSOR POSITIONS IN (I) GEOBIOLOGY AND (II) LITHOSPHERE AND SURFACE PROCESSES, YALE UNIVERSITY

The Dept. of Geology & Geophysics at Yale University solicits applications for two tenure-track faculty positions. We seek candidates with outstanding prospects for research and scholarly leadership who will complement the existing strengths of the Department. The successful applicants will develop and implement independent, externally-funded research programs, advise students, and facilitate interdisciplinary research.

Geobiology (ID #2188). Relevant fields include, but are not limited to: astrobiology, geomicrobiology, and the interactions of Earth and life as revealed by the rock record. This search is affiliated with the Yale Institute for Biospheric Studies.

Lithosphere and Surface Processes (ID #2189). Relevant fields include, but are not limited to, active tectonics, sedimentary basin analysis, geologic time, geomorphology, petrology, volcanology, surface-atmosphere interactions, and planetary evolution.

Yale is an equal opportunity/affirmative action employer. Applications from women and minorities are strongly encouraged. Applicants should submit a curriculum vitae, a statement of research and teaching interests, and a list of publications, plus the names and contact information of four referees. Applications

should be submitted online at <https://academicjobsonline.org/ajo/yale/G&G>. Applications received prior to 1/1/2013 will receive full consideration. For information regarding Yale Geology & Geophysics, visit our website at <http://earth.yale.edu>.

GEOSCIENTIST

LECTURER FACULTY POSITION

MIAMI UNIVERSITY (MIDDLETOWN CAMPUS)

The Dept. of Geology and Environmental Earth Science at Miami University invites applications for a Lecturer faculty position on our campus in Middletown, Ohio. The successful candidate will teach at the undergraduate level, engage in outreach with the surrounding community, provide other service to the university, and be willing to teach in the Bachelor of Integrative Studies degree program. The successful candidate's teaching and service agenda should complement existing department and regional campus strengths and ideally will benefit from the regional geologic setting, interdisciplinary interactions with department and campus colleagues, and existing facilities. Requirements: M.S. in geoscience by date of appointment; interests in advising and promoting undergraduate student research and educating students of earth and environmental sciences in the field. Desire: Ph.D. in geoscience.

You are invited to visit the following websites for information on the department (www.MiamiOH.edu/geology), the Middletown regional campus (www.mid.MiamiOH.edu), and the University (www.MiamiOH.edu).

Miami University Middletown, with 2700 students, is a commuter campus located in a suburban setting close to both Cincinnati and Dayton. The campus has a strong connection to the main campus in Oxford, 25 miles away, as well as to the communities it serves.

Interested candidates should submit a packet containing a letter of application, curriculum vitae, statement of teaching philosophy, and service objectives and accomplishments, transcripts; and arrange three letters of reference to be sent to: GeoLecturerMUM@MiamiOH.edu. Review of applications will begin in January 2013 and continue until the position is filled. The appointment will be effective August 12, 2013.

Miami University is an EOE/AA employer with smoke-free campuses. Right to Know-Consumer Information found at www.miami.MiamiOH.edu/about-miami/publications-and-policies/student-consumer-info/. Hard copy upon request.

IGNEOUS/METAMORPHIC PETROLOGY

DEPARTMENT OF EARTH SCIENCE

UTAH VALLEY UNIVERSITY

UTAH, OREM. The Dept. of Earth Science at Utah Valley University (UVU) invites applications for a tenure-track position in Geology, to begin August 2013. The successful candidate will have a Ph.D. in geology or a closely related field and expertise in igneous and/or metamorphic petrology. Responsibilities will include teaching introductory geology and upper division courses in earth materials and petrology, as well as engaging in some combination of research, supervision of undergraduate research, activity in professional organizations, continuing education and/or service learning. This is primarily a teaching job, and the successful candidate will have a demonstrable ability and commitment to effective teaching.



THE UNIVERSITY
of ADELAIDE

CRICOS Provider Number 00123M

School of Earth and Environmental Sciences

Lecturer/Senior Lecturer in *Geobiology/Biogeochemistry* (2 positions)

Lecturer/Senior Lecturer in *Aqueous Geochemistry/ Environmental Mineralogy*

The School of Earth and Environmental Sciences at the University of Adelaide announces a hiring initiative (three academic positions) as part of the establishment of the Sprigg Geobiology Centre (SGC) <http://www.adelaide.edu.au/environment/sgc/>. The SGC endeavours to understand how organisms both alter and evolve in response to the environment and how they control geologic processes that influence resource distribution and environmental stability. The goal of this research is to address critical questions facing society including sustainable energy and resources, changing climate and the identification of thresholds, resource scarcity, water-rock interactions and changing global biogeochemical cycles.

These positions will join recent senior academic appointments in stable isotope palaeoecology, early animal evolution, and sedimentary geochemistry, as well as existing strengths in biogeochemistry, tectonics/lithospheric studies, water resources, evolutionary biology, ecology, and animal and plant physiology, to create the premier geobiology/sedimentary geology group in the southern hemisphere.

We invite applications from persons with demonstrated research records addressing the intersection of the biological and geological sciences who are also committed to quality undergraduate teaching and post graduate supervision. The geosciences program hosts >150 undergraduate geology majors, 35 honours students (post BSc), 40 PhD students and has a strong field-based teaching strategy.

Areas of preferred study include:

- Rates of past climate change/development of high resolution climate records and thresholds
- Interactions between climate and ecosystems in the geologic past
- Feedbacks between evolution and biogeochemical systems
- Biogeochemical cycling of elements across geologic time with changing Earth states
- Organo-mineral and microbial interactions
- Interactions between subsurface microbial and fluid-rock processes
- Aqueous organo-mineral interactions

Appointees will have access to world class analytical equipment, including advanced microbeam capability, multicollector ICPMS, isotope mass spectrometry, clay mineral analysis and organic geochemistry.

Closing Date: 15 January 2013

Terms of Position: 2 x Continuing
1 x Fixed-term three year appointment

Salary: (Level B) \$83,620 - \$99,300
(Level C) \$102,429 - \$118,113
plus an employer superannuation contribution of 17% applies.

adelaide.edu.au/jobs



UVU, located in Orem, Utah, is a comprehensive state institution of higher education with over 30,000 students. The school sits at the western front of the Wasatch Mountains, with superb opportunities for field-based teaching and research. UVU and the Dept. of Earth Science, with 12 full-time faculty, strongly support undergraduate research and service learning, including numerous active international and domestic research projects. Our faculty also has strong ties with other universities and the professional earth sciences community in Utah. Orem has easy access to numerous outdoor recreational activities such as snow sports, hiking, mountain biking, kayaking, fishing, and hunting. The Wasatch Front metropolitan area offers diverse cultural opportunities such as the Sundance Film Festival and world-class music and dance companies. UVU provides excellent benefits to faculty. For more information, please see www.uvu.edu/csh/earth-science/ or contact Michael Bunds at michael.bunds@uvu.edu. To apply, please visit www.uvu.jobs. Click on "Search Postings" and then choose "Earth Science" from the Department drop-down menu. Applications will be evaluated beginning 1/28/13. Utah Valley University is an Affirmative Action/Equal Opportunity/Equal Access Employer.

**GEOLOGY TENURE TRACK POSITION
DEPARTMENT OF EARTH SCIENCES
THE UNIVERSITY OF SOUTH ALABAMA**

The University of South Alabama Earth Sciences Dept. invites applications for a tenure-track faculty position at the Assistant Professor or Associate Professor level beginning August 15, 2013. Candidates with research and industry experience in petroleum geology, geophysics, and related sub-disciplines are particularly encouraged to apply. Minimum qualifications are a Ph.D. degree in geology at the time of appointment. Interested potential applicants may review position requirements at the following web site: www.usouthal.edu/geography/. The University of South Alabama is an Equal Opportunity/Equal Access Employer.

**ASSISTANT PROFESSOR
UNIVERSITY OF KANSAS**

The Dept. of Geology at the University of Kansas is searching for an applicant for a tenure-track appointment at the rank of Assistant Professor to begin as early as August 18, 2013. Area of specialization is in moderate temperature thermochronology who will complement existing programs in isotope and elemental geochronology/geochemistry.

Required Qualifications: Ph.D. or ABD in Geology or a closely related discipline is expected by the start date of the appointment.

For the full position announcement and to apply online, go to <https://jobs.ku.edu> and search for position 00003268. Submit a CV, letter of application, statement of past and future research, statement of teaching interests and philosophy, and a list of at least three references who may be contacted via telephone or e-mail. Initial review of applications begins January 15, 2013 and will continue as long as needed to identify a qualified pool. Direct inquiries to Dr. Doug Walker (jdwalker@ku.edu).

The University of Kansas is especially interested in hiring faculty members who can contribute to four key campus-wide strategic initiatives: (1) Sustaining the Planet, Powering the World; (2) Promoting Well-

Being, Finding Cures; (3) Harnessing Information, Multiplying Knowledge; and (4) Building Communities, Expanding Opportunities. See www.provost.ku.edu/planning/themes/ for more information. Equal Opportunity Employer M/F/D/V.

**ACTINIDE SCIENCE FACULTY POSITION
UNIVERSITY OF NOTRE DAME**

The Dept. of Civil and Environmental Engineering and Earth Sciences, University of Notre Dame, invites applications for a tenure-track position in Actinide Science to expand the Energy Frontier Research Center *Materials Science of Actinides* and to complement existing faculty in Environmental Engineering and Earth Sciences. Qualified candidates at all levels will be considered, with hiring rank and tenure status commensurate with academic accomplishments. *Materials Science of Actinides* is a multi-institution effort led by the University of Notre Dame that is focused on understanding and mastering the nanoscale control of actinides, complex actinide materials, and actinide materials in extreme environments of temperature, pressure, and radiation field (www.ndefrc.com). We seek candidates with interests spanning environmental and energy aspects of actinide sciences, including experimental and/or computational approaches.

The department has a unique blend of environmental engineering and environmental geoscience faculty, and has outstanding research facilities that include laboratories dedicated to actinide science. Current department strengths include environmental microbiology, biofilms and biofilm processes, environmental geochemistry and geomicrobiology, environmental nanoscience and technology, environmental surface chemistry, groundwater hydrology, environmental and computational fluid mechanics, and actinide chemistry and mineralogy. Information about the department can be found at www.ceees.nd.edu. We seek individuals with dynamic and highly innovative research agendas that may cross traditional disciplinary boundaries. Qualifications include a Ph.D. in an appropriate field relating to actinide science. Candidates are expected to exhibit a dedication to excellence in research, teaching, and professional service. The application package should include a cover letter addressing preparation for this position, curriculum vitae, a statement of research and teaching interests, and names and contact information of at least three references. Applications should be uploaded directly, as a single PDF file, to: <http://ceees.nd.edu/positions-available-Actinide-Science> Please direct any questions to **Prof. Peter C. Burns**, Director of the Energy Frontier Research Center and Chair of the Search Committee (pburns@nd.edu), Dept. of Civil and Environmental Engineering and Earth Sciences, 156 Fitzpatrick Hall, University of Notre Dame, Notre Dame, IN 46556-0767. Review of applications will begin immediately, and applications will be accepted until the position is filled. University of Notre Dame is committed to diversity and equality in education and employment, and women and members of underrepresented minority groups are strongly encouraged to apply.

**ASSISTANT PROFESSOR IN
PLANETARY SCIENCES, PURDUE UNIVERSITY**

Purdue University invites applications for a tenure-track assistant professor position in the Dept. of Earth, Atmospheric, and Planetary Sciences (EAPS). The

position is open to all areas of EAPS, but with a particular focus on candidates who would contribute to our strong new effort in Planetary Sciences. Jay Melosh has joined the Purdue Faculty and, together with Andy Freed, Marc Caffee, and David Minton, has a mandate to expand Planetary Sciences.

The successful candidate will be an outstanding researcher with potential for excellence in teaching at both the graduate and undergraduate levels. EAPS has outstanding programs in geodynamics, isotope geochemistry, terrestrial climate and extreme weather systems. In Planetary Sciences, we seek someone who will complement our existing strengths in modeling and isotopic cosmochemistry, and, given Purdue's emphasis on science, mathematics and engineering, we seek a quantitatively focused researcher with an interest in planetary surface processes.

Applicants must have a Ph.D. in a field related to EAPS. Salary and benefits are highly competitive. The appointment will begin in August 2013. Candidates are expected to develop a vigorous research program, obtain external funding, supervise graduate students, and teach undergraduate and graduate courses. Interested candidates should submit their curriculum vitae, publication list, and brief descriptions of their planned research program and teaching philosophy to EAPS-search@purdue.edu. Names and contact information for at least three referees must be included in the application. Information on the EAPS department can be found at www.eaps.purdue.edu. Applications completed by January 1, 2013 will be given full consideration, although the search will continue until the position is filled. A background check is required for employment in this position.

Purdue University is an Equal Opportunity/Equal Access/Affirmative Action employer fully committed to achieving a diverse workforce.

**ASSISTANT, ASSOCIATE, OR PROFESSOR
GEOLOGY AND GEOLOGICAL ENGINEERING
SOUTH DAKOTA SCHOOL OF
MINES AND TECHNOLOGY**

The Dept. of Geology and Geological Engineering at the South Dakota School of Mines and Technology invites applications for a nine-month tenure track position at the Assistant, Associate or full Professor level. We seek candidates specializing in basin analysis and tectonics with expertise in one or more of structural geology, petrology, geophysics, or another field complementing department strengths. The successful applicant should be able to teach/develop courses in their specialty at both the undergraduate and graduate level, to advise graduate students, and to develop an externally funded research program. The department offers BS, MS, and Ph.D. degrees in Geology and Geological Engineering and a minor in Geospatial Technology, with emphases in hydrology, geotechnics, petroleum, mineral resources, and paleontology. A completed Ph.D. in Geology, Geological Engineering or a closely related field is required.

Individuals interested in this position must apply online at www.sdsmt.edu/employment. Human Resources can provide accommodation to the on-line application process and can be reached at (605) 394-1203. Review of applications will begin January 15, 2013, and will continue until the position is filled. Employment is contingent upon completion of a satisfac-

tory background investigation. SDSM&T is an EEO/AA/ADA employer & provider.

SEDIMENTOLOGY AND STRATIGRAPHY WESTERN WASHINGTON UNIVERSITY

Western Washington University invites applications for a tenure-track Assistant Professor with research and teaching specialties in sedimentology and stratigraphy. The appointment will begin effective September 16, 2013. The ideal candidate will enhance our existing strengths in field geology, geomorphology, geophysics, and structural geology/tectonics. Some examples of desirable research directions include basin evolution, marine/coastal processes, use of multi-faceted provenance data to evaluate sediment transport and test different tectonic models examining climate signals recorded by sediments and sedimentary rocks. Candidates must have a PhD in an appropriate Earth Science field at the time of appointment; teaching/research specialty in sedimentology and stratigraphy; ability to teach sedimentology, stratigraphy, introduction to Geology, and historical geology; ability to develop high-quality undergraduate teaching program; ability to establish externally-supported research program; ability to involve students in research; ability to contribute to graduate (MS) degree program. Preferred qualifications include post-doctoral experience; college-level teaching experience; ability to teach GIS, contribute to our geology field courses; and ability to work with a diverse student body. Interested candidates must apply online. To see full position description and log in to WWU's Electronic Application System for Em-

ployment (EASE), please go to <https://jobs.wvu.edu/JobPosting.aspx?JPID=3732>. Applications need to include a cover letter outlining your teaching and research experience and accomplishments with specific reference made to the required and preferred qualifications described above. The application should also include a CV, graduate school transcripts, statements describing teaching and research philosophy and effectiveness, as well as goals and plans for teaching and research at WWU. Letters of reference from four persons familiar with the candidate's research and teaching must be provided and available for review by December 10, 2012; one of these references must be from outside the applicant's current institution. Send letters to the Geology Dept. or email them to the search committee chair. Review of all application materials will begin on December 10, 2012; position is open until filled. Questions regarding this position should be directed to the search committee chair, Thor Hansen (Thor.Hansen@wvu.edu) or the Geology Dept. chair, Bernie Housen (bernieh@wvu.edu). WWU is an EO/AA employer and encourages applications from women, minorities, persons with disabilities and veterans.

FACULTY POSITION IN PALEOBIOLOGY AND GEOBIOLOGY, DEPARTMENT OF GEOSCIENCES, VIRGINIA TECH

The College of Science at Virginia Tech, in support of the university's strategic plan, is expanding its research presence in Energy and the Environment through interdisciplinary faculty hires across departments (for

further information, visit www.science.vt.edu under *faculty openings*). As part of this initiative, the Dept. of Geosciences (www.geos.vt.edu) anticipates a tenure-track opening in Paleobiology and Geobiology, to start in Fall 2013 at our Blacksburg, VA Campus. The department is an international leader in many areas of Geosciences research, with six new members added to its faculty in the last two years. For the new position, the successful candidate needs to have outstanding research/teaching experience that explores the paleontological record using observational, experimental, and quantitative methods to reconstruct the co-evolutionary history of the biosphere and Earth's surface environment at various spatial and temporal scales. Appointment at the assistant professor level is anticipated.

The successful candidate will be expected to establish a vigorous research program, teach effectively at the undergraduate and graduate levels, continue development of scholarly activities and professional capabilities, and participate in department, college, and university governance. Occasional travel to attend professional conferences is required. Applicants must have a Ph.D. degree in Geosciences or a related discipline at the time of appointment, have demonstrated capability/promise to develop an active research program, and pass a criminal background check. Preference will be given to candidates whose research areas complement existing strengths in the department.

Questions regarding the new position can be directed to Search Committee chair Dr. Shuhai Xiao

Sedimentary Basin Analysis and Modeling Position, Berg-Hughes Center and Department of Geology and Geophysics, Texas A&M University



The Berg-Hughes Center (BHC) for Sedimentary and Petroleum Systems and the Department of Geology and Geophysics at Texas A&M University invite applications from individuals for a non-tenure-track, three-year renewable contract position as a senior research professor (full professor) in Sedimentary Basin Analysis and Modeling beginning September 1, 2013. This position will be a joint appointment with teaching, research and service responsibilities in the Berg-Hughes Center and Department of Geology and Geophysics.

The principal responsibility of this position is to spearhead the collaborative research and teaching programs in the newly established Chevron-TAMU/BHC Basin Modeling Center of Research Excellence in the Berg-Hughes Center and Department of Geology and Geophysics. This responsibility includes leading in the development of a robust externally funded research program in basin analysis and modeling that includes research collaboration with researchers in the petroleum industry; teaching integrative courses that introduce advanced concepts and technologies needed for unraveling the geohistory of sedimentary basins and the origin and location of unconventional and conventional petroleum resources inherent to sedimentary basins, and supervising graduate students and mentoring faculty in the use of sophisticated computational and applied research approaches and techniques to solve complex geologic problems.

We seek candidates who have had extensive experience in sedimentary basin analysis and modeling and in serving as a team leader on multi-disciplinary research projects, and who have demonstrated the ability to develop and maintain an externally funded research program. Applicants must have a record of success in working collaboratively with researchers in academia and the petroleum industry and be enthusiastic about teaching integrative courses and supervising graduate students in basin analysis, basin architecture, basin modeling, basin geodynamics, and related areas.

Applicants must have an earned Ph.D. at the time of appointment. Successful applicants will be expected to teach effectively at the graduate level in basin analysis and modeling and related fields and in team taught courses, including classes in the Petroleum Certificate curriculum and to supervise undergraduate, M.S. and Ph.D. research, including students who are interested in pursuing careers in the petroleum industry. Applicants are expected to build and maintain a collaborative research program with colleagues in the College of Geosciences, the Berg-Hughes Center, the Department of Geology and Geophysics, the Department of Petroleum Engineering, and other energy related groups at Texas A&M University and the Texas A&M University System and with geoscientists and petroleum engineers in the oil and gas industry and national and international research institutions.

Interested candidates should submit electronic versions of a letter of application, curriculum vita, teaching philosophy, statement of research vision, strategies to implement that vision, and accomplishments, and the names and email addresses of at least three references to the Chair of the Basin Analysis and Modeling Search Committee (mancini@neo.tamu.edu). Screening of applications for the position will begin February 1, 2013 and will continue until the position is filled. The Berg-Hughes Center (berg-hughes.tamu.edu) and the Department of Geology and Geophysics (geoweb.tamu.edu) are part of the College of Geosciences, which also includes the Departments of Atmospheric Sciences, Geography, and Oceanography; the Geochemical and Environmental Research Group (GERG); and the Integrated Ocean Drilling Program (IODP). Texas A&M University, a land-, sea-, and space-grant university, is located in a metropolitan area with a dynamic and international community of 172,000 people. Texas A&M University is an affirmative action/equal opportunity employer committed to excellence through the recruitment and retention of a diverse faculty and student body and compliance with the Americans with Disabilities Act. We encourage applications from minorities, women, veterans, and persons with disabilities. Texas A&M University also has a policy of being responsive to the needs of dual-career partners.

(xiao@vt.edu). To receive full consideration, applications must be submitted online (www.jobs.vt.edu; reference posting #0122338) by December 21, 2012, and should include a cover letter, resume, research statement, teaching statement, and contact information of at least four referees. Salary will be commensurate with rank and experience. Virginia Tech is an EO/AA university, and offers a wide range of networking and development opportunities to women and minorities in science and engineering. Individuals with disabilities desiring accommodations in the application process should notify Mrs. Ellen Mathena at 540-231-6894, or call TTY 1-800-828-1120.

**TENURE TRACK POSITION
MINERALOGY/MATERIAL SCIENCE
TEMPLE UNIVERSITY**

The Dept. of Earth and Environmental Science at Temple University seeks applicants for a tenure-track position at the level of Assistant or Associate Professor in mineralogy and material science whose research emphasizes the emerging fields of Environmental Mineralogy, Medical Mineralogy, or Nanoscience to begin in August 2013.

The successful candidate will have a Ph.D. degree, an established record of accomplishment in their discipline, a strong commitment to teaching and student mentoring, and a keen interest in collaboration with other faculty at Temple University to build a new Geoscience Ph.D. program. The candidate is expected to complement existing specialties in our department, including low-temperature aqueous geochemistry, hydrology, environmental geophysics, structural geology, mineralogy, coastal geomorphology, soils, sedimentology/stratigraphy, and paleoclimatology.

Available analytical instrumentation includes: X-ray fluorescence, magnetic susceptibility, electron microprobe, liquid chromatography/mass spectrometry, Raman spectroscopy, automated powder, single crystal, and thin film XRD, SEM and TEM with EDS, as well as access to high-performance computing.

The deadline for applications is January 7, 2013. Applications should include a CV, statement of research goals, description of potential classes and teaching philosophy, names and addresses of at least three references (five if applying at the Associate level), and copies of selected reprints. Applications should be submitted electronically via the link on the Department website: www.temple.edu/geology and letter of intent emailed to Jonathan Nyquist, Department chair (nyq@temple.edu).

Temple University is an affirmative action and equal opportunity employer committed to equal access and to achieving a diverse community. The department specifically invites and encourages applications from women and minorities. We will be available to meet with candidates at the 2012 Annual GSA and AGU meetings in Charlotte and San Francisco.

**ASSISTANT PROFESSOR (TENURE-TRACK)
POSITIONS IN WATER, UNIVERSITY OF
NORTH CAROLINA, CHAPEL HILL**

The Dept. of Geography and the Department of Geological Sciences at the University of North Carolina at Chapel Hill invite applications from outstanding scholars for two tenure-track Assistant Professor positions in the general area of water.

The Dept. of Geography invites applications for a position focused on the Biophysical Dimensions of

Water. We seek an energetic scholar who can provide leadership in one or more areas related to the climatological, hydrological, ecological, geomorphological, or health aspects of water. We are particularly interested in candidates who engage human-environment interactions from a physical science perspective.

The Dept. of Geological Sciences invites applications for a position with a focus on Surface Water/Groundwater Interactions. The candidate's research focus may include the physics and/or chemistry of interactions among groundwater, hydrothermal reservoirs, soil water, permafrost, rivers, lakes, and other active reservoirs of liquid water at or near the surface of the Earth. The strongest candidates will conduct research relevant to water as a resource in sustaining natural ecosystems and human societies and as a key component of Earth's critical zone. The successful candidate will also have teaching and service responsibilities in the interdisciplinary Curriculum for the Environment and Ecology. Applicants must hold a Ph.D. at the time of appointment, and postdoctoral and teaching experience is highly desirable.

The successful candidates will be expected to establish dynamic, externally funded research programs and demonstrate excellence in teaching at the undergraduate and graduate levels. They may also wish to take advantage of existing relationships with other departments and research centers including the Institute for the Environment, the Water Institute, the Department of Marine Sciences, the Curriculum for Ecology and Environment, and centers and programs at nearby Duke University and North Carolina State University. Both departments have strong commitments to interdisciplinary and international research and teaching.

Applicants for each position must submit a letter of application, statements of research and teaching interests, vita, and contact information (names, addresses, email, and phone numbers) of four references on-line at <https://unc.peopleadmin.com/postings/9734> (for Geography position) or <https://unc.peopleadmin.com/postings/9722> (for Geology position). Review of applications will begin on December 20, 2012 and will continue until the positions are filled. For more information on the Departments and the University please visit our web pages at geography.unc.edu and www.geosci.unc.edu. If you have questions about the positions, please contact Dr. Chip Konrad, konrad@unc.edu (Tel: 919-962-3873) in Geography or Dr. Tamlin Pavelsky, pavelsky@unc.edu (Tel: 919-962-4239) in Geological Sciences.

The University of North Carolina at Chapel Hill is an equal opportunity/affirmative action employer. Women and minorities are encouraged to apply.

**IGNEOUS PETROLOGIST/VOLCANOLOGIST
THE UNIVERSITY OF ALABAMA**

The Department of Geological Sciences invites applications for a tenure-track faculty position to be filled at the Assistant Professor level beginning August 2013. We seek a candidate with research interests in igneous processes, the evolution of magmatic systems, and experimental/theoretical modeling of volcanic and magmatic processes. The Department of Geological Sciences has vigorous and growing research programs in Tectonics, Environmental Geoscience, and Energy & Earth Resources. Available equipment includes: an automated X-Ray fluorescence spectrometer, an automated X-ray diffractometer, an inductively-coupled

plasma mass spectrometer, an electron probe micro-analyzer, transmission electron microscopes, scanning electron microscopes, and electron backscatter detectors. State-of-the-art computational resources and software are also available. The candidate will be expected to achieve excellence in teaching undergraduate and graduate courses in igneous/metamorphic petrology and volcanology, recruit and supervise master's and doctoral students, and develop an internationally recognized and externally-funded research program with strong field and lab components. Minimum qualifications are a Ph.D. degree in geosciences or related discipline at the time of appointment. Applications, filed electronically at www.facultyjobs.ua.edu, will be reviewed beginning November 26, 2012 and will be accepted until the position is filled. Required components of the application include a cover letter, resume/CV, statement of research interests, statement of teaching philosophy/interests, and the names and contact information for at least 3 referees. Additional information is available on our website at www.geo.ua.edu and from Dr. Harold Stowell, Igneous Petrology & Volcanology Search Committee Chair, hstowell@geo.ua.edu. The University of Alabama is an Equal-Opportunity, Affirmative-Action Employer and applications are solicited from women and minority candidates.

Opportunities for Students

The Jonathan O. Davis Scholarship supports graduate students working on the Quaternary geology of the Great Basin. The national scholarship is \$5,000 and the University of Nevada, Reno stipend is \$1,500. The national scholarship is open to graduate students enrolled in an M.S. or Ph.D. program at any university in the United States. The stipend is open to graduate students enrolled in an M.S. or Ph.D. program at the University of Nevada, Reno. Details on application requirements can be found at: www.dri.edu/GradPrograms/Opportunities/JonathanDavis. Applications must be post-marked by February 2, 2013. Proposal reviews will not be returned. Applications should be addressed to: Executive Director Division of Earth and Ecosystem Sciences Desert Research Institute 2215 Raggio Parkway Reno NV 89512

Graduate Student Opportunities, Case Western Reserve University. Students with backgrounds in geology, physics, chemistry, biology, engineering and related fields are encouraged to apply for our Ph.D. and MS programs in Earth, environmental, and planetary sciences. Areas of active research in the department include planetary geology and geophysics, igneous geochemistry, mineral physics, sediment transport, aqueous geochemistry and carbon sequestration. For more information, see <http://geology.case.edu> or write to eeps-gradinfo@case.edu. Financial assistance is available. Application deadline: 1/15/2013.

IGERT: Adaptation To Abrupt Climate Change (A2c2). Ph.D. assistantships available. University of Maine. The University of Maine is seeking outstanding applicants for a doctoral graduate training program in adaptation to abrupt climate change funded by the NSF IGERT program. This is a joint program between the Climate Change Institute and the School of Policy & International Affairs at UMaine (www.umaine.edu/

a2c2igert). The A2C2 IGERT is designed to train doctoral students in **earth sciences, ecology, anthropology, archaeology, international affairs, and economics** to meet critical societal needs in human adaptation to ACC. Please see the program website for descriptions of program goals and research themes.

Students in this program will receive an annual stipend of \$30,000 per year in each of the first 2 years, plus tuition, fees, and health insurance coverage. Students must be U.S. citizens or permanent residents to receive IGERT support.

Application instructions are provided on the program website. For full consideration, submit all documents no later than **February 1** for the following academic year. Any questions about this program should be sent to the IGERT A2C2 Project Director, Dr. Jasmine Saros, jasmine.saros@umit.maine.edu

Fellowship Opportunities

TURNER POSTDOCTORAL FELLOWSHIP UNIVERSITY OF MICHIGAN

The Dept. of Earth and Environmental Sciences at the University of Michigan invites applications for the Turner Postdoctoral Fellowship. This highly competitive fellowship is open to all fields within Earth Sciences.

The Department is interested in innovative research proposals that can be pursued in collaboration with a faculty member. Interested applicants are encouraged to contact prospective hosts ahead of the application deadline to discuss areas of common interest and potential collaborations (www.lsa.umich.edu/earth/people/faculty/).

Turner Postdoctoral Fellows receive an annual salary of \$55,000, discretionary research funds totaling \$10,000, and a generous benefits package. The fellowship is awarded for a one-year period, with an anticipated extension for a second year.

Interested applicants should send a single pdf file with the following: a curriculum vitae, research proposal (5 pages maximum), and the names and addresses of at least three references no later than January 15, 2013. Applications should be sent to turnerpdf@umich.edu.

The University of Michigan is an affirmative action/equal opportunity employer. Women and minorities are encouraged to apply.

W.O. CROSBY POSTDOCTORAL FELLOWSHIP MASSACHUSETTS INSTITUTE OF TECHNOLOGY

The Dept. of Earth, Atmospheric and Planetary Sciences at the Massachusetts Institute of Technology (MIT) invites applications for the W.O. Crosby Postdoctoral Fellowship. We seek exceptional scientists with research interests in geology, geochemistry, or geobiology. Crosby Fellows pursue independent research, but are encouraged to collaborate with one or more researchers in the department. A faculty mentor will be assigned to host the fellow and provide intellectual guidance. Prospective fellows are encouraged to contact members of the department to discuss possible collaborations.

The fellowship appointment will be for one year, renewable for a second year, and includes an annual salary of \$60,000, a research and relocation allowance

of up to \$10,000 over two years, and benefits.

Applications and three letters of reference are due by January 7, 2013, with an anticipated start date between June 1, 2013 and January 31, 2014. Applicants must have obtained a Ph.D. by the start date of the fellowship, but not more than three years before the start date.

Applications and reference letters should be sent separately by email to wocrosby@mit.edu. The application should be submitted as a single PDF file containing a CV, a list of publications, a two-page plan of research to be conducted during the fellowship, and the names, telephone numbers and email addresses of the reference letter writers.

We especially encourage applications from women and underrepresented minorities.

THE JOSEPH P. OBERING POSTDOCTORAL FELLOWSHIP DARTMOUTH COLLEGE

The Dept. of Earth Sciences at Dartmouth College seeks outstanding candidates for the Joseph P. Obering Postdoctoral Fellowship in Earth Sciences. This competitive fellowship provides two years of full-time salary and a research allowance, with a third year contingent upon performance and funding. In concert with Dartmouth's philosophy that scholarship and teaching are inseparable facets of academic life, this fellowship provides recent Ph.D. recipients the opportunity to pursue independent research as well as to develop a teaching portfolio. Candidates will be expected to collaborate with one or more Dartmouth Earth Sciences faculty members, taking advantage of existing resources and facilities, and will teach one course (under the quarter system) per year. The starting date is negotiable, but could be as early as July 1, 2013. Details about Dartmouth Earth Sciences may be found at www.dartmouth.edu/~earthsci.

Candidates should submit a CV, statements of research and teaching interests, and selected preprints/reprints by January 8, 2013. Applications should be sent to: Obering Postdoctoral Fellowship Committee, Dept. of Earth Sciences, Dartmouth College, 6105 Fairchild Hall, Hanover, NH 03755. In addition, applicants should arrange for three letters of recommendation to be sent directly to the above address. Dartmouth College is an EO/AA Employer.

DOCTORAL FELLOWSHIP IN GEOCHEMISTRY OR GEOPHYSICS AT UTAH STATE UNIVERSITY

The Dept. of Geology at USU seeks outstanding Ph.D. applicants for a Presidential Doctoral Research Fellowship pursuing research in geochemistry or geophysics/geodynamics, starting fall 2013. This highly selective fellowship provides four years of support in the form of a competitive stipend, tuition and health benefits.

Potential research in geochemistry includes geologic CO₂ sequestration, origin and history of crustal fluids in active tectonic settings, unconventional fuels, and geothermal energy. Contact Dr. Dennis Newell (dlnewelljr@gmail.com).

Research in geophysics/geodynamics of the lithosphere may include thermal transfer by fluids and melts; imaging of subsurface mass and composition; mapping of lithospheric strength and rheology; and GPS measurement and modeling of fault slip and

earthquake cycle deformation. Contact Dr. Anthony Lowry (tony.lowry@usu.edu).

The Dept. of Geology at USU is field oriented with a dynamic and growing faculty and graduate program. We are located in Logan, Utah with close proximity to a wide variety of recreational and cultural activities.

Please visit <http://geology.usu.edu> for more information about our program, and <http://www.usu.edu/graduateschool/apply/> to apply before February 15, 2013.

Call for Applications

2013–2014 GSA-USGS Congressional Science Fellowship

Deadline for application:
1 February 2013

Bring your science and technology expertise to Capitol Hill to work directly with national leaders at the interface between geoscience and public policy.

The GSA-USGS Congressional Science Fellowship provides a rare opportunity for a geoscientist to work in a House or Senate personal or committee office for one year. Prospective candidates are GSA members with a broad geoscience background and excellent written and oral communication skills. The fellowship is open only to U.S. citizens or permanent U.S. residents, with a minimum requirement of a master's degree with at least five years professional experience or a Ph.D. at the time of appointment.

Learn more at
www.geosociety.org/csf/
or by contacting
Ginger Williams,
+1-303-357-1040,
gwilliams@geosociety.org.

Apply today!



THE
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USGS
science for a changing world

Tier II Canada Research Chair in Mineral Deposit Research

Lakehead University invites applications for the Tier II Canada Research Chair (CRC) in Mineral Deposit Research at a rank commensurate with experience and qualifications. We seek an innovative individual with an outstanding record of interdisciplinary research and publications in any aspect of mineral deposit research from discovery and development to closure and remediation of mine sites. The successful candidate will provide leadership for national and international collaborative research, and will develop initiatives involving the Canadian Mining Industry. The Chair will work closely with the proposed Centre of Mineral Exploration and Sustainable Mining Development at Lakehead University. It is expected that the successful candidate's current and future research program provides opportunities for our graduates and enhances mineral exploration in Northern Ontario and internationally.

The CRC Program was created by the Government of Canada to cultivate world-class research and development. Tier II CRC's are designed for exceptional emerging researchers with the potential to achieve international recognition in their fields in the next five to 10 years. Candidates must have the necessary qualifications to be appointed as a tenured or tenure-track professor at the assistant or associate professor level.

All candidates will have completed a Ph.D. in Geology, Environmental Geology, or a related field. The Tier II CRC competition is only open to candidates who have at most 10 years of experience from the highest degree at the time of nomination. The applicant is expected to conduct an active research program and to seek external research funding. Lakehead University has a world-class central instrumentation laboratory that has a new ICP-MS and high-resolution FESEM-EDX system, ICP-AES, XRD, and several spectroscopy instruments.

Lakehead University offers on-campus and community-based programs, continuing education and distributed learning, and graduate programs at the Master's and Doctoral levels. Lakehead is a comprehensive research intensive University providing an impressive array of programs in professional arts and sciences, and is the home of the west campus of the Northern Ontario School of Medicine. The University has an enrolment of approximately 8,100 students at campuses in Thunder Bay and Orillia, with a significant Aboriginal contingent at the Thunder Bay campus. For further information, please access: www.lakeheadu.ca.

For further information regarding this CRC position, please contact Dr. Peter Hollings, Chair of the Department of Geology, at (807) 343-8329 or peter.hollings@lakeheadu.ca. Detailed information on our undergraduate and graduate programs is available at <http://geology.lakeheadu.ca/>.



Review of applications will begin on January 11, 2013 and continues until the position has been filled. Applications and nominations including a letter of interest, curriculum vitae, evidence of teaching effectiveness (such as a statement of teaching philosophy, teaching evaluations, course outlines), a five-year CRC research plan, the contact information for three referees, and three publications that demonstrate a significant contribution to the field should be sent to:

Dr. Rui Wang, Vice-President (Research, Economic Development and Innovation)
Lakehead University
955 Oliver Road
Thunder Bay, ON P7B 5E1
e-mail: Janice.Pellizzari@lakeheadu.ca | tel: (807) 343-8201

Please note that this position is subject to review and final approval by the CRC Secretariat in Ottawa. For additional information on the CRC program, please visit the program website at:
www.chairs.gc.ca.

Lakehead University is an Equal Opportunity Employer. The CRC program imposes no restrictions with regard to nationality or current country of residence.

Lakehead
UNIVERSITY

lakeheadu.ca

Roof of the World

Joint Scientific Meeting of the Geological Society of China and The Geological Society of America

17-19 June 2013

Jinjiang Hotel, Chengdu, Sichuan Province, China

A Joint Scientific Meeting of the Geological Society of China and The Geological Society of America with cooperation from the GSA International Section

Please join us for the first joint conference between GSC and GSA. Conducted in English, the three-day conference will include post-meeting field trips investigating the Qinghai-Tibet Plateau, intra-continental deformation and mineral resources, and unique sites for the end-of-Permian mass extinctions.

Scientific Program Chairs

Prof. Dong Shuwen, Chinese Academy of Geological Sciences, Prof. J.G. Liou, Stanford University

Additional Organizers

Chinese Academy of Geological Sciences
Dept. of Land and Resources of Sichuan Province, China, Chengdu University of Science and Technology

Abstract deadline: 1 March 2013 (abstract submission opens in late December 2012)

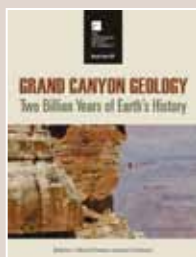


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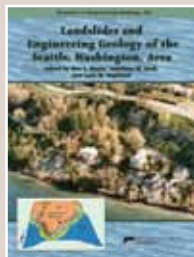
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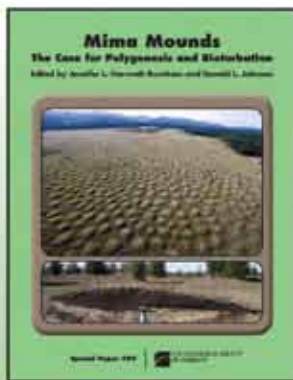
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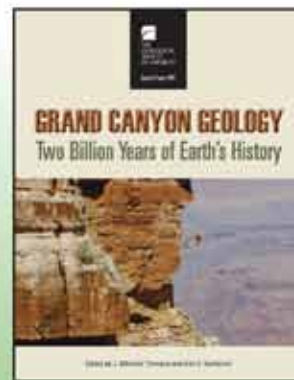
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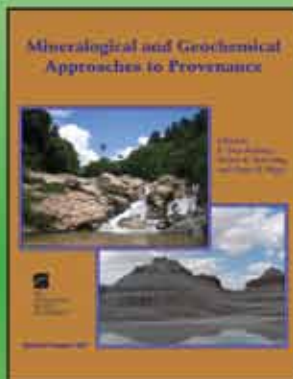
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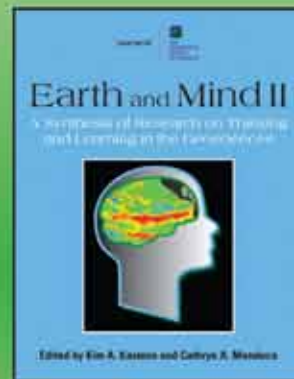
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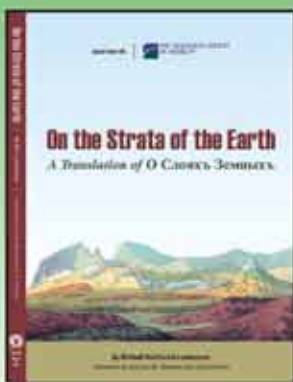
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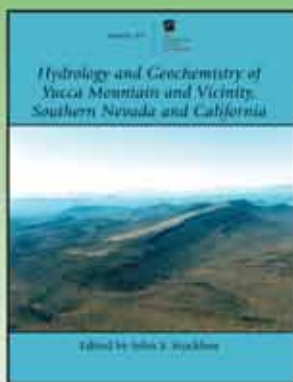
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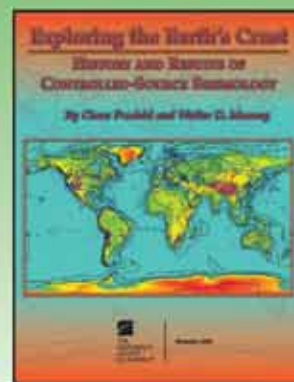
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