

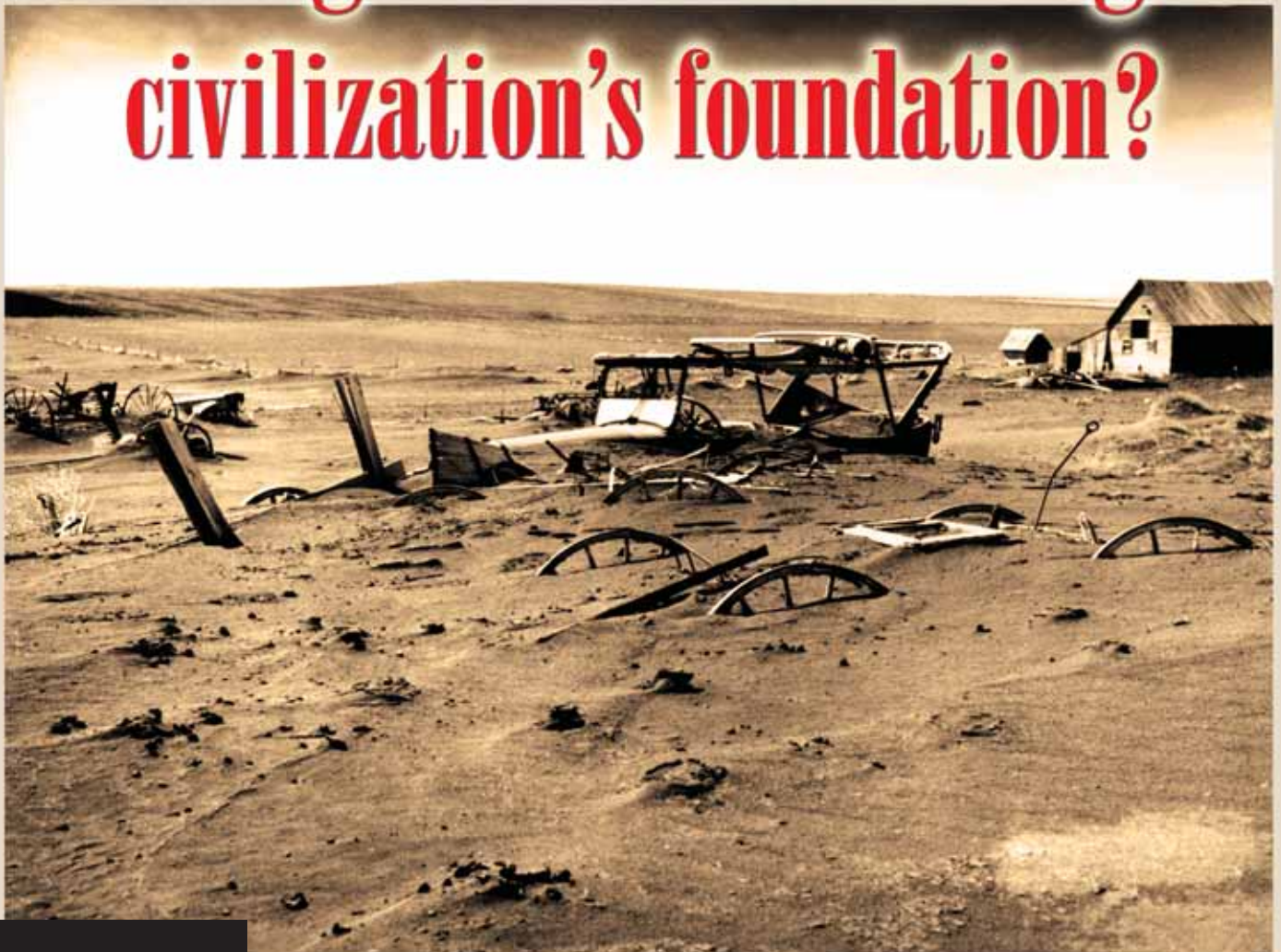
# GSA TODAY

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OCTOBER 2007

## Is agriculture eroding civilization's foundation?



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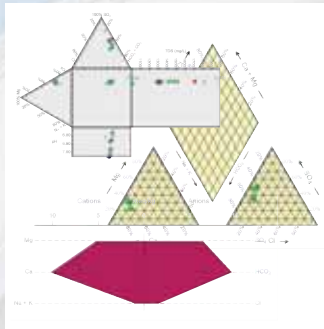
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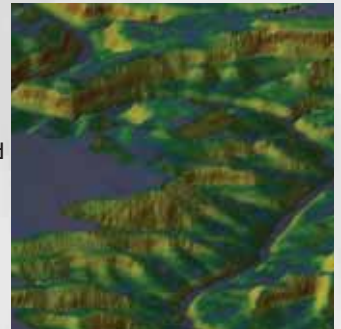
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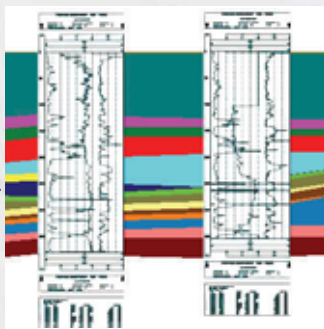
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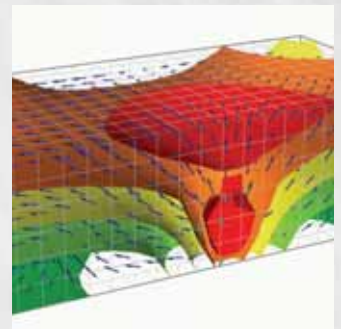
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# Is agriculture eroding civilization's foundation?

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## ABSTRACT

Recent compilations of data from around the world show that soil erosion under conventional agriculture exceeds both rates of soil production and geological erosion rates by from several times to several orders of magnitude. Consequently, modern agriculture—and therefore global society—faces a fundamental question over the upcoming centuries. Can an agricultural system capable of feeding a growing population safeguard both soil fertility and the soil itself? Although the experiences of past societies provide ample historical basis for concern about the long-term prospects for soil conservation, data compiled in recent studies indicate that no-till farming could reduce erosion to levels close to soil production rates. Similarly, organic farming methods have been shown to be capable of preserving—and in the case of degraded soils, improving—soil fertility. Consequently, agricultural production need not necessarily come at the expense of either soil fertility or the soil, even if recent proposals to rely on conventionally grown corn for biofuels exemplify how short-term social and economic trade-offs can deprioritize soil conservation. Like the issues of climate change and loss of biodiversity, ongoing global degradation and loss of soil present fundamental social challenges in which the slow pace of environmental change counter-intuitively makes solutions all the more difficult to adopt.

*They're making more people every day but they ain't makin' any more dirt.*—Will Rogers

## INTRODUCTION

Public concern over the future of civilization and issues of sustainability in general tends to focus on global warming, loss of biodiversity, and the end of the fossil-fuel era. Far less societal concern has been focused on how dramatically conventional agriculture has increased soil erosion around the world, however, or on the role of soil degradation and loss in the history and fate of civilizations. With global agricultural soil erosion outpacing soil production by a wide margin (Wilkinson and McElroy, 2007; Montgomery, 2007b), modern conventional agriculture is literally mining soil to produce food (Fig. 1)—and yet, feeding humanity fundamentally depends on fertile soil. Unless this deceptively simple problem is solved, soil loss will become a key issue facing society over the next several centuries, in a process like that recognized as contributing to the decline of ancient societies (e.g., Montgomery, 2007a). Even a casual reading of history shows that under the right circumstances, climatic extremes, political turmoil, and/or resource



Figure 1. *Crucified Land*, by Alexandre Hogue (1898–1994). Oil on canvas, 1939. Courtesy of Gilcrease Museum, Tulsa, Oklahoma.

abuse can bring down a society, and in the upcoming century, we face the potential convergence of all three as shifting climate patterns and depleted oil supplies collide with accelerated soil erosion and the resulting loss of cropland (Brink et al., 1977; Larson et al., 1983; Ruttan, 1999).

Soil erosion represents just a single aspect of agricultural sustainability because soil productivity involves nutrient budgets, not just soil loss. Ecologically productive soils, those with more soil microorganisms and organic matter, can support greater plant growth. Numerous studies have shown how conventional tillage reduces soil organic matter (Lal, 2007) and thereby reduces biological activity that supports soil fertility. In addition, soils that thin due to rapid erosion have reduced weathering time that may limit the availability of key plant nutrients, leading to reduced soil fertility. And it has long been recognized that sustained cropping without appropriate crop rotation can deplete soil nutrients and that chemical fertilizers can greatly enhance the productivity of degraded soils. So even though the issue of sustainable soil erosion may be appropriately gauged by soil production rates, the overall health and fertility of the soil further depends on soil nutrient and organic matter contents. An agricultural soil need not be entirely eroded away to preclude economical farming.

Farmers around the world plow to prepare the seedbed for planting, to mix crop residues, manure, and fertilizers into the soil, and to dry and warm the soil in spring. Plowing leaves soils bare and vulnerable to erosion, especially on modern mechanized farms, leading to net soil loss and degradation (Dale and Carter, 1955). Each pass of the plow also pushes soil downslope: The straight, angled blade of a conventional plow lifts and turns soil over, pushing it aside and moving it downhill

little by little. So even plowing along topographic contours accelerates soil erosion—all the more so on steeper slopes. This is not an issue in the flat-bottomed floodplains along river valleys, where plowing shifts soil back and forth, but on the intervening slopes, including the gently inclined land of the plains, the soil thins over time, and runoff across bare fields carries it to streams and rivers. How long it takes to deplete the soil depends not only on how fast plowing pushes soil downhill and runoff carries soil away but also on how rapidly the underlying rocks break down to replace eroded soil.

In the 1970s and 1980s, recognition that soil erosion was outpacing soil production led to warnings that society could run out of soil before oil (Brown, 1981). While such concerns now appear rather overstated, soil erosion under conventional plow-based agriculture proceeds slowly enough for a farmer to ignore in his or her lifetime (Osterman and Hicks, 1988), but fast enough to wear away the fertile topsoil capable of sustaining high crop yields in just a few generations (Dale and Carter, 1955; Hillel, 1991; Montgomery, 2007a).

### RATES OF SOIL LOSS

Recent studies confirm that agricultural soil erosion substantially outpaces soil production under now-conventional agricultural practices around the world. Specifically, Wilkinson and McElroy (2007) reported that an average erosion rate of 0.6 mm yr<sup>-1</sup> from modern farmlands greatly exceeds the estimated average erosion rate of 0.016 mm yr<sup>-1</sup> over the past 500 m.y. based on the preserved volumes of sedimentary rocks. Similarly, Montgomery (2007b) compiled data from a wide range of contexts around the world to compare soil erosion rates under conventional, plow-based agriculture with long-term geologic rates and found that the distributions differed by one to two orders of magnitude (Fig. 2).

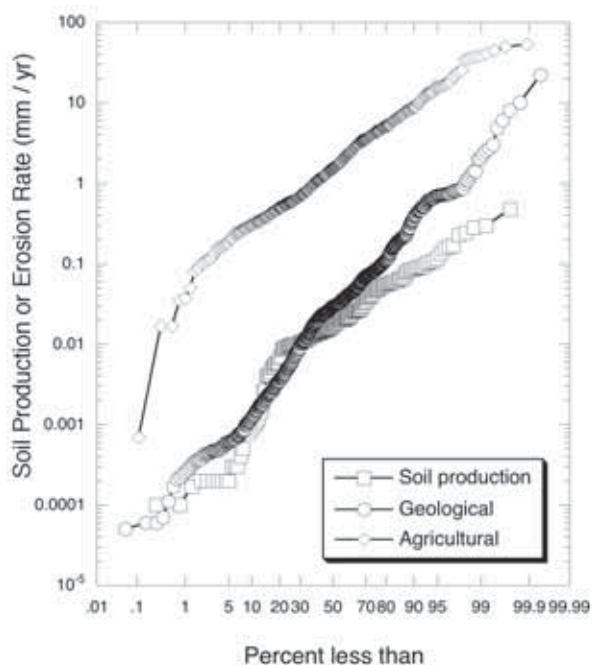


Figure 2. Percentile plot of agricultural erosion rates and geological erosion rates, as well as soil production rates (see Montgomery, 2007b, for compiled data and sources).

But how representative are such comparisons, given that they involve such disparate spatial and temporal scales? The most recent compilation of data from studies that directly assess soil erosion rates from agricultural land use shows increases of several to a thousand times above pre-agricultural rates (Fig. 3). Some estimates hold that nearly a third of the world's potentially farmable land already has been lost to erosion since the dawn of agriculture—and much of it in the past forty years. In 1990, the Global Assessment of Soil Degradation found that human-induced soil erosion and salinization had already affected almost two billion hectares of agricultural land (Bridges and Oldeman, 1999). Ongoing soil degradation and loss present a global ecological crisis that, although less dramatic than climate change or a comet impact, can prove catastrophic nonetheless, given time.

### RATES OF SOIL PRODUCTION

Hardly any data on rates of soil production were available in the 1950s when the Soil Conservation Service began developing the concept of soil loss tolerance values (*T* values) to define “tolerable” rates of soil erosion from agricultural land. In practice, *T* values were set by what was attainable using conventional farming equipment without undue economic impact on farmers, prompting concerns that “acceptable” *T* values would allow erosion at a pace far faster than soil rebuilds.

Over the past several decades, direct quantification of soil production rates became possible through measurements of the abundance of certain isotopes (particularly <sup>10</sup>Be and <sup>26</sup>Al) in and at the base of soil profiles. Produced at a known rate when cosmogenic rays bombard quartz grains, their concentrations can be used to calculate rates of soil production. Pioneering applications of this technique to temperate regions in coastal California and southeastern Australia (Heimsath et al.,

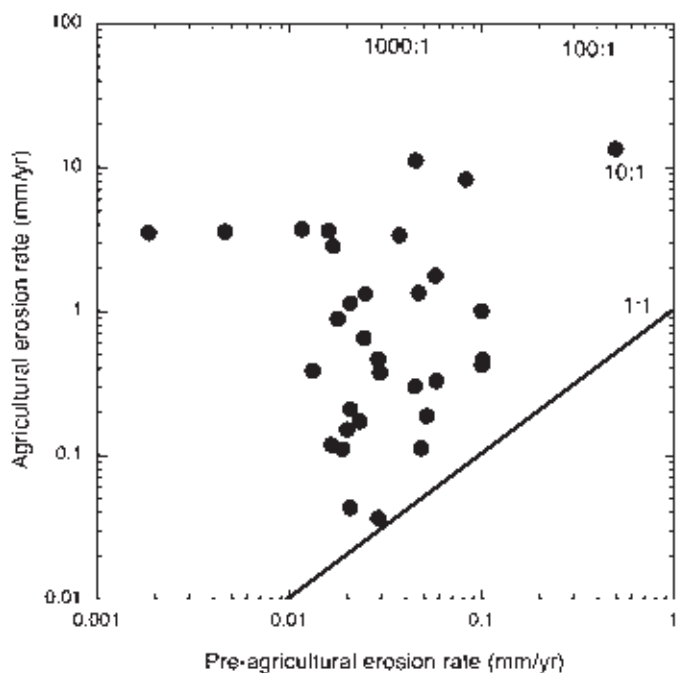


Figure 3. Pre-agricultural erosion rates versus erosion rates under conventional agriculture on comparable terrain (see Montgomery, 2007b, for compiled data and sources).

1997, 2000) confirmed nineteenth-century hypotheses that a thick blanket of soil would protect the bedrock from weathering, whereas a thin soil accelerates soil formation by exposing the underlying rock. So, as soil thickens, the rate of soil formation slows, leading to an equilibrium soil depth that locally reflects the particular balance between soil production and erosion. Soil production rates likely vary closely with long-term geological erosion rates, and estimates of average global soil production range from 0.058 to 0.083 mm/yr (Wakatsuki and Rasyidin, 1992; Troeh et al., 1999).

### ANCIENT SOIL LOSS

Throughout history, societies grew and could prosper as long as the soil remained productive or there was new land to plow and declined when neither remained true. Recent archaeological studies in Greece (Pope and van Andel, 1984; van Andel et al., 1990; Runnels, 1995), the South Pacific islands (Kirch, 1996, 1997), and the Mayan homeland in Central America (Beach, 1998; Beach et al., 2006), among other regions, point to soil erosion as a significant factor in the decline of ancient societies. Although the reasons behind the rise and fall of any particular civilization are complex (Tainter, 2006), and soil erosion and degradation alone did not trigger the outright collapse of prior civilizations, their soil budgets set the stage upon which economics, climate extremes, and warfare influenced their fate. In a broad sense, the history of many civilizations follows a common story line (Montgomery, 2007a) in which agriculture in fertile valley bottoms allowed populations to grow to the point that they came to rely on farming sloping land, and geologically rapid erosion of hillslope soils followed when sustained tillage continuously exposed bare soil to rainfall and runoff. Once no new land was available, nutrient depletion or soil loss during subsequent centuries encouraged increasingly intensive farming, which promoted further soil loss. While some societies developed agricultural practices that conserved soil, and even improved soil quality, more often soil loss and degradation eventually translated into inadequate agricultural capacity to support a burgeoning population, triggering societal decline, territorial expansion, or agricultural innovations.

### POTENTIAL TO FURTHER INCREASE AGRICULTURAL PRODUCTIVITY

Feeding the doubled human population anticipated later this century without further increasing crop yields would require doubling the roughly one and a half billion hectares presently under cultivation. Realistically, the only remaining vast tracts of virgin land that could be brought into production are tropical forests and subtropical grasslands—like the Amazon and the Sahel (Tilman et al., 2001)—where experience shows that conventional farming will produce an initial return until the land quickly becomes degraded and then abandoned. With the land best suited for agriculture already under cultivation (Young, 1999), agricultural expansion into marginal areas might buy time but would represent more of a delaying tactic than a sustainable strategy.

Innovation and technological advances, however, can coax greater production from less land and thereby offset resource constraints (Morrison, 2006; Tainter, 2006). Indeed, social and technological advances have repeatedly reduced the amount of land needed to feed a person (Table 1). Hunting and gather-

TABLE 1. HECTARES PER PERSON FOR DIFFERENT PLACES AND PERIODS THROUGH HISTORY

Location and time period	Hectares/person
Hunting-gathering	20.00–100
Swidden	2.00–10
Sedentary agriculture	0.20–1.0
Mesopotamia	0.50–1.50
Holland, 1800s	0.25–0.33
Southern China, 1900s	0.15
Northern China, 1930s	0.20
Egypt, 1936	0.20
Egypt, 1971	0.10
China, 2000	0.11
Indonesia, 2000	0.12
Philippines, 2000	0.13
Global average 1990	0.52
Global average 2000	0.25

*Note:* Data compiled from Smil, 2001.

ing societies required 20–100 ha of land to support a person, whereas the shifting pattern of cultivation that characterized slash-and-burn agriculture took just 2–10 ha. The earliest sedentary floodplain-based agricultural societies used an estimated 0.5–1.5 ha of floodplain to feed a Mesopotamian. Today, it still takes ~0.25 ha to feed each person, with roughly six billion people and 1.5 billion hectares of cultivated land on the planet, although the world’s most intensively farmed regions use just 0.1–0.2 ha to support a person (Smil, 2001). Increasing the average global agricultural productivity to this level would support between 7.5 billion and 10 billion people. Yet by 2050 the amount of available cropland is projected to drop to <0.1 ha per person due to continued population growth and loss of cropland (USDA, 2004). Simply staying even in terms of food production will require major increases in per-hectare crop yields—increases that may not be achievable using industrial agriculture, despite human ingenuity.

Before 1950, most of the increase in global food production came from increasing the area under cultivation and improved husbandry. Since 1950, most of the increase has come from mechanization and growing use of chemical fertilizers. Dramatic intensification of agricultural methods during this green revolution is widely credited with averting a food crisis in the late twentieth century. Increased harvests were due to the development of high-yield “miracle” varieties of wheat and rice capable of producing two or three harvests a year, the increased use of chemical fertilizers, and massive investments in irrigation infrastructure in developing nations. The introduction of fertilizer-responsive rice and wheat increased crop yields by >2%/yr between the 1950s and 1970s (Smil, 2001).

Since then, however, growth in crop yields has slowed to a virtual standstill. The great post-war increase in crop yields appears to be over. Wheat yields in the United States and Mexico are no longer increasing. Asian rice yields are starting to fall. Crop yields not only appear to have reached a technological plateau but are projected to fall in a warming climate (Peng et al., 2004). Thirty-year experiments on response to nitrogen fertilization at the International Rice Research Institute in the Philippines found that increasing nitrogen inputs were needed to counter declining soil fertility and maintain crop yields (Cassman et al., 1995). Nonetheless, over the coming decades, further annual increases of 1% to 1.5% are needed to

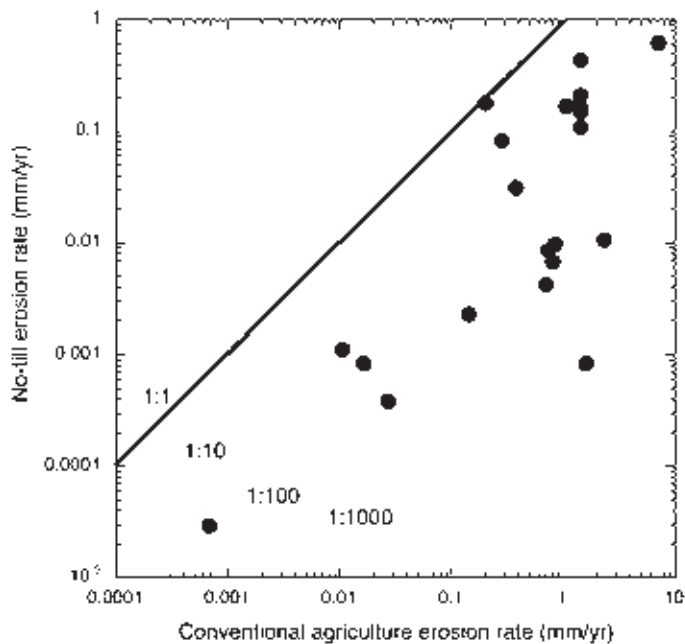


Figure 4. Erosion rates under no-till agricultural practices versus erosion rates under conventional agriculture on comparable terrain (see Montgomery, 2007b, for compiled data and sources).

meet projected demand for wheat, rice, and maize (Cassman, 1999). It is getting harder just to stay even, let alone increase crop yields.

Still, in the second half of the twentieth century, food production did double in great part due to a sevenfold increase in nitrogen fertilization and a three-and-a-half-fold increase in phosphorus fertilization (Tilman, 1999). But repeating this story seems rather unlikely because even tripling fertilizer applications won't help if plants cannot use the additional nitrogen and phosphorus. Crops already do not take up much of the nitrogen in the fertilizers farmers apply today—as shown by the vast hypoxic zone in the Gulf of Mexico created by the nitrogen-laden discharge from agricultural fields in the Mississippi River Basin (Turner and Rabalais, 2003). Even if we could, it might not do all that much good to dump more fertilizers on our fields.

### NO-TILL AND ORGANIC AGRICULTURE—THE NEXT REVOLUTION?

Agriculture has experienced several revolutions in historical times and, much like mechanization did a century ago, changes in farming practices are once again transforming agriculture as farmers increasingly abandon the plow in favor of long-shunned no-till methods. Could the growing adoption of no-till and organic methods foster a new agricultural revolution based on soil conservation and soil ecology rather than soil chemistry? The typical arguments offered for why organic agriculture cannot feed the world have been blunted by recent studies showing that organic farming can produce both crop yields (Phillips et al., 1980; Blevins et al., 1998) and profits (Pimentel et al., 2005) comparable to conventional methods. Although no-till and organic methods may not be as productive and competitive in all situations, substantial expansion of both could happen without sacrificing either yields or profits.

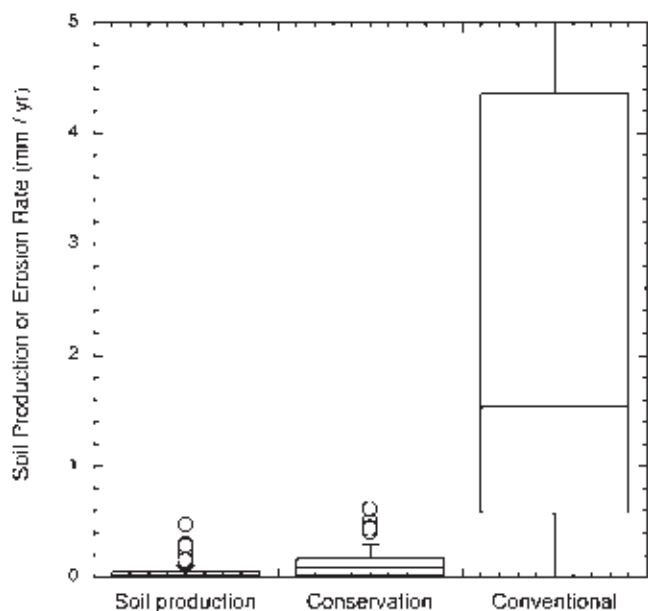


Figure 5. Box and whisker plots of soil production rates and rates of erosion under conservation agriculture and conventional agriculture. Boxes defined as median (line)  $\pm$  inner quartile, and whiskers defined as upper or lower quartile  $\pm$  1.5 times the inner quartile distance (i.e., upper quartile less the lower quartile); circles mark outliers outside range of the whiskers. See Montgomery, 2007b, for compiled data and sources.

Instead of using a plow to turn the soil and open the ground, no-till farmers push seeds down through the organic matter from prior crops, minimizing direct disturbance of the soil. Leaving crop residue at the ground surface instead of plowing it under allows it to act as mulch, helping to retain moisture and leaving the soil less vulnerable to erosive rainfall and runoff. Consequently, no-till farming can greatly reduce soil erosion (Fig. 4) and even bring erosion rates close to soil production rates (Fig. 5). In addition to dramatically reducing soil loss, no-till methods can improve soil health and reduce costly energy inputs (Lal, 1976; Edwards et al., 1992; Ismail et al., 1994; Karlen et al., 1994).

Indeed, the attraction of such techniques will likely grow in the coming decades along with the cost of fossil fuels used to make chemical fertilizers and power the machinery needed to work large-scale mechanized farms. At the same time, local food production will become increasingly attractive in a world of higher transportation costs. Half the world's population now lives in cities where labor-intensive, low-tech urban farming techniques could dramatically contribute to ending hunger.

Despite the attraction of no-till and organic methods, challenging obstacles remain to their adoption—no-till methods are practiced on just 6% of global cropland (Lal, 2007). They can also be seen as somewhat conflicting, as leaving crop residues on the ground can foster weeds and attract pests, which can force some farmers to choose between soil-conserving no-till practices and environmentally detrimental herbicide and pesticide use. In addition, no-till methods work less well in cold and damp climates and are best suited for well-drained sandy



and silty soils. Moreover, a key constraint on adoption of no-till methods in developing countries is that the biomass left on the fields under no-till practices is more valuable as cooking fuel (Lal, 2007).

Yet, rebuilding soil organic matter could provide one of the few simple, profitable ways to fend off global warming. When soil is plowed and exposed to the atmosphere, oxidation of organic matter releases carbon dioxide gas. A third of the total carbon dioxide buildup in the atmosphere since the industrial revolution has come from degradation of soil organic matter as hundreds of millions of acres of virgin land were plowed up in the late nineteenth and early twentieth centuries (Stuiver, 1978). No-till farming can reverse this process by stirring crop residues back into the soil surface, gradually increasing soil organic matter—as much as tripling soil carbon content in <15 yr in some studies. Conversion of all the world's croplands to no-till farming could sequester 1 Pg C yr<sup>-1</sup> (Pacala and Socola, 2004) while simultaneously rebuilding soil fertility. Increasing the organic matter content of agricultural soils could play a significant role in efforts to reduce the pace of global warming.

Like many environmental problems that become harder to address the longer they are neglected, soil erosion threatens to undermine the foundation of civilization over time scales longer than social institutions last. Irreplaceable over human time scales, soil is an awkward hybrid—an essential resource renewable only at a glacial pace. But unlike oil, there is no conceivable alternative for soil. Recent proposals to increasingly rely on conventionally grown corn and sugar cane to supply biofuels risk trading a system based on mining oil for one rooted in mining soil. Consequently, geoscientists will prove instrumental in establishing, evaluating, and implementing sustainable agricultural practices.

Indeed, as society grapples with agricultural issues in a post-petroleum world, geoscientists will have as great—and as fundamental—a role to play as do genetic and agricultural engineers. Sustainable agriculture will require adapting farming techniques to the land, and fertile soils are complex systems well-suited to study in the interdisciplinary perspective common amongst geoscientists. Although Leonardo da Vinci's insightful observation that “we know more about the celestial bodies than the soil underfoot” may no longer be literally true, further understanding of soil formation and erosion would help tailor agriculture to the land. Foremost among these are developing increased understanding of the controls on rates of weathering and soil production and on erosion under different agricultural techniques. In addition, the role of microbial life in establishing and maintaining soil fertility is becoming increasingly recognized as a research area critical for evaluating both conventional and alternative agricultural practices. The geosciences in general, and pedology, geobiology, hydrology, and geomorphology in particular, have key roles to play in defining, understanding, and implementing a path to feeding the world in the coming centuries.

For all the attention focused on global warming, the end of the oil era, and loss of biodiversity, there is a danger that society may neglect the most basic environmental change sweeping the planet. Even though it is hard to notice in a single lifetime, Earth's continents are losing their prime agricultural soils in a

process that, if sustained, will eventually undermine civilization. Bringing soil erosion rates back into line with soil production rates could provide the basis for sustaining the soil—whether on industrial or organic farms. And adapting agricultural methods to the land could use agroecology to improve the soil even as it is worked to produce food. Still, we would be well served to recognize that the history of soil loss and degradation in past societies reveals that, paradoxically, sometimes the things that happen slowly are the most difficult to stop.

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Art from *Dirt*

## The GSA Critical Issues Caucus

**E-an Zen**, *Scientist Emeritus, Department of Geology, University of Maryland, College Park, Maryland 20742, USA, ezen@erols.com*

### INTRODUCTION

Twelve years ago in *GSA Today* (v. 5, no. 5, p. 100), I summarized the history and purpose of GSA's Geosphere Alliance Committee (GAC) and invited GSA Members to join. Since then, the prospect of Earth as a sustainable habitat has become increasingly precarious. The need for earth scientists to acquire new knowledge about planetary and environmental systems and to transmit that knowledge to decision-, opinion-, and policy makers is ever more urgent.

In 1991, as GSA president, I appointed an ad hoc committee to recommend to GSA Council what the profession and the Society ought to do to ensure that geoscientists would be contributing adequately to nascent discussions on global sustainability. Inaugural members of this committee were Fred Donath, Bill Fisher, Bob Hatcher, Sue Kieffer, and Raymond Price, with Bill Fyfe as chair. I joined the committee in 1993.

In 1995, the Union of Concerned Scientists and the American Academy of Arts and Sciences jointly called a meeting of leaders of nearly two dozen scholarly and scientific societies to a three-day workshop on "critical issues" facing the world's future. Many ideas that emerged at this conference turned out to be the very ones that the GAC had considered important, and to highlight this opportunity to work across disciplines, the GAC changed its name to the Critical Issues Committee (CIC). It was formally attached to the Geology and Public Policy Committee. After the formation of the Geology and Society Division, the CIC became a part of that group, and it is now called the Critical Issues Caucus.

### PROGRESS

From its inception, the CIC has acted as an informal "think tank" on issues that threaten the continued health of the earth-system habitat. The CIC's purpose is to highlight important earth-science issues that significantly impact the well-being, equity, and life quality of global human society; to consider conditions for the prospect of preserving the health of the global ecosystem irrespective of its utility to mankind; and to consider how geoscientists can help make lateral linkages for more holistic interdisciplinary thinking. The CIC has discussed intergenerational, interspecies, and intersociety equity in resource allocation and whether geological knowledge can provide insight on better ways to preserve and nourish the decision-making options of future generations. Accordingly, our activities have in recent years focused on sustainability, societal vulnerability, and related topics, including global energy resources, water resources, land use, human ecological footprints, agriculture and soil, the NIMBY (not in my backyard) syndrome, global resource monitoring systems, and the intersection of scientific knowledge with social equity, justice, and value systems.

In 1995, I wrote that the CIC "would profit by including a few representatives from fields that our deliberations impinge upon—ecology and economics, for example—so as to both broaden our perspective and promote synergism." At one point, our roster did include an ecologist, an economist, a political scientist, a social geographer, and a biologist. Everyone was interested, but everyone was busy. So the CIC, now numbering 23 members, is once again dominated by earth scientists. We remain conscious of the need for cross-disciplinary thinking, however, and invite people outside our disciplines to join us.

Our formal activities have concentrated on identifying themes for presentations at the annual meetings of both GSA and the American Association for the Advancement of Science (AAAS). Since 1995, the CIC has sponsored the following sessions:

### AT GSA

**1998, Toronto:** "The sustainability challenge I—energy for the 21st century" and "Developing sustainability curricula: A challenge for earth science educators."

**1999, Denver:** "The sustainability challenge II—water and human sustainability" and "Environmental justice: Geological, social, and philosophical perspectives."

**2000, Reno:** "Toward a stewardship of the global commons: Perspectives for a new century, part I, the issues; part II, the engines of change."

**2001, Boston:** "The watershed within: Scientific and moral reflections on water in the 21st century."

**2002, Denver:** "Effective communication and/or partnership: Engaging geoscientists, the public, and policymakers: Case studies."

**2003, Seattle:** "Soils and a sustainable future, the neglected challenge in geology: A tribute to the many contributions and challenges of Aldo Leopold."

**2004, Denver:** "Geoscientific aspects of human and ecosystem vulnerability" and "The science of sustainability: How can we most effectively educate students, the public, and policymakers?"

**2005, Salt Lake City:** "Does geology serve society? Let's count the ways."

**2006, Philadelphia:** "Geosciences and the media: How can we better communicate the imperatives of sustainability?"

### AT AAAS

**1996:** "Population and consumption: Twin challenges to sustainable development."

**1997:** "Beyond the 100th meridian."

**2004:** "From the ground up: The importance of soil in sustaining civilization."

**2007:** "The science and ethics of a culture of sustainability."

It is important that we communicate our concerns not just to GSA Members or even to fellow scientists, but also to citizens at large. Accordingly, our Web site, <http://bcn.boulder.co.us/basin/local/sustainintro.html>, includes a link to a "Guideline for Sustainability Literacy," accompanied by 12 short, teacher-friendly explanatory articles on specific subtopics. Our Web site also includes an article by Zen et al. (2002) titled "Earth resources: The little engine that could brake sustainability."

In 2004, a free CD-ROM containing these articles and other items from our Web site was distributed at the National Science Teachers Association annual meeting, as well as at the 2004 GSA Annual Meeting.

CIC member A.R. (Pete) Palmer has been a champ in community outreach and deserves special mention. Since 2005, he has presented talks to more than 50 civic and church groups on understanding deep time and on sustainability and the challenge for the human enterprise. Inspired by her work with the CIC, Sue Kieffer of the University of Illinois Urbana-Champaign, along with the university's faculty of religion, has developed a course titled "The ethics and science of sustainability." Other outreach efforts include a discussion with John Grim and Mary Evelyn Tucker, coordinators for the Harvard Forum on Religion and Ecology, which directly led to one of the CIC-sponsored sessions at a GSA Annual Meeting.



### BECOME A CRITICAL ISSUES CAUCUS MEMBER

Please consider this an invitation for you to join the CIC. Either let one of the steering group know of your interest or write to us about some issues that you feel we should consider. We'd like your comments about our efforts so far: Are they in the right direction? How can we do better?

Current CIC members are Paul Barton, Richard Berg, Robin Brett, Charlette Chastain, Ward Chesworth, Gary Ernst, George Fisher, Brooks Hanson, Laszlo Keszthelyi, John Kiefer, Sue Kieffer, Bob Kopp, Estella Leopold, Eldridge Moores, Julianne Newton, A.R. (Pete) Palmer, Eric Reitan, Paul Reitan, Craig Schiffries, Chris Swezey, Trileigh Tucker, Christine Turner, and E-an Zen.

CIC members share ideas and concerns via e-mail. Chesworth (wcheswor@uoguelph.ca), Fisher (gfisher@jhu.edu), Kieffer (skieffer.uiuc.edu), Palmer (allison.palmer@comcast.net), P. Reitan (preitan@buffalo.edu), and Zen (ezen@erols.com) have served as CIC's coordinators; today they make up an informal steering group to identify, initiate, and advance projects and to maintain communication within the group and with other entities of GSA.



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# 2008 GSA Awards and Medals

## Penrose Medal

The Penrose Medal, established in 1927 by R.A.F. Penrose, Jr., recognizes eminent research in pure geology, outstanding original contributions, or achievements that mark a major advance in the science of geology. This award is made at the discretion of GSA Council, and nominees may or may not be members of the Society. Penrose's sole objective in making the gift was to encourage original work in purely scientific geology, which is interpreted as applying to all scientific disciplines represented by the Society. Nominations should focus on scientific achievements rather than contributions in teaching, administration, or service. Mid-career scientists who have already made exceptional contributions should be given full consideration for the award.

## Day Medal

The Day Medal was established in 1948 by Arthur L. Day to be awarded annually, or less frequently, at the discretion of GSA Council, for outstanding distinction in contributing to geologic knowledge through the application of physics and chemistry to the solution of geologic problems. Day's intent was to recognize outstanding achievement and inspire further effort rather than reward a distinguished career. Scientific achievements should be considered rather than contributions in teaching, administration, or service.

## Young Scientist Award (Donath Medal)

Established in 1988, the Young Scientist Award recognizes a young scientist (35 or younger throughout the year in which the award is to be presented\*) for outstanding achievement in contributing to geologic knowledge through original research that marks a major advance in the earth sciences. The award, consisting of a gold medal (the Donath Medal) and a cash prize of US\$20,000, was endowed by Dr. and Mrs. Fred A. Donath. \*For the year 2008, only those candidates born on or after 1 January 1973 are eligible for consideration.

## Honorary Fellows

GSA Council established Honorary Fellowship in 1909, and since then, except during a few war years, GSA has elected one or more Honorary Fellows each year. At present, GSA has 67 (living) Honorary Fellows.

Honorary Fellowship is bestowed on geoscientists who have lived and developed their careers outside of North America and who have made outstanding and internation-

ally recognized contributions to our science, or in rare circumstances, provided notable service to the Society. Under exceptional circumstances, North Americans have been named Honorary Fellows. This amendment to the award bylaws was made in 1969 to recognize the Apollo II astronauts.

GSA Council encourages members to recommend geoscientists who qualify for this honor. In preparing a nomination, it is imperative that the original research and scientific advances of the candidate be stressed. The nominator should also verify all supporting data, especially degrees received, publications, positions held, and so forth.

## How to Nominate

To ensure thorough consideration by the respective committees, please follow these nomination instructions carefully; additional information supplied will not enhance the nomination. Paper submissions will still be accepted; however, we encourage electronic submission.

For each candidate, please submit the following:

1. **Nomination form**, online or on paper. Please go to <https://rock.geosociety.org/forms/Awardform.asp> for online submission or hardcopy download (to submit via post).
2. **Supporting documents** to be submitted as e-mail attachments or via post. Each award requires the submission of supporting documents. For these medals and for Honorary Fellowship, the following are required:
  - a brief biographical sketch, similar to those in *American Men and Women of Science* and *Who's Who in America*, and a **summary** (300 words or less) of the scientific contributions to geology that qualify the candidate for the award;
  - a **select** bibliography of no more than 20 titles. For the Donath Medal, only 10 titles are required; and
  - signed letters from each of five GSA Fellows or Members **in addition** to that of the person making the nomination. *For the Day Medal only*: letters from five scientists with at least three letters from GSA Fellows or Members, and up to two from fellows or members of the Mineralogical Society of America, Geochemical Society, or American Geophysical Union.

**All nominations must be received by GSA no later than 1 February 2008.**



# 2008 GSA Awards and Medals

## GSA Public Service Award

GSA Council established the GSA Public Service Award in honor of Eugene and Carolyn Shoemaker in 1998. This annual award recognizes contributions that have materially enhanced the public's understanding of the earth sciences or significantly served decision makers in the application of scientific and technical information in public affairs and public policy related to the earth sciences. This may be accomplished by individual achievement through the following:

- ▲ authorship of education materials of high scientific quality that have enjoyed widespread use and acclaim among educators or the general public;
- ▲ acclaimed presentations (books and other publications, mass and electronic media, or public presentations, including lectures) that have expanded public awareness of the earth sciences;
- ▲ authorship of technical publications that have significantly advanced scientific concepts or techniques applicable to the resolution of earth resource or environmental issues of public concern; and/or
- ▲ other individual accomplishments that have advanced the earth sciences in the public interest.

The award normally goes to a GSA Member, with exceptions approved by Council. As well, it may be presented posthumously to a descendant of the awardee.

### How to Nominate

Paper submissions will still be accepted; however, we encourage electronic submission.

1. **Nomination form**, online or on paper. Please go to <https://rock.geosociety.org/forms/Awardform.asp> for online submission or hardcopy download (to submit via post).
2. **Supporting documents** to be submitted as e-mail attachments or via post:
  - a letter of nomination (300 words or less);
  - a brief biographical sketch that clearly demonstrates the applicability of the selection criteria; and
  - a *select* bibliography of no more than 10 titles.

## GSA Distinguished Service Award

GSA Council established the GSA Distinguished Service Award in 1988 to recognize individuals for their exceptional service to the Society. GSA Members, Fellows, Associates, and employees may be nominated for consideration. Any GSA Member or employee may make a nomination for the award. The Executive Committee will select awardees, and GSA Council must ratify all selections. Awards may be made annually, or less frequently, at the discretion of Council. This award will be presented during the GSA Annual Meeting.

### How to Nominate

Paper submissions will still be accepted; however, we encourage electronic submission.

1. **Nomination form**, to be submitted online or on paper. Please go to <https://rock.geosociety.org/forms/Awardform.asp> for online submission or hardcopy download (to submit via post).
2. **Supporting documents** to be submitted as e-mail attachments or via post:
  - a letter of nomination summarizing the candidate's contributions to the Society (300 words or less); and
  - a brief biographical sketch that clearly demonstrates the applicability of the selection criterion noted above.

### Award Notes

Candidates whose names are submitted by the respective award committees to GSA Council but who do not receive an award will remain under consideration by those committees for three years. For those still under consideration, it is recommended that an updated nomination letter be sent to GSA.

All nomination forms and submission instructions are available on the GSA Web site at [www.geosociety.org/awards/](http://www.geosociety.org/awards/). A nomination form and instructions may also be obtained from Grants, Awards, and Recognition, +1-303-357-1028, [awards@geosociety.org](mailto:awards@geosociety.org).

**All nominations must be received by GSA no later than 1 February 2008.**



# 2008 GSA Awards and Medals

## Subaru Outstanding Woman in Science Award

Sponsored by Subaru of America, Inc.



The Subaru Outstanding Woman in Science Award was created to recognize a woman whose Ph.D. research has had a major impact on the geosciences. The generous support of Subaru of America Inc. in conjunction with the Doris M. Curtis Fund makes this award possible. Doris Curtis was GSA's 103rd president. Her popularity was widespread, and she pioneered many new directions for geology, not the least of which was her tenure as GSA president after an unbroken chain of 102 men. Causes dear to her were women, public awareness, minorities, and education. Candidates are eligible for the first three years following their degree.

### How to Nominate

Paper submissions will still be accepted; however, we encourage electronic submission.

1. **Nomination form**, online or on paper. Please go to <https://rock.geosociety.org/forms/Awardform.asp> for online submission or hardcopy download (to submit via post).
2. **Supporting documents** to be submitted as e-mail attachments or via post:
  - a nomination letter that clearly states how the candidate's Ph.D. research has significantly impacted the geosciences (300 words or less);
  - a brief biographical sketch that clearly demonstrates the applicability of the selection criteria;
  - a **select** bibliography of no more than 10 titles; and
  - dissertation title and abstract.

## GSA Fellowship

Fellowship is an honor that is bestowed annually upon the best of our profession at the spring GSA Council meeting. If you are a GSA Fellow, please review the following for updated instructions: A **GSA Fellow** may support only **two** nominees per election cycle and only **once** as a primary nominator. **GSA Members** who are not Fellows may not be primary nominators but may be secondary nominators for only **two** nominees per election cycle.

**The primary nominator must** collect the entire nomination packet (including letters of support) and submit it as one e-mail (with supporting documents as attachments) or as one package via post.

### How to Nominate

Paper submissions will still be accepted; however, we encourage electronic submission.

1. **Nomination form**, to be submitted online or on paper. Please go to <https://rock.geosociety.org/members/fellow.htm> for online submission or hardcopy download (to submit via post).
2. **Supporting documents** are required from the **primary nominator** and may be submitted as e-mail attachments or via post:
  - a letter of nomination (up to one page) including a summary of the nominee's significant contributions that clearly demonstrates the applicability of the selection criteria;
  - a curriculum vitae of the nominee; and
  - a statement (one paragraph) of the total number of the nominee's publications as well as a select bibliography (up to four pages).
3. A **supporting letter of nomination** must be submitted by *each* of the secondary nominators to the primary nominator, who will forward all paperwork to GSA in a single package or e-mail.

## AGI Medal in Memory of Ian Campbell

The AGI Medal in Memory of Ian Campbell recognizes singular performance in and contribution to the profession of geology. Candidates are measured against the distinguished career of Ian Campbell, whose service to the profession touched virtually every facet of the geosciences. Campbell was a most uncommon man of remarkable accomplishment and widespread influence. In his career as a geologist, educator, administrator, and public servant, he was noted for his candor and integrity. To submit a nomination, please go to [www.agiweb.org/direct/awards.html](http://www.agiweb.org/direct/awards.html).

**All nominations must be received by GSA no later than 1 February 2008.**





# John C. Frye Environmental Geology Award

**Nomination Deadline: 31 March 2008**

In cooperation with the Association of American State Geologists (AASG), GSA makes an annual award for the best paper on environmental geology published either by GSA or by one of the state geological surveys. This US\$1,000 cash prize is generated from the endowment income of the GSA Foundation's John C. Frye Memorial Fund.

## Criteria for Nomination

Anyone may submit a nomination following these criteria: (1) the paper must be a GSA or state geological survey publication; (2) the paper must be selected from those published during the preceding three full calendar years; (3) the nomination must include a paragraph stating the pertinence of the paper; and (4) the nomination must be sent to Grants, Awards, and Recognition, GSA, P.O. Box 9140, Boulder, CO 80301-9140, USA.

## Basis for Selection

Each nominated paper will be judged on its uniqueness or significance as a model of its type of work and report and

its overall worthiness for the award. In addition, nominated papers must establish an environmental problem or need, provide substantive information on the basic geology or geologic process pertinent to the problem, relate the geology to the problem or need, suggest solutions or provide appropriate land-use recommendations based on the geology, present the information in a manner that is understandable and directly usable by geologists, and address the environmental need or resolve the problem. It is preferred that the paper be directly applicable to informed laypersons (e.g., planners, engineers).

## 2007 Award Recipients Named

The 2007 John C. Frye Environmental Geology Award will be presented at the 2007 GSA Annual Meeting in Denver to David K. Brezinski, for *Stratigraphy of the Frederick Valley and its relationship to karst development*, 2004, Maryland Geological Survey, Report of Investigation 75.

## National Awards for 2008

**Deadline: 1 February 2008**

Nominations are now solicited for the 2008 national awards described below. GSA Members are invited to nominate colleagues by sending background information and vitae, specifying the award for which the candidate is being submitted, to Grants, Awards, and Recognition, GSA, P.O. Box 9140, Boulder, CO 80301-9140, USA, +1-303-357-1028, fax +1-303-357-1070, awards@geosociety.org **by 1 February 2008**. On behalf of its member societies, the American Geological Institute (AGI) coordinates the nomination process. The AGI Member Society Council will finalize a roster of candidates for nomination at its spring 2008 meeting and submit these names to the respective national award sponsor offices.

The annual **William T. Pecora Award**, sponsored jointly by the National Aeronautics and Space Administration and the U.S. Department of the Interior, recognizes outstanding individual or group contributions toward the understanding of Earth by means of remote sensing. The award recognizes the contributions of those in the scientific and technical community as well as those involved in the practical application of remote sensing. Consideration will be given to sustained or single contributions of major importance to the art or science of understanding Earth through observations made from space.

The president of the United States awards the **National Medal of Science** to individuals "deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, engineering, or social and behavioral sciences." Many younger American

scientists and engineers are now reaching a point at which their contributions merit recognition. The committee is giving increasing attention to these individuals as well as to the work of outstanding women and minority scientists.

The **Vannevar Bush Award** is presented periodically to a person who, through public service activities in science and technology, has made an outstanding contribution toward the welfare of mankind and the nation. The award is given to a senior statesman of science and technology and complements the National Science Foundation's Alan T. Waterman Award, which is given to a promising young scientist. The two awards are designed to encourage individuals to seek the highest levels of achievement in science, engineering, and service to humanity. Nominations for this award should be accompanied by a complete biography and a brief citation summarizing the nominee's scientific or technological contributions to our national welfare in promotion of the progress of science.

The **Alan T. Waterman Award** is presented annually by the National Science Foundation (NSF) and National Science Board to an outstanding young researcher in any NSF-supported field of science or engineering. Candidates must be U.S. citizens or permanent residents and must be 35 years of age or younger or not more than five years beyond receipt of the Ph.D. degree by 31 December of the year in which they are nominated. Candidates should have completed sufficient scientific or engineering research to have demonstrated, through personal accomplishments, outstanding capability and exceptional promise for significant future achievement.

## 2008 Birdsall-Dreiss Distinguished Lecturer: Larry McKay

**Larry McKay** is Jones Professor of Hydrogeology in the Dept. of Earth and Planetary Sciences at the University of Tennessee. McKay received a bachelor's degree in 1981 in geological engineering from the University of British Columbia and a Ph.D. in earth sciences at the University of Waterloo in 1992. He's been a faculty member at the University of Tennessee since 1993, and his main areas of research are groundwater flow and contaminant transport in fractured clays, as well as transport of pathogens and fecal indicators in streams and groundwater. McKay has prepared three lectures for presentation at the request of interested institutions.

To request a visit to your institution, contact McKay by e-mail at [lmckay@utk.edu](mailto:lmckay@utk.edu) by **30 November 2007**; additional information will be posted on McKay's Web site, <http://web.utk.edu/~hydro>. This lecture tour is sponsored by the GSA Hydrogeology Division, which is especially interested in including liberal arts colleges in the itinerary. The Chattanooga Creek lecture, therefore, is aimed at multidisciplinary undergraduate audiences. GSA and the University of Tennessee will pay travel expenses, and the host institution will provide local accommodation and meals.

### LECTURE TOPICS

#### ***Cracks in the Clay: The Role of Fractures and Macropores in Critical Zone Hydrology***

Fine-grained geologic deposits often contain extensive networks of fractures, root holes, and other macropores that can strongly influence groundwater flow and contaminant transport. The extent and depth of these features vary greatly according to the origin and geologic and pedologic history of the material. Recent research in weathered clay-rich residuum developed on sedimentary rocks in east Tennessee shows evidence of fractures and fracture-induced flow to depths of up to 40 m. Fractures and macropores can also act as pathways for transport of contaminants to underlying aquifers. Solutes are transported by advection along the fractures and/or macropores but can also be strongly attenuated by diffusion into the fine pore structure. In contrast, mineral colloids and microorganisms are largely size-excluded from the fine pore structure and hence can travel at much faster rates than solutes. Immiscible phase liquids, such as industrial solvents or coal tar, can enter some fractures or macropores, even in relatively low hydraulic conductivity materials, and can lead to extensive contamination. These immiscible liquids dissolve and diffuse into the fine pore structure, where they can act as long-term sources of contamination to adjoining streams or underlying aquifers.

#### ***Germs and Geology: Emerging Issues in Waterborne Pathogen Research***

This lecture addresses how recent hydrological research and development of new analytical methods in molecular microbiology can combine to change how we detect, monitor, and

predict human exposure to waterborne pathogens. Much of our understanding of waterborne pathogen occurrence and transport is based on conceptual models and investigative methods that have changed little in the past 30–50 years. Investigations at the University of Tennessee and many other institutions challenge the existing paradigms. For example, a study of community water supply wells in karst aquifers in east Tennessee indicates that enteric viruses are common and can occur even in wells that don't exhibit other indicators of fecal contamination. Other studies show that very rapid transport of bacteria and viruses can occur in fractured clay-rich sediments and in partially saturated soils, both of which are settings where slow transport of pathogens is usually expected. There is a great need for additional field-based studies of pathogen occurrence and transport, as well as better collaboration between hydrologists, microbiologists, and the public health community. Development of new microbial assays, including those based on the DNA or RNA of the microorganisms, are providing hydrological researchers with improved tools to help carry out this research.



Larry McKay

#### ***Chattanooga Creek: How 30,000 Tons of Coal Tar Brought Together Scientists, Social Workers, and a Community***

Chattanooga Creek flows through a mixture of low-income urban neighborhoods, commercial developments, and old industrial sites. One of the largest contaminant sources in the area is a former manufactured gas/coke plant, which is typical of many such sites found across the United States. Studies at the plant site and in laboratory experiments show that coal tar and dissolved tar compounds can readily penetrate fractures and macropores in the fine-grained soils. However, contamination is also widespread in the creek, and in response to community concerns we shifted our research to focus on the transport and persistence of coal tar compounds in the streambed and floodplain, as well as investigations of the residual contamination that remains after typical excavation-based cleanup measures. The point of this scenario is that successfully dealing with environmental problems often requires collaboration between a variety of different groups, including local residents, community activists, scientific researchers, and regulatory agencies. *This talk is especially suitable for undergraduate institutions or programs.*

**Deadline for lecture requests: 30 November 2007**



## 2008 Jahns Distinguished Lecturer: John Clague



John Clague

The Association of Engineering Geologists and the Engineering Geology Division of the Geological Society of America jointly established the Richard H. Jahns Distinguished Lectureship in 1988 to commemorate Jahns and to promote student awareness of engineering geology through a series of lectures offered at various locations around the country throughout the year. Richard H. Jahns (1915–1983) was an engineering geologist who had a diverse and distinguished career in academia, consulting, and government.

This year's distinguished lecturer, **John Clague**, received an A.B. degree from Occidental College in 1967, an M.A. in geology from the University of California at Berkeley in 1969, and a Ph.D. in geology from the University of British Columbia in 1973. He was a research scientist for the Geological Survey of Canada from 1974 to 1998, when he accepted an academic appointment at Simon Fraser University (SFU) in Burnaby, British Columbia. Clague is currently professor and Canada Research Chair in Natural Hazard Research at SFU and director of SFU's Centre for Natural Hazard Research. He is a Fellow of the Royal Society of Canada, past-president of the International Union for Quaternary Research (INQUA), and a former president of the Geological Association of Canada. Clague has received several professional awards, including the Logan and E.R.W. Neale medals of the Geological Association of Canada, the Bancroft Award of the Royal Society of Canada, and the Burwell Award of the GSA Engineering Geology Division. He has been a member of the Geological Society of America since 1970.

Clague and his graduate students conduct research on earthquakes, tsunamis, landslides, floods, and other hazardous earth processes, both in Canada and abroad. They also have been studying the impacts of climate change on glaciers, vegetation, and geomorphic processes in the high mountains of British Columbia, Yukon Territory, and Alaska. Clague is author or co-author of over 250 journal papers in 40 different journals, as well as a textbook on natural hazards, published in 2006. He has also written two successful books on societally relevant geoscience issues in the Pacific Northwest. Clague's other main professional interest is earth science education. He is a past president of the Canadian Geoscience Education Network and regularly gives

public lectures and media interviews on geoscience issues, as well as leading field trips with these issues in mind.

The titles of Clague's four 2008 Jahns lectures are (1) "Tsunamis—Stealth Killers," (2) "Earthquake Hazards and Risk in the Pacific Northwest," (3) "The Formation and Failure of Natural Dams," and (4) "The Last Great Ice Sheet in Western Canada." **Requests for lectures on these topics should be directed to John Clague at [jclague@sfu.ca](mailto:jclague@sfu.ca).**

### CALL FOR APPLICATIONS

#### 2008–2009 GSA–USGS Congressional Science Fellowship

**Work directly with national leaders, and bring your experience and expertise to bear on science and technology policy on Capitol Hill.**

Opportunities to work as a Congressional Science Fellow are rare, and selection for this unique position will be based on applications from top competitors in the geoscience community. Prospective candidates should be GSA Members with a broad geoscience background and excellent written and oral communication skills. Minimum requirements are a master's degree with at least five years of professional experience or a Ph.D. at time of appointment. The fellowship is open only to U.S. citizens or permanent U.S. residents. The next Geological Society of America–U.S. Geological Survey Congressional Science Fellow will be selected in early 2008.

Put your academic and professional background, experience applying scientific knowledge to societal challenges, and passion for shaping the future of the geoscience profession to work in this coveted arena: Apply today!

Find application information at **[www.geosociety.org/csf/](http://www.geosociety.org/csf/)** or contact Ginger Williams, +1-303-357-1040, [gwilliams@geosociety.org](mailto:gwilliams@geosociety.org). **Deadline for application: 1 February 2008.**





# DRAFT: Position Statement on Government's Role in Energy and Mineral Resources

The Geological Society of America (GSA) supports using scientific knowledge as an essential component in making decisions regarding finite energy and mineral resources. To provide that knowledge, GSA further supports broadly based public funding for education, research, and stewardship regarding energy and mineral resources. GSA also supports the use of technologies leading to increased use of renewable energy resources, recycling, and resource substitution.

## IMPLEMENTATION

**GSA encourages** knowledgeable geoscientists to communicate with decision makers regarding:

- the potential for resource development,
- potential environmental impacts,
- stewardship of public lands, and
- public support of education and research.

**GSA recommends** that scientists rely upon peer-reviewed research based on the scientific method when communicating with decision makers.

**GSA recommends** that geology and the importance of energy and mineral resources to society be part of public education, including K–12 curricula. Elements of the National Science Education Standards published by the National Academy of Sciences should be included in state- and local-level standards for education.

**GSA recommends** that all universities offer earth-science education, including knowledge about energy and mineral resources and the environmental impacts of resource extraction. GSA further supports the need for:

- programs in resources (petroleum geology and economic geology and complementary engineering, natural science, and social science disciplines) at a sufficient number of universities to meet the demands for professionals in the field (in industry, universities, and governmental research and regulatory organizations); and
- programs that analyze life-cycle impacts of resource use, including increased use of renewable resources, recycling, and substitution.

**GSA broadly supports** government funding for research in the interest of the public. Specific to this position statement, GSA supports government funding at multiple levels, through federal, tribal, and state or provincial agencies, and through government-supported universities, for:

- mineral- and energy-resource assessments,
- preservation of physical samples and data on these resources, and
- research on resources of the future.

**Within the United States, GSA supports** adequately funding energy- and mineral-resource programs within the relevant federal agencies, including the Departments of Agriculture, Defense, Energy, Health and Human Services, Interior, and Labor, and the Environmental Protection Agency. Such programs are essential for sound energy, mineral, and environmental policy decisions, national security, and a vibrant economy.

**GSA encourages** government funding and incentives for the development of renewable sources of energy, improvements in the efficiency of energy use, and increased recycling of products that incorporate mineral resources.

**When consistent with this position statement and implementation plan,** the GSA president will write letters of support for funding of appropriate governmental agencies and programs and for appropriate educational programs. As appropriate, GSA may choose to join other scientific and professional organizations in supporting specific initiatives and programs. Members of GSA may reference this position statement and implementation plan in their individual efforts in support of wise decision making.

## SEND US YOUR COMMENTS

The GSA Panel on Energy and Mineral Resources, operating under the auspices of the Geology and Public Policy Committee, requests comments and suggestions from GSA Members, Sections, Associated and Allied Societies, and other interested parties, on this draft GSA Position Statement on Government's Role in Energy and Mineral Resources. **Please send your comments and suggestions to Jon Price at [jprice@unr.edu](mailto:jprice@unr.edu), preferably by 25 October 2007.**

## Call for Geological Papers



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## SECTION MEETINGS

Cordilleran–Rocky Mountain, 19–21 March  
Northeastern, 27–29 March  
South-Central, 30 March–1 April  
Southeastern, 10–11 April  
North-Central, 24–25 April

Submit your abstracts online at  
[www.geosociety.org/meetings](http://www.geosociety.org/meetings).

## 2007 GSA Annual Meeting

# NOTICE of Council Meetings

Hyatt Regency Denver  
at Colorado Convention Center, Quartz AB  
Sat., 27 Oct., 1p.m. • Wed., 31 Oct., 8 a.m.

These meetings are open to GSA Fellows, Members, and Associates, who may attend as observers; only councilors and officers may speak to agenda items, except by invitation of the chair.



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## 2008 Section Meeting Mentor Program Calendar



*The following Mentor Programs are sponsored by the GSA Foundation.*

### CORDILLERAN-ROCKY MOUNTAIN JOINT MEETING

Shlemon Mentor Program Luncheons: Thurs.-Fri.,  
20-21 March, 11:30 a.m.-1:00 p.m.

Mann Mentors in Applied Hydrogeology Program:  
Thurs., 20 March, 5-6:30 p.m.

### NORTHEASTERN

Shlemon Mentor Program Luncheons: Thurs.-Fri.,  
27-28 March, 11:30 a.m.-1:00 p.m.

Mann Mentors in Applied Hydrogeology Program:  
Thurs. 27 March, 5-6:30 p.m.

### SOUTH-CENTRAL

Shlemon Mentor Program Luncheons: Mon.-Tues.,  
31-1 April, 11:30 a.m.-1:00 p.m.

Mann Mentors in Applied Hydrogeology Program:  
Mon., 31 March, 5-6:30 p.m.

### SOUTHEASTERN

Shlemon Mentor Program Luncheons: Thurs.-Fri.,  
10-11 April, 11:30 a.m.-1:00 p.m.

Mann Mentors in Applied Hydrogeology Program:  
Thurs., 10 April, 5-6:30 p.m.

### NORTH-CENTRAL

Shlemon Mentor Program Luncheons: Thurs.-Fri.,  
24-25 April, 11:30 a.m.-1:00 p.m.

Mann Mentors in Applied Hydrogeology Program:  
Thurs., 24 April, 5-6:30 p.m.

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# 9th annual

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**Room 608**

**Colorado Convention Center**

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## SOUTHEASTERN

57th Annual Meeting  
Charlotte, North Carolina, USA

10–11 April 2008



True-color Moderate Resolution Imaging Spectroradiometer (MODIS) image taken 9 June 2002. Credit: Jacques Descloitres, MODIS Land Rapid Response Team, National Aeronautics and Space Administration–Goddard Space Flight Center, [http://visibleearth.nasa.gov/view\\_rec.php?id=3164](http://visibleearth.nasa.gov/view_rec.php?id=3164) (Accessed 10 Aug. 2007). Image modified to highlight the Carolina Coast.

### INFORMATION

Details on field trips, workshops, student opportunities, the guest program, and symposia and theme sessions are listed at [www.geosociety.org/meetings](http://www.geosociety.org/meetings). If you have questions or special requirements, please contact local committee chair, Andy R. Bobyarchick, [arbobyar@uncc.edu](mailto:arbobyar@uncc.edu), Dept. of Geography and Earth Sciences, University of North Carolina, Charlotte, NC 28223, USA, +1-704-687-5998; or technical program chair, John Diemer, [jadiemer@uncc.edu](mailto:jadiemer@uncc.edu), +1-704-687-5994.

### CALL FOR PAPERS

**Abstract deadline:** 15 January 2008

Please submit your abstract online at [www.geosociety.org/meetings/](http://www.geosociety.org/meetings/); the abstract submission fee is US\$10. Contact Nancy Carlson, +1-303-357-1061, [ncarlson@geosociety.org](mailto:ncarlson@geosociety.org), if you have any problems with the electronic abstract submission process.

### Technical Sessions

If you would like to propose additional symposia or theme sessions, please contact the technical program chair, John Diemer, at [jadiemer@uncc.edu](mailto:jadiemer@uncc.edu).

### Symposia

1. **Symposium in Honor of Conrad Neumann.** Tony Rodriguez, University of North Carolina Institute of Marine Sciences, [abrodrig@email.unc.edu](mailto:abrodrig@email.unc.edu).
2. **Symposium in Honor of Stephen G. Conrad, State Geologist of North Carolina 1964–1990.** Kenneth Taylor, North Carolina Geological Survey, [kenneth.b.taylor@ncmail.net](mailto:kenneth.b.taylor@ncmail.net).
3. **Cenozoic and Echinoderm Paleontology of the Southeastern United States: Symposium in Honor of Craig Oyen.** Cosponsored by *Paleontological Society*. Michael L. McKinney, University of Tennessee–Knoxville, [mmckinne@utk.edu](mailto:mmckinne@utk.edu); Douglas S. Jones, Florida Museum of Natural History.

### Theme Sessions

1. **Natural Contaminants in the Southeastern United States.** Avner Vengosh and David Vinson, Duke University; Rick Bolich and Andrew Pitner, North Carolina Division of Water Quality.
2. **Metamorphic and Tectonic Chemical and Isotopic Geochronology of the Blue Ridge and Southern Appalachian Environs.** Clayton Loehn and Bob Tracy, Virginia Polytechnic Institute and State University (Virginia Tech).
3. **Undergraduate Research Session (Posters).** Cosponsored by *Council on Undergraduate Research*. Brannon Andersen, Furman University; Jeff Ryan, University of South Florida–Tampa.
4. **Geologic Maps (Posters).** Mike Higgins and Ralph Crawford, Geological Mapping Institute; Scott Southworth, U.S. Geological Survey.

### FIELD TRIPS

Go to [www.geosociety.org/meetings/](http://www.geosociety.org/meetings/) for a list of field trips already scheduled. Anyone interested in proposing other field trips should contact field trip chair Missy Eppes at [mceppes@uncc.edu](mailto:mceppes@uncc.edu).

### REGISTRATION

**Online registration begins** January 2008

**Early registration deadline:** 10 March 2008

**Cancellation deadline:** 17 March 2008

### ACCOMMODATIONS

**Hotel registration deadline:** 14 March 2008

A block of rooms has been reserved at the Hilton Charlotte University Place, 8629 J.M. Keynes Drive, Charlotte, North Carolina 28262, USA, for US\$129 + tax per night single occupancy. Please call the Hilton Charlotte University Place reservation line, +1-704-547-7444, and request a reservation under “SE GSA 2008.” You can also make reservations via Web link at <http://tinyurl.com/yq9fns>.



# NORTH-CENTRAL

42nd Annual Meeting  
Evansville, Indiana, USA

24–25 April 2008

University of Southern Indiana, Room SC2216, 8600 University Blvd., Evansville, IN 47712, USA, +1-812-465-7132; or technical program chair, James M. Durbin, +1-812-465-1208, [jdurbin@usi.edu](mailto:jdurbin@usi.edu).



The arrival of WWII vessel USS LST325, which saw duty on the D-Day invasion of Normandy, for permanent docking on the Ohio River at Evansville. Photo by Paul Doss.

## LOCATION

Evansville, Indiana, USA, is bounded to the south by the Ohio River and is home to the largest old-growth forest in any city in the United States, Wesselman Woods, with ~200 acres of virgin hardwood forest. Just east of Evansville, on the rich bottom lands of the Ohio River, is Angel Mounds State Historic Site, which was occupied from A.D. 1100 to A.D. 1450 by people of the Middle Mississippian culture. An hour to the east and west of Evansville, respectively, are the rugged hills of Hoosier National Forest and Shawnee National Forest; a few hours south is Mammoth Cave National Park.

New Harmony, Indiana, which was the hub of frontier geology for the “Northwest Territories” during the early to mid-1800s, is about 26 miles from Evansville. New Harmony first-citizen David Dale Owen headed two federal geological surveys into Wisconsin, Iowa, and Minnesota and served as state geologist for Indiana, Kentucky, and Arkansas. In 1841, Charles Lyell, the “founder of modern geology,” visited North America and insisted on a trip to New Harmony. We hope you take advantage of the opportunities we have designed to visit the labs there and to examine the same outcrops described nearly 200 years ago.

## INFORMATION

Details on field trips, workshops, student opportunities, the guest program, and symposia and theme sessions are listed at [www.geosociety.org/meetings/](http://www.geosociety.org/meetings/). If you have questions or special requirements, please contact local committee chair, Paul K. Doss, [pdoss@usi.edu](mailto:pdoss@usi.edu), Dept. of Geology and Physics,

## CALL FOR PAPERS

**Abstract deadline:** 29 January 2008

Please submit your abstract online at [www.geosociety.org/meetings](http://www.geosociety.org/meetings); the abstract submission fee is US\$10. Contact Nancy Carlson, +1-303-357-1061, [ncarlson@geosociety.org](mailto:ncarlson@geosociety.org), if you have any problems with abstract submission.

## Technical Sessions

**Deadline for new session proposals:** 19 October 2007

If you are interested in proposing additional symposia or theme sessions, contact the technical program chair, James M. Durbin, at [jdurbin@usi.edu](mailto:jdurbin@usi.edu).

## Symposia

- 1. Living in Ruhe’s Shadow with Loess, Paleosols, and Tills: A Session in Honor of Bob Hall’s Contributions to Quaternary Science.** John P. Szabo, [jpszabo@uakron.edu](mailto:jpszabo@uakron.edu); Timothy G. Fisher, [tfisher4@utnet.utoledo.edu](mailto:tfisher4@utnet.utoledo.edu).
- 2. Applications of Optical Dating in the Midcontinent.** Ronald J. Goble, [goble@unlnotes.unl.edu](mailto:goble@unlnotes.unl.edu); Kenneth Lepper, [ken.lepper@ndsu.nodak.edu](mailto:ken.lepper@ndsu.nodak.edu).
- 3. New Approaches and Initiatives in Paleozoic High-Resolution Stratigraphy: A Session Commemorating 15 Years of Views from the Craton and Beyond.** Patrick McLaughlin, [pimclaughlin@wisc.edu](mailto:pimclaughlin@wisc.edu); Brad Cramer, [bcramer70@osu.edu](mailto:bcramer70@osu.edu); Mark Kleffner, [kleffner.1@osu.edu](mailto:kleffner.1@osu.edu).
- 4. Water Availability and Use in the Great Lakes Basin.** E. Randall Bayless, [ebayless@usgs.gov](mailto:ebayless@usgs.gov).

## Theme Sessions

- 1. Volatiles in Magmas: From Source to Surface.** Jim Walker, [t60jaw1@wpo.cso.niu.edu](mailto:t60jaw1@wpo.cso.niu.edu); Jim Brophy, [brophy@indiana.edu](mailto:brophy@indiana.edu).

2. **A Surface Water Sojourn.** David Grow, dave\_grow@bellsouth.net.
3. **Recycled and Industrial Byproduct Materials as Aggregate in Construction.** Nancy Whiting, nancy.whiting@dot.state.mn.us.
4. **We Have National Parks Too! Earth and Environmental Science Research and Teaching in National Lands of the Midcontinent and the Eastern United States.** Paul K. Doss, pdoss@usi.edu.
5. **The Legacy of New Harmony, and Other Topics in the History of Science and Technology in North America.** Cosponsored by *GSA History of Geology Division*. Julie R. Newell, jnewell@spsu.edu; Joe Hannibal, hannibal@cmnh.org.
6. **Innovative Applications of Isotope Geochemistry in Environmental Geology.** Eugene Perry, Jr., t60ecp1@wpo.cso.niu.edu; Liliana Lefticariu, lefticariu@geo.siu.edu.
7. **Neotectonics of the Central United States.** Roy Van Arsdale, rvanrsdl@memphis.edu; Edward Woolery, woolery@uky.edu.
8. **Inquiry-Based, Hands-On, Class and Lab Demonstrations.** Cosponsored by *National Association of Geoscience Teachers—Central Section*. Mark Francek, mark.francek@cmich.edu.
9. **Partnerships for Geology Education with Quarries, Museums, and Geology Parks.** Alan Goldstein, agoldstein@dnr.in.gov.
10. **Geophysical Applications in Midwestern Geoarchaeology.** Harvey Henson, Jr., henson@geo.siu.edu.
11. **Program Development and Assessment—Step 1: Identifying Learning Objectives.** Cosponsored by *National Association of Geoscience Teachers—Central Section*. Annabelle Foos, afoos@uakron.edu.
12. **Coal for the 21st Century: New Science for New Applications.** Maria Mastalerz, Indiana Geological Survey, mmastale@indiana.edu; John A. Rupp, Indiana Geological Survey, rupp@indiana.edu.
13. **Carbon Dioxide Sequestration.** Matthew Belobraydic, matthew.belobraydic@und.edu.
14. **Biocomplexity in the Ohio River Watershed.** Ozeas S. Costa, Jr., costa.47@osu.edu.
15. **GIS Mapping Applications in Geology.** Kenneth Kuehn, kenneth.kuehn@wku.edu; Joe Islas.
16. **Late Neogene Continental Ecosystems of North America.** James O. Farlow, farlow@ipfw.edu.
17. **Petroleum Geology of Eastern North America.** Beverly Seyler, seyler@isgs.uiuc.edu.
18. **Initiating a Dialogue on Dealing with Resistance to Teaching the Geologic Time Scale and Fossil Record.** Cosponsored by *National Association of Geoscience Teachers—Central Section*. Sadredin C. Moosavi, smoosavi@tulane.edu; Kurt A. Shoemaker, kshoemaker@shawnee.edu; Helen Greer, greerp@sigeconet.net.
19. **Conodont Biostratigraphy and Correlation of Paleozoic–Early Mesozoic Records of Environmental Change.** Cosponsored by *Pander Society*. Jed Day, jeday@ilstu.edu.
20. **Paleozoic–Mesozoic Regional and Global Environmental Change.** Cosponsored by *Society for Sedimentary Geology (SEPM)—Great Lakes Section*. Jed Day, jeday@ilstu.edu.
21. **Undergraduate Research Posters.** Cosponsored by *Council for Undergraduate Research*. Bob Shuster, rshuster@mail.unomaha.edu; Ed Hansen; Jeanette Pope.

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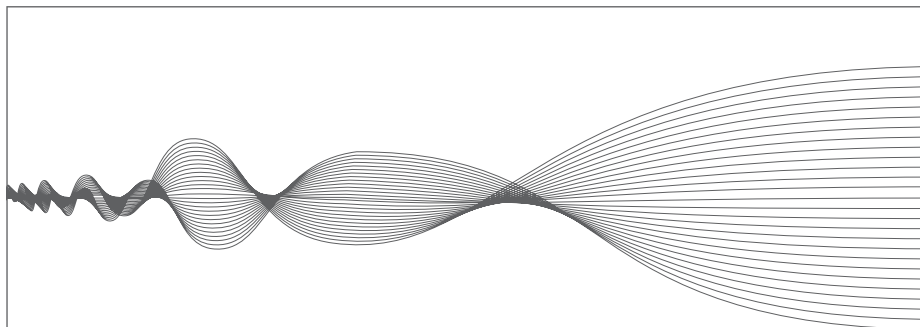
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# ROCK STARS .....

## Robert M. Garrels (1916–1988): Pioneer of Modern-Day Sedimentary Geochemistry and Geochemical Cycling

*Fred T. Mackenzie, Department of Oceanography, School of Ocean and Earth Science and Technology, University of Hawaii, Honolulu, Hawaii 96822, USA*

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### SUMMARY

Bob Garrels spent his formative years in the mountainous southwestern part of Saltville, Virginia, USA, passing most of his time outdoors, hunting, exploring, and swimming. This probably laid the foundation for Bob's selection of a scientific career involving the outdoors.

Except for a brief stint (1952–1955) with the U.S. Geological Survey, Garrels' entire 47-year career was as a researcher and teacher in academia. During his career, Garrels was among a handful of persons who truly altered the field of geochemistry and earth science in general, particularly in the disciplines of sedimentary geochemistry and geochemical cycling.

### THE EARLY YEARS

Robert Minard Garrels, the son of John C. Garrels and Margaret Ann Gibney, was born in Detroit, Michigan, USA, on 24 August 1916. His father was a chemical engineering graduate of the University of Michigan, where he excelled in track and field and football. His athletic accomplishments were passed on to his children, and Bob became highly proficient in tennis. He habitually frustrated opponents by lobbing one "where they ain't."

Bob's mother enrolled him in piano lessons at the age of three. He had a natural talent for the piano and continued to play into his college days and thereafter. Although I thought he was a great rag-time player, one of his music teachers told him, "Bob, you play loud and fast, but don't try to make it a profession!"

In 1923, the Garrels' family moved to Saltville, Virginia. Bob's father was an assistant plant manager at a soda ash plant that used local salt and limestone as raw materials. The rural setting in which Bob lived was idyllic for free exploration and the initial development of Garrels' congenial character and warmth. The influence on his career choice by these years in Saltville is clear. In his unpublished autobiography, Garrels wrote:

There were three factors, I think, that pushed me toward a scientific career. First, of course, my father's interest; second, the richness of the area (southwestern Virginia) in natural lore. The rocks of the hills surrounding the town contain abundant Paleozoic fossils. The third factor was the presence of James Moore, a bachelor who was a first-rate amateur astronomer, and who delighted in teaching me and my friends about the universe.



Robert M. Garrels

When Bob was 12, the Garrels family moved to Grosse Ile, Michigan, USA. Grosse Ile then was sparsely populated and Bob continued to flourish in this rural setting with forests and plenty of space for exploration. In high school, he excelled in mathematics and chemistry, continued to be an avid reader, and maintained his interest in athletics. One of his enjoyments was sailing on the Detroit River with his brother, John.

### COLLEGE

Garrels entered the School of Liberal Arts at the University of Michigan in 1933. He studied chemistry, geology, and German. His original intention was to become a chemist like his father, or a novelist. However, because of a bad chemistry teacher (he actually failed physical chemistry!) Garrels instead majored in geology.

In 1937, Garrels earned a B.S. with honors from the University of Michigan. Because of the Great Depression, he went straight to work with the Michigan Geological Survey. Garrels soon found, however, that he could attend graduate school with a scholarship at a pay level only slightly less than what he was making at the Michigan Geological Survey. So, in 1937, he enrolled in Northwestern University's department of geology. In his own words:

I entered the Graduate School at Northwestern University, only because they needed a teaching assistant at \$50 per month and the best job (at the Michigan Geological Survey) I could find paid \$75. The Department of Geology at Northwestern was small but excellent; my fellow graduate students were compatible, competitive, and capable. I soon ran out of geology courses, and took chemistry courses to fill in my program; to my amazement I found them fascinating and useful.

On his first day at Northwestern, Garrels met John T. Stark, chair of the department of geology. He described his first meeting with Professor Stark:

I walked into the chairman's office and was invited to sit down. The chairman stretched out his hand, which was full of pebbles, and asked me to identify them. I said they looked like stream pebbles to me, and Jack remarked, "Not bad," as he popped one of those candy pebbles into his mouth.

Jack Stark became a close friend and had a tremendous influence on Garrels. Stark's teaching method was that of devil's advocate, and Garrels adopted and employed this method in his own career with great relish.

C.H. Behre Jr. was the chair of Garrels' M.S. thesis committee at Northwestern. Garrels received his M.S. in 1939 for work on iron ores of Newfoundland, and in 1941, he received his Ph.D., primarily for his laboratory work employing electrochemical techniques to study complex ion formation between lead and chloride ions in aqueous solution. This was the beginning of his lifelong interest in natural aqueous solutions and the use of Eh-pH diagrams in interpreting their history and evolution.

## CAREER HIGHLIGHTS

Garrels stayed at Northwestern as a replacement for Charles Behre and worked with a distinguished faculty, including Larry Sloss, Bill Krumbein, Ed Dapples, and Art Howland. In 1944, he joined a team of scientists working with the military geology unit of the U.S. Geological Survey (USGS). He was based in Hawaii with the Corps of Engineers' beach erosion board, studying maps and photographs for the planned invasion of Japan.

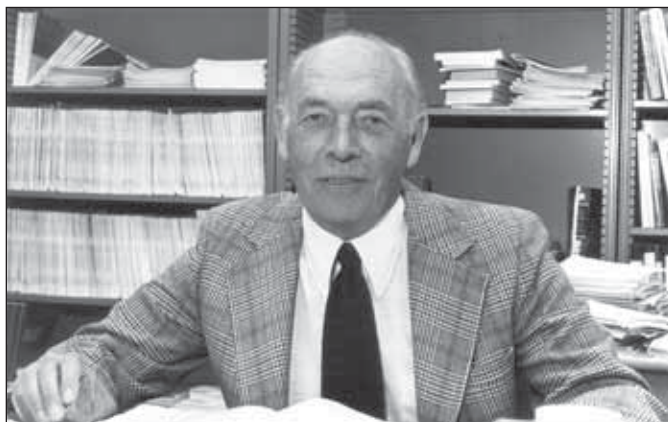
After the war, in 1945, Garrels returned to Northwestern and remained until 1952. At Northwestern, he produced the first of several books, *A Textbook of Geology*, an undergraduate text far ahead of its time because of a heavy dose of physics and chemistry and innovative thought.

In 1952, Garrels joined the USGS as head of the solid state group, geochemistry and petrology branch. He did not remain there long because the personnel-related duties were not to his liking. Thus, in 1955, he accepted the position of associate professor of geology at Harvard and in 1957 was promoted to professor. At Harvard, Garrels' research talents flourished and he attracted an excellent group of graduate students. His laboratory was a hub of intellectual activity with individuals like Paul Hosteler, Owen Bricker, and Don Langmuir doing Eh-pH experiments in mineral-aqueous solutions; Hal Helgeson and Al Truesdell doing theoretical calculations; Bruce Hanshaw studying the flow of water through clay packs; and M. Sato, along with Garrels' laboratory assistant, Mary Thompson, making electrodes out of such materials as sulfide minerals. Bob Berner, presently a professor at Yale University, feels himself

fortunate to have been trained by Garrels in the theoretical and experimental aspects of geochemistry, which at that time were not commonly taught elsewhere.

Garrels published a book in 1960 titled *Mineral Equilibria at Low Temperatures and Pressure*, which changed completely the field of low-temperature geochemistry. This book and its successor, *Solutions, Minerals, and Equilibria* (1965), co-authored with long-time friend, Charles L. Christ, were ahead of the field and the first of their kind to demonstrate to earth scientists how to rigorously apply chemical thermodynamics, particularly in the form of Eh-pH diagrams, to the solution of geochemical and geological problems involving minerals and aqueous solutions. Garrels also wrote several classic papers while at Harvard. One of these, "A Chemical Model for Sea Water at 25 °C and One Atmosphere Total Pressure" (1960, with co-author Mary Thompson), attests to Garrels' diverse interests in the natural sciences. This paper was a *tour de force* in chemical oceanography but encountered resistance from the ocean-scientist community and was turned down three times before being published.

Garrels chaired the geology department at Harvard from 1963 to 1965, but because of his continuous dislike for administrative duties returned to Northwestern in 1965. Hal Helgeson and



Robert M. Garrels

Fred Mackenzie joined Garrels on the Northwestern faculty at about the same time. The early 1960s also saw the beginning of Garrels' association with the Bermuda Biological Station for Research (now the Bermuda Institute of Ocean Sciences), at which Fred Mackenzie was then staff geochemist. Garrels spent many summers at the station writing and conducting research with several colleagues, including his close friend, Roland Wollast. This intellectual setting not only led

to a great deal of scientific output but also to the formation of the Bermuda Biological Station Athletic Club (BBSAC), with Garrels as president. This unusual organization sponsored athletic events at the station for students, staff, and scientists. It also had a strong code of ethics, which included rules for how many gin and tonics one might be entitled to for swimming 200 yards between a raft and the research vessel *Panuliris*.

In 1969, Garrels left Evanston for the Scripps Institution of Oceanography, and in 1972 he became the Captain James Cook Professor of Oceanography at the University of Hawaii. In 1974, he once more returned to Northwestern, leaving there in 1980 to join the faculty in the department of marine science at the University of South Florida, where he held the St. Petersburg Endowed Chair of Marine Science until the time of his death in 1988.

During all these moves, Garrels continued to produce a number of innovative and insightful papers and books and was largely responsible (with Bryan Gregor) for the GSA symposium on geochemical cycles that ran for 11 years. The 1971 book *Evolution of Sedimentary Rocks* (with co-author Fred



Mackenzie) had a major influence on scientists interested in the chemical recycling of sediments. During this time, Garrels also wrote two books with his second wife, Cynthia Garrels (Hunt): *Water: the Web of Life* (1972) and *Chemical Cycles and the Global Environment* (1975, with a third co-author, Fred Mackenzie). The latter book was one of the first in geochemistry to demonstrate the strong influence of human activities, including fossil-fuel burning, on the natural biogeochemical cycles of life-essential elements such as carbon. Garrels' final book, written shortly before his death, was a compilation of thermodynamic data for minerals at low temperature (1987, with co-author Teri Woods). Important papers, usually written with friends and co-authors, dealt with topics such as irreversible reactions in geochemical processes; the diffusion coefficient of silica; the concept of reverse weathering; carbon, sulfur, and oxygen cycling through geologic time; the BLAG model of the carbonate-silicate cycle; and modeling oxygen in the global sedimentary redox cycle.

### HONORS AND AWARDS

Garrels received many awards during his lifetime, including election to the U.S. National Academy of Sciences, the Arthur L. Day and Penrose Medals of the Geological Society of America, the V.M. Goldschmidt Medal of the Geochemical Society, the

Roebbling Medal of the Mineralogical Society of America, and the Wollaston Medal of the Geological Society of London.

### FINAL NOTE

Robert M. Garrels was one of the giants in the field of geochemistry but always felt himself to be a geologist at heart. He certainly is the recognized "father" of modern sedimentary geochemistry. His one overriding goal was to understand the origin and evolution of the surface environment of Earth from a geologist's point of view.

### ACKNOWLEDGMENTS

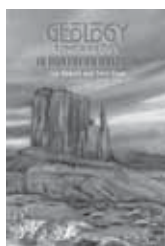
I am especially grateful to Cynthia Garrels for constructive criticism of the first version of this Rock Star profile and thank the Rock Star committee members for their invaluable help with reducing the size of the original manuscript.

### FURTHER READING

Berner, R.A., 1992, Robert Minard Garrels: National Academy of Sciences, v. 61, p. 195-212.  
 Helgeson, H.C., 1992, Preface: The Robert M. Garrels Memorial Issue: *Geochimica et Cosmochimica Acta*, v. 56, p. 2975-2983.

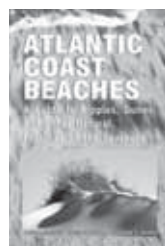
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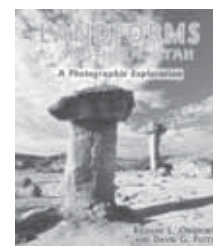
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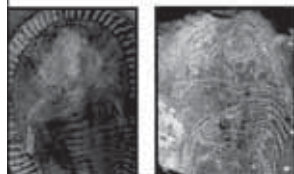
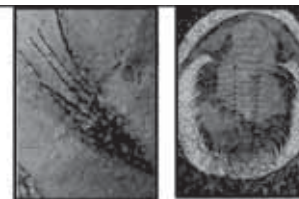
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# GSA Committees: Progress through Service

## Committee on Education

The future of the role of the geosciences in our communities and possibly of GSA itself depends on how well we educate our stakeholders: students, the general public, current and future teachers, current and future geoscientists, and our peers. The Committee on Education serves as advisor and advocate to the Society on issues and programs that have the potential to stimulate interest in the importance and acquisition of basic knowledge in the earth sciences at all levels of education.

Committee members work with GSA Education and Outreach (E&O) staff and with other interested scientific and education organizations to develop informal, pre-college (K–12), undergraduate, and graduate earth science education and outreach objectives and initiatives. In the last few years committee members have had a significant advisory role to the E&O staff as they developed several new initiatives. Currently, the committee is working to increase its education advocacy role to the Society and to improve communication with other geoscience-related education organizations and provide a link between national, section-level, and division activities.

### The Committee at Work

National discussions related to evolution and global warming make clear the need for public understanding of the earth-science perspective on the nature of science and use of the scientific method to advance science. Recently, the committee was involved in preparation of *The Nature of Science and the Scientific Method*, a document now available at [www.geosociety.org/educate/natureofscience.htm](http://www.geosociety.org/educate/natureofscience.htm). This document is intended to provide a concise resource along with possible talking points.

One initiative of the GSA E&O staff for which the committee has provided advice and feedback is the teacher advocate

program. This program provides curriculum-linked geoscience teaching resources and teacher activities that include topical CDs with

content linked to student activities, an education and teacher resources Web site ([www.geosociety.org/educate/](http://www.geosociety.org/educate/)), workshop presentations at national and regional science teacher meetings, and field courses for teachers.

Other issues that have been addressed by the committee include discussion of the status of geology or earth science advanced placement exams and courses, development of resources for possible junior (pre-college) GSA clubs, and ways to facilitate outreach to existing groups such as the Girl Scouts and Boy Scouts.

### Serving with the Committee on Education

The committee includes members from a broad spectrum of perspectives and interests within the Society. Members represent each GSA Section and the Geoscience Education Division. A broad range of educational perspectives is provided by pre-college (K–12), undergraduate-level, and graduate-level educators and by a student representative.

The committee includes two Members-at-Large, and the GSA past president serves *ex officio*. The E&O Director is the GSA liaison to the committee, and other members of the E&O staff commonly provide information to committee members. The Committee on Education meets formally two times each year, once at the annual meeting and a second time typically by phone conference. The committee welcomes input and ideas from all GSA Members.

### Virginia Peterson

*Grand Valley State University, [petersvi@gvsu.edu](mailto:petersvi@gvsu.edu)  
2006–2007 Education Committee chair*

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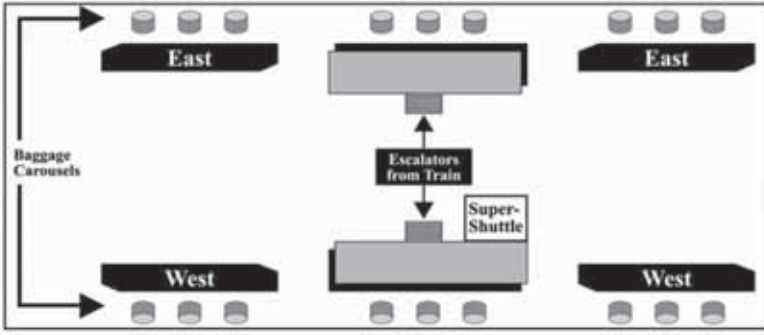
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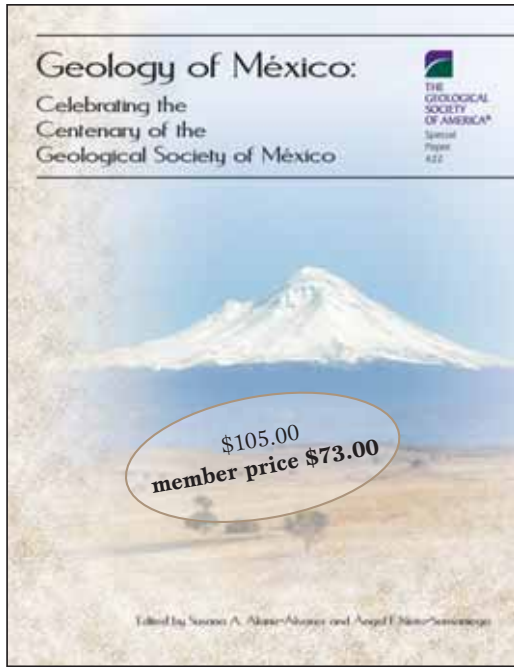
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# Geology of México: Celebrating the Centenary of the Geological Society of México



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edited by Susana A. Alaniz-Álvarez and Ángel F. Nieto-Samaniego

In 2004, the Sociedad Geológica Mexicana (Geological Society of México) celebrated its first centenary. To mark this milestone, the society published (in Spanish) a collection of papers that present the state of the art in some areas of Mexican geology. The geological community will find in this English-language version of the volume valuable information on diverse topics related to the Mexican territory. This Special Paper focuses on three subjects: reviews of some of the geological provinces, major faults that constitute tectonic borders, and ore deposits. Papers are of general or regional character but provide a deep treatment of the themes and bring together useful information for researchers, students, technicians, and others interested in México.

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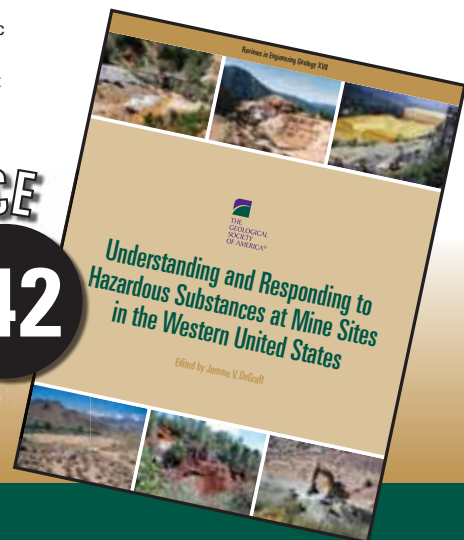
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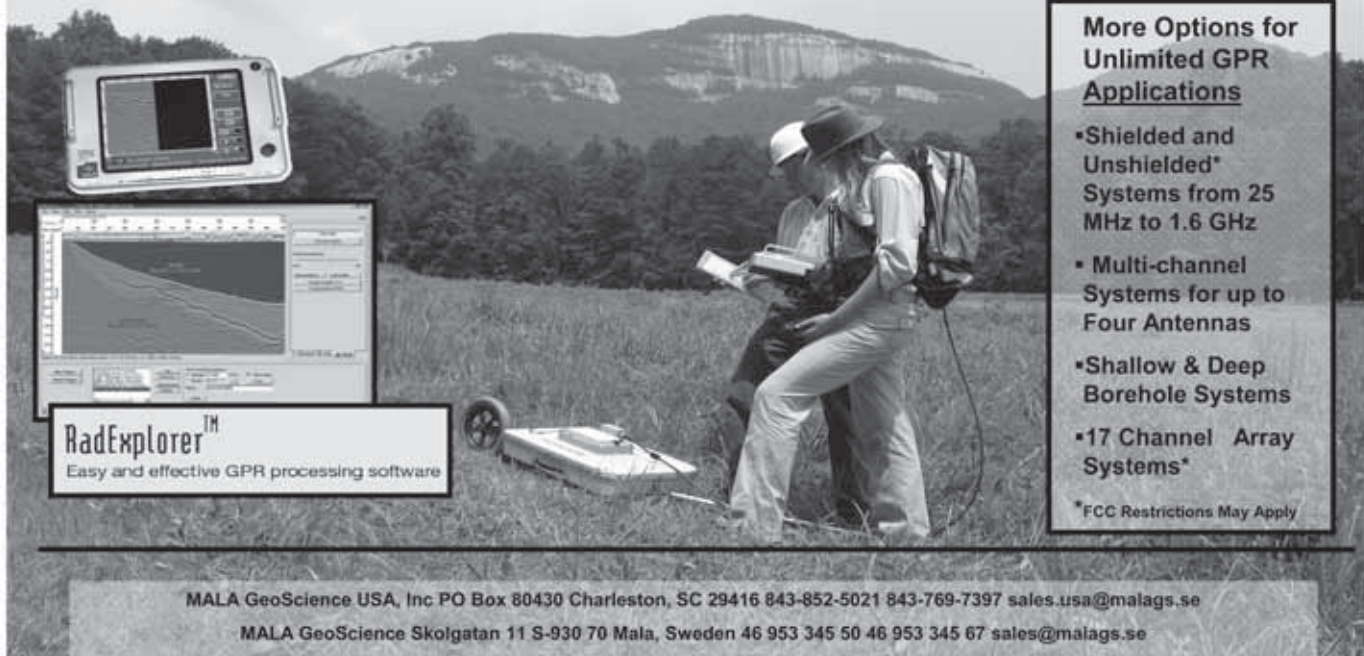
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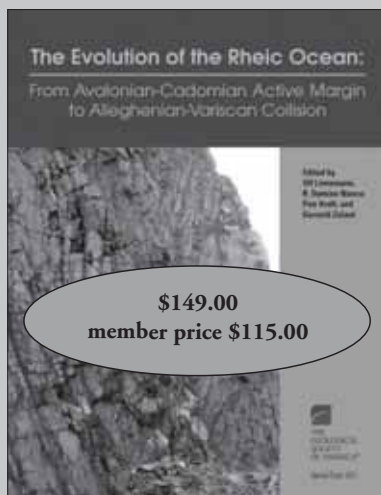
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## The Evolution of the Rheic Ocean:

From Avalonian-Cadomian Active Margin to Alleghenian-Variscan Collision  
edited by Ulf Linnemann, R. Damian Nance, Petr Kraft, and Gernold Zulauf



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This Special Paper includes 29 papers presented at several meetings of the International Geoscience Programme (IGCP) Project 497: "The Rheic Ocean: Its origin, evolution and correlatives." The Rheic Ocean was one of the dominant oceans of the Paleozoic. Its origin can be traced to the Avalonian-Cadomian orogenies in the Latest Neoproterozoic. Closure of the Rheic Ocean began in the Lower Devonian and ended with the assembly of the supercontinent Pangaea. Its history involves North and South America, Africa, Baltica, and a number of peri-Gondwanan terranes. Papers mirror the history of the Rheic Ocean and document a chain of global events and produced orogenic belts that extend discontinuously from Mexico to easternmost Europe. The ocean's evolution was responsible for the formation of a wide variety of sedimentary basins; it significantly impacted the history of life, and it profoundly influenced contemporary paleoclimate and global environmental conditions. Fields of research involved in its study range widely and, as this book illustrates, include stratigraphy, sedimentology, paleontology, paleogeography, paleoceanography, igneous and metamorphic petrology, tectonics, structural geology, provenance analysis, geochemistry, geochronology, and paleomagnetism. Despite decades of research, aspects of the evolution of the Rheic Ocean remain controversial. With this book, the authors hope to answer a number of important questions and to encourage further research.

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### RESEARCH SCIENTIST W.M. KECK FOUNDATION CENTER FOR ISOTOPE GEOCHEMISTRY UNIVERSITY OF CALIFORNIA AT LOS ANGELES

The W.M. Keck Foundation Center for Isotope Geochemistry at UCLA is seeking a research scientist to support day-to-day operation of its CAMECA ims 1270 ion microprobe. The Center hosts a team of faculty, researchers, and students engaged in wide-ranging geo- and cosmochemical studies, and is supported as a NSF National Facility for ion microprobe research (<http://sims.ess.ucla.edu/>).

The new staff scientist will: (1) train and advise facility users; (2) carry out analysis programs designed by principal investigators; and (3) perform instrument alignment and maintenance tasks. Independent research is encouraged.

Applicants should have experience in ion microprobe analysis and be able to work collaboratively with a broad spectrum of geoscientists. A Ph.D. in geochemistry or related (geochronology, cosmochemistry, biogeochemistry, material science, and/or environmental science) is preferred. Experience in application software development is desirable.

The position is available immediately. Evaluation of applications will begin 11/01/07. Salary and benefits are competitive and commensurate with the candidate's prior experience. The University of California is an affirmative action/equal opportunity employer.

Please e-mail resumes complete with current contact information for 3 or more references to [search07X@ess.ucla.edu](mailto:search07X@ess.ucla.edu).

### ASSISTANT PROFESSOR, STRUCTURAL GEOLOGY TRINITY UNIVERSITY

The Department of Geosciences at Trinity University invites applications for a tenure-track position at the rank of Assistant Professor in structural geology and tectonics beginning in August 2008. Candidates must be dedicated to excellence in undergraduate teaching and to an active research program that engages undergraduates. Teaching responsibilities will include upper division courses in structural geology and tectonics and introductory geoscience courses in the University's Common Curriculum. Experience in teaching undergraduate courses is preferred.

Trinity University, founded in 1869, is one of the nation's top private undergraduate institutions. The Department has granted degrees in the geosciences for over 40 years and is a member of the Keck Geology Consortium. Further information about the department and this search can be found at [www.trinity.edu/departments/geosciences/](http://www.trinity.edu/departments/geosciences/).

Applications must include a letter of application, curriculum vitae, undergraduate and graduate transcripts, a detailed description of teaching and research plans, and 3 letters of recommendation; sent to Dr. Nancy Mills, Search Committee Chair, Department of Geosciences, Trinity University, One Trinity Place, San Antonio, Texas 78212-7200. For full consideration, complete applications must be received by November 7, 2007.

Women and minority candidates are strongly encouraged to apply. Trinity University is an Equal Opportunity Employer.

### ASSISTANT PROFESSOR IN GEODYNAMICS UNIVERSITY OF FLORIDA

The Department of Geological Sciences, University of Florida, invites applications from outstanding scientists for a tenure-track faculty position in geodynamics at the Assistant Professor level, to start fall 2008. We seek a creative scientist committed to high standards in research and teaching to complement Departmental research in tectonics, geomagnetism, seismology, geochemistry, and surficial processes. The successful candidate will have an established record of publication in peer-reviewed scientific journals, clear potential to lead an externally-funded research group, and enthusiasm for research involving highly talented and broadly diverse graduate and undergraduate students. We especially encourage applicants with expertise in any aspect of physical or chemical geodynamics, from core to surface, involving integration of quantitative modeling and field observations. For more information visit <http://web.geology.ufl.edu/search.html>.

Applicants should hold a Ph.D. at the time of application, and supply (a) a curriculum vitae, including publication list and details of current research funding; (b) a statement of teaching experience and interests; (c) a summary of current research activities and future goals, including a statement describing potential links with existing programs in the Department of Geological Sciences at UF; (d) complete contact information for at least three established scientists who are willing to supply letters of reference.

To ensure full consideration, applications should be submitted by 19 Dec. 2007 to the Search Committee chair, R. M. Russo, [rrusso@ufl.edu](mailto:rrusso@ufl.edu), Department of Geological Sciences, P.O. Box 112120, 241 Williamson Hall, University of Florida, Gainesville, FL, 32608, USA; phone +1-352-392-2231; fax +1-352-392-9294. Evaluation of candidates will begin on the closing date and continue until the position is filled.

The University of Florida is an equal opportunity institution dedicated to building a broadly diverse and inclusive faculty and staff.



### Earth Systems Science Faculty Position Rice University Department of Earth Science

The Earth's surface is the principal interface between the lithosphere, hydrosphere, cryosphere, biosphere, and atmosphere, which interact at a variety of spatial and temporal scales. The Earth Science department at Rice University anticipates an opening in Earth Systems Science and seeks an outstanding scientist at the junior level who studies aspects of these interactions by integrating theory and observations. We particularly encourage applications from and nominations of women and minorities.

Successful candidates are expected to drive active research programs, supervise graduate research and teach courses for undergraduate and graduate students. Details about the department and its facilities can be found at <http://earthscience.rice.edu>.

Applications received by November 1<sup>st</sup>, 2007, will receive fullest consideration.

Please send a resume, research and teaching statements, and names of five or more references to:

Search Committee Chair  
Earth Science Department, MS-126  
Rice University, PO Box 1892  
Houston, TX 77251-1892.

Rice is an equal opportunity affirmative action employer.



### Energy Resources Faculty Position Rice University Department of Earth Science

Houston is the energy capital of the world. The Earth Science department at Rice University anticipates an opening in Energy Resources and seeks an outstanding scientist at the junior level who will forge strong ties to the energy industry in one or more research areas, including basin analysis and stratigraphy, hydrocarbon systems, sedimentary processes, fluid flow in porous media, or carbon sequestration. We particularly encourage applications from and nominations of women and minorities.

Successful candidates are expected to drive active research programs, supervise graduate research and teach courses for undergraduate and graduate students. Details about the department and its facilities can be found at <http://earthscience.rice.edu>.

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**POST-DOCTORAL RESEARCH ASSOCIATE  
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PRINCETON UNIVERSITY (PROGRAM IN SCIENCE,  
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The use of scientific assessment as a formalized process for evaluating knowledge for the specific purpose of informing government decision-making has expanded since the mid-1970s, but how well have these assessments worked? As part of the initial stage of a multi-year collaborative project between University of California at San Diego and The Woodrow Wilson School's Science, Technology and Environmental Policy Program at Princeton University, we seek a post-doctoral fellow to examine the history of scientific assessments of ozone depletion. The ideal candidate will have a Ph.D. in history of science or a closely related field, and sufficient scientific background to understand the technical issues at stake in the scientific evaluations. The fellow will work under the joint supervision of Michael Oppenheimer, Woodrow Wilson School and Department of Geosciences, Princeton University and Naomi Oreskes, University of California at San Diego.

The initial appointment will be for one year, with the possibility of renewal. The successful candidate will be based primarily at Princeton. Research could begin anytime after October 1, 2007. Review of applications begins immediately and will continue until the position is filled.

The Postdoctoral Research Associate's position is open to all regardless of citizenship, but requires a completed doctorate and does not support work towards the completion of a degree. The postdoctoral fellow will be eligible for salary and full employee benefits in accordance with Princeton University guidelines.

Applicants should send a CV and a cover letter describing their areas of expertise and interest via e-mail to Charles Crosby at [ccrosby@princeton.edu](mailto:ccrosby@princeton.edu). For more information about applying to Princeton please link to: <http://web.princeton.edu/sites/dof/ApplicantsInfo.htm>. Candidates may choose to complete the "Invitation to Self-Identify" form <http://web.princeton.edu/sites/dof/forms/PSoftSelfID.pdf>. Providing the self-identification information is completely voluntary and declining to submit the information will not adversely affect your candidacy.

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The use of scientific assessment as a formalized process for evaluating knowledge for the specific purpose of informing government decision-making has expanded since the mid-1970s, but how well have these assessments worked? As part of the initial stage of a multi-year collaborative project between University of California at San Diego and The Woodrow Wilson School's Science, Technology and Environmental Policy Program at Princeton University, we seek two post-doctoral associates to examine the history of scientific assessments of the West Antarctic Ice Sheet and its role in sea level rise caused by global warming. The ideal candidate will have a Ph.D. in history of science or a closely related field, and sufficient scientific background to understand the technical issues at stake in the scientific evaluations. The postdocs will work under the joint supervision of Naomi Oreskes, University of California at San Diego, and Michael Oppenheimer, Woodrow Wilson School and Department of Geosciences, Princeton University.

The initial appointment will be for one year, with the possibility of renewal. The position will be based primarily at the University of California, San Diego campus but the research associate must be flexible enough to travel to Princeton to conduct research there as needed. Research could begin anytime after October 1, 2007. Review of applications begins immediately and will continue until the position is filled.

The Postdoctoral Research Associate positions are open to all regardless of citizenship, but require a completed doctorate and do not support work towards the completion of a degree. The postdoctoral researchers will be eligible for salary and full employee benefits in accordance with Princeton University guidelines.

Applicants should send a CV and a cover letter describing their areas of expertise and interest via e-mail to Charles Crosby at [ccrosby@princeton.edu](mailto:ccrosby@princeton.edu).

For more information about applying to Princeton please link to: <http://web.princeton.edu/sites/dof/ApplicantsInfo.htm>. Candidates may choose to complete the "Invitation to Self-Identify" form <http://web.princeton.edu/sites/dof/forms/PSoftSelfID.pdf>. Providing the self-

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**ASSISTANT PROFESSOR  
ENVIRONMENTAL GEOPHYSICS  
ILLINOIS STATE UNIVERSITY**

Illinois State University, Department of Geography-Geology invites applications for a tenure-track position in Geophysics at the rank of assistant professor with a preferred start date of Aug. 17, 2008. A Ph.D. in geology or a related field is preferred at the time of appointment. Preference will be given to candidates with research interests in shallow geophysics applied to environmental problems. Experience in glacial environments or sequence stratigraphy is desirable. Potential for a significant start-up package exists. The successful candidate is expected to pursue an active program of scholarly research, publication, and external grant funding. Teaching expectations include general education courses, and graduate courses in his/her area of interest.

Illinois State University is a research-intensive university enrolling approximately 20,000 students. Our department offers a BS in Geology, a MS in Hydrogeology, and a BA/BS in Geography. Illinois State University and the department place strong emphasis on undergraduate and Masters level education. The department has a strong working relationship with geophysicists and geologists at the Illinois State Geologic Survey.

A cover letter, a curriculum vita, research and teaching statements, the names of three references, and all college and university transcripts must be received by November 16, 2007, to ensure full consideration.

Apply to: Dr. Robert Nelson, Department of Geography-Geology, Campus Box 4400, Normal, Illinois 61790-4400. Telephone: (309) 438-2692, Fax: (309) 438-5310, e-mail: [rsnelso@ilstu.edu](mailto:rsnelso@ilstu.edu). Additional information about our department, university, and community is available at [www.geo.ilstu.edu](http://www.geo.ilstu.edu).

Illinois State University is an equal opportunity/affirmative action university encouraging diversity.

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For more information, contact Cindy Lonergan at [clonergan@usgs.gov](mailto:clonergan@usgs.gov) or +1-703-648-7472.

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**WELLESLEY COLLEGE  
ASSISTANT PROFESSOR**

The Department of Geosciences at Wellesley College invites applications for a tenure-track faculty position at the rank of assistant professor beginning September 2008. We seek an exceptional scientist who can integrate classroom, field and laboratory approaches to teaching undergraduates in a liberal arts environment. This individual will be expected to develop courses at all levels of our curriculum, with emphasis in structural geology. There will be an expectation to develop courses complementary to existing offerings. The ideal candidate will also be active in research that broadens opportunities for students in the department. Completion of the Ph.D. is required, and previous postdoctoral research and teaching experience is desirable.

Applicants should send their curriculum vitae, a statement of teaching and research interests, and the names and contact information (including e-mail address) of three referees to [Geosearch@firstclass.wellesley.edu](mailto:Geosearch@firstclass.wellesley.edu). Further inquiry should be made to Dr. Daniel Brabander at Department of Geosciences, Wellesley College, 106 Central Street, Wellesley, MA 02481-8203. Applications will be accepted until November 15, 2007.

Wellesley College is an Affirmative Action/Equal Opportunity Employer, and we are committed to increasing the diversity of the college community and the curriculum. Candidates who believe they can contribute to that goal are encouraged to apply.

**VACANCY ANNOUNCEMENTS  
THE UNIVERSITY OF LOUISIANA AT MONROE**

The Department of Geosciences at The University of Louisiana at Monroe announces a tenure-track opening for an assistant professor of geology beginning in fall 2008 (pending funding approval). We are seeking applicants with a broad training and experience in geology with perhaps some abilities in geomorphology, environmental geology, or GIS/remote sensing. The successful candidate should be prepared to teach introductory physical and historical geology courses and must be committed to excellence in teaching and research. A Ph.D. is preferred. The Department offers a B.S. in atmospheric sciences and soon plans to create a B.S. in geosciences. Facilities include the Weather Research Center and a state-of-the-art computer laboratory for teaching and research.

Review of applications will begin on 22 October and will continue until the position is filled. Women and minorities are encouraged to apply. ULM is an AA/EEO employer.

Applicants should send a letter of application, curriculum vita, and the contact information for three professional references to: Dr. Michael Camille, Head, Department of Geosciences, The University of Louisiana at Monroe, 700 University Ave., Monroe, LA 71209-0550, USA.

Interviews will be conducted through the employment service at the fall GSA meeting.

**GEOSCIENCE LECTURER, PENN STATE ERIE**

The Behrend College, invites applications for a multi-year lecturer position (with the possibility of renewal), to begin August 2008. Following an initial probationary term, up to five-year contracts can be renewed multiple times. The successful candidate will teach/develop GIS as part of the Environmental Studies program, and teach introductory courses in general and historical geology, and earth system science. An M.S. or higher in geology, physical geography, GIS, or closely related field is required.

Send application letter, curriculum vitae, copies of undergraduate and graduate transcripts, teaching statement, and names, addresses, and e-mail addresses of three references to Dr. Roger Knacke, School of Science; Penn State Erie, The Behrend College; 4205 College Dr., Dept. GEOSC-B, Erie PA 16563-0203. Application screening will begin on 1 December 2007 and continue until the position is filled.

Penn State is committed to affirmative action, equal opportunity, and the diversity of its work force.

**FULL-TIME TEACHING ASSOCIATE  
SKIDMORE COLLEGE**

**Description:** The Geosciences Department invites applications for a full-time Teaching Associate to begin Fall 2008. This position requires teaching four sections of GE 101: Earth Systems Science laboratories in the Fall Semester and three sections of GE 102: The History of Earth, Life, and Global Change laboratories in the Spring. The Department seeks a candidate with strong teaching skills who will engage students in the laboratory classroom and in the field. A three-year renewable

contract is attached to this position. Skidmore College is a liberal arts institution of approximately 2,200 students and 200 full-time faculty, located in upstate New York. Preference will be given to those candidates with teaching experience who have a minimum of a Bachelor's degree in the geosciences or related field. The review for this position will begin December 1, 2007. Candidates should send vitae, evidence of excellence in teaching, and three letters of recommendation to: Katharine A. Cartwright, Chair, Geosciences Department, Skidmore College, Saratoga Springs, NY 12866.

Skidmore College is committed to being an inclusive campus community and, as an Equal Opportunity Employer, does not discriminate in its hiring or employment practices on the basis of gender, race or ethnicity, color, national origin, religion, age, disability, family or marital status, or sexual orientation.

#### FULL-TIME ASSISTANT PROFESSOR SKIDMORE COLLEGE

**Description:** The Department of Geosciences invites applications for an opening in Climate Sciences at the level of Assistant Professor to begin Fall 2008 [pending budgetary approval]. The Department seeks a candidate with strong teaching skills who will build and maintain an active research program with students. For this position we seek a teacher/scholar with background in climatology, oceanography, geochemistry, or geophysics as related to one or more of the following: climate dynamics, geochemical cycles, ocean-atmosphere interaction, climate diagnostics and analysis, and basic processes in atmospheric and oceanic dynamics. Course coverage includes Introduction to Oceanography, Climatology, and upper-level courses in the candidate's area of expertise. The position also involves contribution to all-college requirements; e.g., by way of an Interdisciplinary Seminar (topic open) for first year students. The College offers competitive start-up funds, pre-tenure sabbaticals and internal grants, however, the successful candidate is also expected to seek and obtain external research funding. Skidmore College is a liberal arts institution of approximately 2,200 students and 200 full-time faculty, located in upstate New York.

**Qualifications:** Preference will be given to those candidates with teaching experience who have a Ph.D. in the geosciences or a related field. The review process for this position will begin December 20, 2007.

**Apply to:** Candidates should send a vitae, evidence of excellence in teaching and scholarship, and three letters of recommendation to: Katharine A. Cartwright, Chair, The Department of Geosciences, Skidmore College, Saratoga Springs, NY 12866.

Skidmore College is committed to being an inclusive campus community and, as an Equal Opportunity Employer, does not discriminate in its hiring or employment practices on the basis of gender, race or ethnicity, color, national origin, religion, age, disability, family or marital status, or sexual orientation.

#### MINERALOGY AND PETROLOGY ASSISTANT PROFESSOR TUFTS UNIVERSITY

Tufts University invites applications for a full-time, tenure-track position as an Assistant Professor of Geology in the areas of Mineralogy and Petrology, beginning September 1, 2008. Qualifications include: Ph.D. by time of appointment; demonstrated potential for research supported by external funding; and teaching experience at the college level. The applicant should be able to fit into a small, well-equipped department where teaching is highly valued. The department currently offers undergraduate majors, and a new focused graduate program is being developed. The successful candidate will be expected to teach undergraduate courses in Mineralogy, Igneous/Metamorphic Petrology, and one or more upper level and graduate courses in a field related to the person's expertise. A letter of application, statement of teaching and research interests, transcripts, CV, and the names and addresses of three references should be sent to Anne F. Gardulski, Chair, Department of Geology, Tufts University, Medford, MA 02155. Review of applications will begin November 15, 2007 and will continue until the position is filled. Tufts University is an Affirmative Action/Equal Opportunity employer. We are committed to increasing the diversity of our faculty. Members of underrepresented groups are strongly encouraged to apply.

#### GEOLOGICAL ENGINEER

Geological Engineer, President, & CEO, Fischer-Watt Gold Co. Inc. in Lakewood, CO. Work from home office anywhere in western U.S. Approx 50% travel to remote mining locs incl int'l. B.S. geology or geological engg, 10 yrs exp, prof'l engg license. Resume to George Beattie, [gjbeattie@yahoo.com](mailto:gjbeattie@yahoo.com).

#### HYDROGEOLOGIST EARTH & ENVIRONMENTAL SCIENCES CALIFORNIA STATE UNIVERSITY-EAST BAY

The Department of Earth & Environmental Sciences at California State University-East Bay invites applications for an assistant professor tenure-track position in Environmental Hydrogeology to begin in Fall of 2008. Responsibilities include teaching undergraduate and graduate courses in the applicant's areas of expertise in the Geology and Environmental Science programs and other courses. Applicants should have a Ph.D., outstanding teaching skills, and a commitment to pursue an active research program involving undergraduate and graduate students. For additional information, visit our department's Web site ([www.sci.csueastbay.edu/earth](http://www.sci.csueastbay.edu/earth)). Review of applications will begin December 17, 2007. Please submit a letter of application; a complete and current vita; graduate transcripts; copies of major publications; and three letters of recommendation to Dr. Jeffery Seitz, 08-09 EES-ENV/HYDROGEOLOGIST, Department of Earth & Environmental Sciences, California State University, East Bay, 25800 Carlos Bee Blvd., Hayward, CA 94542-3088, USA. CSUEB is an Equal Opportunity Employer.

#### ASSISTANT PROFESSOR OF SCIENCE EDUCATION NEW MEXICO STATE UNIVERSITY

The College of Arts & Sciences and the College of Education at New Mexico State University are seeking to fill a joint appointment as Assistant Professor in science education. The position requires teaching courses in the subject concentration (the science department in which the appointment is made: astronomy, biology, chemistry, geology, or physics) as well as teaching science education courses in the Department of

## Associate or Full Professor, Petroleum Geology

As part of a large expansion of its petroleum geoscience teaching and research activities, the Department of Geoscience at the University of Calgary is seeking a petroleum geologist with significant industry experience. At this time, the department invites applications for a full-time tenure track position at the associate or full professor level to begin July 1, 2008.

Candidates require a PhD in a petroleum-related discipline of Geology. Appointments at the Associate Professor or Full Professor level will be considered for qualified candidates. Industry experience is essential for this position. The department requires industry experience and expertise for the successful delivery of the

Bachelor of Science with a concentration in Petroleum Geology. Inclusion of material on the evaluation of hydrocarbon reservoirs is looked at as critical to in the success of this program and will help vault the program above others nationally and internationally. The successful applicant is expected to develop new curriculum in this area, undertake graduate student supervision, and develop a strong research program.

Successful research candidates will join other members of the department in collaborative research and in pursuing the development of strong ties with the petroleum industry through the initiatives of the Institute for Sustainable Energy, Environment and Economy (ISEEE) and the Geoscience Professional Development Centre (GPDC). Further information about the Department, ISEEE, and GPDC is available at [www.ucalgary.ca/geoscience](http://www.ucalgary.ca/geoscience).

Applications will be reviewed as received. Selection of candidates is targeted for **December 2007**, however the position will remain open until a successful candidate is found. Applicants should submit a curriculum vitae, list of publications, statement of research interests and teaching philosophy, and arrange to have three reference letters forwarded to:

#### Dr. D. Eaton, Head

Department of Geoscience  
University of Calgary, 2500 University Drive NW  
Calgary, Alberta, Canada T2N 1N4 Canada  
Email: [geojobs@ucalgary.ca](mailto:geojobs@ucalgary.ca)  
Fax: (403) 284-0074

*All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. The University of Calgary respects, appreciates and encourages diversity.*

*To see all University of Calgary academic positions, please visit: [www.ucalgary.ca/br/careers](http://www.ucalgary.ca/br/careers).*



UNIVERSITY OF  
CALGARY

Curriculum & Instruction. In addition, duties include research and service.

Required Qualifications: (1) Earned doctorate in either curriculum & instruction with a concentration in science education; or an earned doctorate in science (e. g. astronomy, biology, chemistry, geology, physics) with an area of focus in science education; or a doctorate in science education; (2) Two or more years of teaching (K-12, preferred); and (3) A research focus in K-12 science education. Preferred qualifications include evidence of successful teaching experience in content area with K-12 populations; evidence of experience of working with diverse ethno-linguistic populations; evidence of ability to use educational technologies with critical perspectives (e.g., WebCT, Blackboard); and dispositions and/or ability to work in both Spanish and English. Salary is commensurate with education and experience.

Screening of applicants will begin November 1, 2007, and will continue until the position is filled. See [www.nmsu.edu/~personel/postings/faculty/13221533.html](http://www.nmsu.edu/~personel/postings/faculty/13221533.html) for more information and application procedure.

#### DEPARTMENT OF GEOLOGICAL SCIENCES COLLEGE OF ARTS AND SCIENCE UNIVERSITY OF SASKATCHEWAN

The Department of Geological Sciences at the University of Saskatchewan, is accepting applications for a tenure-track position at the Assistant Professor level in the broad area of Geodynamics and Crustal Tectonics. The department seeks a versatile researcher who takes an integrative approach to elucidating the structural and tectonic evolution of the Earth's crust.

The successful candidate will be expected to develop a vigorous, externally funded research program, and participate broadly in undergraduate and graduate student teaching and research, including introductory courses, structural geology, and field schools. Candidates must hold a Ph.D. when appointed, which is expected to be July 1, 2008.

The University of Saskatchewan is located in Saskatoon, Saskatchewan, a city with a diverse and thriving economic base, a vibrant arts community and a full range of leisure opportunities. The University has a reputation for excellence in teaching, research and scholarly activities and offers a full range of undergraduate, graduate, and professional programs to a student population of about 20,000. The university is one of Canada's leading research-intensive universities.

The College of Arts & Science offers a dynamic combination of programs in the humanities and fine arts, the social sciences and the sciences. There are over 8,000 undergraduate and graduate students in the College and 325 faculty, including 14 Canada Research Chairs. The College emphasizes student and faculty research, interdisciplinary programs, community outreach and international opportunities. The Department of Geological Sciences in the Division of Science has 16 full-time faculty, including two Canada Research Chairs and two endowed research chairs, and excellent analytical and computing facilities. For detailed information about the Department, the applicants are encouraged to visit [www.usask.ca/geology/](http://www.usask.ca/geology/).

Applications, including résumé, statement of research interests and teaching philosophy, and three letters of reference, should be sent to: Search Committee Department of Geological Sciences University of Saskatchewan 114 Science Place Saskatoon, SK S7N 5E2, Canada; e-mail: [kevin.ansdell@usask.ca](mailto:kevin.ansdell@usask.ca); fax: 306-966-8593.

We will begin reviewing applications after 2 November 2007.

The University of Saskatchewan is committed to increasing representation of equity groups (women, people of aboriginal ancestry, visible minorities and/or people with disabilities). Applicants from these groups are encouraged to self-identify in their applications. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority.

#### DEPARTMENT OF GEOLOGY AT JUNIATA COLLEGE

The Department of Geology at Juniata College invites applications for a tenure-track position in sedimentary geology. Candidates should have a Ph.D. in geology and significant field experience. Teaching duties will include courses in Invertebrate Paleontology, Stratigraphy, Sedimentology, Historical Geology, and Oceanography. The successful applicant will be expected to mount a student-centered research program that exploits our advantageous setting in the Valley and Ridge Province. The Department consists of three full time faculty and about 25 majors, an unusually high proportion of whom go on to graduate school. The Department is well equipped with microscopes, X-ray diffractometer,

analytical Scanning Electron Microscope, and a rock preparation laboratory. The Department collaborates extensively with Juniata's Department of Environmental Science and Studies. Pre-screening interviews will be scheduled during the National GSA meeting in October. Juniata College is a co-educational, liberal arts college with an enrollment of 1,400 in rural central Pennsylvania, highly regarded for academic excellence. It has long had an outstanding reputation of educating young scientists. Juniata is committed to gender and cultural diversity and encourages applications from women and minorities. Send letter of application; curriculum vitae; three letters of recommendation; transcripts; and a concise statement of current and long-term teaching, research and career goals by December 15, 2007 to Mrs. Gail Leiby Ulrich, Director of Human Resources, Juniata College, 1700 Moore Street, Box GS, Huntingdon, PA 16652, USA, [www.juniata.edu](http://www.juniata.edu). It is the policy of Juniata College to conduct background checks. Juniata College will take positive steps to enhance the ethnic and gender diversity on its campus. The College commits itself to this policy not only because of legal obligations, but because it believes that such practices are basic to human dignity.

#### PETROLOGY POSITION APPALACHIAN STATE UNIVERSITY

The Department of Geology at Appalachian State University invites applications for a tenure-track position at the Assistant Professor level, beginning August 2008. We seek a petrologist with a field-based research program and an interest in involving undergraduates in their research. The principal teaching responsibilities will include igneous and metamorphic petrology. Individuals whose research involves the application of geochemistry to petrological problems are encouraged to apply. Candidates are expected to take advantage of the regional geologic setting of the Southern Appalachians in teaching upper-level courses. The candidate must have a Ph.D. at the time of appointment and must possess a strong commitment to undergraduate education and research.

Applications must include a letter of interest, vita, a statement of career goals, copies of transcripts of all college and university work (official copies due upon employment), and the names and contact information (including e-mail) of three referees familiar with the applicant's teaching and scholarship. Send applications to: Richard N. Abbott, Jr., Chair of Search Committee, Department of Geology, Appalachian State University, P.O. Box 32067, 195 Rankin Science Bldg., Boone, NC 28608-2067.

Review of completed applications will begin December 1, 2007, and will continue until the position is filled.

#### ASSISTANT PROFESSOR OF GEOSCIENCES— PETROLOGY, PACIFIC LUTHERAN UNIVERSITY

The Department of Geosciences at Pacific Lutheran University invites applications for a tenure-track position in Petrology at the level of Assistant Professor to begin September 2008. Responsibilities will include teaching mineralogy, igneous and metamorphic petrology, and topical lower division geoscience courses and mentoring senior capstone research projects. Field-based research involving undergraduates is expected and is competitively supported by the Division of Natural Sciences. Experience and interest in structural geology is advantageous.

A Ph.D. is required. Commitment to teaching excellence at the undergraduate level is expected. Pacific Lutheran University, near Seattle and Mount Rainier, enrolls 3700 students, with a mission of educating for lives of thoughtful inquiry, service, leadership, and care. It serves a diverse clientele and is a strongly EO/AA employer. See Web site: [www.plu.edu/~geos/](http://www.plu.edu/~geos/).

Submit CV, undergraduate and graduate transcripts, statement of teaching philosophy, summary of current research interests, and three recommendation letters to: Search Committee, Department of Geosciences, Pacific Lutheran University, Tacoma, WA 98447. Applications due by October 31, 2007.

#### DOCTORAL DIRECTOR IN ENVIRONMENTAL MANAGEMENT, MONTCLAIR STATE UNIVERSITY

Applications are invited for the Director of our interdisciplinary Doctoral Program in Environmental Management, beginning January 14, 2008, or September 1, 2008, as available. The Director will hold a faculty appointment at the Associate/Full Professor rank with undergraduate and graduate teaching duties within a related department in the College of Science and Mathematics. The successful candidate will carry out an active, externally

funded research program in a field within environmental management. The position includes reassigned time for administrative duties and recruiting and advising doctoral students. Preference will be given to candidates with a demonstrated record of scholarship, teaching, graduate advising, and leadership skills within an established doctoral program. Applications should include a curriculum vita, statements of teaching, research, and administrative activities and philosophies, and the names and contact information for five professional references. Please send applications to Dr. Stefanie Brachfeld, VF32 Search Committee Chair, Department of Earth and Environmental Studies, 252 Mallory Hall, Montclair State University, Montclair, NJ, 07043, USA. E-mail: [brachfelds@mail.montclair.edu](mailto:brachfelds@mail.montclair.edu). Electronic applications are preferred. Review of applications will begin on October 19, 2007. Please visit [www.csam.montclair.edu/earth](http://www.csam.montclair.edu/earth) for more information about our programs. Montclair State University is an equal opportunity/affirmative action institution; visit us at [www.montclair.edu](http://www.montclair.edu).

#### UTAH GEOLOGICAL SURVEY GEOLOGIC HAZARDS PROGRAM MANAGER

The Utah Geological Survey seeks applications for the position of Manager of the Geologic Hazards Program, to begin in January 2008. The Utah Geological Survey is the State's principal agency assigned to identify, inventory, assess, and mitigate Utah's geologic hazards to promote safe and responsible land use. The Geologic Hazards Program comprises 10-12 staff to identify and characterize geologic hazards and prepare geologic-hazard maps. It promotes hazard reduction by disseminating information and assisting government and private-sector users through publications and databases, Web site information, conferences and workshops, and participation on committees, panels, advisory and review boards, and working groups.

Candidates should have at least a M.S. degree in geology and be licensed as a Professional Geologist in Utah, or meet the qualifications to become licensed, and have experience in program management and supervision. Technical skills and research interests should include engineering geology, Quaternary geology, applied geology, geomorphology, neotectonics, and earthquake- and landslide-hazard assessment.

For a complete announcement and instructions on how to apply, please visit the State of Utah Web site at <http://jobs.utah.gov> after Sept. 1. For further information, contact Rick Allis, UGS Director, at [rickallis@utah.gov](mailto:rickallis@utah.gov) or +1-801-537-3300.

#### TENURE-TRACK FACULTY POSITION IN BIOGEOSCIENCE UNIVERSITY OF MINNESOTA DEPARTMENT OF GEOLOGY AND GEOPHYSICS

The Department of Geology and Geophysics at the University of Minnesota-Twin Cities invites applications for a tenure-track faculty position in biogeoscience. Potential research areas include: microbe/mineral interactions; microbe/groundwater interactions; microbial evolution and biochemistry; the role of organisms in geological processes; organic geochemistry and paleoenvironments; biogeochemical cycling; origin and early evolution of life on Earth; analytical paleobiology; and astrobiology. We would be especially interested in candidates whose work would complement and extend our current strengths in stable-isotope paleoecology, paleoclimatology, limnology, environmental magnetism, low-temperature geochemistry, geofluids and environmental geology, marine geochemical modeling and hydrothermal vents, surface-lithosphere interactions, and Earth-surface dynamics. We are open to applicants whose training is outside the Earth sciences, but the candidate would be expected to concentrate on Earth sciences problems if hired. The successful candidate is expected to initiate and maintain a strong externally funded research program.

The N.H. Winchell School of Earth Sciences includes the Limnological Research Center; three NSF-funded research centers: the National Lacustrine Core Repository, the National Center for Earth-surface Dynamics, and the Institute for Rock Magnetism; the Minnesota Geological Survey; and excellent laboratories in geochemistry and experimental mineral physics and petrology. Other resources include the St Anthony Falls Laboratory ([www.safll.umn.edu](http://www.safll.umn.edu)), Materials Characterization Facility ([www.charfac.umn.edu](http://www.charfac.umn.edu)), Supercomputer Institute ([www.msi.umn.edu](http://www.msi.umn.edu)), Digital Technology Center ([www.dtc.umn.edu](http://www.dtc.umn.edu)), BioTechnology Institute ([www.bti.umn.edu](http://www.bti.umn.edu)), OMNI, a multi-disciplinary organization for Minnesota Nanotechnology Initiatives ([www.nano.umn.edu](http://www.nano.umn.edu)), and the Initiative for Renewable Energy and the Environment



([www.umn.edu/iree/](http://www.umn.edu/iree/)). Further information concerning the Department, its faculty and their research programs can be obtained at [www.geo.umn.edu](http://www.geo.umn.edu).

The department encourages and rewards innovative research and excellence in teaching. Teaching duties reflect the expertise of the candidate and include both undergraduate and graduate levels. Appointment will most likely be at the rank of assistant professor and could begin as early as August 2008. A Ph.D. degree must be earned by the time of the appointment. The review of completed applications will begin **15 October 2007** and continue until an appointment is made. Complete applications, which may be on paper or electronic, must include (1) curriculum vitae, (2) complete list of publications, (3) statement of research interest, (4) statement of teaching interests, and (5) names, addresses and e-mail addresses of at least four references. All candidates must complete an online application via the University of Minnesota employment system at: <https://employment.umn.edu> (requisition number 150214). Application materials may be sent to Chris Paola, Biogeoscience Search Committee Chair, Department of Geology and Geophysics, University of Minnesota, 310 Pillsbury Dr. S.E., Minneapolis, MN 55455, USA; <[cpaola@umn.edu](mailto:cpaola@umn.edu)>.

The University of Minnesota is an equal opportunity educator and employer.

**STABLE ISOTOPE GEOCHEMISTRY/  
ENVIRONMENTAL HYDROLOGY  
UNIVERSITY OF PUGET SOUND**

FT; tenure-line Assistant Professor; begins Fall Term 2008. Teach a mix of introductory & upper-level courses, including an interdisciplinary 100-level Environmental Science class, sedimentology/stratigraphy or hydrology, & upper-division geology courses in area of expertise. Play a key role in developing and leading the Environmental Studies Program and will establish an active research program that involves undergraduates, facilitates collaboration with environmental scientists in other disciplines, and has relevance to the Puget Sound-Pacific NW region. Ph.D. (ABD considered) in

Geology, with strong commitment to Environmental Studies, & a commitment to undergraduate teaching & liberal arts education. For complete announcement, visit [www.ups.edu/x18229.xml](http://www.ups.edu/x18229.xml). Application materials should be postmarked no later than 11/20/07. To apply, please submit letter of interest, curriculum vitae, teaching statement (including course descriptions), a statement of research interests, & three letters of reference to: Geology Search-880; University of Puget Sound; 1500 North Warner #1007; Tacoma, WA 98416-1007. Please specifically address how your teaching & research would complement & enhance our existing programs in the Geology Department & the Environmental Studies Program. Additional information is available at [www.ups.edu/geology.xml](http://www.ups.edu/geology.xml) & [www.ups.edu/envstudies.xml](http://www.ups.edu/envstudies.xml).

**COLBY COLLEGE—TENURE-TRACK  
ASSISTANT PROFESSOR OF GEOLOGY:  
MINERALOGY/GEOCHEMISTRY**

The Department of Geology invites applications for a tenure-track Assistant Professorship in Mineralogy with complementary expertise in either geochemistry, low or high-temperature diagenesis, or petrography/petrology, beginning 1 September 2008. We are seeking a candidate with instrumental and analytical expertise that will be incorporated into majors' courses and student-research projects. The successful applicant will be expected to teach five undergraduate courses annually, including a 100-level introductory lecture, a 200-level Mineralogy with laboratory, and upper-division courses designed to complement existing faculty expertise in and outside of the department. Additionally, the successful candidate will direct independent research projects as senior capstone experiences. Colby is a highly selective liberal arts college recognized for excellence in undergraduate education and for close student-faculty interaction. Ph.D. with teaching experience at time of application preferred. Applicants should submit a letter of application, curriculum vitae, transcripts, statements of teaching and research interests, teaching evaluations, and three letters of reference to Dr. Robert A. Gastaldo, Chair, Department of Geology, 5807 Mayflower Hill Drive, Waterville, ME 04901. Review of applications

will begin on 26 November 2007 and will continue until the position is filled. Colby is an Equal Opportunity/Affirmative Action employer, committed to excellence through diversity, and strongly encourages applications and nominations of persons of color, women, and members of other under-represented groups. For more information about the College, please visit the Colby Web site: [www.colby.edu](http://www.colby.edu).

**COLBY COLLEGE—TENURE TRACK  
ASSISTANT PROFESSOR OF GEOLOGY:  
STRUCTURE/REMOTE SENSING**

The Department of Geology invites applications for a tenure-track Assistant Professorship in structure/tectonics and geophysics/remote sensing, beginning 1 September 2008. The department is seeking a candidate who combines empirical and remotely sensed data in his/her research program, and who will translate these skills into the classroom. The successful applicant will be expected to teach five undergraduate courses annually, including a 100-level introductory lecture, a 200-level laboratory-based structure course, and upper-division courses designed to complement existing faculty expertise inside and outside of the department. Additionally, the successful candidate will direct independent research projects as senior capstone experiences. Colby is a highly selective liberal arts college recognized for excellence in undergraduate education and for close student-faculty interaction. Ph.D. with teaching experience at time of application preferred. Applicants should submit a letter of application, curriculum vitae, transcripts, statements of teaching and research interests, teaching evaluations, and three letters of reference to Dr. Robert A. Gastaldo, Chair, Department of Geology, 5807 Mayflower Hill Drive, Waterville, ME 04901. Review of applications will begin on 26 November 2007 and will continue until the position is filled. Colby is an Equal Opportunity/Affirmative Action employer, committed to excellence through diversity, and strongly encourages applications and nominations of persons of color, women, and members of other under-represented groups. For more information about the College, please visit the Colby Web site: [www.colby.edu](http://www.colby.edu).



**USGS Mendenhall Postdoctoral Research Fellowship Program (Fiscal Year 2009)**

The U.S. Geological Survey (USGS) invites applications for the Mendenhall Postdoctoral Research Fellowship Program for Fiscal Year 2009. The Mendenhall Program provides opportunities to conduct research in association with selected members of the USGS professional staff. Through this Program the USGS will acquire current expertise in science to assist in implementation of the science strategy of its programs. Fiscal Year 2009 begins in October 2008.

Opportunities for research are available in a wide range of topics including: shale-gas resource potential; climate change; karst geomorphology and hydrology; greenhouse gas fluxes from the land/sea margin; coastal change; mapping 3D distribution of hydrogeologic properties; geological materials and human health; applications of airborne gravity gradient measurements; petroleum system processes; unconventional energy resources; earthquake simulations; uncertainty assessments; tsunamigenic earthquakes; detection of anomalous hydrothermal and volcanic activity; rates of magma production; geologic storage of carbon dioxide; modeling debris flows and rock avalanches; urban hazards; slip rate indicators; risk and vulnerability of communities to natural hazards; applied remote sensing; dynamics of volcanic tephra plumes; landforms associated with active faults; landscape change; valuating landscape and ecological services.

The postdoctoral fellowships are 2-year appointments. The closing date for applications is November 9, 2007. Appointments will start October 2008 or later, depending on availability of funds. A description of the program, research opportunities, and the application process are available at <http://geology.usgs.gov/postdoc>. The U.S. Geological Survey is an equal opportunity employer.

Program Contacts: Dr. Rama K. Kotra, [rkotra@usgs.gov](mailto:rkotra@usgs.gov), 703-648-6271; Ms. Sarah Griffin-Bemis, [sgriffin@usgs.gov](mailto:sgriffin@usgs.gov), 703-648-7395.

U.S. Department of the Interior  
U.S. Geological Survey

CLASSIFIED ADVERTISING

**W.M. KECK PROFESSORSHIP IN GEOPHYSICS  
DEPARTMENT OF GEOLOGY, BAYLOR UNIVERSITY**

The Department of Geology at Baylor University invites applications for the W.M. Keck Professorship in Geophysics, beginning August 2008. A Ph.D. in Geophysics, Geology or a related field is required at the time of appointment. The Department currently consists of 13 geoscientists, including geologists, geophysicists, and geographers (please see the Department Web site, [www.baylor.edu/Geology/](http://www.baylor.edu/Geology/), for further information).

**Research:** The Department seeks a nationally recognized individual who has a strong research agenda in geophysics or the use of geophysical data. Potential areas of interest may include, but are not limited to, earthquake or reflection seismology, potential fields, geodynamics, or geophysically oriented aspects of petroleum geology. We encourage communication and collaboration with a subset of the Geology faculty members that are currently engaged in studies in the general areas of petroleum geology, stratigraphy, structural geology, hydrogeology, and environmental geology and geophysics, and the successful candidate is expected to carry out a vigorous research program that involves both undergraduates and graduates. Research space is available in the 500,000 ft<sup>2</sup> "state-of-the-art" Baylor Sciences Building.

**Teaching:** We seek an individual with a strong commitment to excellence in teaching, and require that he/she contribute significantly to both the undergraduate programs in Geology and Earth Science by teaching a freshman course, a senior-level course, as well as contribute to the graduate (M.S. and Ph.D.) programs in Geology by teaching graduate courses or seminars in his/her areas of specialization. A laboratory that includes high-performance computers and software, as well as two large plotters, is available for both instruction and research.

**Application Process:** Send letter of application, including statement of teaching and research interests, curriculum vitae, copies of transcripts, and the names and contact information for three references to: Dr. Steven Dworkin, Geophysics Search Committee Chair, Department of Geology, Baylor University, One Bear Place #97354, Waco, TX 76798-7354, USA; tel:

+1-254-710-2361; e-mail: [Steve\\_Dworkin@Baylor.edu](mailto:Steve_Dworkin@Baylor.edu). The review of applications will begin December 1, 2007, and applications will be accepted until the position is filled. To ensure full consideration, application must be completed by December 15, 2007. Baylor is a Baptist university affiliated with the Baptist General Convention of Texas. As an Affirmative Action/Equal Opportunity employer, Baylor encourages minorities, women, veterans and persons with disabilities to apply.

**TENURE-TRACK HYDROGEOLOGIST  
DEPARTMENT OF GEOLOGY, BAYLOR UNIVERSITY**

The Department of Geology at Baylor University invites applications for a full-time, tenure-track Assistant or Associate Professor in hydrogeology, beginning in August 2008. We seek a dynamic person with expertise in groundwater flow dynamics and processes involving such aspects as quantitative modeling, groundwater geochemistry, geomicrobiology, and basin-scale fluid flow. Experience with field-based research in groundwater pollution and contaminant transport is highly desirable. Preference will be given to candidates whose expertise complements existing departmental teaching and research areas. The successful candidate will be expected to pursue a vigorous externally-funded research program, aspire to teaching excellence, and engage in interdisciplinary collaboration. Teaching of both undergraduate and graduate level courses, including hydrogeology, environmental geology, and in area of expertise, is required. A Ph.D. in Hydrogeology or related area is required.

The Department offers undergraduate degrees in Geology and Geography and MS and Ph.D. degrees in Geology ([www.baylor.edu/Geology/](http://www.baylor.edu/Geology/)). Candidates should submit CV, letter of intent including statements of research and teaching interests, examples of published work, teaching evaluations (if available) and contact information (with e-mail addresses) of three references to: Dr. Joe C. Yelderman, Jr., Hydrogeology Search Committee Chair, Dept. of Geology, One Bear Place #97354, Baylor University, Waco, TX 76798-7354, USA, [Joe\\_Yelderman@baylor.edu](mailto:Joe_Yelderman@baylor.edu). Review of applications will begin on 1 December 2007, and applications will be

accepted until the position is filled. To ensure full consideration, application must be completed by January 15, 2008. Baylor is a Baptist university affiliated with the Baptist General Convention of Texas. As an Affirmative Action/Equal Opportunity employer, Baylor encourages minorities, women, veterans and persons with disabilities to apply.

**U.S. GEOLOGICAL SURVEY (USGS)  
POSITIONS AVAILABLE, RESEARCH GEOLOGIST**

The USGS, Central Region Energy Resources Team, is soliciting interest from qualified individuals for two positions of Research Energy Geologists in Lakewood, Colorado. These positions will conduct fundamental geologic research to evaluate and characterize the geologic framework and occurrence of a variety of geologic energy resources, including conventional and unconventional oil and gas, coal, and uranium. The unconventional oil and gas applications may include oil shale, oil sands, basin-centered gas, shale gas, and coalbed methane. Candidates must be able to work as part of a multidisciplinary team of geologists, geochemists, geophysics, and engineers. Excellent skills in writing and oral presentation of scientific findings are also required.

Applications (resume and application questions) for this vacancy must be received on-line via the USGS Online Automated Recruitment System (OARS) BEFORE midnight Eastern Time (Washington DC time) on the closing date of this announcement. If you fail to submit a complete online resume, you will not be considered for this position. Requests for extensions will not be granted. If applying online poses a hardship for you, you must speak to someone in the Servicing Personnel Office listed on this announcement PRIOR TO THE CLOSING DATE for assistance. Contact Jennifer Farrell at +1-303-236-9566 or [jfarrell@usgs.gov](mailto:jfarrell@usgs.gov).

The OARS system can be accessed at [www.usgs.gov/ohr/oars/](http://www.usgs.gov/ohr/oars/). The announcement number is: CR-2007-0589. The salary range is \$67,572-\$87,847 depending upon qualifications. The closing date is October 26, 2007.

U.S. citizenship is required. USGS is an Equal Opportunity/Affirmative Action Employer.



# Sedimentary Geology Multiple Faculty Positions

Texas A&M University

Department of Geology & Geophysics

The Department of Geology and Geophysics at Texas A&M University invites applications from individuals or groups for up to three tenure-track faculty positions in sedimentary geology, broadly defined. Areas of interest include but are not limited to fundamental and applied problems in sedimentary processes ranging from pore to basin scale, depositional environments, sequence stratigraphy, basin architecture, sea level change and coastal evolution, and energy and natural resource science. Hiring is anticipated over a range of ranks. Successful applicants will be expected to develop and maintain vigorous, externally funded research programs and contribute to undergraduate and graduate teaching. There is ample opportunity to collaborate with faculty in the Department, other research units in the College of Geosciences, and the Department of Petroleum Engineering.

Interested candidates should submit electronic versions of a curriculum vita, statement of research interests and teaching philosophy, the names and email addresses of at least three references, and up to four reprints by email attachments, to the Chair of the Sedimentary Geology Search Committee, [sedsearch@geo.tamu.edu](mailto:sedsearch@geo.tamu.edu). Group applications should be

submitted as a single package. Screening of applications will begin October 31, 2007 and will continue until positions are filled. A Ph.D. is required at the time of employment.

The Department of Geology and Geophysics ([geoweb.tamu.edu](http://geoweb.tamu.edu)) is part of the College of Geosciences, which also includes the Departments of Geography, Oceanography, and Atmospheric Sciences, Sea Grant, 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 152,000 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 ([hr.tamu.edu/employment/dual-career.html](http://hr.tamu.edu/employment/dual-career.html)).

**U.S. GEOLOGICAL SURVEY (USGS)  
POSITION AVAILABLE, GEOLOGIST**

The USGS, Central Region Energy Resources Team, is soliciting interest from qualified individuals for a position of Energy Geologist in Lakewood, Colorado. This position will provide technical support to geologic studies of sedimentary basins in support of national and worldwide energy resource assessments. Candidates must be able to work as part of a multidisciplinary team of geologists, geochemists, geophysicists, and engineers. Excellent skills in writing and oral presentation of scientific findings are also required.

Applications (resume and application questions) for this vacancy must be received on-line via the USGS Online Automated Recruitment System (OARS) BEFORE midnight Eastern Time (Washington DC time) on the closing date of this announcement. If you fail to submit a complete online resume, you will not be considered for this position. Requests for extensions will not be granted. If applying online poses a hardship for you, you must speak to someone in the Servicing Personnel Office listed on this announcement PRIOR TO THE CLOSING DATE for assistance. Contact Jennifer Farrell at +1-303-236-9566 or [jfarrell@usgs.gov](mailto:jfarrell@usgs.gov).

The OARS system can be accessed at [www.usgs.gov/ohr/oars/](http://www.usgs.gov/ohr/oars/). The announcement number is: CR-2007-0587. The salary range is \$46,597-60,574, depending upon qualifications. The closing date is October 26, 2007.

U.S. citizenship is required. USGS is an Equal Opportunity/Affirmative Action Employer.

**DEPARTMENT OF GEOLOGICAL SCIENCES  
COLLEGE OF NATURAL SCIENCE & MATHEMATICS  
CALIFORNIA STATE UNIVERSITY-FULLERTON**

**Hydrogeochemist, Tenure Track**

The Department of Geological Sciences at California State University Fullerton invites applications for a tenure-track, Assistant Professorship that will begin August 2008. The successful candidate is expected to develop an active, field-based, externally-funded research program in Hydrogeochemistry involving undergraduate and Master's students and must be committed to excellence in teaching the diverse student population at CSU Fullerton. A Ph.D. in Geological Sciences is required at the time of appointment.

Teaching responsibilities will include general education classes (e.g., oceanography, physical geology) and upper-division/graduate courses (e.g., aqueous geochemistry and/or contaminant transport, hydrogeology/hydrology) in the candidate's field of expertise. The department places a strong emphasis on field-based instruction in all class offerings. For a complete description of the requirements, go to <http://diversity.fullerton.edu/>.

The Department currently has approximately 80 undergraduate majors, 25 MS students and 12 full-time faculty. Fullerton's location offers convenient access to coastal, mountain, and desert environments, providing many opportunities for field-based research and instruction. Abundant collaborative research and teaching opportunities exist within the Departments of Geological Sciences, Biological Sciences, Chemistry and Biochemistry and the Environmental Studies Program. Applicants are encouraged to visit <http://geology.fullerton.edu/> for additional information regarding research and curriculum.

To apply, please send (1) a detailed curriculum vitae; (2) a letter of application; (3) a teaching statement that includes: a discussion of relevant course work and/or experience in preparation for teaching, a list of courses you would feel comfortable teaching, and a statement of your teaching philosophy; (4) a statement of your future research plans and goals; and (5) letters of recommendation from at least three references familiar with your teaching and research potential. Applicants and referees should send materials directly to: Search Committee Chair, Department of Geological Sciences, California State University, 800 N. State College Blvd., Fullerton, California 92834-6850.

Applications will be accepted until the position is filled. To insure full consideration, submit all application materials by November 19, 2007.

CSU Fullerton is an Equal Opportunity/Title IX/503/504/VEVRA/ADA Employer.

**BRYN MAWR COLLEGE  
GEOLOGY/LAB COORDINATOR**

The Geology department seeks to fill an ongoing non-tenure track position beginning August 2008. Primary responsibilities include teaching the laboratory sections of three introductory courses each year in physical, historical and environmental geology and supervising advanced undergraduate teaching assistants. The suc-

cessful candidate may also supervise undergraduate research projects and will offer one course each year in her or his specialty. The field of specialization is open, but should complement that of present faculty. Candidates should have a strong interest in teaching. Those holding a Ph.D. are preferred.

Members of the department will be at the Denver GSA meeting in October. Applicants should send a letter describing teaching interests, a curriculum vitae, and addresses of three references by December 6, 2007, to Search, Department of Geology, Bryn Mawr College, 101 North Merion Avenue, Bryn Mawr, PA 19010, USA.

Located in suburban Philadelphia, Bryn Mawr College is a highly selective liberal arts college for women who share an intense intellectual commitment, a self-directed and purposeful vision of their lives, and a desire to make meaningful contributions to the world. Bryn Mawr comprises an undergraduate college with 1,200 students, as well as coeducational graduate schools in some humanities, sciences, and social work. The College supports faculty excellence in both teaching and research, and participates in consortial programs with the University of Pennsylvania, and Haverford and Swarthmore Colleges. Bryn Mawr College is an equal-opportunity, affirmative action employer. Minority candidates and women are especially encouraged to apply.

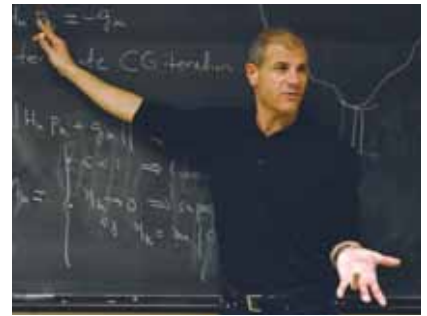
**INDIANA UNIVERSITY-PURDUE UNIVERSITY,  
FORT WAYNE (IPFW), STRUCTURAL GEOLOGY/  
NEOTECTONICS/APPLIED GEOPHYSICS**

IPFW seeks to fill a full-time, tenure-track position at the Assistant Professor level in structural geology/neotectonics/applied geophysics. The successful applicant for the position will have a Ph.D. and be expected to share with other faculty responsibilities for teaching introductory geology, introductory planetary geology, introductory climatology, and regional field geology. Over a multi-year cycle, the successful applicant will teach additional courses in his/her specialty, including structural geology and geomorphology. Familiarity and experience with GIS will be a plus. Geosciences faculty are expected to maintain an active research program and to involve undergraduate students in research. IPFW's geology research program is well-supported in both equipment (e.g. thin section lab, SEM, XRD) and opportunities for new faculty.

There are four other full-time faculty in the department. IPFW is a comprehensive university. Send a letter of application, statement of teaching and research interests, curriculum vitae, copies of transcripts, and the names and contact information for three references to: Prof. J. Farlow, Search Committee Chair, Department of Geosciences, Indiana University-Purdue University, Fort Wayne, 2101 East Coliseum Boulevard, Fort Wayne, IN 46805, USA. Review of applications will begin November 1, 2007. IPFW is an equal opportunity, equal access, affirmative action university.

**EARTH SYSTEM SCIENCE—LEHIGH UNIVERSITY**

The Department of Earth and Environmental Sciences has a tenure-track opening at the Assistant Professor level for an Earth System Scientist who conducts research in the near-surface environment where biological, geological, hydrological, atmospheric and human processes interact. We seek an individual doing innovative research, ideally with observations and modeling directed toward understanding the processes that control the behavior of the global environment and its response to natural and anthropogenic forcing at geologic to modern time scales. Fields of interest include, but are not limited to biogeochemistry, climatology, oceanography, glaciology, geobiology, and ecosystem ecology. We expect the successful candidate to develop a vigorous externally funded research program, teach a course in their field of expertise, contribute to our undergraduate and graduate curricula, and mentor Ph.D., M.S., and undergraduate students. This position is one of several new hires in Earth and Environmental Sciences, engineering, and the social sciences expected to participate in a university wide, multidisciplinary initiative focusing on the environment. To receive full consideration, applicants should submit by November 15th a letter of application, curriculum vitae, statement of research and teaching interests, up to 3 reprints, and the names of three referees to Prof. Dork Sahagian, Search Committee Chair, Department of Earth and Environmental Sciences, 31 Williams Drive, Lehigh University, Bethlehem, PA 18015, USA. For further information about the EES Department, see [www.ees.lehigh.edu/](http://www.ees.lehigh.edu/). Lehigh University is an Equal Opportunity Affirmative Action Employer. The College of Arts and Sciences at Lehigh is especially interested in qualified candidates who can contribute, through their



**NEW HIRES IN  
GEOSCIENCE EDUCATION**

The Jackson School of Geosciences seeks individuals attracted to the challenge of geoscience education at the university level. As leaders in geoscience pedagogy, candidates should excel as teachers and developers of courses set in field, laboratory, and lecture environments. The new hires may also contribute to the Jackson School's commitment to educate the wider community of the public and K-12 pre-college students.

We encourage applications from those with proven records of teaching and related experience at the college level. Candidates are expected to hold a PhD degree in the geosciences or a closely related field. Additional credentials may include experience in securing external funding, and a record of publications related to geoscience education. Opportunities exist for appointments as Lecturer, Senior Lecturer, Adjunct Faculty, or tenure-track Faculty, depending upon credentials and interests. Appointments will be primarily within the Department of Geological Sciences, but may include affiliations with the Jackson School's main research units, the Bureau of Economic Geology or the Institute for Geophysics. The schedule of appointment is negotiable.

Send inquiries and applications (cover letter, CV, publications) to: Office of the Chairman / Department of Geological Sciences / Jackson School of Geosciences, The University of Texas at Austin / 1 University Station C1100 / Austin, TX 78712-0254 or [jobs@jsg.utexas.edu](mailto:jobs@jsg.utexas.edu).

For more information on the school and its hiring program visit us online at [www.jsg.utexas.edu/hiring](http://www.jsg.utexas.edu/hiring).

THE UNIVERSITY OF TEXAS AT AUSTIN IS AN  
AFFIRMATIVE ACTION / EQUAL OPPORTUNITY EMPLOYER

THE UNIVERSITY OF TEXAS AT AUSTIN  
**JACKSON**  
SCHOOL OF GEOSCIENCES

CHANGING THE WORLD OF GEOSCIENCES



research, teaching, and/or service, to the diversity and excellence of the academic community.

**TENURE TRACK FACULTY POSITION(S)  
STRUCTURAL GEOLOGIST AND GEOPHYSICIST  
PHYSICS DEPARTMENT.**

The Physics Department at Cal Poly—San Luis Obispo is seeking one or two geoscientists for full-time, academic year tenure-track position(s) beginning 9/8/08. **STRUCTURAL GEOLOGIST**—We seek one individual capable of teaching structural geology, field-geology methods, and geologic mapping to science majors. The primary duties and responsibilities of the structural geologist position also include teaching introductory-level geology courses, with the possibility of teaching seismology to engineering majors and students pursuing a Geology Minor. **GEOPHYSICIST**—A second position may be filled by a geophysicist capable of teaching seismology to engineering majors and students pursuing a Geology Minor, and who is willing and able to teach introductory Physics courses and laboratories. Candidates for either position must have a Ph.D. in Geology or related field. All requirements for the Ph.D. must be completed prior to 9/8/08. Candidates must provide evidence of potential for high quality teaching. Both positions require directing undergraduate research projects complementing the candidates' own professional development program. Structural geologists having experience in teaching and conducting research based on field-geologic mapping and interested in seismology, as well as geophysicists interested in classical physics are encouraged to apply. The successful candidate(s) will contribute to the Geology Minor and Earth Sciences Major programs at Cal Poly, and will interact with a quaternary geologist/geomorphologist, as well as Earth and Soil Sciences Department faculty. Salary is commensurate with qualifications and experience. To apply, please visit [www.calpolyjobs.org](http://www.calpolyjobs.org), complete a required on-line faculty application and apply to Requisition #101415. Attach a cover letter, your résumé, and a statement of professional goals. Make sure to link your on-line application specifically to the Physics Department requisition. Please see on-line posting for instructions for mailing three letters of recommendation.

Positions are open until filled; review of applications will begin 12/3/07. Applications received after this date may be considered. On campus interviews with finalists are expected to commence in mid-January 2008. For information about the Physics Department please see [www.calpoly.edu/~phys](http://www.calpoly.edu/~phys). For questions please contact the Physics Dept. at +1-805-756-1752, or [physics@calpoly.edu](mailto:physics@calpoly.edu). Cal Poly is strongly committed to achieving excellence through cultural diversity. The university actively encourages applications and nominations of all qualified individuals. EEO.

## Opportunities for Students

**Visiting Fellowships—Institute for Rock Magnetism.** Applications are invited for visiting fellowships (regular and student) lasting for up to 10 days during the period from July 1 through December 31, 2008. Topics for research are open to any field of study involving fine particle magnetism, but preference will be given to projects relating magnetism to geological or environmental studies, or to fundamental physical studies relevant to the magnetism of Earth materials.

A limited number of travel grants of up to \$750 are available to cover actual travel costs. No funds are available for per diem expenses. Application forms and information necessary for proposal preparation may be obtained from IRM manager Mike Jackson at the address below, or online at [www.irm.umn.edu](http://www.irm.umn.edu).

Short proposals (two pages, single-spaced text plus two forms and necessary figures and tables) are due by October 30, 2007, for consideration by the IRM's Review and Advisory Committee. Successful applicants will be notified in December 2007. Proposals should be sent by e-mail to [irm@umn.edu](mailto:irm@umn.edu), or by post to: Facilities Manager, Institute for Rock Magnetism, University of Minnesota, 291 Shepherd Laboratories, 100 Union St. SE, Minneapolis, MN 55455-0128, USA.

**M.S. and Ph.D. Positions in Hydrogeology, University of Missouri—Columbia.** Applicants are invited for new M.S. and Ph.D. student opportunities in hydrogeology in the Department of Geological Sciences at the University of Missouri—Columbia. Our research is focused on flow

and transport processes in sedimentary rocks. Ongoing and new projects include carbon sequestration, groundwater flow and contaminant transport through karst aquifers, transport of sediment through karst aquifers, the formation of sediment-hosted base metal mineral deposits, flow of hydrocarbons and water in viscous and visco-elastic porous media. We use a wide range of complementary analytical geochemical, numerical modeling, and field-based tools in our research, and have excellent resources for research on site and through collaborations with other institutions. Stipends for student positions are available through both research and teaching assistantships, depending on the project, and currently pay at least a nine-month academic year salary of between \$15,000 and \$17,000. Applications are being sought for positions beginning in both January and August, 2008. For more information, please contact Dr. Martin Appold ([appoldm@missouri.edu](mailto:appoldm@missouri.edu); 1-573-882-0701) or Dr. Carol Wicks ([wicks@missouri.edu](mailto:wicks@missouri.edu); 1-573-882-3231), or visit our department Web site at <http://geology.missouri.edu/>.

**UCLA Ion Microprobe Student Workshop (Nov. 12–16, 2007).** The W.M. Keck Foundation Center for Isotope Geochemistry at UCLA invites interested graduate or prospective graduate students to attend a five day workshop for research training in ion microprobe applications. We seek motivated applicants involved in geochemical, geochronologic, cosmochemical, biogeochemical, or environmental research that can benefit from the relatively non-destructive capability of ion microprobes to obtain high spatial resolution elemental and radiogenic/stable isotopic compositions from solid materials. The workshop will occur within UCLA's National Facility for SIMS (secondary ionization mass spectrometry) research (<http://sims.ess.ucla.edu/>) which features a high-resolution, high sensitivity CAMECA ims 1270. SIMS theory and hands on instruction will be provided by UCLA faculty and researchers associated with the facility. NSF's Instrumentation and Facilities program will sponsor travel, accommodation costs, and course materials. Please submit applications via: <http://sims.ess.ucla.edu/SIMSWORKSHOP2007.html>. Successful applicants will be notified by 9/15/07.

# UNIVERSITY OF WYOMING

## *Aqueous and Environmental Geochemistry*

The Department of Geology and Geophysics at the University of Wyoming invites applications for a tenure-track Assistant Professor position in the broadly defined area of aqueous and environmental geochemistry beginning in August 2008.

We are interested in promising scientists in fields of research including, but not restricted to, aqueous and environmental geochemistry, mineral-fluid interface geochemistry, microbiological geochemistry, reactive and contaminant transport, watershed chemistry and weathering, and groundwater geochemistry. The successful candidate will be involved in the undergraduate and graduate teaching mission of the Department of Geology and Geophysics, and will be expected to develop an active externally funded research program that complements and expands upon departmental strengths.

The Department of Geology and Geophysics has well-equipped and staffed laboratories for SEM, XRD, EPMA, TIMS for radiogenic isotopes, and a full range of aqueous geochemical analyses from automated titrations to ICP-MS. Several user facilities on campus afford easy access to a wide variety of analytical techniques, from stable isotope analysis to PCR. The Department of Geology and Geophysics is working closely with the newly created School of Energy Resources (SER), an institute dedicated to energy-related teaching and research in support of state, national, and international energy-related activities (including carbon sequestration, environmental impact, and renewable energy resources). The Helga Otto Haub School of Environment and Natural Resources and William D. Ruckelshaus Institute also offer venues for integrating research across disciplinary boundaries. Additional information on the Department Geology and Geophysics can be obtained at <http://home.gg.uwyo.edu/>. Information about the School of Energy Resources is available at <http://uwacadweb.uwyo.edu/SER/> and the Haub School and Ruckelshaus Institute at <http://www.uwyo.edu/ENR/enrschool.asp>.

Applications should include a statement of research and teaching interests and accomplishments, curriculum vitae, and the names and contact information for three individuals who can provide letters of evaluation. Review of completed applications will begin November 1, 2007; however, applications will be accepted until January 31, 2008. Send an electronic copy of your application to: Ms. Carol Pribyl at [cpribyl@uwyo.edu](mailto:cpribyl@uwyo.edu); if you have additional application materials to send, please direct them to the Geochemistry Search Committee, Department of Geology and Geophysics, University of Wyoming, 1000 East University Avenue, Dept. 3006, Laramie, WY 82071-2000.

The University of Wyoming is an equal opportunity/affirmative action employer.

## Fellowship Opportunities

### INTERDEPARTMENTAL POSTDOCTORAL FELLOWSHIP IN GEOSCIENCES AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University ([www.geology.yale.edu](http://www.geology.yale.edu)) seeks applicants for a postdoctoral fellowship in research that links geosciences (studies of the solid earth, oceans, atmosphere, climate, and the evolution of life) with other sciences, including, for example, astronomy and astrophysics; environmental studies; physics; chemistry; biology; engineering; anthropology; medical science and public health; economics and political science.

This Postdoctoral Associate position is awarded for two years, contingent on satisfactory progress, and provides a stipend (\$48,000/yr) and base research funds (\$5,000/yr), plus health care benefits and expenses for relocation.

The Interdepartmental Postdoctoral Fellowship will have at least two faculty collaborators: the primary sponsor will be from Geology and Geophysics, while others are from one or more other Yale departments. Interested candidates should first contact a faculty member in Geology and Geophysics to define a research theme and to identify other appropriate faculty collaborators.

Applicants should submit a curriculum vita, a list of publications, an interdisciplinary research proposal (2–3 pages, in which the Yale collaborators are identified), and a brief letter of endorsement from each of the Yale faculty collaborators. Applicants should also arrange for three reference letters to be sent directly to the Department. The deadline for receipt of all application materials is January 2, 2008, and decisions will be announced by February 29, 2008. Successful candidates are expected to begin their program at Yale between July 1 and December 31, 2008.

Application materials and reference letters should be sent by e-mail to [interdepartmental.fellowship@geology.yale.edu](mailto:interdepartmental.fellowship@geology.yale.edu)

or by post: Interdepartmental Postdoctoral Fellowship, Yale University, Department of Geology and Geophysics, PO Box 208109, New Haven, CT 06520-8109, USA. Yale University is an equal opportunity/affirmative action employer; applications from women and minority scientists are strongly encouraged.

### BATEMAN POSTDOCTORAL FELLOWSHIPS IN GEOSCIENCES AT YALE UNIVERSITY

The Department of Geology and Geophysics at Yale University ([www.geology.yale.edu](http://www.geology.yale.edu)) announces an annual competition for one or more Bateman Postdoctoral Fellowships. We welcome applicants with research interests across the full range of disciplines within the Earth Sciences, including studies of the solid earth, oceans, atmosphere, climate dynamics, geochemistry, paleoclimatology, and the evolution of life. Each of these Postdoctoral Associate positions is awarded for two years, providing a stipend (\$48,000/yr) and base research funds (\$5,000/yr), plus health care benefits and expenses for relocation. Applicants should contact a sponsor in the Department to identify potential research projects, and then submit a short (2–3 pages) statement of research interests and proposed research, a curriculum vita, and list of publications. Applicants should also arrange for three reference letters to be sent directly to the Department. The deadline for receipt of all application materials is January 2, 2008, and decisions will be announced by February 29, 2008. Successful candidates are expected to begin their program at Yale between July 1 and December 31, 2008.

Application materials and reference letters should be sent by e-mail to [bateman.fellowship@geology.yale.edu](mailto:bateman.fellowship@geology.yale.edu) or by post: Bateman Postdoctoral Fellowship, Yale University, Department of Geology and Geophysics, PO Box 208109, New Haven, CT 06520-8109, USA. Yale University is an equal opportunity/affirmative action employer; applications from women and minority scientists are strongly encouraged.

## RADCLIFFE INSTITUTE FOR ADVANCED STUDY HARVARD UNIVERSITY fellowships

The Radcliffe Institute for Advanced Study at Harvard University awards fully funded fellowships each year. Radcliffe Institute fellowships are designed to support scientists of exceptional promise and demonstrated accomplishment. Scientists, in any field, with a doctorate in the area of the proposed project by December 2006 are eligible to apply. Only scientists who have at least two published articles or monographs are eligible to apply.

The stipend amount of \$70,000 is meant to compliment sabbatical leave salaries of faculty members. Fellows receive office space, computers and high speed links, and access to libraries and other resources of Harvard University during the fellowship year, which extends from early September 2008 through June 30, 2009. Residence in the Boston area is required as is participation in the Institute community. Fellows are expected to present their work-in-progress and to attend other fellows' events.

For more information, including lists of present and past fellows, visit our Web site at [www.radcliffe.edu](http://www.radcliffe.edu). Applications are due by December 3, 2007. Apply on-line or write, call, or e-mail for an application:

Radcliffe Application Office  
34 Concord Avenue  
Cambridge, MA 02138 617-496-3048  
[science@radcliffe.edu](mailto:science@radcliffe.edu)  
[www.radcliffe.edu](http://www.radcliffe.edu)

# Journal Highlights

### Geology—October 2007

- Cosmogenic Dating and Fault Movement: Let's Talk Turkey!
- Perfect Preservation Paints Pictures of Paleozoic Paleobiodiversity
- Origin of Archean Chert: Silicon Isotopes Separate Significant Sources
- Deconstructing the Martian Layer Cake

### GSA Bulletin—September/October 2007

- Chicxulub ejecta dysfunction
- Nested volcanoes for Canaries
- Exposed in California: Land use practices laid bare

### Geosphere—October 2007

- Weaving a whole-earth metamodel
- Cutting our faults down to size
- Quiet zones and jumping ridges



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## Celebrity meets science: Hollywood's environmentalism and its effect

**Amy Gajda**, Department of Journalism, College of Communications, University of Illinois, Gregory Hall, 810 S. Wright Street, Urbana, Illinois 61801, USA, [agajda@uiuc.edu](mailto:agajda@uiuc.edu);

**Susan W. Kieffer**, Department of Geology, University of Illinois, 1301 W. Green Street, Urbana, Illinois 61801, USA, [skieffer@uiuc.edu](mailto:skieffer@uiuc.edu)

Leonardo DiCaprio, movie star, stares out from the cover of the May 2007 issue of *Vanity Fair*. He looks both serious and sad. He's wearing a black parka and crampons, perfect for exploring the icy wilderness around him. The ice at DiCaprio's feet is melting, and nearby sits a baby polar bear, looking up at him as would an adoring fan. The polar bear also looks sad.

### THE GREEN ISSUES OF VANITY FAIR

So begins the second annual "Green Issue" of *Vanity Fair*, the high-flying magazine's ambitious, in-your-face attempt to convince its readership that climate change, sustainability, and greenhouse gases are of critical and immediate concern. A quote from Theodore Roosevelt in tiny, filigreed typeface fades into the melting ice almost like an editor's afterthought: "The conservation of natural resources is the fundamental problem. Unless we solve that problem it will avail us little to solve all others."

It's clear that the magazine's marketing department (one that boasts of a total audience of 6.3 million for *Vanity Fair* and readers with an average income of \$72,303<sup>1</sup>) believed that a photo of DiCaprio, not a quote from Roosevelt, and certainly neither photographs nor words from the Intergovernmental Panel on Climate Change, would sell magazines.

The more important marketing question should be: Can Hollywood celebrities sell to the masses the need for urgent action on the environmental problems that we face?

### CELEBRITY ACTIVISTS: THE PROS

The easy, superficial answer to whether Hollywood can sell the need for urgent action would be "Yes, of course!" One can reach that conclusion simply by looking at the apparently successful advertising and marketing strategies featuring celebrities currently underway.

Toyota, for example, has credited movie stars Cameron Diaz and Tim Robbins as the perhaps unintentional leaders of the Prius movement after the two showed up at the 2003 Academy Awards in separate Prius hybrids. A Toyota communications executive told the *San Francisco Chronicle* that such a happening was "the kind of advertising that money could never buy."<sup>2</sup>

*Vanity Fair*, the magazine that once featured a very pregnant and nude Demi Moore on its cover, would certainly agree that celebrities have the power to influence. When the first green issue hit the newsstands in May 2006, it featured on the cover not a scientist who had done research on global warming or an unknown environmental activist but Julia Roberts, George Clooney, Al Gore, and Robert Kennedy, Jr., all wearing shades of green. Breathless environmental coverage gushed that this edition proved that environmentalism was super cool and that green was glam<sup>3</sup>. The *Toronto Sun* punned that global warming was suddenly hot<sup>4</sup>, and the *Denver Post* noted that the first green issue helped to signal a "tipping point" in America's grasp of global warming<sup>5</sup>. The movement has been labeled a "bandwagoning social change" by *New York* magazine<sup>6</sup>. The *Hartford Courant* opined that "[g]reen is the new black" and "[e]co is chic" and "eco consciousness has the stamp of hip," attributing the trend in part to "celebrities like Leo DeCaprio."<sup>7</sup>

Suddenly, and perhaps thanks in part to the linking of celebrity and cause in *Vanity Fair*, "melting ice caps" were "way hotter" than any other social movement in Tinseltown, according to *Defamer*, a celebrity-watch Web site.<sup>8</sup> A *Good Morning America* report credited "a young, elite, and very sexy group" of celebrities as the power behind the new movement.<sup>9</sup>

<sup>1</sup>*Vanity Fair* media kit, circulation/demographics, [www.condenastmediakit.com/vf/circulation.cfm](http://www.condenastmediakit.com/vf/circulation.cfm).

<sup>2</sup>Zinko, C., Take one wee car, add glitz ... zoom! 19 June 2006: *San Francisco Chronicle*, p. A1.

<sup>3</sup>Two examples: Kyles, K., Eco-Tripping: It's cool to go green. 14 August 2006: *Chicago Tribune*, p. 6; White, J., It's easier to be posh and green. 12 May 2006: *Orlando Sentinel*, p. E4.

<sup>4</sup>Giese, R., Time to think green. 14 April 2006: *Toronto Sun*, p. 23.

<sup>5</sup>Kennedy, L., Gore rides earth-alert momentum. 28 May 2006: *The Denver Post*, p. F1.

<sup>6</sup>Andersen, K., So we're green. Now what? 23 April 2007, *New York*, <http://nymag.com/news/imperialcity/30635/>.

<sup>7</sup>Morago, G., Eco chic: The marketplace has figured out there's green in being green. 22 April 2007: *Hartford Courant*, p. H1.

<sup>8</sup>*Defamer*, "Hollywood trendwatch: Melting ice caps way hotter than passé pandemic!" 14 June 2006: Newstex Web Blogs, <http://defamer.com/hollywood/celeb-activism/hollywood-trendwatch-melting-ice-caps-way-hotter-than-passe-pandemic-180701.php>.

<sup>9</sup>Sawyers, D., and R. Roberts, Transcript: Brad, Cameron, Leo, Edward go green. 11 January 2007: ABC News, *Good Morning America*.



Even *Women's Wear Daily* acknowledged the celebrity push behind the green movement, writing that "green giants" like DiCaprio were using "their celebrity status to keep the environment high on everyone's agenda."<sup>10</sup>

## AND CONS

But not all that's Tinsel turns to gold. Not everyone is impressed when a major Hollywood star speaks out on a social issue.

And, sure enough, the sniping about celebrities started almost immediately upon the publication of *Vanity Fair's* green issues. Some questioned the celebrities' true motivation, believing it to be publicity-driven, while others suggested that celebrities say one thing and do another. In October 2006, celebrity news Web site TMZ.com featured a story titled "Celebs who claim they're green but guzzle gas."<sup>11</sup> Julia Roberts recycles plastic bags and drinks from a reusable coffee cup? George Clooney drives an electric car? That's not enough!

A green-inspired Internet poster on the *Grist* environmental news site called this particular celebrity cause "superficial greenness."<sup>12</sup> A contributor to the *Washington Times* went further, suggesting that the "cute faces" of DiCaprio and the polar cub merely covered "enough journalistic toxic waste to put Love Canal to shame."<sup>13</sup> The *National Review* called DiCaprio an "eco-porn centerfold," and wondered if the cover shot had "more to do with celebrity and *V.F.'s* own corporate desire for profit" than environmentalism.<sup>14</sup>

Not only are journalists skeptical, even the general public seems wary of the "fakeness factor." After all, they don't call Hollywood "Silicone Valley" (a pun on Silicon Valley) for nothing. In June 2007, the *Washington Post* asked its readers, "Do Hollywood star-activists help bring attention to global problems, or do they get in the way of those who know what they're doing?"<sup>15</sup> While most readers were somewhat supportive and found such celebrity work mostly harmless, others responded that they viewed celebrity causes with great skepticism, writing that they rolled their eyes after hearing about celebrities' new causes. Some found them "comical" or wondered about the true motivation behind a celebrity's philanthropic work.

This brings us back to the photograph on the cover of the second *Vanity Fair* green issue, featuring Leonardo DiCaprio and the little polar bear cub. It turns out that the cover itself is not what it seems. As *Vanity Fair* editors explained in the magazine's short "On the Cover" feature (p. 18): "Knut, the cub on our cover, was born in the Berlin Zoo. We brought him together with Leonardo DiCaprio the only way we could, in a photomontage." *Vanity*

*Fair* then acknowledged that "there are no polar bears in Iceland" where Annie Leibovitz shot the pictures of DiCaprio on melting ice, but, it warned, in a seemingly desperate attempt to link polar bear and celebrity, that "[i]f current trends continue, there won't be any [polar bears left] in Canada either."

## SCIENCE AND CELEBRITY: A HAPPY ENDING?

Not as many commentators took smirking advantage of this photomontage as one might think, and that in itself may forecast a coming change in the way some skeptics view celebrity environmentalism. Could it be that the old Hollywood adage that any publicity is good publicity also applies to problems that scientists care about?

Reverend Richard Cizik of the National Association of Evangelicals is credited in the first *Vanity Fair* green issue with turning the religious right on to global warming concerns through Biblical references.<sup>16</sup> Cizik told the *Los Angeles Times* that many celebrities are now rightly moving beyond partisan politics and are, instead, "reaching out to tell a vital story." He suggested that even skeptical conservatives will listen to those stories.<sup>17</sup>

In the end, celebrities probably won't play a particularly powerful role in Earth's future. They can only do so much, with limited scientific knowledge and typical Hollywood shooting schedules. But they may influence many others to care, and that could lead to powerful changes.

Just about the time the second *Vanity Fair* green issue hit mailboxes and newsstands, a poll taken by the *Washington Post*, *ABC News*, and Stanford University showed that one-third of Americans believe that global warming is the most important environmental problem facing the world today, more than double from the year before, and that seven people out of ten surveyed believe that the federal government should take more action to help sustain the environment.<sup>18</sup>

Whether this change in opinion is due to the diligent and careful work of scientists, to Al Gore and *An Inconvenient Truth*, or to input from Tinseltown stars remains an intriguing question. But it cannot be bad that this awareness is happening. The movement just may continue if those movie stars who support the environment can stay out of the tabloids and move their greenness into publications that reach a wider audience.

## ACKNOWLEDGMENT

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<sup>10</sup>Groves, E., Cool to care. April 10, 2007: *Women's Wear Daily*, Supplement, p. 6.

<sup>11</sup>Celebrities who claim they're green but guzzle gas. 18 October 2006: TMZ.com, [www.tMZ.com/2006/10/18/celebs-who-claim-theyre-green-but-guzzle-gas](http://www.tMZ.com/2006/10/18/celebs-who-claim-theyre-green-but-guzzle-gas).

<sup>12</sup>Zarconi, Green Fad, posted 12 April 2007, in response to van Schagen, S., *Vanity Fair's* green issue, part deux. 11 April 2007: *Grist*, Environmental News and Commentary: Gristmill, <http://gristmill.grist.org/story/2007/4/10/175348/588>.

<sup>13</sup>Gainor, D., Commentary: Green issues the place to be. 22 April 2007: *Washington Times*, p. B3.

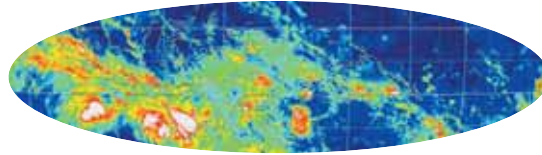
<sup>14</sup>Spencer, R., A green vanity affair. 10 April 2007: *National Review Online*, <http://article.nationalreview.com/?q=YTE0MTc3ZGFkYWVhN2Q5Y2NhYzRkMDM2ZTUwYTBlkN2I=>.

<sup>15</sup>Igantius, D., F. Zakaria, and N. Ahn, Celebrities help or hurt global causes? posted 11 June 2007: [www.washingtonpost.com](http://www.washingtonpost.com), PostGlobal, [http://newsweek.washingtonpost.com/postglobal/2007/06/celebrities\\_help\\_or\\_hurt\\_globa/](http://newsweek.washingtonpost.com/postglobal/2007/06/celebrities_help_or_hurt_globa/).

<sup>16</sup>The Good Reverend. May 2006: *Vanity Fair*; p. 194.

<sup>17</sup>Goldstein, P., Believers preach gospel of green. 10 October 2006: *Los Angeles Times*, p. E1.

<sup>18</sup>Eilperin, J., and J. Cohen, Growing number of Americans see warming as leading threat. 20 April 2007: *The Washington Post*, p. A20. Poll results: [www.washingtonpost.com/wp-srv/nation/polls/postpoll\\_environment\\_042007.html](http://www.washingtonpost.com/wp-srv/nation/polls/postpoll_environment_042007.html).



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