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Cover: View southwest across Laguna del Maule, Chile, from near the summit of the vent for the Holocene rhyolite flows of Cari Launa at 3030 masl. The 1.2 km$^3$ of brown glassy lava comprising the central lakeshore in the middle of the photo is the late Holocene rhyolite coulée of Las Nieblas, whose vent is 12.7 km away. The center of maximum uplift measured using InSAR geodesy is in the bay just to the right (north) of the Nieblas rhyolite. Nathan Andersen is collecting pumice blocks for geochemical and geochronological study. Photo by Brad Singer, 6 April 2013. See related article, p. 4–10.

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Erratum: In the October 2014 issue of GSA Today (v. 24, no. 10, p. 29) the date of death for James B. Thompson Jr. was given as 1 June 2014. The correct date of death for Dr. Thompson is 15 November 2011.
Dynamics of a large, restless, rhyolitic magma system at Laguna del Maule, southern Andes, Chile

Brad S. Singer*, Nathan L. Andersen, Hélène Le Mével, Kurt L. Feigl, Charles DeMets, Basil Tikoff, Clifford H. Thurber, Brian R. Jicha, University of Wisconsin–Madison, Dept. of Geoscience, Madison, Wisconsin 53706, USA; Carlos Cardona, Observatorio Volcánologico de los Andes del Sur (OVVAS) and SERNAGEOMIN, Chile, and Universidad de Concepción, Chile; Loreto Córdova, Fernando Gil, Observatorio Volcánologico de los Andes del Sur (OVVAS) and SERNAGEOMIN, Chile; Martyn J. Unsworth, University of Alberta, Dept. of Physics, 116 Street and 85 Ave., Edmonton, Alberta T6G 2R3, Canada; Glynn Williams-Jones, Craig Miller, Dept. of Earth Sciences, Simon Fraser University, 8888 University Drive, Burnaby, British Columbia V5A 1S6, Canada; Judy Fierstein, Wes Hildreth, and Jorge Vazquez, U.S. Geological Survey, 345 Middlefield Road, MS 977, Menlo Park, California 94025, USA

ABSTRACT

Explosive eruptions of large-volume rhyolitic magma systems are common in the geologic record and pose a major potential threat to society. Unlike other natural hazards, such as earthquakes and tsunamis, a large rhyolite volcano may provide warning signs long before a caldera-forming eruption occurs. Yet, these signs—and what they imply about magma-crust dynamics—are not well known. This is because we have learned how these systems form, grow, and erupt mainly from the study of ash flow tuffs deposited tens to hundreds of thousands of years ago or more, or from the geophysical imaging of the unerupted portions of the reservoirs beneath the associated calderas. The Laguna del Maule Volcanic Field, Chile, includes an unusually large and recent concentration of silicic eruptions. Since 2007, the crust there has been inflating at an astonishing rate of at least 25 cm/yr. This unique opportunity to investigate the dynamics of a large rhyolitic system while magma migration, reservoir growth, and crustal deformation are actively under way is stimulating a new international collaboration. Findings thus far lead to the hypothesis that the silicic vents have tapped an extensive layer of crystal-poor melt in the shallow crust, nor has it captured the dynamics that preceded these large eruptions.

This paper focuses on the Laguna del Maule Volcanic Field, Chile, a large, potentially hazardous, rhyolitic magmatic system, where an alarming rate of surface uplift for the past seven years and concentrated swarms of shallow earthquakes prompted Observatorio Volcánologico de los Andes del Sur (OVVAS) to declare in March 2013 a yellow alert, signaling a potential eruption within months or years. Straddling the Andean range crest at 36°S (Fig. 1A), this volcanic field features: (1) 13 km3 of rhyolite that erupted both explosively and effusively during the past 20 k.y.; (2) a zone of low electrical resistivity in the shallow crust below the deforming area; (3) widespread elevated CO2 concentrations; and (4) a negative (~10 mGal) Bouguer anomaly and preliminary evidence for a positive dynamic gravity signal indicating mass addition.

The underlying magma system has been sampled by eruptions numerous times since its apparent inception in the late Pleistocene, including a dozen crystal-poor, glassy rhyolitic lavas during the Holocene. Linking the assembly and evolution of this

INTRODUCTION

Caldera-scale rhyolitic volcanoes can rapidly deposit hundreds of cubic kilometers of ash over several million square kilometers, threatening people and agriculture at the scale of an entire continent (Sparks et al., 2005; Lowenstern et al., 2006; Self, 2006). Sooner or later, Earth will experience another eruption of this magnitude (Lowenstern et al., 2006; Self and Blake, 2008); consequently, there is a need to gather comprehensive information and create multi-scale models that realistically capture the dynamics leading to these destructive events. Most of our current understanding of this type of volcanic system has been gleaned from the study of eruptive products long after the catastrophic eruption, including voluminous ash flow deposits, such as the Bishop, Bandelier, Huckleberry Ridge, and Oruanui Tuffs (Lowenstern et al., 2006; Hildreth and Wilson, 2007; Bachmann and Bergantz, 2008; Wilson, 2008). The most recent rhyolitic “super-eruption” produced the Oruanui Tuff 26,500 years ago in New Zealand. Even in this relatively recent case, the geologic evidence has been partly obliterated by caldera-collapse, erosion, and burial (Wilson et al., 2005). Moreover, probing the present-day structures beneath a number of calderas using seismic tomography (e.g., Romero et al., 1993; Steck et al., 1998; Farrell et al., 2014) or other geophysical measures (e.g., Lowenstern et al., 2006; Battaglia et al., 2004; Tizzani et al., 2009) has not detected eruptible domains of crystal-poor melt in the shallow crust, nor has it captured the dynamics that preceded these large eruptions.

This unique opportunity to investigate the dynamics of a large rhyolitic system while magma migration, reservoir growth, and crustal deformation are actively under way is stimulating a new international collaboration. Findings thus far lead to the hypothesis that the silicic vents have tapped an extensive layer of crystal-poor, rhyolitic melt that began to form atop a magmatic mush zone that was established by ca. 20 ka with a renewed phase of rhyolite eruptions during the Holocene. Modeling of surface deformation, magnetotelluric data, and gravity changes suggest that magma is currently intruding at a depth of ~5 km. The next phase of this investigation seeks to enlarge the sets of geophysical and geochemical data and to use these observations in numerical models of system dynamics.

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large, youthful system on geologic time scales to magma-crust interactions over human time scales while it is actively growing is an exciting frontier for multidisciplinary research. Here we present initial findings, although the ultimate goal is to use these, together with seismic and other data yet to be acquired, in novel ways to create and test a unified computational model of how these hazardous systems operate.

THE LAGUNA DEL MAULE VOLCANIC FIELD

Geology, Geochronology, Geochemistry

The Laguna del Maule volcanic field is 230 km east of the epicenter of the $M_{w}$ 8.8 Maule earthquake of 27 February 2010, atop one of the most seismically and volcanically active subduction zones on Earth (Fig. 1A). Geologic mapping and $^{40}$Ar/$^{39}$Ar geochronology reveal that 350 km$^3$ of lavas and tuffs of basaltic to rhyolitic composition erupted during the Pleistocene (Hildreth et al., 2010). Previous large-volume explosive silicic eruptions are recorded by a 1.5 Ma dacitic ignimbrite and a 950 ka rhodacitic tuff associated with the Bobadilla caldera (Fig. 1B). Activity culminated in a spectacular concentric ring of 36 separate postglacial silicic eruptions between 25 ka and perhaps as recently as 2 ka or later. These most recent eruptions were from 24 vents and produced 15 rhodacite and 21 rhyolite coulées and lava domes. The vents encircle the 23.5 $\times$ 16.5 km lake basin, with the 36 silicic flows comprising 6.4 km$^3$ of mainly phenocryst-poor glassy lava covering $>100$ km$^2$ of the 300 km$^2$ basin (Fig. 1B). Pumice and ash fall deposits associated with the explosive phase of each rhyolitic eruption are preserved in Argentina and likely are equal in volume to these lava flows (Fierstein et al., 2013). This is the greatest concentration of post-glacial rhyolite in the Andes. The only comparable Holocene rhyolite flare-up globally comprises $>4$ km$^3$
of rhyolite lava and tephra that occur along the 15 km Mono Craters chain in California (Hildreth, 2004). Building on Hildreth et al. (2010) and Singer et al. (2000), ongoing efforts to determine the ages of youngest lavas using the $^{40}$Ar/$^{39}$Ar method and distal ash beds using $^{14}$C indicate that silicic volcanism is concentrated in two phases separated by a 5–10 k.y. period during which eruptions were relatively small and less frequent (Andersen et al., 2013; Fierstein et al., 2013) (Fig. 2). Coincident with deglaciation, phase 1 began with the eruption of the rhyolite east of Presa Laguna del Maule (unit rep; Fig. 1B). Following this eruption, numerous andesitic flows and rhyodacitic domes were erupted, primarily along the western shore of the lake. Phase 1 culminated in the eruption of two high-silica rhyolite flows at 22.5 and 19 ka—respectively, the rhyolite of Arroyo Palacios (unit rap) and the Espejos Rhyolite (unit rle). Phase 2 began in the Holocene with the eruption of the earliest Barrancas complex (unit rcb) at the southeastern end of the lake (Figs. 1B and 2B). Rhyolitic eruptions continue into the late Holocene in the southern and eastern basin at the Cari Launa (units rsl, 3.5 ka, and rcf), Divisoria (unit rcd, 2.2 ka), and Nieblas (unit rln) eruptive centers. The eruption rate increased with time, with the phase 2 average nearly double that of phase 1 (Fig. 2C).

The post-glacial magma compositions are remarkably co-linear in variation diagrams, reflecting the strong imprint of crystal fractionation (Hildreth et al., 2010). However, the post-glacial eruptions do not record a monotonic trend toward more evolved compositions. While phase 2 eruptions are dominantly rhyolitic, several andesitic, rhyodacitic, and mixed eruptions occurred on the western periphery of the basin, including the mid- to late-Holocene succession of a rhyodacite lava (rdcn), andesite scoria (asm), and a rhyodacite dome (rdsp), each erupted from a contiguous vent system in the northwestern part of the basin (Fig. 1B) (Hildreth et al., 2010). Moreover, the rhyolite lavas display coherent temporal trends in trace element compositions (Figs. 2D–2F), reflected in coeval rhyolites on opposite sides of the lake having nearly identical major and trace element compositions.

Whereas there have been few mafic eruptions in the past 20 k.y., textural and chemical evidence that mafic magma has intruded to shallow depths is clear. Quenched inclusions of basaltic andesite are common in the early post-glacial rhyodacites (Fig. 2G), indicating physical interactions between hot mafic magma and cooler silicic magmas. While the rhyolite lavas are notably free of such inclusions, the 100 °C range and temporal trend in pre-eruptive magma storage temperatures are consistent with reheating of the silicic system by recent mafic intrusion (Fig. 2A). Reconnaissance measurements of soil gas have revealed emissions of CO$_2$ of between 0.5% and 1.0% (vol.) throughout the basin and up to 7% (vol.) along the northern lakeshore. Because the solubility of CO$_2$ in rhyolite is limited (e.g., Lowenstein et al., 2006), these findings suggest that the inflation may reflect intrusion of mafic magma.

Phenocrysts in large silicic ash flow tuffs reveal magma residence times up to several hundred thousand years (Costa, 2008; Reid, 2008; Simon et al., 2008; Wotzlaw et al., 2013). However, these estimates are complicated by diverse crystal populations, including autocrysts that crystallized from the erupted melt, antecrysts that may have grown from earlier melts, and xenocrysts from wallrocks (Charlier et al., 2004; Cooper and Reid, 2008). Using a sensitive high-resolution ion microprobe–reverse geometry (SHRIMP-RG) instrument and secondary ion mass spectrometry, $^{230}$Th/$^{238}$U disequilibrium dates were obtained from the outer surfaces of zircons in the <2 ka Nieblas rhyolite (Andersen et al., 2013). Model ages range from ca. 2 ka to 42 ka, demonstrating
zircon residence and assembly of the system over as much as 40 k.y. (Fig. 2H).

Geodetic and Geophysical Evidence of Current Processes, Unrest, and System Structure

The Laguna del Maule volcanic field is currently deforming at an exceptionally high rate. Using interferometric analysis of synthetic aperture radar (InSAR) data, Fournier et al. (2010) found the rate of surface deformation to be negligible from January 2003 to February 2004, but that inflation accelerated rapidly between 2004 and 2007. Using InSAR data acquired between 2007 and 2012, Feigl et al. (2014) found uplift rates exceeding 280 mm/yr (Fig. 3). Feigl et al. (2014) modeled the source as a 9.0 × 5.3 km inflating sill at a depth of 5.2 km, assuming a rectangular dislocation in a half space with uniform elastic properties. From January 2004 to April 2012, the total increase in volume was 0.15 km³. The high rate of deformation is confirmed by continuous Global Positioning System (cGPS) measurements at five OVDAS stations between 2012 and 2014 (Fig. 3) (Le Mével et al., 2013; Feigl et al., 2014). During this ongoing episode of unrest, the rate of deformation at Laguna del Maule has been among the highest ever measured at a volcano that is not actively erupting. For example, the remarkable inflation episodes at Yellowstone (Chang et al., 2010) and Santorini (Newman et al., 2012) calderas occurred at rates 2–5 times slower than at Laguna del Maule (Fig. 3). Uplift at Uturuncu volcano, in the Central Andes above the vast and deep Altiplano Puna magma body, is an order of magnitude slower than at Laguna del Maule (Henderson and Pritchard, 2013; del Potro et al., 2013). The inferred rate of magma intrusion at Laguna del Maule of 0.03 km³/kyr is twice that at Santorini (Parks et al., 2012).

The electrical resistivity of crustal rocks is sensitive to temperature, fluid content, and the degree of hydrothermal alteration (Unsworth and Rondenay, 2013). The resistivity structure around Laguna del Maule was investigated with commercial magnetotelluric (MT) surveys commissioned for geothermal exploration by Alterra Power in 2009–2011. A subset of these MT data have been used to create both 2-D and 3-D inversion models. The 3-D inversion used the algorithm of Siripunvaraporn et al. (2005), and a representative model is shown in Figure 4. It shows a zone of low resistivity under the western half of Laguna del Maule at a depth of ~5 km below the surface. This feature likely represents a magma body and an associated hydrothermal system (Fig. 4). The resistivity values of this feature are consistent with a zone of 10%–20% rhyolitic melt with the water and Na₂O concentrations determined from the recently erupted rhyolites (Pommier and Le Trong, 2011) (Fig. 2). The location agrees very well with the inflation source inferred from the geodetic data (Fig. 3).

In the area of maximum uplift along the southwestern shores of Laguna del Maule, 30-m-thick outcrops of Late Pleistocene diatomaceous lacustrine sediments are weakly tilted, cut by numerous normal faults with centimeters of offset, and may reflect long-term uplift over decades (Hildreth et al., 2010; Andersen et al., 2013). These observations are consistent with the radial pattern of deformation observed geodetically.

Of 223 located earthquakes in the vicinity of Laguna del Maule recorded by the five OVDAS seismometers between April 2011 and January 2014, 154 (69%) are shallower than 5 km, and 91% of these had a local magnitude ≤2, with most occurring beneath the recent Nieblas (rhn) and Barrancas (rcb) rhyolite vents, along the periphery of the uplifting region (Fig. 5). Both

![InSAR interferogram spanning 14 Apr. 2013 to 25 Jan. 2014. One fringe denotes 15.5 mm of range change between satellite and ground.](image-url)
short-period volcano-tectonic (VT) and long-period earthquakes are concentrated in these zones. On 11–12 January 2013 OVDAS recorded a swarm of 240 VT earthquakes of M ≤ 1.3 located ~9 km SW of the lake at depths shallower than 5 km (Fig. 5). This earthquake swarm may have resulted from presurization of fluids and faults distal to an intruding body of magma (e.g., Manga and Brodsky, 2006).

To evaluate the mass changes at depth—and constrain the contribution of fluids and/or magma to the uplift signal—we are also conducting a dynamic gravity study in order to evaluate temporal changes. Using three gravimeters, a network of 37 stations (Fig. 1B) was installed in April 2013 and re-occupied in January 2014. Preliminary results suggest widespread positive residual gravity changes (>30 µGal) throughout the lake basin during the ten months between occupations. A ~10 mGal gravity low exists along the western margin of the lake, as delineated by the reconnaissance study of Honores (2013). Our dynamic gravity network will also expand this Bouguer survey to help delineate the magma body below the lake.

CURRENT HYPOTHESES, CONCLUSIONS, AND FUTURE WORK

The “magmatic mush” model of Hildreth (2004) and Hildreth and Wilson (2007) was developed to explain volcanological, petrological, and structural observations of the Long Valley magma system from which the compositionally and thermally zoned crystal-poor rhyolite of the 650 km³ Bishop Tuff erupted at 767 ka. In this model, the magma system comprises a relatively thin boundary layer of granitoid that solidified against the country rocks, inboard of which is a rigid “sponge” of mainly crystals with minor interstitial melt. Within this rigid zone is an extensive reservoir of crystal-rich mush that is maintained in a partially molten state via fluxing of heat and mafic magma through the basal parts of the crustal reservoir. The amalgamation of melt-rich lenses near the roof creates a low-density barrier that blocks the ascent of mafic magma to the surface (Hildreth, 2004). The crystal-poor, melt-dominated zone near the roof of such a system is a magma chamber that may be tapped to feed rhyolitic eruptions.

Our observations—including the basin-wide, temporally correlated, chemical evolution; the distribution of silicic vents ringing the lake basin during the past 25 k.y. (Fig. 1B); the juxtaposition of peripheral mafic and bimodal eruptions with the central ring of rhyolites that are devoid of mafic inclusions; the high rate of surface deformation; MT evidence of a large body of fluid at a depth of 5 km; the concentration of shallow earthquakes; zircon phenocrysts that record ~40 k.y. of magma residence; and changes in gravity—collectively support the working hypothesis in Figure 6. We propose that the silicic vents have tapped crystal-poor, rhyolitic melt that segregated from an extensive crystal-rich mush zone that had become established beneath much of the basin by ca. 20 ka, as indicated by eruption of units rle, rap, rdac, and ras (Fig. 1B). Crystal-poor melt later fueled the Holocene rhyolite eruption of units rsl, rcl, rcd, rng, rcb, and rln. What remains unclear is whether a crystal-poor rhyolitic melt layer that intercepts mafic recharge magma at deep levels currently caps the entire magmatic system or, alternatively, if the current unrest reflects a singular intrusive event rebuilding toward such a configuration.
The model of Jellinek and DePaolo (2003) relates magma supply, wallrock viscosity, and the volume of eruptible magma in a chamber. For the Laguna del Maule system, we estimate a recurrence interval of one dike-fed eruption every ~1000 years to generate the 24 silicic vents and take this as the elastic pressurization time $t_e$. Constraints on the long-term magma supply rate, $Q$, are as follows: The minimum value of $Q$ of 0.0005 km$^3$/yr assumes an eruptive volume of 13 km$^3$ of silicic magma over the past 25 k.y. that includes an estimate of tephra volume equal to that of the lavas (Fierstein et al., 2013). The maximum value of $Q$ of 0.03 km$^3$/yr is based on the model of an inflating sill needed to drive the ongoing deformation by Feigl et al. (2014). These parameters suggest that the magma body (melt + mush) supplying rhyolite into dikes that have erupted has a volume of at least 100 km$^3$ and more likely several hundred cubic kilometers (see figure 6 in Jellinek and DePaolo, 2003). As the magma body takes on a flattened, disc-shaped form via lateral spreading, hoop stresses concentrate at the intrusion’s edges, allowing dikes to form around its periphery—consistent with the spatial distribution of vents at Laguna del Maule (Jellinek and DePaolo, 2003).

Testing the hypothesis outlined in Figure 6 using a variety of geophysical, geochemical, and computational approaches is now an important goal of our team, and it is highlighted at http://geoscience.wisc.edu/rhyolitic/. For example, using an array of temporary seismometers to augment the OVDAS network, passive source seismology can provide both (a) a synoptic image of the seismic structure of the crust, and (b) evidence for temporal change in the magmatic system. The electrical resistivity survey by Alterra Power was planned to image the geothermal system northwest of Laguna del Maule. These data clearly detect the low resistivity body beneath the lake (Fig. 4) that is likely an accumulation of melt. However, the station spacing is insufficient to define the geometry of this magma body. A dense array of MT stations within the basin would allow the 3-D geometry of the magma body to be better defined and give more robust estimates of the resistivity that can lead to improved constraints on the quantity and composition of magma. Similarly, as station density is increased, further changes in the gravity field may be detected at a spatial resolution that can resolve fluid/magma pathways, the geometry of the magma reservoir, and whether the source responsible for the uplift is intruding magma or lower density hydrothermal fluid. Continuing the InSAR and GPS measurements will ensure that changes in seismicity or the gravity field are measured coeval with the deformation. Studies of trace element zoning in phenocrysts in the rhyolites are under way, in parallel with expanded $^{230}$Th/$^{234}$U dating of zircons, to constrain the number, extent, and timing of mixing events between mafic and silicic magmas, and the longevity of the silicic reservoir. Quantifying the flux and isotopic composition of diffuse CO$_2$ would help gauge the addition of any basaltic magma. Mapping of fault displacements in the uplifted lacustrine sediments may help quantify long-term deformation rates. These sets of geophysical and geochemical observations will be used in numerical models at a variety of scales, including micro- and meso-scale magma chamber simulations linked directly to a macro-scale finite element model of crustal deformation. The aim is to create a unified model of magmatic system dynamics using Laguna del Maule as the example.

Figure 6. Hypothesized magmatic system feeding the crystal-poor rhyolitic eruptions encircling Laguna del Maule (adapted from Hildreth, 2004). Section is SW-NE along bent line in Figure 1B. Observations support inferences shown here, including: (1) rapid uplift, (2) shallow earthquakes, (3) active intrusion of mafic magma at 5 km depth, and (4) normal faulting and geodetic data that record extension.

ACKNOWLEDGMENTS

Hildreth and Fierstein were supported by the U.S. Geological Survey and Servicio Nacional de Geología y Minería of Chile, leading to the map on which Fig. 1B is based and the eruptive history in Boletín 63. Support includes NSF RAPID grant EAR-1322595, NASA grant NNX12AO37G, a student research grant from the Geological Society of America, and Canadian NSERC Discovery and Mitacs-Accelerate grants. The 3-D MT inversion was performed on the high performance cluster developed by Compute Canada/Westgrid using an algorithm provided by Weerachai Siripunvaraporn. We thank Catherine Hickson and Alterra Power for sharing MT data. The “Alcalde del Mar,” don Luis Torres, is thanked for hospitality and assistance in safely navigating the windswept Laguna. We are grateful for assistance from Neal Lord, Tor Stetson-Lee, Erin Birsic, Nico Garibaldi, Meagan Ankeny, Brian Beard, Clark Johnson, and Marsha Lidzbarski. Comments by Calvin Miller and two anonymous reviewers improved the manuscript.

REFERENCES CITED


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With deepest appreciation, the Museum acknowledges Kathryn W. Davis for her generous founding support.

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Fellow GSA members and friends, it was with mixed emotions that I submitted my resignation to President Hap McSween on 1 July 2014. My last day will be Friday, 2 Jan. 2015. It is time for change, for me and the Society. I have served as your Executive Director for 13 exciting and sometimes challenging years. As I looked back over the years, the Society has accomplished a lot by all of us working together. We righted the ship financially, opened a Geoscience Policy office in Washington, D.C., increased our global engagement, enhanced our education and outreach activities, grew the number of presented abstracts at our Annual Meetings, strengthened our commitment to inclusion and diversity in our profession, launched two new journals, jumped into social media with both feet, made GSA and GSA Foundation a fully functioning team, and started down the path to changing the Society’s publishing model to Gold Open Access.

Taking on the GSA Executive Director position after 27 years with the Desert Research Institute in Nevada was a life changing experience. I leave the GSA Executive Director position after 13 years of learning the association world, more fully engaging in public policy, and spending countless hours of travel domestically and internationally to raise the visibility of GSA and its wonderful programs, and to build strong relationships around the globe. It has been an experience that I would not trade for anything.

The Society has grown in many ways during my time as Executive Director. Membership has increased 55% to 26,400, the number of Divisions has grown from 13 to 18, Interdisciplinary Interest Groups have been created, and the number of Associated Societies has increased from 27 to 70, with several more pending. We have done this while slowly growing the GSA budget and staff in a way that has enabled GSA to weather the economic downturn and slow recovery over the past six years.

As I write this letter, a search is under way for my replacement. The hope is to have someone named by the end of December and on board shortly after the first of the year.

I am planning to build upon my commitment to GSA by soon occupying a different chair. On 26 Jan. 2015, after a three-week vacation, I will begin serving as the GSA Foundation President (part-time). Thus, I will continue to engage in GSA leadership, meetings, and other programs, plus continue to interact with all of you in a different role of working to increase the funds that the Foundation provides to the Society for its many varied programs.

I wish all of you and GSA the very best in the future. GSA and the GSA Foundation are embarking on an exciting experiment with a change in GSA’s publishing paradigm. We will all look back at this time in GSA’s history as a significant turning point for the Society.

Thank you for all that you have done and will do to support the Society and the Foundation.

Jack Hess, GSA Executive Director, December 2014
2015 GSA Medals and Awards

• Penrose Medal
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• Young Scientist Award (Donath Medal)
• GSA Public Service Award
• Bromery Award for Minorities
• GSA Distinguished Service Award
• Doris M. Curtis Outstanding Woman in Science Award
• Geologic Mapping Award
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Nomination deadline: 1 Feb. 2015.

GSA Fellowship

Elevation to GSA Fellowship is an honor bestowed on the best of our profession at each spring GSA Council meeting. GSA Fellows may support two nominees each year but only one as a primary nominator, and GSA members who are not Fellows may be secondary nominators for up to two nominees.

Nomination deadline: 1 Feb. 2015.

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. To submit a nomination, go to www.agiweb.org/direct/awards.html.

Nomination deadline: 1 Feb. 2015.

AGI Marcus Milling Legendary Geoscientist Medal

The Marcus Milling Legendary Geoscientist Medal is given to a recipient with consistent contributions of high-quality scientific achievements and service to the Earth sciences having lasting, historic value; who has been recognized for accomplishments in field(s) of expertise by professional societies, universities, or other organizations; and is a senior scientist nearing completion or has completed full-time regular employment. To submit a nomination, go to www.agiweb.org/direct/awards.html.

Nomination deadline: 1 Feb. 2015.

2015 National Awards

• National Medal of Science: www.nsf.gov/od/nms/medal.jsp.
• Vannevar Bush Award: www.nsf.gov/nsb/awards/bush.jsp.
• Alan T. Waterman Award: www.nsf.gov/od/waterman/waterman.jsp.

Nomination deadlines vary.

John C. Frye Environmental Geology Award

In cooperation with the Association of American State Geologists and supported by endowment income from the GSA Foundation’s John C. Frye Memorial Fund, GSA makes an annual award for the best paper on environmental geology published either by GSA or by a state geological survey.

Nomination deadline: 31 March 2015.

2015 Student Research Grants

Applications will be accepted online only beginning early December. Paper applications or letters will not be accepted.

Submission deadline: 2 Feb. 2015 at 5 p.m. (MST) to www.geosociety.org/grants/gradgrants.htm.

2015 Post-Doctoral Research Awards

The following post-doc research awards are available. Learn more at www.geosociety.org/grants/postdoc.htm.

Application deadline: 1 Feb. 2015.

• The Gladys W. Cole Memorial Research Award for research on the geomorphology of semi-arid and arid terrains in the United States and Mexico is awarded annually to a GSA member or Fellow between 30 and 65 years of age who has published one or more significant papers on geomorphology.

• The W. Storrs Cole Memorial Research Award for research on invertebrate micropaleontology is awarded annually to a GSA member or Fellow between 30 and 65 years of age who has published one or more significant papers on micropaleontology.
Writing a Successful GSA Grant Proposal

Each year, GSA funds approximately half of the proposed graduate student research grants it receives. In addition to providing our graduate student members with the means to complete their research, this program gives them an introduction to the all-important skill of proposal writing. Here, we provide some suggestions to help the next generation of scientists develop this skill. To augment this piece, consult resources at www.geosociety.org/grants/ap_tips.htm, and look for our workshop at next year's GSA Annual Meeting.

As with all grant proposals, GSA has rules that you need to read and follow if you hope to get funded. Before you begin writing, read the policies and procedures at www.geosociety.org/grants/gradgrants.htm. Note the deadline—NO LATE SUBMISSIONS! Also note the eligibility requirements and what items are permitted in your budget. For more information, visit the GSA Research Grants Program website at www.geosociety.org/grants.htm. Note the deadline—NO LATE SUBMISSIONS! Also note the eligibility requirements and what items are permitted in your budget.

Your proposal will be evaluated on six factors: how well you address each of the four sections, your figure, and the overall writing in your proposal. The four sections ask you to:

1. Present the problem, hypotheses, and overall project objectives;
2. Discuss the scientific and, if appropriate, societal importance of your project;
3. State your research plan and how it will test your hypotheses; and
4. Provide an itemized budget with detailed justification for each item.

The core task of your proposal is to identify a real scientific question or problem, develop hypotheses, convince the reviewers that it is an important problem worthy of funding, that you have a plan for testing your hypotheses, and that you have carefully identified the costs involved in conducting your study. The vast majority of funded studies follow the scientific method (i.e., problem identification, propose hypotheses, develop/conduct tests, and evaluate hypotheses based on results). A subordinate number involve discrete solutions to a problem (e.g., probability of an area/facility being inundated by lava as part of a volcanic hazard assessment). In either case you must clearly relate why and to whom the results of your study will be important. The best proposals focus on a scientific problem rather than starting with a specific field area. The motivation for your study cannot simply be “because nobody has studied this before.”

Your research plan must describe in detail the steps you will take to address your question. A common mistake here is the lack of connection between problem/hypotheses from the first two sections and the tasks proposed in this section. Because your planned study should test a hypothesis, state clearly how your proposed research will accomplish this task. This can be as simple as “Since the goal of this study is to determine if this fault was active during the Sevier Orogeny or Miocene extension, I will determine U/Pb zircon ages of intrusions emplaced concomitant with slip on the fault.”

Show that your work plan is carefully thought out, with methods that are necessary and sufficient to address the problem. Provide specific details: If you are mapping, what features, where, and at what scale? If collecting or analyzing samples, what, how many, with what methods or equipment? The scope of work must also be reasonable for the time frame you propose.

In many proposals, the budget section is treated as an afterthought. Nothing could be further from the truth; one of the easiest means of being denied funding is to include disallowed items in your budget. Your budget should be as explicit and realistic as possible. Determine the actual costs in detail (e.g., sample analysis, campsite and vehicle rentals, airfare, and baggage fees) and provide them on a per-sample/day/night/mile basis. Justify every item listed in the budget.

Perhaps the most important part of your proposal is your figure. This is your chance to present a figure that can explain what would require paragraphs of text. Location maps and photos of the fossil/mineral/etc. you are working on are great, but is it the best use of your figure? The strongest proposals tend to use multi-box figures illustrating the concepts to be tested in their studies. Design a figure specifically for your study. Be sure your graphics are clear, high resolution, and use text that is legible at a normal, full-page viewing scale. A well-written caption is also very helpful. Include legends and scale bars, and use colors and annotations that make the figure intuitive to understand.

Finally, take care with the proposal’s language and writing style. Start paragraphs with strong topic sentences and keep the rest of the paragraph on topic. Avoid unnecessary technical jargon—the reviewers are professional earth scientists but may be outside of your study’s discipline. Explain and minimize acronyms (three or fewer). Check and re-check grammar and spelling. Check the math in your budget. Cite the work of others properly (the reviewers might have published on your topic!), using the superscripted reference numbering system to save space. And make sure that you have addressed the topic of each section and connected them logically to each other (problem/hypotheses-importance-research plan-budget/justification).

Constructing a solid proposal not only improves your chance of receiving GSA funds, it also sets the stage for a successful research plan to generate interesting and useful results that the scientific community will want to see.

Good luck!

Paul H. Wetmore and Amy Draut East, GSA Committee on Research Grants
2015 Student Research Grants

Submission deadline: 2 February 2015 at 5 p.m. MST

GSA is proud to offer research grants to its highly qualified student members. The primary role of the GSA research grants program is to provide partial support of master’s and doctoral thesis research in the geological sciences for graduate students enrolled in universities in the United States, Canada, Mexico, and Central America. In 2014, US$683,535 was awarded to 401 graduate students (52% of the 774 who applied), with an average grant of US$1,680.

Students may receive a total of two GSA graduate student grants in their entire academic career, regardless of what program they are currently enrolled in. The maximum award per grant is US$2,500.

The GSA student research grant application process is available online only at www.geosociety.org/gradgrants.htm; no paper applications or letters will be accepted.

For further information, call +1-303-357-1028, or e-mail awards@geosociety.org.

New Color Editions of Two Classic Roadside Geologies

ROADSIDE GEOLOGY OF ALASKA
Second Edition
CATHY CONNOR
Alaska, with the highest peak in North America, extensive glaciers, and breathtaking fjords, is a state full of superlatives. Discover how all these features developed in the new edition of our Alaska guide.
328 pages • 6x9 • full-color illustrations
$26.00, paper • Item #245

ROADSIDE GEOLOGY OF OREGON
Second Edition
MARLI B. MILLER
Oregon’s list of geologic superstars is long: it includes Crater Lake, Mt. Hood, the Columbia River Gorge, and more. Learn about them all with this new edition of a classic Roadside guide.
400 pages • 6x9 • full-color illustrations
$26.00, paper • Item #246
From the Proterozoic to the Anthropocene: All the Right Stuff

LOCATION

The 49th annual meeting of GSA’s North-Central Section will take place in the Frank Lloyd Wright–designed Monona Terrace Convention Center in Madison, Wisconsin, USA. The meeting will feature technical sessions and field trips that highlight the geologic diversity of the region, from the Precambrian Baraboo Hills, to Paleozoic sedimentary rocks exposed in the nearby Driftless Area, to glacial features along the Ice Age Trail, to effects of recent human activities on Earth’s water and mineral resources, and to new approaches to analysis of geoscience data and educating the next generation of geoscientists.

REGISTRATION

Meeting registration will open in early February. The deadline for early registration is 13 April 2015.

CALL FOR PAPERS

Abstract deadline: 17 Feb. 2015

Submit your abstract online at www.geosociety.org/Sections/nc/2014mtg/techprog.htm. Abstract submission fees: US$10 for students; US$15 for all others. If you cannot submit an abstract online, please contact Heather Clark, +1-303-357-1018, hclark@geosociety.org.

In addition to Theme Sessions, we are soliciting abstracts for general sessions in the following areas: geochemistry, economic geology, paleontology, geochronology, geophysics and geodynamics, structural geology, limnology, Quaternary geology, sedimentology, and stratigraphy. Please direct questions on these sessions to the technical program co-chairs: Michael Cardiff, cardiff@wisc.edu, and Eric Carson, eric.carson@uwex.edu.

Theme Sessions

T1. Precambrian Geology of the Great Lakes Region. Samuel R. Castonguay, Univ. of Wisconsin–Eau Claire, castonsr@uwec.edu; Esther K. Stewart, Wisconsin Geological & Natural History Survey.

T2. Shortening, Shearing and Stretching the Midcontinent: Geologic and Geophysical Records of Proterozoic Tectonics. Stephen Marshak, Univ. of Illinois at Urbana-Champaign, smarshak@illinois.edu; Marcia Bjornerud, Lawrence Univ.; John P. Craddock, Macalester College; Dyanna M. Czeck, Univ. of Wisconsin–Milwaukee; Laurel B. Goodwin, Univ. of Wisconsin–Madison; L. Gordon Medaris Jr., Univ. of Wisconsin–Madison; Carol Ormand, SERC–Carleton College.

T3. Quantitative Approaches in Stratigraphy and Paleontology: Where Are We Going, and How Will We Get There? Stephen Meyers, Univ. of Wisconsin–Madison, smeyers@geology.wisc.edu; Shanan Peters, Univ. of Wisconsin–Madison.


T5. Coming Full Circle: From Diagenesis to Modern Aquifer Chemistry—Exploring the Role of Water-Rock Interactions over Time. John Luczaj, Univ. of Wisconsin–Green Bay, luczajj@uwgb.edu.


T7. Quaternary Time Machine: Methods and Analyses of Soils and Sediments Reveal Secrets of Past Environments. Maija Sipola, Minnesota State Univ.–Mankato, maija.sipola@mnsu.edu; Kat Rocheford, Univ. of Iowa.

T8. Non-Glacial Quaternary Research in the Great Lakes Region. Henry Loope, Indiana Geological Survey, hloope@indiana.edu; Andy Breckenridge, Univ. of Wisconsin–Superior.

T9. Quaternary Paleoecology of the Upper Midwest. Carrie Eaton, Univ. of Wisconsin–Madison, carrie@geology.wisc.edu; Matthew Hill, Iowa State Univ.


T11. Geomorphology, Hydrology, and Critical Zone Processes in the Anthropocene. Alison M. Anders, Univ. of Illinois, amanders@illinois.edu; E. Arthur Bettis III, Univ. of Iowa.

T12. Lowland and Wetland Flooding under Changing Climate and Regulatory Conditions. Kyle Fredrick, California Univ. of Pennsylvania, fredrick@calu.edu; John Skalbeck, Univ. of Wisconsin–Parkside.

T14. Frac Sand in the Midwest: Geology, Mining, Reclamation, and Environmental Issues. Kent Syverson, Univ. of Wisconsin–Eau Claire, syverskm@uwec.edu; Holly Dolliver, Univ. of Wisconsin–River Falls.


T16. Applied Geology: Environmental, Engineering, Hydrogeology, Geotechnical, and Applied Geophysics. Terry R. West, Purdue Univ., trwest@purdue.edu.

T17. New Advances in the Use of GIS in Geologic Mapping and Analysis (Posters). Stephen Crabtree, Univ. of Minnesota–Morris, crabt012@morris.umn.edu.

T18. From Virtual to Real and Back Again: Emerging 3-D Applications in Paleontology. Joseph E. Peterson, Univ. of Wisconsin–Oshkosh, petersonj@uwosh.edu; Christopher R. Noto, Univ. of Wisconsin–Parkside.

T19. Teaching and Learning Earth Science: K–16 Educational Pedagogy. Katie Lewandowski, Eastern Illinois Univ., kjlewandowski@eiu.edu; Carolyn R. Sparks, Northwest Missouri State Univ.

T20. Geology in the Classroom and the Community: Reaching a Broader Audience. Mike Phillips, Illinois Valley Community College, mike_phillips@ivcc.edu.

T21. Geoheritage and Place-Based Education. Erika Vye, Michigan Tech Univ., ecvye@mtu.edu; Emily Gochis, Michigan Tech Univ., William Rose, Michigan Tech Univ.


T23. Earth Science Week Activities and Events. Katie Lewandowski, Eastern Illinois Univ., kjlewandowski@eiu.edu.

T24. Student Research (Posters). Cosponsored by the Council on Undergraduate Research Geoscience Division. Robert R. Shuster, Univ. of Nebraska–Omaha, rshuster@unomaha.edu.

T25. New Insights into the Midcontinent Rift and Continental Rifting. Seth Stein, Northwestern University, seth@earth.northwestern.edu; Carol Stein, Univ. of Illinois–Chicago, cstein@uic.edu.

FIELD TRIPS

For additional information, please contact the field trip co-chairs: Phil Brown, pbrown@geology.wisc.edu, and Esther Stewart, esther.stewart@uwex.edu.

Quaternary Geology along the Southwest Margin of the Green Bay Lobe (Including a Hike on the Ice Age National Scenic Trail). David Mickelson, Univ. of Wisconsin–Madison, mickelson@geology.wisc.edu; John Attig, Wisconsin Geological & Natural History Survey, jwattig@wisc.edu; Eric Carson, Wisconsin Geological & Natural History Survey, eric.carson@uwex.edu.

Late Cenozoic Evolution of the Lower Wisconsin River Valley. Eric Carson, Wisconsin Geological & Natural History Survey, eric.carson@uwex.edu; Elmo Rawling III, elmo.rawling@uwex.edu.


What’s New at Baraboo? A Field Trip for Educators. Laurel B. Goodwin, Univ. of Wisconsin–Madison; laurel@geology.wisc.edu; Marcia Bjornrud, Lawrence Univ., marcia.bjornerd@lawrence.edu; John P. Craddock, Macalester College, craddock@macalester.edu; Dyanna M. Czeck, Univ. of Wisconsin–Milwaukee, dyanna@uwm.edu; Robert H. Dott Jr., Univ. of Wisconsin–Madison, rdot@geology.wisc.edu; Stephen Marshak, Univ. of Illinois at Urbana-Champaign, smarshak@illinois.edu; Carol Ormand, SERC–Carleton College, cormand@geology.wisc.edu.

Cliffs, Crater, and Culture: The Geology of Wisconsin’s Door Peninsula. Joanne Kluessendorf, Weis Earth Science Museum, joanne.kluessendorf@uwc.edu; Donald G. Mikulic, Illinois State Geological Survey, mikulic@illinois.edu.

Cambrian and Ordovician Stratigraphy of Southwestern Wisconsin. Jay Zambito, Wisconsin Geological & Natural History Survey, jay.zambito@uwex.edu; Pat McLaughlin, Wisconsin Geological & Natural History Survey, patrick.mclaughlin@uwex.edu.

ACCOMMODATIONS

A block of rooms has been reserved at the Hilton Madison Monona Terrace, 9 East Wilson Street, Madison WI 53703, USA, connected via bridge to the Monona Terrace Community and Convention Center. Group room rates range from US$149 to US$359 plus tax. To make your reservation, call +1-866-403-8838 or follow the link at www.geosociety.org/Sections/n/2015mtg/. Use code “NCRC” when making your reservation to ensure that you are booked into the specially priced GSA block.

Madison, Wisconsin, USA. Photo courtesy GMCVB.
OPPORTUNITIES FOR STUDENTS

Presentation Awards

Awards for best student posters and papers are supported by the GSA North-Central Section and by SEPM (Society for Sedimentary Geology).

On To the Future (OTF)

Stop by the GSA Foundation booth at the Welcome Reception to ask an onsite representative about applying to OTF, which provides travel support to students underrepresented in the geosciences to attend their first GSA Annual Meeting (the next one is 1–4 Nov. 2015 in Baltimore, Maryland, USA).

Mentor Programs

Cosponsored by the GSA Foundation. For more information, contact Jennifer Nocerino at jnocerino@geosociety.org.

Roy J. Shlemon Mentor Program in Applied Geoscience. Tues., 19 May, lunchtime. Students will have the opportunity to discuss career prospects and challenges with professional geoscientists from multiple disciplines over a FREE lunch. Learn more at www.geosociety.org/mentors/shlemon.htm.

John Mann Mentors in Applied Hydrogeology Program. Wed., 20 May, lunchtime. Students interested in applied hydrogeology or hydrology as a career will have the opportunity to network with professionals in these fields over a FREE lunch. Learn more at www.geosociety.org/mentors/mann.htm.

Geoscience Career Workshops

Cosponsored by the GSA Foundation. For more information, contact Jennifer Nocerino at jnocerino@geosociety.org.

Part 1: Career Planning and Informational Interviewing. Tues., 19 May, 8 a.m.–9 a.m. Your job-hunting process should begin with career planning, not when you apply for jobs. This workshop will help you begin this process and will introduce you to informational interviewing.

Part 2: Geoscience Career Exploration. Tues., 19 May, 9 a.m.–10 a.m. What do geologists in various sectors earn? What do they do? What are the pros and cons to working in academia, government, and industry? Workshop presenters, and when possible, professionals in the field, will address these issues.

Part 3: Cover Letters, Résumés, and CVs. Wed., 20 May, 9 a.m.–10 a.m. How do you prepare a cover letter? Does your résumé need a good edit? Whether you are currently in the job market or not, learn how to prepare the best résumé possible. You will review numerous résumés helping you to learn important résumé dos and don’ts.

LOCAL COMMITTEE

General Chair: Jean Bahr, jmbahr@geology.wisc.edu
Vice-Chair, Exhibits, Sponsorship: M. Carol McCartney, carol.mccartney@uwex.edu
Technical Program Co-Chairs: Michael Cardiff, cardiff@wisc.edu; Eric Carson, eric.carson@uwex.edu
Field Trip Co-Chairs: Phil Brown, pbrown@geology.wisc.edu; Esther Stewart, esther.stewart@uwex.edu
Student Poster Awards: J. Elmo Rawling, elmo.rawling@uwex.edu

GSA Member in the News

GSA Fellow Sean C. Solomon has been awarded the National Medal of Science, the nation’s highest honor for achievement and leadership in advancing science. Solomon will receive his medal at a White House ceremony with President Barack Obama later this year. Solomon is director of Columbia University’s Lamont-Doherty Earth Observatory and principal investigator of NASA’s mission to Mercury. Learn more at www.ldeo.columbia.edu/news-events/lamont-doherty-director-awarded-national-medal-science.
Second Announcement

SOUTH-CENTRAL SECTION

49th Annual Meeting of the South-Central Section, GSA
Stillwater, Oklahoma, USA
19–20 March 2015
www.geosociety.org/sections/sc/2015mtg/

Geosciences at the Crossroads of America: Integrating Geosciences to Address Complex Problems

LOCATION

The 49th annual meeting of GSA’s South-Central Section will take place in Stillwater, Oklahoma, USA, in the student union building at Oklahoma State University (OSU). OSU has provided an intersection of geologic disciplines since the inception of its Boone Pickens School of Geology, with a history in petroleum, water, and agriculture. Our meeting is during the spring break for the campus, giving us the run of the largest student union in the world.

REGISTRATION

Early registration deadline: 17 Feb. 2015
Cancellation deadline: 23 Feb. 2015

For further information or if you need special accommodations, please contact Sandy Earls at sandy.earls@okstate.edu.

REGISTRATION FEES (all fees are in U.S. dollars)

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<tr>
<td>Field Trip/Short Course only</td>
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CALL FOR PAPERS

Abstract deadline: 16 Dec. 2014
Submit your abstract online at www.geosociety.org/sections/sc/2015mtg. Abstract submission fees: US$10 for students; US$15 for all others.

Hot Topic Event

Hydraulic Fracturing: Communicating Risks. Cosponsored by the OSU Hydraulic Fracturing Evaluation and Communication Team. Chairs: Larry Sanders, Gina Peek, and Karen Neurohr, Oklahoma State Univ. As one of the newer technologies in geology, risk management of hydraulic fracturing has found a number of factors to consider and communication of those risks poses its own difficulties.

Symposia

S1. Mississippian Sedimentology and Sequence Stratigraphy of the Mid-Continent from Outcrop and Subsurface Studies. Michael Grammer, michael.grammer@okstate.edu, Oklahoma State Univ.; Jim Puckette, jim.puckette@okstate.edu, Oklahoma State Univ.; Darwin Boardman, darwin.boardman@okstate.edu, Oklahoma State Univ.; Jay Gregg, jay.gregg@okstate.edu; Oklahoma State Univ.

S2. Sequence Stratigraphy and High Resolution Biostratigraphy of the Pennsylvanian Subsystem. Darwin Boardman, darwin.boardman@okstate.edu, Oklahoma State Univ.; John Pope, jppope@nwmissouri.edu, Northwest Missouri State Univ.; W. Lynn Watney, lwatney@kgs.ku.edu, Kansas Geological Survey; Jim Puckette, jim.puckette@okstate.edu, Oklahoma State Univ.

Theme Sessions

T1. East African Rift, Southern Oklahoma Aulacogen, Rio Grande Rift, and Other Continental Rifts: A Tribute to the Career of G. Randy Keller. Mohamed Abdel Salam, mohamed.abdel_salam@okstate.edu, Oklahoma State Univ.; Estella Atekwana, estella.atekwana@okstate.edu, Oklahoma State Univ.; Asish Basu, abasu@uta.edu, Univ. of Texas at Arlington; Kevin Mickus, kevinmickus@missouristate.edu, Missouri State Univ.; Robert Stern, rjstern@utdallas.edu, Univ. of Texas at Dallas.

T2. Geological Carbon Sequestration: Understanding Physical, Chemical, and Biological Processes. Jack Pashin, jack.pashin@okstate.edu, Oklahoma State Univ.; Matt Kirk, mfkirk@k-state.edu, Kansas State Univ.
T3. New Insights on the Architecture of the Gulf Coast Margin. Raphael Gottardi, rrx0121@louisiana.edu, Univ. of Louisiana at Lafayette; Gary Kinsland, gkinsland@louisiana.edu, Univ. of Louisiana at Lafayette.


T5. Recent Advances in the Geochemical Evolution of the Southern Oklahoma Aulacogen. Cosponsored by the Geochemical Society; GSA Mineralogy, Geochemistry, Petrology, and Volcanology Division. Matthew Bruseke, bruseke@ksu.edu, Kansas State Univ.; Jonathan Price, jonathan.price@mwsu.edu, Midwestern State Univ.; Richard Hanson, r.hanson@tcu.edu, Texas Christian Univ.

T6. Geochemical Characterization of Dynamic Sedimentary Systems. Tracy Quan, tracy.quan@okstate.edu, Oklahoma State Univ.; Natascha Riedinger, natascha.riedinger@ucr.edu, Univ. of California Riverside and Oklahoma State Univ.; Eliot Atekwana, eliot.atekwana@okstate.edu, Oklahoma State Univ.

T7. Subsurface Fluids and Induced Seismicity. Katie Keranen, Cornell Univ. Cosponsored by the GSA Hydrogeology Division.

T8. Ouachita-Marathon Fold-Thrust Belt and Foreland Basins: Their Tectonics, Structural Geology, Sedimentology, and Hydrocarbon Potential. Ibrahim Çemen, icemen@as.ua.edu, Univ. of Alabama; Jim Puckette, jim.puckette@okstate.edu, Oklahoma State Univ.; Darwin Boardman, darwin.boardman@okstate.edu, Oklahoma State Univ.

T9. Karst Hydrogeology. Joe Myre, joemyre@gmail.com, Univ. of Arkansas; Katherine Kneirim, katherine.kneirim@gmail.com, Univ. of Arkansas. Cosponsored by the GSA Hydrogeology Division.


FIELD TRIPS

For additional information, please check the website.

Premeeting

High-Resolution Sequence Stratigraphy of the Pennsylvanian of the North American Midcontinent. Sat.–Tues., 14–17 March. Darwin Boardman, darwin.boardman@okstate.edu, Oklahoma State Univ.; John Pope, jppope@nwmissouri.edu, Northwest Missouri State Univ.; W. Lynn Watney, lwatney@kgs.ku.edu, Kansas Geological Survey; Jim Puckette, jim.puckette@okstate.edu, Oklahoma State Univ.


Postmeeting

Hydrogeology of the Arbuckle Simpson Aquifer and EPA Tour/ Hydrodays. Cosponsored by The Nature Conservancy; GSA Hydrogeology Division. Fri.–Sat., 20–21 March. Todd Halihan, todd.halihan@okstate.edu, Oklahoma State Univ.; Randall Ross, ross.randall@epamail.epa.gov, U.S. Environmental Protection Agency; Jona Tucker, jtucker@tnc.org, The Nature Conservancy.

Meramecian and Chesterian (Visean) of Northeastern Oklahoma: Conodont Biostratigraphy and Revised Regional Stratigraphic. Sat.–Sun., 21–22 March. Cory Godwin, cory.godwin@okstate.edu, Oklahoma State Univ.; Darwin Boardman, darwin.boardman@okstate.edu, Oklahoma State Univ.; Michael Grammer, michael.grammer@okstate.edu, Oklahoma State Univ.; Jim Puckette, jim.puckette@okstate.edu, Oklahoma State Univ.

Short Courses

Mid-Continent Conventional and Unconventional Reservoirs—CORE WORKSHOP. Wed., 18 March. Michael Grammer, michael.grammer@okstate.edu, Oklahoma State Univ.; Jack Pashin, jack.pashin@okstate.edu, Oklahoma State Univ.; Jim Puckette, jim.puckette@okstate.edu, Oklahoma State Univ.; Darwin Boardman, darwin.boardman@okstate.edu, Oklahoma State Univ.; Jay Gregg, jay.gregg@okstate.edu, Oklahoma State Univ.


Introduction to Carbonate Diagenesis. Sat., 21 March. Jay Gregg, jay.gregg@okstate.edu, Oklahoma State Univ.


ACCOMMODATIONS

Housing deadline: 25 Feb. 2015

GSA has reserved blocks of rooms at three locations in Stillwater: (1) Best Western Plus Cimarron Hotel, 315 N. Husband Street, Stillwater, OK 74075, USA; room rate: US$77, plus tax; call +1-405-372-2878 to make a reservation; (2) Fairfield Inn and Suites Stillwater, 418 E. Hall of Fame Ave., Stillwater, OK 74075, USA; room rate: US$99, plus tax; call +1-405-372-6300 to make a reservation; and (3) Atherton Hotel, H103 Oklahoma State University Student Union, Stillwater, OK 74078, USA; room rate: $98, plus tax; call +1-405-744-6835 to make a reservation. For all locations, please be sure to mention you are attending the GSA South-Central Meeting.
OPPORTUNITIES FOR STUDENTS
On To the Future (OTF)
Stop by the GSA Foundation booth at the Welcome Reception to ask an onsite representative about applying to OTF, which provides travel support to students underrepresented in the geosciences to attend their first GSA Annual Meeting (the next one is 1–4 Nov. 2015 in Baltimore, Maryland, USA).

Mentor Programs
Sponsored by the GSA Foundation. For more information, contact Jennifer Nocerino at jnocerino@geosociety.org.

Thurs., 19 Mar., lunchtime. Students will have the opportunity to discuss career prospects and challenges with professional geoscientists from multiple disciplines over a FREE lunch. Learn more at www.geosociety.org/mentors/shlemon.htm.

John Mann Mentoring Luncheon for Applied Hydrogeology.
Fri., 20 Mar., lunchtime. Students interested in applied hydrogeology or hydrology as a career will have the opportunity to network with professionals in these fields over a FREE lunch. Learn more at www.geosociety.org/mentors/mann.htm.

Geoscience Career Workshops
Sponsored by the GSA Foundation. For more information, contact Tahlia Bear at tbear@geosociety.org.

Part 1: Career Planning and Informational Interviewing.
Thurs., 19 Mar., 8 a.m.–9 a.m. Your job-hunting process should begin with career planning, not when you apply for jobs. This workshop will help you begin this process and will introduce you to informational interviewing.

Part 2: Geoscience Career Exploration.
Thurs., 19 Mar., 9 a.m.–10 a.m. What do geologists in various sectors earn? What do they do? What are the pros and cons to working in academia, government, and industry? Workshop presenters, and when possible, professionals in the field, will address these issues.

Part 3: Cover Letters, Résumés, and CVs.
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Travel Grants
Deadline to apply: 17 Feb. 2015
The GSA Foundation has funds available for student travel grants. To qualify, you must be (1) the senior author and presenter of the paper; (2) a current student member of the South-Central Section; and (3) registered for the meeting. Apply at www.geosociety.org/Sections/sc/2015mtg/; for more information, contact Jay Sims, wmjaysims@gmail.com.

LOCAL COMMITTEE
General Chair: Todd Halihan, todd.halihan@okstate.edu
Technical Program Chair: Jack Pashin, jack.pashin@okstate.edu
Field Trip Chair: Darwin Boardman, darwin.boardman@okstate.edu
Student Volunteer Coordinator: Tracy Quan, tracy.quan@okstate.edu
Judging Coordinator: Joseph Donoghue, joseph.donoghue@okstate.edu
Industry Liaison: Anna Cruse, acruse@sampson.com

New Publication Calendar for GSA Today
GSA Today is published 11 times per year, and this won’t change. What will change is that the March issue will now be combined with April, and we will have an independent May issue (instead of March). So look for your first dedicated Annual Meeting issue in May this coming year.

As always, GSA Today is open-access online at www.geosociety.org/gsatoday/.
Second Announcement

SOUTHEASTERN SECTION

64th Annual Meeting of the Southeastern Section, GSA
Chattanooga, Tennessee, USA
19–20 March 2015
www.geosociety.org/Sections/se/2015mtg/

LOCATION

Widely known as “The Scenic City,” Chattanooga owes this distinction to its geologic setting. The city lies along the Tennessee River, among the valleys and ridges of the southern Appalachian fold-and-thrust belt, and within view of the Cumberland Plateau and Blue Ridge. Its name derives from “catō,” the Muskogean word for “rock,” giving due emphasis to the geology of the area and the ideal setting it provides for this meeting.

REGISTRATION

Early registration deadline: 17 Feb. 2015
Cancellation deadline: 23 Feb. 2015
REGISTRATION FEES (all fees are in U.S. dollars)

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TECHNICAL PROGRAM

Abstract deadline: 9 Dec. 2014
Please submit your abstract online at www.geosociety.org/Sections/se/2015mtg/techprog.htm. An abstract submission fee of US$10 for students and US$15 for professionals is required.

FIELD TRIPS

Pre-Meeting


Post-Meeting
Sequence Stratigraphy, Invertebrate Fauna and Ichnofacies of the Silurian Red Mountain Formation, Birmingham, Alabama, to Chattanooga, Tennessee. Fri.–Sun., 20–22 Mar. US$250 for full trip; US$140 for one day* only. Principal organizer: Tim Chowns, Univ. of West Georgia. Co-organizer: Andrew Rindsberg, Univ. of West Alabama. The cost includes accommodations for two nights with breakfast, transport, and a box lunch Sunday. Other meals (dinners & lunch on Saturday) are not included. Lunch Saturday will be at the Irondale Café. For dinner, numerous restaurants are available close to the motel. *Participants living close to Birmingham may wish to opt for a one-day field trip on Saturday. Registration will include transportation but not accommodations or meals. One-day participants should arrive at the Holiday Inn Express in Trussville by 7.45 a.m.

US$250. Principal organizer: Clinton Barineau, Columbus State Univ. Co-organizers: James F. Tull, Florida State Univ.; and Christopher Holm-Denoma, USGS.

**Coal Mining Impacts and Remediation in the Chattanooga Region.** Sat., 21 Mar. US$60. Principal organizer: Gregory Brodie, Univ. of Tennessee at Chattanooga.

**Evolution and the Evidence around Dayton, Tennessee.** Sat., 21 Mar. US$60. Principal organizer: William Witherspoon. Co-organizers: Michael Gibson, Univ. of Tennessee at Martin; and Don Byerly, Univ. of Tennessee at Knoxville.

**Geology and Water Use History atop the Cumberland Plateau.** Sat., 21 Mar. US$35. Principal organizers: Martin Knoll, Univ. of the South; Bran Potter, Univ. of the South.


**EXHIBITORS**

View exhibitor information at www.geosociety.org/Sections/se/2015mtg/ and reserve your space now. Please contact the exhibits coordinator, Kevin Hon, at khon@smeinc.com for more information.

**OPPORTUNITIES FOR STUDENTS**

**On To the Future (OTF)**

Stop by the GSA Foundation booth at the Welcome Reception to ask an onsite representative about applying to OTF, which provides travel support to students underrepresented in the geosciences to attend their first GSA Annual Meeting (the next one is 1–4 Nov. 2015 in Baltimore, Maryland, USA).

**Mentor Programs**

Sponsored by the GSA Foundation. For more information, contact Jennifer Nocerino at jnocerino@geosociety.org.

**Roy J. Shlemon Mentoring Luncheon for Applied Science.** Thurs., 19 Mar., lunchtime. Students will have the opportunity to discuss career prospects and challenges with professional geoscientists from multiple disciplines over a FREE lunch. Learn more at www.geosociety.org/mentors/shlemon.htm.

**John Mann Mentoring Luncheon for Applied Hydrogeology.** Fri., 20 Mar., lunchtime. Students interested in applied hydrogeology or hydrology as a career will have the opportunity to network with professionals in these fields over a FREE lunch. Learn more at www.geosociety.org/mentors/mann.htm.

**Geoscience Career Workshop**

Sponsored by the GSA Foundation. For more information, contact Jennifer Nocerino at jnocerino@geosociety.org.

**Part 1: Career Planning and Informational Interviewing.** Thurs., 19 Mar., 8 a.m.–9 a.m. Your job-hunting process should begin with career planning, not when you apply for jobs. This workshop will help you begin this process and will introduce you to informational interviewing.

**Part 2: Geoscience Career Exploration.** Thurs., 19 Mar., 9 a.m.–10 a.m. What do geologists in various sectors earn? What do they do? What are the pros and cons to working in academia, government, and industry? Workshop presenters, and when possible, professionals in the field, will address these issues.

**Part 3: Cover Letters, Résumés, and CVs.** Fri., 20 Mar., 9 a.m.–10 a.m. How do you prepare a cover letter? Does your résumé need a good edit? Whether you are currently in the job market or not, learn how to prepare the best résumé possible. You will review numerous résumés helping you to learn important résumé dos and don’ts.

**Outstanding Undergraduate Research Poster Award**

We encourage undergraduate students to present their research as a poster under the “Undergraduate Research Posters” session (T5). An award, cosponsored by the Council on Undergraduate Education Geoscience Division, will be presented for the best undergraduate research poster.

**EVENTS**

**Welcome Reception.** Wed., 18 March, 7–9 p.m., Chattanoogan Ballroom. Enjoy light hors d’oeuvres and one complimentary drink and exhibitors’ displays while meeting with friends and colleagues.

**Map Blast.** Thurs., 19 March, 7–9 p.m., outside the Chattanoogan Ballroom. Meeting attendees are welcome to bring, post, and discuss newly published, unpublished, and in-progress maps at this informal session.

**LOCAL COMMITTEE**

**General Chair:** Jon Mies, jonathan-mies@utc.edu

**Technical Program Chair:** Amy Brock-Hon, amy-brock-hon@utc.edu

**Technical Program Co-Chair:** Mark Steltenpohl, steltmg@auburn.edu

**Field Trip Chair:** Ann Holmes, ann-holmes@utc.edu

**Field Trip Co-Chairs:** Michael Gibson, mgibson@utm.edu; Chuck Trupe, chrtrupe@GeorgiaSouthern.edu

**Exhibits Coordinator:** Kevin Hon, khon@smeinc.com

**Student Volunteer Coordinator:** Claire Landis, claire-landis@utc.edu
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2015 Calendar

Geomarvels

This 12-month, 11" x 14" calendar showcases awe-inspiring landscapes. Photographs were selected from award-winning and exceptional submissions to the 2013 GSA Annual Meeting Photo Exhibition in Denver, Colorado. Featuring breathtaking photographs of a Grand Canyon storm (Arizona), Khumbu (Nepal), a Snowdon Peak sunrise (Colorado), and Double-O Arch (Utah), this stunning calendar will spruce up your home or office.

CAL2015, 11" x 14" calendar | $9.95 (sorry, no additional discount)

Geomarvels

2015

SPECIAL FEATURES

› Dates of many noteworthy eruptions and earthquakes
› Birthdates of famous geoscientists
› Calendar of GSA events, meetings, and deadlines
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Second Announcement

NORTHEASTERN SECTION

50th Annual Meeting of the Northeastern Section, GSA
Bretton Woods, New Hampshire, USA
23–25 March 2015

www.geosociety.org/Sections/ne/2015mtg/

Celebrating the Section’s Golden Anniversary

LOCATION

This meeting of the Northeastern Section will celebrate its Golden Anniversary and will do so by returning to The Omni-Mount Washington Resort “by popular demand.” As those who attended in 2013 already know, the venue is unlike any before, and with its help, the meeting will be an informative, unusual, not-to-be-missed occasion for professionals and students alike.

REGISTRATION

Deadline: 17 Feb. 2015
Cancellation deadline: 23 Feb. 2015

Interest in this meeting is rapidly developing and early registration and accommodation reservations are strongly recommended.

REGISTRATION FEES (all fees are in U.S. dollars)

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ACCOMMODATIONS

Reservation deadline: 27 Feb. 2015

Blocks of specially priced rooms and townhomes have been reserved for professionals, students, groups of both, and families. These rates (which do not include 9% New Hampshire tax) are available from Fri., 20 March, through Thurs., 26 March. The Omni–Mount Washington Resort is also offering the following benefits to those reserving rooms: complimentary wireless Internet; complimentary self- or valet parking; 10% discount to ski/snowboard at Bretton Woods; complimentary 24/7 on-demand/on-resort van transportation; dining at 10 on-resort restaurants and “Grab & Go” breakfast & lunch kiosks.

- **Individual rooms for professionals** at US$156 per room/night can be reserved by calling +1-800-258-0330 and referring to the “NEGSA Meeting” or by going online at omnihotels.com and using the code 031815GEOLOGICA.
- **Individual rooms for students** at US$95 per room/night (single or double); US$115 per room/night (triple); or US$135 per room/night (quad) can only be reserved by contacting Melissa Lombard, meeting housing coordinator, at melissalombard@alum.rpi.edu.
- **Townhomes for professional, student, and family groups** at US$309 per night (2-bedroom); US$409 per night (3-bedroom); US$509 per night (4-bedroom); and US$609 per night (5-bedroom) can only be reserved by contacting Melissa Lombard, meeting housing coordinator, at melissalombard@alum.rpi.edu.

CALL FOR PAPERS

Abstract deadline: 9 Dec. 2014

Please submit your abstract online at www.geosociety.org/Sections/ne/2015mtg/. An abstract submission fee of US$10 for students and US$15 for professionals is required. If you cannot submit your abstract online, contact Heather Clark, +1-303-357-1018, hclark@geosociety.org.

Symposia


S2. Coastal and Glacial Processes from Alaska to New England: In Honor of Jon Boothroyd. Bryan Oakley, Eastern Connecticut State Univ., oakleyb@easternct.edu; Mark Borrelli, Center for Coastal Studies, mborrelli@coastalstudies.org.

S3. Climate Change in Space & Time: An Update. P. Thompson Davis, Bentley Univ., pdavis@bentley.edu; Jeremy Skakun, Boston College, jeremy.shakun@bc.edu.

S4. Contributions of Cosmogenic-Nuclide Geochronology to Glacial Geology and Geochronology in northeastern North America—and Vice Versa. Greg Balco, Berkeley Geochronology Center, balcs@bgc.org; John Gosse, Dalhousie Geochronology Centre, john.gosse@dal.ca.
Theme Sessions

T1. Updating the Orogen: Along-Strike Tectonic Correlations and Comparisons in the Northeastern Appalachians. Jon Kim, Vermont Geological Survey, geojon710@msn.com; Craig Dietsch, Univ. of Cincinnati, dietscc@umail.uc.edu.

T2. Northeastern North American Volcanic Successions and Their Tectonic Context. Sheila Seaman, Univ. of Massachusetts, sjs@geo.umass.edu; Christopher Koteas, Norwich Univ., gkoteas@norwich.edu.

T3. Terrane Forensics—Where Did They Come From and Which Are Related? Sandra Barr, Acadia Univ., sandra.barr@acadiau.ca; Scott Samson, Syracuse Univ., sdsamson@syr.edu.


T5. The Role of Interacting Processes in Deformation. Jeff Marsh, Queens College, jhmarsh@gmail.com; Chris Gerbi, Univ. of Maine, christopher.gerbi@maine.edu; Scott Johnson, Univ. of Maine, johnsons@maine.edu.

T6. Retracing the Steps of Northeastern U.S. Geologists in the Past 50 Years. Jeri Jones, Jones Geological Services, jonesgeo@comcast.net.


T8. Advances in Pleistocene Geology: Northeastern U.S. and Eastern Canada. Serge Occhiotti, Université du Québec à Montréal, occhiotti.serge@uqam.ca; George Springer, Norwich Univ., gsprings@norwich.edu; Woodrow Thompson, Maine Geological Survey, woodrow.b.thompson@maine.gov.

T9. New Perspectives on Paleoclimate from Advances in Glacial Geology. Meredith Kelly, Dartmouth College, meredith.kelly@dartmouth.edu; Alice Doughty, Dartmouth College, alice.doughty@dartmouth.edu; Margaret Jackson, Dartmouth College, margaret.s.jackson.gr@dartmouth.edu.

T10. Holocene Paleoclimate Perspectives on Present-Day Arctic Change. Erich Osterberg, Dartmouth College, erich.osterberg@dartmouth.edu; Karl Kreutz, Univ. of Maine, karl.kreutz@maine.edu; Lisa Doner, Plymouth State Univ., ladoner@plymouth.edu.

T11. Limnological Records in Past, Present, and Future Climates. Lisa Doner, Plymouth State Univ., ladoner@plymouth.edu; Julia Daly, Univ. of Maine, julia.daly@maine.edu; Bradford Hubeny, Salem State Univ., blhubeny@salemstate.edu.

T12. Pleistocene to Anthropocene Landscape Evolution in the Northeastern U.S. Will Ouimet, Univ. of Connecticut, william.ouimet@uconn.edu; Noah Snyder, Boston College, noah.snyder@bc.edu.


T16. Coastal and Nearshore Environments of the Northeast. Dan Belknap, Univ. of Maine, belknap@maine.edu; Joe Kelly, Univ. of Maine, jtkelly@maine.edu.

T17. Ecohydrology Science and Sustainability. Sean Smith, Univ. of Maine, ssmith@maine.edu; Andrew Reeve, Univ. of Maine, areeve@maine.edu; Ciaran Harman, Johns Hopkins Univ., charman@hu.edu.

T18. Fossils in New England: Recent Discoveries and Reinterpretations. William Clyde, University of New Hampshire, will.clyde@unh.edu.

T19. The New England Continental Shelf. Larry Ward, Univ. of New Hampshire, lgward@comcom.unh.edu.

T20. Evolution of Minerals in Diverse Environments: Geobiological and Geochemical Aspects. Dawn Cardace, Univ. of Rhode Island, dawn.cardace@gmail.com; Amanda Olsen, Univ. of Maine, amanda.a.olsen@maine.edu.

T21. Life Cycle of Produced Water from Hydraulic Fracturing of Marcellus and Utica Shales. Devon Renock, Dartmouth College, devon.j.renock@dartmouth.edu; Nathaniel Warner, Dartmouth College, nathaniel.r.warner@dartmouth.edu.

T22. State and Fate of Urban Watersheds in the Northeast. Jonathan Gourley, Trinity College, jonathan.gourley@trincoll.edu; Suzanne O’Connell, Wesleyan Univ., scoconnell@wesleyan.edu.

T23. Morphological and Hydrological Responses of Salt Marshes to Anthropogenic and Natural Stressors. Beverly Johnson, Bates College, bjohnso3@bates.edu; Kristin Wilson, National Estuarine Research Reserve, krwills@gmail.com.


T25. River Restoration in New England. Frank Magilligan, Dartmouth College, magilligan@dartmouth.edu; Carl Renshaw, Dartmouth College, renshaw@dartmouth.edu; Anne Lightbody, Univ. of New Hampshire, anne.lightbody@unh.edu.


T27. Potential for Geothermal Energy in New England. Matt Davis, Univ. of New Hampshire, matt.davis@unh.edu; Rick Chormann, New Hampshire State Geologist; frederick.chormann@des.nh.gov; Steve Mabee, Massachusetts State Geologist, smabée@geo.umass.edu.

T28. Disruptive Technology and Geoscience Education. Declan DePaor, Old Dominion Univ., ddepaor@odu.edu; Steve Whitmeyer, James Madison Univ., whitmjes@jmu.edu; G. Wayne Bentley, Northern Virginia Community College, cbentley@nvcc.edu.

T29. Innovative and Multidisciplinary Approaches to Geoscience Education. Jennifer Hanselman, Westfield State
Univ., jhanselman@westfield.ma.edu; Jennifer Sliko, Penn State Univ.—Harrisburg, jls1093@psu.edu.


T31. Hydropedology at Hubbard Brook Experimental Forest: Landscape Patterns and Hydrologic Processes. Scott Bailey, U.S. Forest Service, swbailey@plymouth.edu.

T32. Pegmatite Processes and Problems. Paul Tomascak, SUNY-Oswego, paul.tomascak@oswego.edu; Marin Lupulescu, New York State Museum, mlupules@mail.nysed.gov.

FIELD TRIPS

Mount Washington: Its Summit & Observatory. Michelle Cruz, Mount Washington Observatory, mcruz@mountwashington.org; Mark Van Baalen, Harvard Univ., mvb@harvard.edu; Timothy Allen, Keene State College, tallen@keene.edu. Sat., 21 Mar., 7 a.m.; and Sun., 22 Mar., 7 a.m. Observatory member: US$225; observatory non-member: US$265. Departs from Mt. Washington Auto Road Base.

Bedrock Geology and Tectonics of the Presidential Range on Nordic Skis. J. Dykstra Eusden, Bates College, deusden@bates.edu. Sat., 21 Mar., 8:30 a.m.; and Sun., 22 Mar., 8:30 a.m. US$10 plus trail pass. Departs from the Nordic Center.

Landslides in the White Mountains. P. Thompson Davis, Bentley Univ., pdavis@bentley.edu. Sun., 22 Mar., 9 a.m. US$70. Departs from the hotel.

Ground Penetrating Radar: Data Collection, Processing, and Analysis. Steve Arcone, U.S. Army ERDC-Cold Regions Research & Engineering Laboratory, steve.a.arcone@erdc.dren.mil; Seth Campbell, ERDC-Cold Regions Research & Engineering Laboratory, seth.campbell@erdc.dren.mil. Sun., 22 Mar., 9 a.m. US$15. Departs from the hotel.

SPECIAL EVENTS


50th Anniversary Celebration. Tues., 24 Mar., 5:30–9 p.m. Fees: professionals: US$45; students: US$15. The reduced student fee is the result of generous support from Dartmouth College.

Mentor Programs

Sponsored by the GSA Foundation. For more information, contact Jennifer Nocerino at jnocerino@geosociety.org.

Roy J. Shlemon Mentoring Luncheon for Applied Science. Mon., 23 Mar., lunchtime. Students will have the opportunity to discuss career prospects and challenges with professional geoscientists from multiple disciplines over a FREE lunch. Learn more at www.geosociety.org/mentors/shlemon.htm.

John Mann Mentoring Luncheon for Applied Hydrogeology. Tues., 24 Mar., lunchtime. Students interested in applied hydrogeology or hydrology as a career will have the opportunity to network with professionals in these fields over a FREE lunch. Learn more at www.geosociety.org/mentors/mann.htm.

Geoscience Career Workshops

Sponsored by the GSA Foundation. For more information, contact Tahlia Bear at tbear@geosociety.org.

Part 1: Career Planning and Informational Interviewing. Mon., 23 Mar., 8 a.m.–9 a.m. Your job-hunting process should begin with career planning, not when you apply for jobs. This workshop will help you begin this process and will introduce you to informational interviewing.

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Travel Grants

Application deadline: 17 Feb. 2015

Please review the eligibility guidelines and application procedure. The application form is available at www.geosociety.org/grants/negrant.htm.

Volunteer Opportunities

Application deadline: 17 Feb. 2015

The Northeastern Section offers free meeting registration to student volunteers in return for two shifts of 4–5 hours of work. Please contact the student volunteer coordinator, Lee Wilder, geology@des.nh.gov, for more information.
Metamorphic petrology

Maria Luisa B. Crawford, Department of Geology, Bryn Mawr College, Bryn Mawr, Pennsylvania 19010

Advances in metamorphic petrology reflect an increasing sophistication in interpreting the data preserved in lower crustal and uppermost mantle rocks raised to the surface. Ten years ago the temperature and pressure stability conditions for many common minerals, primarily in aluminous and calcareous rocks, were determined on the basis of reasonable, albeit simplified, reactions among mineral phases. A fluid phase composed of pure water, or water-CO₂ mixtures in calcareous assemblages, was assumed. At the start of the decade, major advances appeared to lie in obtaining ever more reliable geothermometers, usable geobarometers, and a better understanding of the nature of the associated fluid and the role and consequences of diffusion. These expectations have largely been realized. Experimental, thermodynamic, and field data have provided new calibrated assemblages for assigning temperature, pressure, and fugacities of water and CO₂. Mineral zoning and other kinetically controlled phenomena are also increasingly being utilized for deciphering reaction paths.

The past decade saw fundamental advances in the study and understanding of the metamorphism of mafic rocks, particularly at intermediate metamorphic grades. Similar gains remain to be made for low-temperature and low-pressure metamorphic environments. The progress in thermodynamic calculation of stability relations, one of the major achievements of the past decade, will help in this area but cannot solve the problems of metastability and of the presence of complex mineral phases. After many years of study there is no good assessment of the physical state of the fluid in rocks undergoing metamorphism and of the way that fluid is expelled from the deeper crust. As was predicted in 1973, we are beginning to grasp the true complexity of the chemistry of this fluid phase. Much remains to be learned about its role in transporting material in the crust and as a heat-transfer agent.

Another area for continuing significant contributions from metamorphic petrologists is the interpretation of rock fabrics. Recrystallization, solution, and diffusion of materials are subjects within the domain of metamorphic petrologists and are fundamental mechanisms by which rock fabrics develop. Mineral deformation, promoting structural instability, and rock deformation, providing channelways for migrating fluids, play significant roles in metamorphic processes. The physical behavior and properties of deep-seated rocks constrain the interpretation of geophysical observations.

Ten years ago careful studies in regions where structural as well as metamorphic relations had been carefully deciphered showed that tectonic models for metamorphic terranes were possible and sorely needed. Major contributions based on thermal modeling have been made in this area; more will certainly come. This focus has encouraged a growing relationship between geochronologists and metamorphic petrologists. The advent of techniques for obtaining dates from just a few grains, and of understanding what information is preserved in metamorphic rocks for the various unstable isotope systems poses new challenges to geochronologists and to metamorphic petrologists, who must ask the right questions and learn which samples will provide the answers. The results will lead to a better grasp of the length of time involved in metamorphic events and in the cooling histories of metamorphic terranes. A hope for the decade is that determination of the bulk and isotopic compositions of individual fluid inclusions will help in understanding the retrograde path of metamorphic rocks as they return to Earth’s surface.
Geologic disposal of commercial radioactive waste


Within the past decade several prestigious review groups have judged that (1) geologic disposal is the preferred method of isolating high-level radioactive wastes from the biosphere, (2) disposal in a mined repository can be accomplished in a safe manner, and (3) available technology is adequate to identify and characterize potential sites for a repository. A consensus that developed in the earth-science community included the proposition that safety could be predicted (not proven) only after lithologic and hydrologic properties were determined on a site-specific basis, including in situ measurements at the proposed repository depth. A second proposition holds that because no single property will determine the fate of the buried radionuclides, the waste package and the repository and its geologic environment must be analyzed as a system. The adoption of a systems approach implies that natural barriers to radionuclide migration, to the extent that they are independent, can provide significant assurance of waste isolation and can compensate for imperfect prediction. Also implied is that the waste form and other engineered components of the repository can provide significant barriers to radionuclide migration, but only to the extent that they are tailor-made to be compatible with the host rock and its environment (i.e., the multiple barrier concept).

Since the establishment of these principles, research has advanced considerably. Ten years ago, exploration was concentrated on rock salt. The Department of Energy’s current exploration program employs three approaches, each of which can identify acceptable sites: (1) to look for favorable occurrences of candidate host rocks, (2) to look for favorable environments and host rocks on large federal reservations dedicated to nuclear activities, and (3) to look for favorable geohydrologic environments that contain rocks with suitable properties. Thus, the DOE is investigating salt (bedded as well as domed), tuff, basalt, and “crystalline” (loose term for igneous and metamorphic) rocks.

What seemed to be a job mainly for geologists has turned out to involve a much wider group of interested parties, nontechnical as well as technical. As public awareness of the need for radioactive waste disposal has grown, institutional responses have been made at both the state and federal levels, leading to the passage of the Nuclear Waste Policy Act of 1982. The act requires the DOE to consult with affected states in establishing a repository site. It further provides a mechanism whereby a state can object to the selection of a site within its borders but retains for Congress the ability to override a state’s objection.

During the next decade, we expect to select a site and begin excavation of the first repository at one of the nine sites now under study. Barring unexpected geologic or political complications, the currently directed congressional schedule calls for the first repository to begin operation by 1998. The repository would operate in a “retrievable mode” for about 50 years—that is, emplaced waste could be removed if some unforeseen factors should develop that would seriously reduce the safety of the repository. If no untoward events interfered, the repository would be closed, sealed, and monitored for some time.

Whether the DOE program for the geologic disposal of radioactive waste will be accepted by the public remains to be seen and depends a great deal on how closely the public is involved in the many choices that must be made along the way. The technical data required to evaluate safety will be developed by earth scientists. The validity of these data, and the predictions based on them, may well be among the most important social challenges facing earth science in the next decade.
The GSA Foundation is pleased to introduce a completely updated website. The new website is designed to provide visitors with a pleasant, informative, inspiring, and efficient resource for learning about and supporting GSA programs and priorities. The modern design incorporates suggestions from members as well as current technologies capable of addressing future needs. We invite you to visit the new site at www.gsafweb.org to explore several useful new features.

Informed Choices

Decades of support from GSA members allow the GSA Foundation to offer donors an unmatched range of giving choices. Visitors now have two new search features to identify and display information about giving options. A search bar will enable visitors to search by name or term for specific funds. A second search function will provide a condensed list of giving options grouped by purpose (specialized awards, section funds, division funds, and GSA programs). Each giving option will display a short summary of its purpose and a link to additional information on the GSA website (www.geosociety.org).

Efficient Transactions

In response to requests, donors can now include multiple choices in one giving transaction. The search by name or purpose feature will also be available on this page. For your security, the site will utilize the latest encryption and security technology.

We are pleased to provide these improvements for GSA Foundation sponsors, donors, and visitors. The site will also feature enhanced access to information about governance, reporting, and stories about how your donations are advancing the geosciences. We welcome your suggestions and appreciate your support!
Due to corporate-wide shifts in sponsorship strategy, GSA's long-standing partnership with Subaru of America, Inc., will be coming to a close at the end of March 2015. GSA and the GSA Foundation are appreciative of the 14 years of support from this sponsor, which has included the Minority Student Scholarship Program, Outstanding Woman in Science Awards, the Subaru Outdoor Life Lectures, general annual meeting funding, and the VIP Partners Program (an exclusive program for GSA members in the continental USA that offers significant discounts on the purchase of a new Subaru) along with the use of two vehicles for GSA headquarters.

Some of these programs will continue, such as the Woman in Science Award, which has a supporting GSA Foundation fund. Both GSA and the GSA Foundation are looking for new opportunities to continue important programs like the Minority Student Scholarships. Proposals for a new automobile partnership are also underway.

The VIP Partners Program remains available to GSA members until 31 March 2015. Many members have taken advantage of this benefit over the years, which offers a discount on the purchase of a new Subaru. In addition, each sale of a new Subaru through the program results in a US$100 contribution to the GSA Foundation. To give an idea of the benefit to GSA: In just the second quarter of this year, VIP sales resulted in a US$2,700 contribution back to GSA. These returns have averaged this amount each quarter for the last two calendar years.

All GSA members who have a minimum of six consecutive months of membership qualify to purchase a Subaru using this discount. If you are interested in taking advantage of this program before the end of March, please contact GSA Sales & Service at gsaservice@geosociety.org for details.
Geoscience Jobs & Opportunities

Positions Open

ENVIRONMENTAL BIOGEOCHEMISTRY/ GEOBIOLOGY, DARTMOUTH COLLEGE

The Dept. of Earth Sciences at Dartmouth College invites applications for a junior rank tenure-track position in the general areas of biogeochemistry and geobiology. We especially welcome applications from candidates with research interests that include microbially-mediated biogeochemical interactions in processes of mineralization, weathering, and sequestration of contaminants; hydrocarbon formation and degradation; biogeochemical cycling in fluvial and/or cold environments, including river-channel, floodplain, and lacustrine ecosystem response to environmental change. Particular attention will be given to candidates who combine a focus on understanding fundamental processes with state-of-the-art laboratory and/or field research programs that complement and contribute to ongoing research activities in the department as well as in Dartmouth’s Geisel School of Medicine and Thayer School of Engineering. The successful candidate will continue Dartmouth’s strong traditions in graduate and undergraduate research and teaching. Teaching responsibilities consist of three courses spread over three of four ten-week terms. The Dept. of Earth Sciences is home to 11 tenure- and tenure-track faculty members in the School of Arts and Sciences, and enjoys strong Ph.D. and M.S. programs and outstanding undergraduate majors. To create an atmosphere supportive of research, Dartmouth College offers new faculty members grants for research-related expenses, a quarter of sabbatical leave for each three academic years in residence, and flexible scheduling of teaching responsibilities.

Dartmouth College, a member of the Ivy League, is located in Hanover, New Hampshire (on the Vermont border). Dartmouth has a beautiful, historic campus located in a scenic area on the Connecticut River. Recreational opportunities abound all year round. To learn more about Dartmouth College and the Dept. of Earth Sciences, visit www.dartmouth.edu/~earthsci.

To submit an application, send curriculum vitae, statements of teaching and research interests and objectives, reprints or preprints of up to three of your most significant publications, and the name, address (including street address), e-mail address and fax/phone numbers of at least three references to: Environmental Biogeochemistry / Geobiology Search Committee, Dept. of Earth Sciences, Dartmouth College 6105 Fairchild Hall, Hanover, NH 03755, e-mail: earth.sciences@dartmouth.edu

Applications received by November 7, 2014 will receive first consideration. The appointment will be effective July 1, 2015.

Dartmouth is an equal opportunity/affirmative action employer with a strong commitment to diversity. In that spirit, we are particularly interested in receiving applications from a broad spectrum of people, including women, persons of color, persons with disabilities, veterans or any other legally protected group.

LECTURER

DEPARTMENT OF GEOLOGY

COLLEGE OF WILLIAM & MARY

The Dept. of Geology at the College of William & Mary invites applications for a continuing non-tenure-eligible faculty lecturer position that will begin August 10, 2015. The department has six full-time faculty and a laboratory coordinator, and graduates ~25 undergraduate majors per year. We seek a colleague eager to interact with undergraduates in an environment in which both teaching and research are emphasized. Primary responsibilities include teaching introductory geology courses, geology labs, and one or more upper level courses. Other duties may include oversight of select department facilities (e.g., computer lab, analytical labs) and supervision of senior research projects. While the field of specialty is open, we seek an individual who can bring additional expertise to our program.

Candidate must apply online at https://jobs.wm.edu. Submit a curriculum vitae, a cover letter, and statements of teaching and research interests. You will be prompted to submit online the names and email addresses of three references who will be contacted by us with instructions on how to submit a letter of reference.

For full consideration, submit application materials by the review date, January 5, 2015. Applications received after the review date will be considered if needed.

Required: A Master’s degree in an appropriate field is required.

Preferred: A Ph.D. or ABD is preferred at the time the candidate begins the appointment (August 10, 2015).

Information on the degree programs in the Dept. of Geology can be found at www.wm.edu/as/geology/.

The College of William & Mary values diversity and invites applications from underrepresented groups who will enrich the research, teaching and service missions of the university. The College is an Equal Opportunity/Affirmative Action employer and conducts background checks on applicants for employment.

RESEARCH POSITION IN SEDIMENT RADIONUCLIDE GEOCHEMISTRY

U.S. GEOLOGICAL SURVEY

NATIONAL CENTER, RESTON, VIRGINIA

The U.S. Geological Survey, a center for geochemical research for the Nation providing unbiased research in the fields of Water, Climate, Natural Hazards, Ecosystems, Energy and Minerals, and Environmental Health (http://water.usgs.gov/npr/) seeks candidates for a full-time permanent research position in sediment radionuclide geochemistry at the GS-11 or GS-12 grades. This is an interdisciplinary position and may be filled under any of several job series: Research Hydrologist/Chemist/Physical Scientist/Geologist. Grade and salary (in the range of $60,000 to $90,000) will be based on education and experience. Prior to starting employment with the USGS, a successful applicant will have demonstrated educational and research accomplishments, through the attainment of a Ph.D. or equivalent doctoral degree, or through equivalent experience and knowledge, in a field related to radionuclide geochemistry. Environments of interest include surface water, ground water and sediment, disturbed and pristine. The applicant will have demonstrated scientific vision, leadership, and productivity on exciting, societally-relevant, and collaborative inter-disciplinary research topics. The successful candidate will lead a research program which develops laboratory capabilities and guides research applications in the area of sediment fate and transport. The scientist will develop collaborations with USGS research scientists and provide assistance and direction in methods development for the Center for Sediment Dynamics and Forensics (CSDF), a center of excellence for research focused on critical sediment-related issues. A full range of observational and experimental techniques in both the laboratory and the field is applied to the research problems. Examples of techniques to be used by the CSDF include: radiometric techniques (14C, 137Cs, 7Be, 234U, 238U and other radioisotopes), Optically Stimulated Luminescence, Electron Spin Resonance, X-ray mineralogy, stable isotopes (light and heavy), basic elemental analysis, geochemical phase analyses, organic molecular markers, rare earth and trace element distributions, and carbon and nutrient analyses.

The online vacancy announcement contains additional information regarding these and other qualifications requirements. The opening date of this vacancy announcement is December 1, 2014. Applications (resumes and questionnaire responses) must be received online BEFORE midnight Eastern Time on the closing date of the announcement. It is important that candidates view the Vacancy Announcement in its entirety to be sure that all required documents are submitted. Incomplete application packages cannot be considered. For further information, please contact: Harry Jenter, 703-648-5916, hjenter@usgs.gov, or Pierre Glynn, 703-648-5823, pglynn@usgs.gov in the Branch of Regional Research, or Alleea Leyba, 303-236-9573, aleyba@usgs.gov, Human Resources Specialist. After the opening of the vacancy on or about December 1, the vacancy announcements should be found on the Office of Personnel Management’s USAJOBS website at www.usajobs.opm.gov. The Vacancy Announcement numbers are: ATL-2015-0049 (Open to all US Citizens), and ATL-2015-0050-Merit Promotion (for current or former Federal employees with competitive status or who are eligible under a special appointing authority such as VRA, Severely Physically Disabled. Returning Peace Corp Volunteers and VEOA eligibles.) U.S. citizenship is required. The USGS is an Equal Opportunity Employer.

ASSISTANT PROFESSOR

GEOPHYSICS

CONOCOPHILLIPS SCHOOL OF GEOLOGY AND GEOPHYSICS, MWBEWOUR COLLEGE OF EARTH & ENERGY

DEPARTMENT OF GEOLOGY

UNIVERSITY OF OKLAHOMA

The University of Oklahoma invites applications for a tenure-track position in Geophysics at the rank of Assistant Professor. The school has a strong seismic program and is looking for a faculty member to broaden the scope of the program in non-seismic methods. We seek a dynamic colleague who will teach and supervise students at all levels, while conducting an independent, externally funded research program in his/her field of expertise.
The candidate should hold a Ph.D., have a demonstrated research record, and an interest in teaching undergraduates and mentoring graduate students. Potential areas of interest include gravity, magnetics, electromagnetics, and GPS applied to crustal processes. Salary, benefits, and start-up funds will be competitive and commensurate with experience. The ConocoPhillips School of Geology and Geophysics has a large, vibrant faculty with a broad range of research activities and strong ties to the petroleum industry. The student body currently includes 182 undergraduates and 110 MS and Ph.D. students. The Mewbourne College of Earth & Energy possesses extensive software and computing labs with PC and Linux platforms networked to our own dedicated cluster within the OU supercomputer center (OSCER). The College hosts numerous industrial consortia, a research institute focused on seismic monitoring, and a field campus in Colorado for field courses in geology and geophysics. The geophysics group conducts active research projects that are funded by industry as well as by U.S. and foreign government agencies and institutes. The College maintains a comprehensive pool of geophysical equipment including GPR, seismic (active and passive), magnetic, and gravity instruments as well as extensive rock physics characterization laboratories. Through collaboration with industry, we have a suite of 3D seismic and microseismic data volumes that are used for teaching, algorithm calibration, seismic geomorphological analysis, crustal imaging, and a range of open source software for lithospheric-scale research. Information about the School and College, the facilities and the entities that it houses can be found at http://geology.ou.edu.

Review of applications will begin December 1, 2014, and on-campus interviews will start early in 2015. The search will continue until the position is filled. The anticipated starting date is August 15, 2015. Applicants are requested to submit a complete vita/resume, statement of research and teaching interests, and a list of five references who can be contacted, including phone numbers, e-mail addresses, and mailing addresses. Questions or information requests may be addressed to Chair of the Geophysics Search Committee, at (405) 325-3253, or ougeophysicssearchchair@ou.edu. Applications and nominations should be addressed to Geophysics Search Committee, University of Oklahoma, Sarkeys Energy Center, 100 E. Boyd Street, Room 710, Norman, OK 73019-1008. The University of Oklahoma is an Affirmative Action, Equal Opportunity Employer. Women and minorities are encouraged to apply. Protected veterans and individuals with disabilities are encouraged to apply.

DEPARTMENT OF GEOLOGY, GEOGRAPHY, AND ENVIRONMENTAL STUDIES
CALVIN COLLEGE

Applications are invited for a tenure-track geology position beginning September 2015, pending final administrative approval. Ph.D. in hand or near completion is required. The successful candidate will teach introductory geology, mineralogy, igneous and metamorphic petrology, structural geology, and participate in the department’s field-oriented geology courses in southwestern Montana in May. Potential additional course teaching could include geochemistry and/or environmental geology or other topics depending on the candidate’s background and interests. Candidates are encouraged to develop a research program with undergraduates. Rank is open. Calvin College is a Christian college in the Reformed tradition, and all faculty are expected to support the college’s religious commitment and educational mission. Calvin is building a tradition of diversity, and seeks faculty who will contribute to that effort. More information can be obtained at www.calvin.edu/admin/provost/.

Applicants should send a resume, transcripts, and three letters of recommendation to: Dr. Ralph Stealey, Dept. of Geology, Geography, and Environmental Studies, Calvin College, Grand Rapids, MI 49546. We will begin reviewing applications starting December 15, 2014. Applications are invited for a tenure-track geology position beginning September 2015, pending final administrative approval. Ph.D. in hand or near completion is required. The successful candidate will teach introductory geology, mineralogy, igneous and metamorphic petrology, structural geology, and participate in the department’s field-oriented geology courses in southwestern Montana in May. Potential additional course teaching could include geochemistry and/or environmental geology or other topics depending on the candidate’s background and interests. Candidates are encouraged to develop a research program with undergraduates. Rank is open. Calvin College is a Christian college in the Reformed tradition, and all faculty are expected to support the college’s religious commitment and educational mission. Calvin is building a tradition of diversity, and seeks faculty who will contribute to that effort. More information can be obtained at www.calvin.edu/admin/provost/.

Applicants should send a resume, transcripts, and three letters of recommendation to: Dr. Ralph Stealey, Dept. of Geology, Geography, and Environmental Studies, Calvin College, Grand Rapids, MI 49546. We will begin reviewing applications starting December 15, 2014.

OPEN RANK (ASSISTANT, ASSOCIATE, OR FULL), DEPT. OF GEOLOGY AND GEOPHYSICS, COLLEGE OF GEOSCIENCES
TEXAS A&M UNIVERSITY

To significantly advance research and instructional excellence in basin tectonics and analysis, the Dept. of Geology and Geophysics invites applications for a tenure-track and/or tenured position. We seek applicants whose interest is in lithospheric controls on basin formation, structural architecture of basins and application of sequence stratigraphy to understanding basin formation mechanisms. The applicant must have a research background in tectonics/structural geology and a demonstrable record of integrating geological and geophysical data. Candidates research interests and expertise should broaden and complement existing strengths in the Dept. of Geology and Geophysics and in particular contribute to and enhance research programs in petroleum studies and basin modeling conducted through the Berg-Hughes Center for Petroleum and Sedimentary Systems. The candidate will have the opportunity to collaborate with colleagues in a variety of related fields on the College of Geosciences that include the Center for Tectonophysics and the International Ocean Discovery Program (IODP), among others.

The academic appointment will be for nine-months, tenure track or tenured position, and is expected to be at the assistant, associate, or full professor level. Candidates with suitable qualifications may be considered for appointment as full professor, and a possible endowed chair.

Applications should demonstrate a strong record of scholarship and the potential for developing an internationally recognized research and teaching program. The candidate will be expected to teach effectively at the undergraduate and graduate levels in his or her specialty and to supervise undergraduate, M.S. and Ph.D. research. For more information about Texas A&M University, the College of Geosciences and the Dept. of Geology and Geophysics, see http://geoweb.tamu.edu.

A Ph.D. is required, and the appointment may begin Sept 1, 2015 or earlier. Review of applications will begin December 1, 2014 and will continue until a suitable candidate is found. Applicants should...
grant. Opportunities exist to participate in and build a vigorous, externally funded research program in the general area of Carbonate Sedimentology/Stratigraphy. This includes but is not limited to one or more of the following research topics: sequence stratigraphy, the sedimentary record of long-term climate change, depositional processes, and diagenesis. We seek applicants with strong potential to collaborate with current faculty as well as potential to interact with the Integrated Ocean Drilling Program and the Berg-Hughes Center for Sedimentary and Petroleum Systems, both housed within the College of Geosciences at Texas A&M, and the Dept. of Petroleum Engineering at Texas A&M.

Applicants for the position must have a Ph.D. at the time of appointment. Post-doctoral research and teaching experience and past experience in the petroleum industry are desirable traits for this position. A record of research in both ancient and modern carbonate systems is preferred. Successful applicants will be expected to teach effectively at the undergraduate and graduate levels in their specialty, including classes in the Petroleum Certificate curriculum; supervise undergraduate, M.S. and Ph.D. research, including students who are interested in pursuing careers in the petroleum industry. The successful candidate will be expected to initiate and maintain a vigorous, externally funded research program. Opportunities exist to participate in and build on collaborative programs with colleagues in isotopic geochemistry, seismic methods, photogrammetry and GPS in the College of Geosciences.

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 Sedimentology Search Committee (sedsearch@geos.tamu.edu). Screening of applications will begin December 1, 2014 and continue until the position is filled. The Dept. of Geology and Geophysics (geoweb.tamu.edu) is part of the College of Geosciences, which also includes the Departments of Atmospheric Sciences, Geography, and Oceanography and 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 172,000 people. Texas A&M University is an affirmative action/equal opportunity employer committed to excellence through the recruitment and retention of a diverse faculty and student body and compliance with the Americans with Disabilities Act. We encourage applications from minorities, women, veterans, and persons with disabilities. Texas A&M University also has a policy of being responsive to the needs of dual-career partners: http://doe.tamu.edu/content/partner-placement.

**ASSISTANT PROFESSOR, CARBONATE SEDIMENTOLOGY/STRATIGRAPHY**

**DEPT. OF GEOLOGY AND GEOPHYSICS**

**COLLEGE OF GEOSCIENCES**

**TEXAS A&M UNIVERSITY**

The Dept. of Geology and Geophysics at Texas A&M University invites applications from individuals for a tenure-track faculty position as assistant professor in Carbonate Sedimentology/Stratigraphy. The position begins August 2015.

We seek candidates who will develop an externally-funded research program in the general area of Carbonate Sedimentology/Stratigraphy. This includes but is not limited to one or more of the following research topics: sequence stratigraphy, the sedimentary record of long-term climate change, depositional processes, and diagenesis. We seek applicants with strong potential to collaborate with current faculty as well as potential to interact with the Integrated Ocean Drilling Program and the Berg-Hughes Center for Sedimentary and Petroleum Systems, both housed within the College of Geosciences at Texas A&M, and the Dept. of Petroleum Engineering at Texas A&M.

Applicants for the position must have a Ph.D. at the time of appointment. Post-doctoral research and teaching experience and past experience in the petroleum industry are desirable traits for this position. A record of research in both ancient and modern carbonate systems is preferred. Successful applicants will be expected to teach effectively at the undergraduate and graduate levels in their specialty, including classes in the Petroleum Certificate curriculum; supervise undergraduate, M.S. and Ph.D. research, including students who are interested in pursuing careers in the petroleum industry. The successful candidate will be expected to initiate and maintain a vigorous, externally funded research program. Opportunities exist to participate in and build on collaborative programs with colleagues in isotopic geochemistry, seismic methods, photogrammetry and GPS in the College of Geosciences.

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 Sedimentology Search Committee (sedsearch@geos.tamu.edu). Screening of applications will begin December 1, 2014 and continue until the position is filled. The Dept. of Geology and Geophysics (geoweb.tamu.edu) is part of the College of Geosciences, which also includes the Departments of Atmospheric Sciences, Geography, and Oceanography and 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 172,000 people. Texas A&M University is an affirmative action/equal opportunity employer committed to excellence through the recruitment and retention of a diverse faculty and student body and compliance with the Americans with Disabilities Act. We encourage applications from minorities, women, veterans, and persons with disabilities. Texas A&M University also has a policy of being responsive to the needs of dual-career partners.

**FACULTY POSITION**

**ENERGY GEOSCIENCES**

**VIRGINIA TECH**

The Dept. of Geosciences at Virginia Polytechnic Institute & State University (“Virginia Tech”) invites applicants for a tenure track position in energy geosciences. We seek a broad-thinking, multidisciplinary scientist employing a combination of field, analytical, experimental and/or theoretical approaches to understanding complex problems related to energy resources. Energy geosciences includes the origin of both conventional and unconventional hydrocarbon occurrences, natural and enhanced geothermal systems, research related to the materials and natural resources that produce energy, and the genesis of deposits that produce the materials for energy generation.

The successful candidate will be expected to establish an active externally funded research program and develop strong ties with stakeholders and constituents (private and public sectors), teach a range of undergraduate and graduate courses, advise and mentor students, maintain an exemplary record of scholarly activity, and contribute to university and professional service. A doctorate is required at the time of appointment.

How to apply: Applications should include a cover letter, curriculum vita, a statement of research and teaching interests, and the names and email addresses of four individuals from whom the search committee can request letters of reference. Interested candidates should apply online at www.jobs.vt.edu to posting number TR0140131 (see direct link below). Review of applications will commence December 15, 2014. The position will remain open until filled. Questions related to your submission may be directed to Dr. Alan L. Smith (e-mail: alsmith@csusb.edu). Applications must be submitted electronically using http://agency.governmentjobs.com/csbush/default.cfm?transfer=1 and must include a cover letter, a curriculum vitae, recent transcripts (official transcripts will be required pending an offer), statements of research/professional accomplishments and goals, and teaching philosophy and strategies, together with the names and complete contact information of at least three references. Review of the applications will begin January 12, 2015, and will continue until position is filled. Inquiries about this position may be directed to Dr. Alan L. Smith (e-mail: alsmith@csusb.edu).

California State University, San Bernardino is an Affirmative Action/Equal Opportunity Employer. We consider qualified applicants for employment without regard to race, color, reli-
Sociation, national origin, age, gender, gender identity/expression, sexual orientation, genetic information, medical condition, marital status, veteran status, or disability.

ASSOCIATE PROFESSOR OR PROFESSOR-LEVEL SENIOR GEOScientist CALIFORNIA STATE UNIV., BAKERSFIELD
The Dept. of Geological Sciences at California State University, Bakersfield seeks to hire a tenure-track faculty member at the Associate Professor or Professor level beginning in the Fall of 2015. Though the particular expertise is open, applicants who specialize in Geophysics, Quaternary Geology, Petroleum Geology, Petrophysics, or Hydrogeology will receive preference. The successful candidate will be expected to chair the department starting in the Fall of 2017 for at least one three-year term. Review of applications will begin after December 31, 2014 and continue until the position is filled. The full announcement, more information about the department and the university, and application information can be found at www.csub.edu/geology/_files/TT14.pdf.

FACULTY POSITION IN SOLID EARTH SCIENCE UNIVERSITY OF MINNESOTA DULUTH
The Dept. of Earth and Environmental Sciences at the University of Minnesota Duluth invites applications for a tenure-track appointment to begin August of 2015. We seek a broadly-based earth scientist who will complement our existing teaching and research strengths in crustal geology, resources, surficial processes, sedimentology, palaeoclimatology, hydrogeology, planetary geology, and geophysics. Fields of expertise include, but are not limited to: Geophysics, Geomorphology, Glaciology, Geomaterials, and Hydrogeology. Applicants must have completed their terminal degree by the date of appointment. Applications will be reviewed until the position is filled. Further information about the department and university can be obtained at http://www.umn.edu/departments/earth/environmental. Tulane University is an EEO/ADAAA employer.

Marshall-Heape Chair, Solid-Earth Geophysics

The Department of Earth and Environmental Sciences at Tulane University invites applications for the newly established Marshall-Heape Chair in Geology, in the Department of Earth and Environmental Sciences at Tulane University. We seek a scholar with an outstanding international reputation who will be appointed at the Full Professor level with tenure. We particularly seek a broad-based geoscientist with a research focus in Solid-Earth Geophysics, who complements current faculty expertise and offers potential for collaborative research. The Marshall-Heape Chair is expected to lead a widely recognized, externally funded research program that will attract PhD-level graduate students and postdoctoral scholars of the highest caliber. Teaching duties are both at the graduate and undergraduate levels. For full consideration, applications should be received by January 15, 2015, but the position will remain open until filled. Applications should include a curriculum vitae, research and teaching statements that articulate how the mission of the department would be enhanced, and the names and contact information of at least three references. Applications must be submitted electronically via the following link: apply.interfolio.com/27240. Any inquiries may be directed to Dr. Torbjörn Törnqvist, Department of Earth and Environmental Sciences, Tulane University, 6823 St. Charles Ave., New Orleans, LA 70118-5698 (tor@tulane.edu). Further information about the department and university can be obtained at http://tulane.edu/sse/eens. Tulane University is an EEO/ADAAA employer.

Now Accepting Applications:

GSA Education & Outreach Programs

Application deadline for both programs: 3 Feb. 2015

GeoCorps™ America—Summer 2015
GSA is now accepting applications for paid geoscience opportunities on public lands managed by the National Park Service, the U.S. Forest Service, and the Bureau of Land Management. All levels of geoscientists—students, educators, professionals, retirees, and others—are encouraged to apply. Learn more at www.geosociety.org/geocorps and www.facebook.com/GeoCorps.

Mosaics in Science—Summer 2015
GSA is now accepting applications for paid STEM (science, technology, engineering, and math) opportunities in National Parks throughout the United States. The goal of the Mosaics program is to increase the level of diversity among those who seek STEM careers within the National Park Service. Learn more at www.geosociety.org/mosaics.
expertise may include, but are not limited to, mineral science, petrology, economic geology, fluid-rock interactions, geodynamics, tectonics, and early Earth history. This is a tenure-track faculty position with responsibility for teaching, research and service to the University. Appointment at the Assistant Professor level is preferred, but applicants with appropriate qualifications may be considered at the Associate Professor level.

Essential qualifications for the position are: (1) completion of a Ph.D. in earth science by July 1, 2015, from a regionally-accredited university or equivalent program; (2) expertise in mineral science, which may include mineralogy, petrologic applications of mineralogy, geochemistry, economic geology, or mineral physics; (3) potential for acquiring external research funding; (4) an established or emerging research publication record; (5) experience in teaching, which may include teaching assistantships; and (6) excellent written communication skills. Essential qualifications for an appointment as Associate Professor also include teaching, scholarship, and leadership commensurate with department expectations for promotion to Associate Professor. Preferred qualifications for all candidates include an interest in interdisciplinary research, collaboration with individuals of diverse backgrounds, and in attracting undergraduate and graduate students who traditionally are underrepresented in the geosciences; and demonstrated excellent oral communication and interpersonal skills. Currently, our faculty teach three courses per year. The successful candidate will teach a core geology majors’ course in Mineralogy, including optical mineralogy, plus other introductory- to graduate-level courses each year. The candidate will also be expected to develop an externally funded research program that involves both undergraduate and graduate students, and to provide service to the profession, campus, and greater community.

For a complete position description, information about our program, and how to apply online, visit the following website: http://employment.umn.edu/applicants/Central?quickFind=125390. Formal review of applications will begin on January 5, 2015 and applications must be received by February 1, 2015, to be considered. The University of Minnesota is an equal-opportunity educator and employer, and we encourage individuals from underrepresented groups to apply. For further information regarding this position, please contact Prof. John Goode, Chair of the Earth Science Faculty Search Committee.

ASSISTANT, ASSOCIATE, OR FULL PROFESSOR, STRUCTURAL GEOLOGY/TECTONICS
SCHOOL OF THE ENVIRONMENT
WASHINGTON STATE UNIVERSITY
Position #119909
Washington State University (WSU) is currently seeking to fill a tenure-track/tenured Assistant, Associate or Full Professor position in the area of Structural Geology/Tectonics. This position is a permanent, 9-month faculty position located on the Pullman Campus. This position is part of a multi-year series of new hires intended to contribute to the growth and development of the School of the Environment, an interdisciplinary academic unit at WSU that focuses on Earth, Water, and the Environment. Duties include developing and teaching undergraduate and graduate courses and mentoring MS and Ph.D. graduate students. The successful candidate will develop an internationally recognized research program in structural geology/tectonics. Specific areas of emphasis within this broad field are open, but we are particularly interested in candidates who will develop an externally funded research program that includes a strong field-based component.

Required: Assistant Professor: Earned doctorate in a discipline related to structural geology and tectonics, at time of employment; record of research accomplishments as demonstrated by peer-reviewed publications and/or extramural grantmanship; demonstrated ability and/or potential to successfully teach and mentor students at the undergraduate and graduate levels. Associate Professor: in addition, 6 years of experience as an Assistant Professor or equivalent. Professor: in addition, 6 years of experience as an Associate Professor or equivalent, and national/international reputation in their field.

Preferred: Demonstrated ability to: develop collaborations; teach field camp and other field-based courses; lead field trips at the undergraduate and graduate level; and develop a strong field-based research component.

For questions about the position contact Jeff Vervoort at (509) 335-5597; vervoort@wsu.edu.

To apply visit: https://www.wsujobs.com. Application materials must include a letter describing how your experience and training meet qualifications for the position, a research plan, a statement of teaching philosophy, current vitae, and names and contact information for three professional references. Screening begins January 6, 2015. EEO/AA/ADA.

FIXED-TERM INSTRUCTOR
GEOLICAL SCIENCES AND INTEGRATIVE STUDIES
MICHIGAN STATE UNIVERSITY
EAST LANSING, MICHIGAN
The Dept. of Geological Sciences & the Center for Integrative Studies in General Science, are jointly seeking a fixed-term faculty instructor to teach undergraduate general education science courses (emphasis on the Integrative Physical Sciences).

• Appointment begins 8/16/15 and will be a renewable, one year (9 months) position with expectation of continuation based on satisfactory performance. Opportunities exist to teach summer semester classes for additional pay.

• Responsibilities include teaching integrative science courses (e.g., History of Life; Climate Change) and Earth Science courses.

• Teaching loads will typically be two to three sections per semester.

• Opportunities exist to teach upper-level courses in Geological Sciences, to participate in building online courses, and collaborate with researchers engaged in cutting-edge research in disciplinary-based science education.

• Minimum qualifications include: Ph.D. in Earth Sciences, related fields, or in science education with an earth science emphasis; and evidence of training or experience in teaching undergraduate science courses. Salary will be commensurate with experience.

Please submit a CV, a statement of teaching philosophy and experience, application, and three letters of recommendation to jobs.msu.edu (posting number 01935). Application review begins Dec. 15th, 2014, and will continue until the position is filled.

For questions contact: David T. Long, Chair of the Search Committee (long@msu.edu)

Gabrie Ordin, Director of the Center for Integrative Studies (ordin@msu.edu)

TENURED OR TENURE-TRACK PROFESSOR, IGNEOUS AND/OR METAMORPHIC PETROLOGY
DEPT. OF GEOLOGICAL SCIENCES
THE UNIVERSITY OF TEXAS AT AUSTIN
The Dept. of Geological Sciences at The University of Texas at Austin seeks to hire a faculty member in the field of igneous and/or metamorphic petrology. We seek an outstanding scientist who will establish an innovative, world-class, externally funded research program in the petrological evolution of the Earth’s crust and/or mantle. The field of interest is open, but preference will be given to candidates who would complement and interact with our existing strengths in structural and metamorphic evolution of the lithosphere, magmatic processes, and/or mantle dynamics. We seek a candidate who will take advantage of the existing geochemical analytical capabilities of the Jackson School, and in particular the electron microprobe, scanning electron microscopes, laser ablation single and multi-collector ICP-MS, TIMS, stable isotope laboratories, and High Resolution Computed X-Ray Tomography facility, as well as interact with and possibly utilize the existing experimental petrology and high-pressure mineral physics laboratories. The search is open rank, with a preference for those at the Assistant Professor level. A Ph.D. is required by the expected start date (August 22, 2015).

The Dept. of Geological Sciences is part of The Jackson School of Geosciences (JSG), which also includes two research units, the Institute for Geophysics (www.ig.utexas.edu/) and the Bureau of Economic Geology (www.beg.utexas.edu/). The JSG is home to more than 190 research scientists and faculty members, and one of the largest combined graduate and undergraduate enrollments of any major Earth science program in the country. At JSG, petrology is a part of the Solid Earth and Tectonic Processes research theme and the Petrology and Mineral Physics discipline.

Review of applications will begin December 31, 2014, and continue until the position is filled. All interested applicants should submit cover letter, CV, research statement, teaching statement, and complete contact information for three letters of reference via e-mail to dg0@jsg.utexas.edu. Questions regarding the search may be addressed to the head of the search committee, Dr. James Gardner, at gardner@jsg.utexas.edu.

Background check conducted on applicant selected.
ASSISTANT PROFESSOR IN WATER SCIENCE, DEPT. OF GEOLOGICAL SCIENCES
JACKSON SCHOOL OF GEO SCIENCES
THE UNIVERSITY OF TEXAS AT AUSTIN

The Dept. of Geological Sciences in the Jackson School of Geosciences at The University of Texas at Austin seeks to hire a tenure-track Assistant Professor in Water Science. We seek candidates at the forefront of their science who will contribute to leadership in research and teaching. Candidates interested in chemical, physical, and biological processes, or water resource sustainability, are encouraged to apply.

We are interested in a wide range of disciplines related to water including but not limited to: (1) physical hydrology, (2) low-temperature geochemistry, (3) remote sensing and geophysics, and (4) alpine and glacial hydrology.

As part of the Jackson School of Geosciences (www.jsg.utexas.edu), the department (www.geo.utexas.edu) has over 50 faculty and a community of research staff with a broad range of specialization and access to outstanding research facilities and equipment.

Applicants should submit a letter of application, curriculum vitae, statements of research and teaching interests, and contact information for at least three references. Submit a compiled electronic copy to [water.search@jsg.utexas.edu] or send to: Water Science Search Committee, Dept. of Geological Sciences, University of Texas at Austin, Austin TX 78712. Review of applications will begin December 15, 2014 and continue until the position is filled.

Background check conducted on applicant selected.

The University of Texas at Austin is an Affirmative Action/Equal Opportunity Employer.

GEOL OGY AND GEOLOGICAL ENGINEERING, SOUTHDAKOTA SCHOOL OF MINES AND TECHNOLOGY

The Dept. of Geology and Geological Engineering at the South Dakota School of Mines & Technology invites applications for a nine-month tenure track position in Geology and Geological Engineering with an expertise in geophysics. The position will be filled at the Assistant, Associate, or Full Professor level. An earned doctorate in geophysics or a closely related discipline is required by the anticipated August 2015 start date. Preference will be given to candidates that are, or are eligible to become, licensed professional engineers. The successful candidate will develop and teach undergraduate and graduate courses in geophysics and related fields, develop and maintain a strong externally funded research program that complements department strengths, advise undergraduate and graduate students. The department offers B.S., M.S., and Ph.D. degrees in Geology and Geological Engineering, and an M.S. degree in Paleontology.

Nine-month salary range is commensurate with background and experience. For questions about this position, contact Larry Stetler, Search Chair, at Larry.Stetler@sdsmt.edu.

Individuals interested in this position must apply online at www.sdsmt.edu/employment. Human Resources can provide accommodation to the online application process and may be reached at (605) 394-1203. Review of applications will begin January 14, 2015, and will continue until the position is filled. Employment is contingent upon completion of a satisfactory background investigation.

SDSM&T is an EEO/AA/ADA employer and provider.

ASSISTANT PROFESSOR OF GEOLOGY & GEOLOGICAL ENGINEERING
SOUTHDAKOTA SCHOOL OF MINES AND TECHNOLOGY

The Dept. of Geology and Geological Engineering at the South Dakota School of Mines & Technology invites applications for a nine-month tenure track position in Geological Engineering with an expertise in groundwater. The position will be filled at the Assistant, Associate, or Full Professor level. An earned doctorate in geological engineering or a closely related engineering discipline is required by the anticipated August 2015 start date. Preference will be given to candidates that are, or are eligible to become, licensed professional engineers. The successful candidate will develop and teach undergraduate and graduate courses in groundwater and related fields, develop and maintain a strong externally funded research program that complements department strengths, advise undergraduate and graduate students. The department offers B.S., M.S., and Ph.D. degrees in Geology and Geological Engineering, and an M.S. degree in Paleontology.

Nine-month salary range is commensurate with background and experience. For questions about this position, contact J. Foster Sawyer, Search Chair, at Foster.Sawyer@sdsmt.edu.

Individuals interested in this position must apply online at www.sdsmt.edu/employment. Human Resources can provide accommodation to the online application process and may be reached at (605) 394-1203. Review of applications will begin January 14, 2015, and will continue until the position is filled. Employment is contingent upon completion of a satisfactory background investigation.

SDSM&T is an EEO/AA/ADA employer and provider.

ASSISTANT PROFESSOR OF GEOLOGY
TENURE TRACK POSITION
STRUCTURAL GEOLOGY/TECTONICS AND/OR ECONOMIC GEOLOGY
UNIVERSITY OF MISSISSIPPI

The Dept. of Geology and Geological Engineering at the University of Mississippi invites applications and nominations for a tenure-track faculty position at the rank of assistant professor. Requirements are a Ph.D. in Geology, or related field, at time of appointment with a demonstrated strength in structural geology/ tectonics and/or economic geology and the ability to teach courses in structural geology and petrography. In addition, the successful candidate will be expected to teach summer field-based courses for additional compensation and develop additional undergraduate and graduate courses in their area of expertise. We encourage applicants with field-based research interests, strong skills in geologic mapping, and the ability to apply quantitative analysis in their research. The successful candidate will integrate into a cohesive Geology and Geological Engineering Dept. and have responsibilities for teaching undergraduate and graduate students in both disciplines and be expected to contribute broadly to our Geology and Geological Engineering
programs. Additional requirements are strong teaching and communication skills and evidence of scholarly achievement. The anticipated starting date for the successful candidate will be in August 2015.

The University of Mississippi offers B.S., M.S., and Ph.D. degrees in both geology and geological engineering and M.S. and Ph.D. degrees in hydrology. We are located in the historic town of Oxford, in the wooded hills of north Mississippi. Oxford has a small college-town atmosphere with excellent public schools, affordable housing, performing arts, fine restaurants, and bookstores. The urban attractions of Memphis, Tennessee are 70 miles to the north.

Review of applications will begin January 5, 2015 and continue until the position is filled. Apply online only at http://jobs.olemiss.edu. Applications cannot be accepted in any other format. If you need assistance with the online application process, please contact The University of Mississippi Employment Office at 662-915-5690. For additional information, contact Dr. Robert M. Holt at rmholt@olemiss.edu. The University of Mississippi is an EEO/AA/Title VI/Title IX/Section 504, ADA/ADEA employer.

ASSISTANT PROFESSOR GROUNDWATER HYDROLOGY/ HYDROGEOLOGY UNIVERSITY OF CALIFORNIA, RIVERSIDE

The College of Natural and Agricultural Sciences at the University of California, Riverside invites applications for a tenure track position in groundwater hydrology or hydrogeology at the rank of Assistant Professor. The position has 25% Instruction and Research and 75% Organized Research in the Agricultural Experiment Station (http://cnas.ucr.edu/about/amr/), and will be located in the Dept. of Environmental Sciences or Dept. of Earth Sciences depending upon the candidate’s background and research interests. The successful candidate will develop a nationally recognized program in groundwater hydrology or hydrogeology. The incumbent is expected to have expertise in subsurface hydrology and measurement and modeling of groundwater flow, reactive transport modeling, or remote and/or geophysical sensing of groundwater. Research areas may include, but are not limited to, local and regional-scale groundwater dynamics and groundwater quality; the impact of climate change on groundwater recharge, storage and use; water injection and/or withdrawal and induced seismicity; or groundwater transport of contaminants. The successful candidate is expected to be fully engaged in the teaching mission of the department and university, including formal classroom instruction in undergraduate and graduate degree programs in Environmental Sciences or Geology Sciences and mentoring of M.S. and Ph.D. students. Teaching responsibilities will include undergraduate courses in groundwater hydrology or hydrogeology and graduate courses in the candidate’s area of specialty. A Ph.D. in groundwater hydrology, hydrogeology, or related field and a proven ability to conduct innovative hydrologic research are required. Evaluation of applications will begin on December 1, 2014, but the position will remain open until filled. Applications must include a vita, statements of research and teaching interests, and list of at least 3 professional references. All application materials, including letters of recommen-

dation, must be submitted through AP Recruit at: https://aprecruit.ucr.edu/applicants/apply/FP01xxx. For more information about the position, please contact Dr. Michael Anderson, Dept. of Environmental Sciences, University of California, Riverside; michael.anderson@ucr.edu. For questions on application procedures and requirements, please contact Judy Bliss, Academic Personnel Coordinator, at judy.bliss@ucr.edu. Additional information about the Departments of Environmental Sciences and Earth Sciences can be found at http://www.envirosci.ucr.edu/ and http://earth-science.ucr.edu/. The University of California is an Equal Opportunity/Affirmative Action/Disability/Veterans Employer.

MINERALOGY/PETROLOGY WESTERN WASHINGTON UNIVERSITY

Western Washington University invites applications for a tenure-track Assistant Professor starting September 2015, with research and teaching specialties in mineralogy or petrology. Western Washington University is a nationally recognized, public, masters-granting institution located in the Pacific Northwest at the base of the North Cascade Mountains. We seek a colleague whose research interests could include metamorphism and the dynamics of orogenic systems, low-temperature alteration processes, generation of ore deposits, or planetary geology. Required qualifications for the position include (1) a Ph.D. in an appropriate Earth Science field at the time of appointment, (2) the ability to develop a high-quality undergraduate teaching program including courses in Mineralogy and Optical Petrography, and contribute to field courses such as Field Camp or Field Petrology, (3) the ability to establish an externally-supported research program, (4) the ability to involve students in research, (5) the ability to contribute to the graduate (MS) degree program, (6) ability to work with a diverse student body and (7) a demonstrated capacity to pursue important problems in the Earth sciences using field-based and quantitative techniques. Preferred qualifications include postdoctoral experience, college-level teaching experience in the courses listed above, ability to teach Introductory Geology, and potential to develop local field research projects. The ideal candidate will engage within the Geology Dept. and the Advanced Materials Science and Engineering Center (AMSEC) and will enhance without duplicating existing departmental strengths in igneous petrology/volcanology, field geology, geomorphology, geophysics, tectonics, geoscience education, and planetary geology, as well as emerging directions in engineering geology and ore-forming systems. For more information see http://geology.wwu.edu/dept/ and www.wwu.edu/amsec.

Interested candidates must apply online. To see a full position description and log in to WWU’s Electronic Application System for Employment (EASE), please go to https://jobs.wwu.edu/ApplicantPortal.do. Applications must include a cover letter outlining teaching and research experience and accomplishments with specific reference made to the required and preferred qualifications described above. The application should also include a C.V., graduate school transcripts, as well as goals and plans for teaching and research at WWU. The names and contact information for letters of refer-

cence from four persons familiar with the candidate’s research and teaching must be provided; one of these references must be from outside the applicant’s current institution. Review of all application materials will begin on January 5, 2015; position is open until filled. Questions regarding this position should be directed to the search committee chair, Liz Schermer (Liz.Schermer@wwu.edu) or the Geology Dept. chair, Bernie Housen (Bernard.Housen@wwu.edu). WWU is an E01/A employer and encourages applications from women, minorities, persons with disabilities, and veterans.

TENURE-TRACK FACULTY POSITION IN STABLE ISOTOPE GEOCHEMISTRY/PALEOClimATOLOGY DEPT. OF EARTH AND ENVIRONMENTAL SCIENCES, UNIVERSITY OF KENTUCKY

The Dept. of Earth and Environmental Sciences (EES) at the University of Kentucky invites applications for this tenure track faculty position with an anticipated start date of August 2015. Exceptional candidates at all ranks will be considered. We seek candidates with expertise in light, stable isotope geochemistry, in particular as applied to research questions in the field of palaeoclimatology. The department maintains a fully equipped, state of the art stable isotope geochemistry facility (three IRMS and full set of peripherals) for analysis of HCN in virtually any substance. In addition to maintaining a productive, externally funded research program, the new faculty member will teach and mentor at the introductory, major, and graduate levels. Potential collaborative research opportunities exist with faculty in EES; staff of the Kentucky Geological Survey and the Center for Applied Energy Research; and faculty in the College of Arts and Sciences, the College of Agriculture, Food and Environment, and the College of Engineering. The successful individual will have a demonstrated publication record, and will have developed, or show the potential for developing, a nationally recognized research program; relevant experience beyond the Ph.D. is essential. Applications will be accepted electronically through Interfolio at http://apply.interfolio.com/27039. We will begin review of applications on January 15, 2015; however, applications will be accepted until the position is filled. The University of Kentucky is an Affirmative Action/Equal Opportunity university that values diversity and is located in an increasingly diverse geographical region. Women, persons with disabilities, and members of other under represented groups are encouraged to apply. The University also supports family friendly policies. Additional details of the Dept. of Earth and Environmental Sciences (facul-
ty, research clusters, and facilities) and the Univer-
sity of Kentucky may be viewed at our web pages: www.as.uky.edu/ees and www.uky.edu.

TWO TENURE-TRACK POSITIONS AT TEXAS TECH UNIVERSITY

The Department of Geosciences at Texas Tech Uni-
versity seeks applicants for two assistant professor, tenure-track positions. A Ph.D. in an Earth Science (or closely-related) discipline at time of appointment is required.

Position 1 focuses on sedimentary systems with an emphasis on one or more of clay mineralogy,
Faculty Position in Petroleum Geosciences

The Department of Geosciences at The Pennsylvania State University is pleased to announce a new tenure-track position in the broad area of Petroleum Geosciences. We seek applicants whose research interests address fundamental geoscience questions in areas relevant to petroleum geosystems including, but not limited to exploration geophysics, multi-channel seismic imaging, petrophysics, borehole geophysics, reservoir geomechanics, basin analysis, geodynamics, structural geology, sedimentary geology and stratigraphy, geochemistry, or geofluids. The successful candidate will be expected to teach courses in both the undergraduate and graduate levels, to develop an internationally recognized, externally funded research program, and to contribute to the operation of the department, college, university, and profession. Demonstrated experience with or a significant interest in working with industry is expected. Evaluation of candidates will begin January 30, 2015.

As an Equal Employment Opportunity/Affirmative Action employer, Penn State is dedicated to the goal of building a culturally diverse faculty committed to teaching and working in a multicultural environment. We actively encourage applications from minorities, women, veterans, persons with disabilities, and dual-career couples. Evaluation of candidates will begin January 30, 2015.

ASSOCIATE SEDIMENTOLOGIST OR SEDIMENTOLOGIST
(DEPENDING ON QUALIFICATIONS)
ILLINOIS STATE GEOLOGICAL SURVEY
PRAIRIE RESEARCH INSTITUTE
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

The Illinois State Geological Survey (ISGS) is part of the Prairie Research Institute (PRI) at the University of Illinois at Urbana-Champaign which is centrally located between Chicago, St. Louis, and Indianapolis. PRI houses five large scientific surveys covering a wide range of expertise including biology, water resources, climate, geology, sustainable technology and archeology. The ISGS is a premier state geological survey, with over 200 scientists and technical support staff, serving the needs of the public, government, and industry with earth science information.
The Department of Geosciences at The University of Texas at Dallas is searching to fill three open, tenure-track or tenured faculty positions in the fields of sedimentary analysis, geophysics, and geocoeconics. We are seeking broadly. These positions aim at the Assistant Professor level, but highly qualified candidates will be considered for Associate Professor or Professor level appointments. The institution entitles the possibility of a team consisting of one senior scientist and two junior scientists to fill the positions. The positions are to be filled during the 2014-2015 academic year.

For the basin analysis position(s), the successful candidate should have principal interests in fundamental processes of sedimentary basin architecture and evolution, and in the application of basin analysis to energy and environmental issues.

The geophysics position(s) is/are broadly defined to include expertise in any facet of geophysics applied to the study of Earth’s interior. Candidates for the neocoeconics position(es) is/are expected to have research interests in geomorphology, structural geology, near surface geophysics, and/or geocoeconics as applied to solving neocoeconics problems.

We seek individuals with the potential to develop vibrant, sustained, externally funded research programs that complement existing departmental strengths and who will contribute effectively to the Department's educational programs at the BS, BA, MS and Ph.D. levels. We especially encourage geoscientists interested in field studies and helping to strengthen the Ellison Miles Center for Geological Field Studies. We also very much want to increase the diversity of the Department and especially encourage women and minorities to apply.

These positions are part of a departmental expansion and all of them will play a pivotal role in the University’s strategic emphasis on energy and the environment. We are seeking individuals who will complement and expand departmental concentrations in structural geology, active and ancient tectonics, geophysics, geospatial science, and computational geoscience. Successful candidates may build upon our traditional collaboration with the petroleum and minerals industry in areas that encompass carbon dioxide sequestration and the exploration and development of petroleum and mineral resources. The Department of Geosciences has strong and expanding undergraduate and graduate programs. UTD is a relatively young and rapidly growing institution. It attracts very talented students (mean freshman SAT > 1200) with great diversity and is situated in a metropolitan area that is undergoing rapid growth.

Applications will be reviewed beginning October 15, 2014, but will be considered until the positions are filled. Indication of gender and ethnicity for affirmative action statistical purposes is requested as part of the application.

Questions about the positions should be directed to the Department Head, Professor John W. Geissman, geissman@utdallas.edu. Applicants should submit a complete resume, a statement of research interest and the names and contact information of five professional references via online applications available at:

http://go.utdallas.edu/pnr141001
http://go.utdallas.edu/psnl14001
http://go.utdallas.edu/pnlt14001

The University of Texas at Dallas is an Equal Opportunity/Affirmative Action Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability, pregnancy, age, veteran status, genetic information or sexual orientation.
Opportunities for Students

Ph.D. Fellowship in Paleobiology/Paleontology at the University of Pennsylvania. A Ph.D. fellowship in Paleobiology is available in the Dept. of Earth and Environmental Science at the University of Pennsylvania, starting in Fall 2015. Prof. Lauren Sallan seeks a graduate student to address major paleobiological questions, such as how global change has affected life over time, how life evolves at high levels (macroroevolution), and the origins of living biodiversity. Specific topics include, but are not limited to: the drivers and ecological consequences of mass extinction the role of predation and competition in setting marine biodiversity, the characteristics of adaptive radiations and “living fossils,” the effects of long-term environmental events on biodiversity trends, and major transitions in early vertebrate evolution. The student can also develop a novel project that addresses similar questions using quantitative, phylogenetic, and descriptive methods. While research in the department is focused on geobiology, students are encouraged to apply for our Ph.D. and MS programs in Earth, environmental, and planetary sciences. Areas of active research in the department include planetary geology and geophysics, igneous geochemistry, mineral physics, sediment transport, aqueous geochemistry and carbon sequestration. For more information, see http://geology.case.edu or write to eeps-gradinfo@case.edu. Financial assistance is available. Application deadline: 1/15/2015.

Graduate Student Opportunities, Case Western Reserve University. Students with backgrounds in geology, physics, chemistry, biology, engineering and related fields are encouraged to apply for our Ph.D. and MS programs in Earth, environmental, and planetary sciences. Areas of active research in the department include planetary geology and geophysics, igneous geochemistry, mineral physics, sediment transport, aqueous geochemistry and carbon sequestration. For more information, see http://geology.case.edu or write to eeps-gradinfo@case.edu. Financial assistance is available. Application deadline: 1/15/2015.

Graduate Student Opportunities, Ohio University. The Dept. of Geological Sciences at Ohio University invites applications to its graduate program for the Fall of 2015. The department offers an MS degree in Geological Sciences and areas of emphasis within three research clusters: paleobiology and sedimentary geology, solid earth and planetary dynamics, and environmental and surficial processes. Prospective students are encouraged to contact faculty directly to discuss potential research topics. Qualified students are eligible to receive teaching or research assistantships that carry a full tuition scholarship and a competitive stipend. For additional program and application information, visit the department website at http://geology.cwu.edu or contact the graduate chair, Dr. Alycia Stigall (stigall@ohio.edu). Review of applications begins 1 February.

Assistantships, Dept. of Geosciences, Univ. of Akron. The Dept. of Geosciences, Univ. of Akron, Ohio, has assistantships available starting in the spring and fall 2015 for students who have the drive and curiosity to succeed in graduate school. Examples of the ongoing research include studies in geobiology, structural and environmental geology, studies of the climate record contained in lake sediments, oceans, and caves, and in global biogeochemical cycles. Interested students may contact Dr. John Peck at jpeck@uakron.edu for more information and apply online at www.uakron.edu/gradsch/apply-online/.

M.S. Positions. The Geological Sciences Dept. at Central Washington University seeks motivated students for two NSF-funded projects; prior research experience is beneficial. Student research positions (MS) are available starting Fall 2015.
1. Geodynamic modeling will focus on characterizing the extensional evolution of the West Antarctic Rift System. The student must be willing and able to participate in Antarctic fieldwork; computer programming skills are beneficial. Contact: Dr. Audrey Huerta (huerta@geology.cwu.edu).
2. Geochronology and thermobarometry will focus on documenting the spatial and time evolution of P-T conditions in the North Qaidam ultrahigh-pressure terrane, western China. A strong petrology background is required. Contact: Dr. Chris Mattinson (mattinson@geology.cwu.edu).

Ph.D. Position, Stable Isotope Geochemistry, Indiana University-Purdue University Indianapolis. The Stable Isotope Biogeochemistry laboratory in the Dept. of Earth Sciences at Indiana University-Purdue University Indianapolis is currently accepting applications for a Ph.D. research assistantship that will begin in the fall of 2015. The graduate research will be part of an NSF funded project to study isotope geochemistry associated with biological sulfur cycling in anoxic lakes. The study sites include Mahoney Lake, British Columbia and Green Lake, New York. We are seeking candidates with field experience and backgrounds in chemistry, geology, and stable isotopes. Information about the laboratory and current research projects is available at http://earthsciences.iupui.edu/~wgilhool/. Those interested in the position should email a CV and personal statement to Dr. William Gilhooly (wgilhool@iupui.edu). Complete graduate applications are due January 15th (http://earthsciences.iupui.edu/graduate/admissions-requirements).

Call for Applications

2015–2016 GSA-USGS Congressional Science Fellowship

Application deadline: 1 Feb. 2015

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

The GSA-USGS Congressional Science Fellowship provides a rare opportunity for a geoscientist to spend a year working for a Member of Congress or congressional committee. If you are an earth scientist with a broad geologic background, experience applying scientific knowledge to societal challenges, and a passion for helping shape the future of the geoscience profession, GSA and the USGS invite your application.

Learn more at www.geosociety.org/csfcifello.htm or by contacting Susan Lofton, +1-303-357-1040, slofton@geosociety.org
How scientometry is killing science

A.M. Celâl Şengör, ITÜ Maden Fakültesi, Jeoloji Bölümü ve Avrasya Yerbilimleri Enstitüsü, Ayazağa 34469 İstanbul, Turkey; sengor@itu.edu.tr

“Publish or perish” is making science perish.

When I was a student, one of my professors once said that the quality of a field geologist is assessed through gossip. When I asked him what he meant by it, he responded by pointing out that unlike in laboratory work or purely theoretical endeavors, a field geologist’s work is difficult to impossible to replicate and therefore to check. One therefore relied on the opinion of those people who were closely associated with that work through similar interest or actual collaboration or simply close acquaintanceship with the author, since publication in a reputable journal does not always guarantee high-quality work. When one needed evaluation of a certain geologist’s work, one asked those people’s opinion who were familiar with it.

This is still done, but it is now increasingly shadowed by scientometric data. Scientometry was defined by its creators (as Naukometriya in Russian) Nalimov and Mul’chenko (1969, p. 191; 1989) as “the application of those quantitative methods which are dealing with the analysis of science viewed as an information process,” although the idea of keeping an index of citations originated in 1873 with Shepard’s Citations, in the United States common law, which enabled previous court decisions to be looked up with ease. During evaluation of geologists (not only academic), letters of recommendation are increasingly supported by the number of papers published in peer-reviewed journals, the number of citations, and such evaluation factors as h or g. A result of this reliance on scientometric data has been the proliferation of “scientific” journals, the main reason for the existence of which is to publish papers that will be scanned by the scientometric organizations. Among such journals even clandestine ones have come into existence, allowing authors to cite each other’s work just to boost their scientometric standing. When detected, scientometric survey organizations throw them out of their lists, but until then they continue their sinister activity and influence the scientometric data.

This state of affairs is particularly pernicious in societies with no scientific tradition. Here is an example from my own experience in my own country, Turkey. Turkey had no science whatever prior to the founding of the Republic of Turkey in 1923. After the Republic was founded, one of the chief aims of its founder, Mustafa Kemal Atatürk (1881–1938), was to introduce science into his country. To that end, he made use of the opportunity provided by Hitler’s expulsion of Jewish and politically undesirable scientists from Germany by hiring as many of such Nazi victims as possible. The experiment largely failed, however, because it turned out that the natives were more interested in obtaining university positions with a view to enhancing their social status than in discovering the secrets of nature. The result was that after the Germans left (almost all of them left in exasperation as soon as the war was over; some returned home, others went to the United States) the university positions began to be filled with politically manipulative but scientifically incompetent people. Therefore, after a forced start, Turkish science largely returned to its pre-Republican levels. Medicine looked as if it were an exception: It was not. Many competent physicians were indeed trained in Turkish universities, but they saw their job as providing service to the community while filling their own pockets by opening private practices parallel with their positions as university teachers. Vanishingly few of them have done any scientific research.

In the early nineties a group of Turkish scientists, upon the urging of the then cabinet member Professor Erdal İnönü (1926–2007), a physics professor and Caltech Ph.D. (who, after a promising start as a Princeton post-doc, himself abandoned science for administrative positions and eventually politics) decided that founding an academy of sciences might help to improve things. Accordingly, İnönü’s government appointed ten founding members. Their job was to elect another ten immediately, thus bringing the number to 20 with the purpose of constituting a council to enable the Academy to begin functioning. I was one of the ten appointed. During the discussions it became obvious that our most urgent matter was to establish criteria by which the next ten members (and also the future ones) might be elected. Since we were all from different disciplines and since there was no existing Turkish science community as such, we only knew the more prominent people in our own fields. It was therefore decided to rely on scientometric data. The result turned out to be so appalling that it led one member to exclaim, “Why the hell don’t we once consider what the candidate will be remembered for after he or she croaks!” Despite such protests, the process went nowhere and the Academy got stuck with the scientometric data, because an alternative, which might have existed in a scientifically mature society, simply was not available in Turkey. As a disastrous consequence, many a worthless “scientist” was elected; many an excellent one was excluded. The Islamist government of Mr. Recep Tayyip Erdoğan used this as an excuse to destroy the Academy entirely in 2012 by having members appointed directly by state organizations that his party controlled (cf. Schiermeier, 2012).

Turkish universities also rely on scientometric data more than anything else and end up having to appoint incompetent people.
to university positions, because if they do not, the unsuccessful candidate goes to court and argues that his or her scientometric data are better than those of so and so. The court almost invariably reverses the decision of the university, giving the position to the scientometrically better-looking, but in reality inferior, candidate.

This is deadly. It automatically disadvantages stratigraphers, structural geologists, tectonicists, or geologists with regional interests. People working in laboratories and with modeling almost always look better scientometrically than their colleagues working in the more field-orientated areas of geology. But, the success of laboratory work is ultimately and critically dependent on field data. Geology is commonly regarded as unique among the sciences because of its historical component. This is untrue. Cosmology also has an historical component (at least since Edwin Hubble [1889–1953]), and every theoretical science making cosmological statements has to take the historical evolution of the universe into account. No theoretical cosmological model can be taken seriously if it flatly contradicts the data on the evolution of the universe. Similarly, no theory of biological evolution can be expected to produce an opinion. Anybody relying on scientometric criteria alone to make a decision about a scientist is simply not competent to do so.

Do not let us ever forget: More does not automatically mean better.

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REFERENCES CITED


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