New evidence for abrupt climate change in the Cretaceous and Paleogene: An Ocean Drilling Program expedition to Shatsky Rise, northwest Pacific
Simultaneous XRD
and DSC
for Geological Applications

- Combines X-ray diffraction (XRD) and differential scanning calorimetry (DSC) into a single instrument
- Eliminates uncertainties comparing XRD and DSC data obtained separately
- Enables simultaneous characterization of dehydration, polymorphic phase transitions, melting, crystallization, and decomposition of geological samples
- Distinguishes exothermic and endothermic reactions and provides their enthalpies and temperatures
- Probes the effects of temperature history and heat treatment on structural and thermal properties
- Requires only milligrams of sample
New evidence for abrupt climate change in the Cretaceous and Paleogene: An Ocean Drilling Program expedition to Shatsky Rise, northwest Pacific  
Timothy J. Bralower, Isabella Premoli Silva, Mitchell J. Malone, and the Scientific Participants of Leg 198

Upcoming Deadlines

Call for Geological Papers: 2003 GSA Section Meetings

Geoscience Horizons: Seattle 2003—Call for Proposals for Keynote Symposia and Topical Sessions

Preliminary Announcement and Call for Papers: Rocky Mountain Section Meeting

GSA Offers Awards in Geomorphology and Micropaleontology

Call for Nominations: Planetary Geoscience Student Paper Award

Final Announcement: Joint Meeting, South-Central and Southeast Sections

GSA Foundation Update

Final Announcement: North-Central Section Meeting

Commentary—Biological Clocks and Tenure Timetables: Restructuring the Academic Timeline

2002 Biggs Award Winner Announced

Letter

GSA Division and Section Grants for 2002

E&EG Call for Papers

Announcements

Classified Advertising

GSA Geology and Public Policy Committee Announces 2002-2003 Speaker’s Tour

Journal Highlights

New evidence for abrupt climate change in the Cretaceous and Paleogene: An Ocean Drilling Program expedition to Shatsky Rise, northwest Pacific

Timothy J. Bralower, Department of Geological Sciences, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina 27599-3315, USA, bralower@email.unc.edu

Isabella Premoli Silva, Dipartimento di Scienze della Terra, Università degli Studi di Milano, Via Mangiagalli 34, 20133 Milano, Italy

Mitchell J. Malone, Ocean Drilling Program, Texas A&M University, 1000 Discovery Drive, College Station, Texas 77845-9547, USA

Scientific Participants of Leg 198*

ABSTRACT

Sediments recovered during an Ocean Drilling Program Leg on Shatsky Rise in the northwest Pacific hold clues to a number of abrupt climate events that took place during the Cretaceous and early Paleogene. These transient events caused major upheaval in marine communities and profoundly altered biogeochemical cycling. Shatsky Rise cores contain organic carbon-rich strata deposited during a brief interval of open ocean dysdia or anoxia in the early Aptian (120 Ma). Analyses of exceptionally preserved organic compounds suggest that bacterial activity helped sequester organic carbon in these strata. Graphic evidence exists in Shatsky cores for the mid-Maastrichtian (ca. 69 Ma) extinction of the inoceramids, a long-ranging, widespread group of bottom-dwelling clams. This extinction is a global event that was likely related to a profound change in deep ocean circulation. Stratigraphically expanded records of the Cretaceous-Tertiary boundary extinction event (65 Ma) were recovered at four different sites. The cores contain evidence of the response of biogeochemical cycling and the recovery of oceanic plankton in the wake of this catastrophe. A new biotic event of major evolutionary significance was found in the early late Paleocene (ca. 58.4 Ma) associated with a change in deep-water circulation, possibly as a result of a brief pulse of warming. Abundant evidence of the Paleocene-Eocene thermal maximum (PETM; ca. 55 Ma), an abrupt warming event associated with major reorganization of benthic and planktonic communities, was recovered in cores from five sites along a depth transect. PETM warming is thought to have been induced by methane derived from dissociation of methane hydrates. The Shatsky Rise depth transect shows evidence of the predicted response of such methane input: pronounced, short-term shoaling of the lysocline and calcite compensation depth (CCD).

Shatsky Rise cores record the response of the tropical Pacific to a rapid cooling event near the Eocene-Oligocene boundary (ca. 33.5 Ma) marking the transition to glacial climates that characterized the remainder of the Cenozoic. This event is reflected by a marked increase in carbonate content of the sediment preserved on Shatsky Rise, which signifies a profound drop in the CCD and markedly changed deep-sea circulation patterns.

INTRODUCTION

Predictions for modern global warming resulting from increased CO2 levels have caused a heightened interest in the mechanics of ancient warm climates and especially of geologically abrupt warming events. The mid-Cretaceous (ca. 80–120 Ma) and early Paleogene (ca. 45–60 Ma) were characterized by some of the most equitable climates of the Phanerozoic (Fig. 1). In addition, these “greenhouse” intervals contain significant abrupt and transient warming events that led to major changes in oceanic environments, profound turnover in marine communities, including extinction, and perturbations to global chemical cycles. Examples include the Paleocene-Eocene thermal maximum (e.g., Kennett and Stott, 1991) and Cretaceous oceanic anoxic events (e.g., Jenkyns, 1980).

Among the largest obstacles facing our understanding of the climate of the Cretaceous and Paleogene is that many good stratigraphic sections on land and in the oceans have been buried at depths where diagenetic alteration has obscured interpretations of stable isotope and other climate proxies. In many oceanic sequences, spot-coring, coring gaps, drilling disturbance, and hiatuses hinder detailed studies of ancient climate. Site coverage is...
uneven and almost nonexistent in some regions, especially the tropics and the Pacific Ocean. The aerial extent and importance of the Pacific in global circulation, however, make this a critical target for investigation of warm climatic intervals.

One of the most promising locations in the Pacific for recovering Cretaceous and Paleogene sediments at relatively shallow burial depths is Shatsky Rise (Fig. 2). This feature, a medium-sized large igneous province in the west-central Pacific was formed in the Late Jurassic and Early Cretaceous between 147 and 135 Ma (Nakanishi et al., 1989). Shatsky Rise was the target of three Deep Sea Drilling Project (DSDP) expeditions: Legs 6, 32, and 86. The latter leg drilled one site on Shatsky Rise (Site 577), which was limited to the Paleogene and uppermost Maastrichtian. Some sites in the older legs were spot-cored, and chert lowered recovery in others, especially in the Cretaceous. Yet even with an extremely patchy record, analyses of Shatsky Rise sediments have provided key data in our understanding of Cretaceous and Paleogene climate; these data are especially significant given that the rise was located in tropical latitudes during this time period.

Ocean Drilling Program (ODP) Leg 198 in August-October, 2001 was designed to understand the causes, nature, and mechanics of the long-term Cretaceous and Paleogene "greenhouse," as well as of transient but critical climate events during this period. A key aspect of the drilling plan was to locate sites along depth and latitudinal transects to provide additional dimensions to reconstructions of the paleoenvironment through time (Fig. 2). Intermediate- and deep-water chemistry (i.e., carbonate solubility, oxygenation) and circulation are sensitive to changes in climate and can be reconstructed using depth transects. One site each was drilled on the North and Central Highs of Shatsky Rise (Sites 1207 and 1208, respectively) and six were drilled on the Southern High (Sites 1209–1214) (Bralower et al., 2002).

An impressive 140 m.y. package of pelagic sediment was recovered at depths between 170 and 623 m below the sea floor (Fig. 3). The Cretaceous and Paleogene section recovered at sites across the depth transect provides a unique opportunity to understand long-term climate change on a warm Earth. However, the key success of the drilling was the abundant evidence for short-lived (<1 m.y.) warming events, and other major intervals of rapid climate and environmental change.

A CLASSIC RECORD OF THE EARLY APTIAN OCEANIC ANOXIC EVENT

The beginning of greenhouse climate conditions in the mid-Cretaceous was associated with widespread deposition of organic-carbon (C_{org})-rich sediments, informally known as black shales, in the oceans. These C_{org}-rich deposits were the result of fundamental oceanographic changes that drastically affected biogeo-chemical cycling and marine ecosystems, resulting in geographically extensive or global oxygen-deficient water masses. C_{org}-rich sediments are known to occur primarily in specific stratigraphic intervals that have been termed oceanic anoxic events (OAEs: Schlanger and Jenkyns, 1976). The ultimate trigger(s) of OAEs, however, remain elusive.

C_{org}-rich sedimentary rocks at Sites 1207 and 1213 (Fig. 4) are evidence for OAE1a during the early Aptian (120 Ma) (Arthur et al., 1990), an event that is well documented in Tethyan sections (Coccioni et al., 1992). At Site 1207, OAE1a is found within 45 cm of finely laminated, dark brown radiolarian claystone. The Site 1213 C_{org}-rich units include clayey porcellanites and radiolarian porcellanites with associated minor tuff. At Site 1214, a black laminated claystone unit contains a distinctive radiolarian assemblage that suggests that the recovered sediments correlate to the OAE1a interval (e.g., Erbacher and Thurow, 1997), but low-C_{org} contents indicate the peak of the event was not recovered.

In Tethys early Aptian OAE1a corresponds to prominent C_{org}-rich horizons that were deposited in open ocean environments; for example, the original Selli level in Italy is in a truly pelagic section (Coccioni et al., 1992). However, the same interval in the North Atlantic is not C_{org} rich (Bralower et al., 1994). C_{org}-rich horizons of OAE1a age have been found
in a number of other locations in the Pacific Ocean, but only DSDP Site 463 (Mid Pacific Mountains) and ODP Site 866 (Resolution Guyot) have good recovery (Stüer, 1989; Jenkyns, 1995). Both of these sites have a shallow-water influence: Site 866 is located in shallow-water carbonates and Site 463 has a considerable fraction of material derived from shallow-water carbonate environments. Thus the Leg 198 Corg-rich units represent the most pelagic records of OAE1a outside of Tethys, and provide important information about the nature of environmental change during the event.

The Corg contents of lower Aptian intervals from Sites 1207 and 1213 (Fig. 4) are among the highest ever recorded in pelagic Cretaceous sequences. They attest to the extraordinary nature of the depositional conditions that led to enhanced sequestration of organic matter. Exceptional preservation of organic compounds, combined with lamination in sediments at Site 1207, indicate that conditions were highly dysoxic or anoxic at the time of deposition. Rock-Eval analyses and gas chromatography–mass spectrometry (GC-MS) of extractable hydrocarbons and ketones indicate that the organic matter is almost exclusively algal and bacterial in origin. GC-MS data show biomarkers associated with cyanobacteria. The prevalence and character of bacterial biomarkers suggest the existence of microbial mats at the time of deposition. Compounds identified in Leg 198 sediments also include the oldest known alkenones, a signature of haptophyte algae (S.C. Brassell, 2002, personal commun.). Thus, biomarker data indicate that profound changes in prokaryote and protistan populations were intimately associated with processes that led to sequestration of Corg during OAE1a. Further studies of the well-preserved organic compounds are planned to elucidate these processes.

At Sites 1207 (~1.3 km paleodepth during OAE1a) and 1213 (~2.8 km paleodepth), the Corg-rich units lack carbonate, but calcareous sediments occur directly underneath the Corg-rich sediments at Site 1213, indicating that the calcite compensation depth (CCD) shoaled by at least 1.5 km during the event. The magnitude of the change in the CCD during OAE1a was at least partially a result of increased rates of CO2 outgassing that may also be directly responsible for global warmth at this time (e.g., Arthur et al., 1985; Larson, 1991).

EXTINCTION EVENTS IN THE MIDDLE-MAASTRICHTIAN AND AT THE CRETACEOUS-TERTIARY BOUNDARY

Stable isotope evidence indicates that cooling in the Late Cretaceous was interrupted by a significant event in the mid-Maastrichtian at 69 Ma when the source of deep waters changed abruptly from low to high latitudes (e.g., MacLeod and Huber, 1996). This event appears to have coincided with the extinction of the inoceramid bivalves (MacLeod et al., 1996). Growing evidence, however, suggests that the Inoceramus extinction is diachronous. Moreover, the magnitude and direction of stable isotope changes are quite variable at different sites (Frank and
Arthur, 1999), possibly as a result of uncertainties in stratigraphic correlation or of true differences in deep-water properties. Thus the relationship between the extinction event and changing deep-water properties is not firmly established.

An unusual record of the mid-Maastrichtian event was observed in the sedimentary record at two sites on the Southern High of Shatsky Rise. At Sites 1209 and 1210, large Inoceramus shell fragments are common for several meters, but disappear abruptly. This disappearance is in the same stratigraphic position at both sites. Furthermore, isolated Inoceramus prisms were recovered in foraminiferal separates at correlative levels at Site 1211. The significance of the short range of visible specimens in this open ocean setting is not currently understood. However, such occurrences have previously been noted in the Pacific (MacLeod et al., 1996) and the stratigraphic position suggests they are related to the Inoceramus extinction and deep-water changes in the mid-Maastrichtian determined at other deep-sea locations (e.g., Barama et al., 1997; Frank and Arthur, 1999). Benthonic and planktonic foraminiferal isotope and assemblage data from Shatsky Rise will help characterize changes in deep- and surface-water properties as well as constrain the timing and origin of the extinction.

The origin of extinctions at the K-T boundary (65 Ma) is well understood, however, the effect of the event on biogeochemical cycling and marine ecosystems is still not completely constrained. A remarkable set of cores was taken across the K-T boundary on the Southern High at Sites 1209, 1210, 1211, and 1212 (Fig. 5).

The lithologic sequence in the K-T boundary interval is similar at all of these sites (Fig. 5). The boundary succession includes uppermost Maastrichtian (nannofossil Zone CC26) white to very pale orange, slightly indurated, nannofossil ooze overlain by an 8–12-cm-thick layer of basal Paleocene (foraminiferal Zone Pα) grayish orange foraminiferal ooze. This layer grades into 19–23-cm-thick white foraminiferal nannofossil chalk, then into grayish orange nannofossil ooze. The boundary between the uppermost Maastrichtian and the lowermost Paleocene is clearly bioturbated as shown by the irregular nature of the contact and the pale orange burrows that extend as much as 10 cm down into the white Maastrichtian ooze (Fig. 5). Sampling of the deepest sections of the burrows of Paleocene ooze within the uppermost Maastrichtian yields highly abundant, minute planktonic foraminiferal assemblages that are dominated by Guembelitria with rare Hedbergella holmdelensis, suggesting a possible Zone P0 age (Smit, 1982). Burrows also contain common light brown to amber spherules up to 100–150 µm in diameter with textures similar to the spherules composed of glauconite and magnetite from the K-T boundary in other locations (Smit and Romein, 1985). The substantial thickness of the uppermost Maastrichtian M. prinsii (CC26) Zone and the lowermost Danian P. eugubina (Pα) Zone indicates that the K-T boundary is expanded compared to the majority of deep-sea sites (the Pα Zone is either unrecovered or poorly preserved at most other deep-sea sites). Moreover, the Zone Pα interval in Shatsky cores bears similarities to other sites such as ODP Site 1049 (western North Atlantic), where the correlative interval corresponds to a dark, burrow-mottled clay underneath 5–15-cm-thick white foraminiferal nannofossil ooze (Norris et al., 1998). A similar white unit is found directly above the boundary at DSDP Site 536 (Gulf of Mexico; Buffler et al., 1984), and ODP Sites 999 and 1001 (Caribbean; Sigurdsson et al., 1997). The ultrafine micrite in this oceanwide white layer may be related to the collapse of the...
Figure 5. The Cretaceous-Tertiary boundary on Shatsky Rise. Arrows show level of paleontological boundary as recognized by planktonic foraminiferal biostratigraphy (see text for details).

Figure 6. The Paleocene-Eocene thermal maximum (PETM) on Shatsky Rise. Arrows show onset of event as recognized by major changes in carbonate content and preservation (confirmed by the presence of bulk sediment carbon isotope excursion). Flags show top of clay-rich ooze horizon. PETM at Site 1208 is recognized by preservational change and confirmed by bulk sediment carbon isotope stratigraphy. Sites are organized by present (and paleo) water depth.
marine biosphere and inorganic production of carbonate in the surface ocean (e.g., Kump, 1991), a hypothesis that requires further testing. The Leg 198 sections represent some of the best-preserved and least-disrupted deep-sea records of the K-T extinction event and the subsequent biotic radiation.

KEY EVIDENCE FOR ABRUPT, TRANSIENT WARMING EVENTS IN THE PALEogene

An abrupt warming event is well documented at the Paleocene-Eocene boundary (the Paleocene-Eocene thermal maximum [PETM; 55 Ma]). However, a number of other intervals of rapid temperature increase, or hyperthermals, akin to the PETM although smaller in magnitude, may also exist in the midst of the warm early Paleogene (Thomas et al., 2000). Leg 198 discovered a new transient climate event of evolutionary significance in the early late Paleogene at ca. 58.4 Ma. A prominent clay-rich ooze found at Sites 1209, 1210, 1211, and 1212 coincides with the evolutionary first occurrences of Heliolithus kleinpellii and primitive discoasters, both of which are important, and often dominant, components of late Paleocene and younger nannoplankton assemblages. Planktonic foraminifers in the clay-rich layer are characterized by a low diversity, largely dissolved assemblages. Planktonic foraminifers in the clay-rich layer are characterized by a low diversity, largely dissolved assemblages dominated by representatives of the genus Igorina (mainly I. pusilla and I. tadzikistanensis). The clay-rich layer contains common crystals of phillipsite, fish teeth, and phosphatic microlodes. The abundance of phillipsite and fish teeth suggests either very slow sedimentation or intervals of seafloor exposure, possibly resulting from pervasive dissolution of carbonate. Even though microfossil assemblages are clearly altered by dissolution, they appear to record a significant environmental perturbation in surface waters as the underlying cause of the biotic event. We speculate that the event was a hyperthermal, an abrupt warming that possibly caused a brief switch in the source of deep waters bathing Shatsky Rise.

Sediments cored on Shatsky Rise show evidence of a strong deep-ocean response to warming in the PETM. The PETM interval was cored in nine holes at Sites 1209, 1210, 1211, and 1212 on the Southern High (Fig. 6). The Paleocene-Eocene boundary interval was also recovered at Site 1208 on the Central High. At the Southern High sites, the PETM corresponds to an 8-23-cm-thick layer of yellowish brown clayey nannofossil ooze with a sharp base and a gradational upper contact. The clay-rich layer is often bioturbated into the underlying sediment. A thin (1 mm) dark brown clay seam lies at the base of the PETM in several holes.

Preliminary biostratigraphy and stable-isotope stratigraphy suggest that the PETM is complete. This biostratigraphy also shows that the PETM interval at the Southern High sites is condensed compared to continental-margin records from the Atlantic and Tethys (e.g., Kennett and Stott, 1991), but somewhat expanded compared to other deep-sea sites. At the relatively deep Site 1208, biostratigraphic and bulk stable isotopic data confirm that the recovered PETM is a highly condensed (~3 cm) record.

The PETM interval at all of the sites contains a clear record of nannofossil and planktonic foraminiferal assemblage transformation at this time of environmental upheaval. One of the dominant nannolith genera, Fasciculithus, is replaced by Zygrhablithus bijugatus, a holococcolith species that is often a highly abundant component of Eocene assemblages. The genus Discoaster is highly abundant, likely as a result of warming or increased oligotrophy (Bralower, 2002). Also found are abundant calcispheres, which are possibly calcareous resting cysts produced by dinoflagellates at times of environmental perturbation. Planktonic foraminiferal assemblages contain an ephemeral group of ecophenotypes or short-lived species of the genera Acarinina and Morozovella (Kelly et al., 1996).

The depth transect strategy of Leg 198 was specifically designed to address the response of the ocean to the greenhouse forcing mechanism proposed for the PETM. This warming is generally thought to have resulted from a massive release of methane from clathrates into the ocean-atmosphere system (e.g., Dickens et al., 1997). Methane can explain the magnitude of the warming and the rate of carbon isotopic change at the onset of the event. The oceanic response to this methane input has been predicted but is currently untested (e.g., Dickens, 2000). Regardless of how the transfer to the ocean took place, oxidation of methane would generate CO₂, which would lower the saturation state of seawater with respect to calcite and cause a dramatic shoaling in the depth of the lysocline and CCD. This response should be recorded in changes in carbonate content and preservation in sections below the mid-slope. Shallower sections should show less change in dissolution and carbonate content than deeper sections. The range of present water depths (PETM paleodepths were broadly similar), from 2387 m at Site 1209 to 3346 m at Site 1208, provides a significant transect to observe changes in dissolution at the PETM as a function of depth.

Nannofossil preservation is moderate to good below the PETM at all of the Southern High sites, indicating that they were located in the upper part of the lysocline. All sites show a short-lived deterioration in nannofossil preservation at the onset of the event. Carbonate contents have been measured in detail across the PETM at Site 1210. These data record a decrease from ~96 to ~86 wt% CaCO₃ at the base of the event, a change that would involve a substantial increase in dissolution, indicating a shoaling of the lysocline. Shallower sites (Sites 1209, 1210, 1212) show less lithologic and fossil preservational change at the base of the PETM than deeper sites (Sites 1208, 1211) (Fig. 6); changes in carbonate solubility at the onset and the termination of the event are more marked at the deep sites, suggesting that they were close to the CCD as it shoaled. The Shatsky Rise depth transect shows clear evidence for an abrupt rise in the level of the lysocline and CCD during the PETM, and thus supports the predicted ocean response to massive methane input.

THE END OF THE GREENHOUSE: PALEOCENE-OLIGOCENE BOUNDARY COOLING IN THE TROPICAL PACIFIC OCEAN

The Eocene-Oligocene (E-O) boundary interval recovered on Shatsky Rise records the response of the tropical Pacific Ocean to a major global cooling event when ice sheets developed on Antarctica and cold water circulated throughout the deep ocean (e.g., Shackleton and Kennett, 1975). This cooling that signaled the end of the warm Paleogene occurred largely in a rapid step in the earliest Oligocene at ca. 33.5 Ma.
The distinctive color change across the E-O boundary in all of Leg 198 records a significant change in carbonate content as a result of a deepening of the lysolcime and CCD. This interpretation is consistent with the observation that the lithologic change is more pronounced at the deepest site, Site 1208. Microfossil preservation in the interval above and below the transition suggests that the CCD dropped from just below the depth of Site 1211 to well below the depth of Site 1208, thus by at least 450 m. This significant change is observed in other ocean basins and possibly reflects an increase in mechanical and chemical weathering rates on continents associated with cooling (e.g., Zachos et al., 1996).

CONCLUSIONS
Drilling on Leg 198 recovered diverse evidence for abrupt environmental changes in the Cretaceous and Paleogene warm climate interval. These changes include a short period of anoxia in the early Aptian (ca. 120 Ma) that led to deposition of highly carbonate sediments; an abrupt reorganization of oceanic circulation in the Maastrichtian (ca. 69 Ma) that caused extinction of a group of deep-sea mollusks; the extinction event at the K-T boundary (65 Ma); a prominent biotic event in the late Paleocene (ca. 58.4 Ma); the PETM (ca. 55 Ma) that shows lithologic and geochemical evidence consistent with methane outgassing; and changes in circulation and rapid cooling near the E-O boundary (ca. 33.5 Ma) that correspond to a sharp lithologic change.

ACKNOWLEDGMENTS
We thank the highly capable drilling operations team, the crew, and the technicians who sailed on Leg 198 for their outstanding support. We are grateful to Hope Jahren, Ken MacLeod, Woody Wise, and an anonymous reviewer for helpful comments on an earlier manuscript. This research used samples and data provided by the Ocean Drilling Program, funded by the National Science Foundation. Funding for this research was provided by the U.S. Science Support Program, administered by Joint Oceanographic Institutions.

REFERENCES CITED

Manuscript received June 24, 2002; accepted September 9, 2002.◆
Committee Service
Nominations Due January 15, 2003
Candidates are needed for service on the following GSA committees: Annual Program; Arthur L. Day Medal Award; Education; Geology and Public Policy; Honorary Fellows; Joint Technical Program; Membership; Minorities and Women in the Geosciences; Nominations; Penrose Conferences and Field Forums; Penrose Medal Award; Professional Development; Research Grants; and Young Scientist Award. Candidates are also needed for a GSA representative to the North American Commission on Stratigraphic Nomenclature (NACSN). Service begins July 2003 for all positions except NACSN, which begins November 1, 2003, and Joint Technical Program, which begins January 1, 2004.

For complete information on committee service, current vacancies, and required qualifications, see the October 2002 issue of GSA Today. Nomination form and instructions are available at www.geosociety.org/aboutus/commtees/.

Officers and Councilors
Nominations Due January 15, 2003
The GSA Committee on Nominations requests nominations for officers (vice president and treasurer) and councilors to serve on the GSA Council beginning in 2004. Each nomination should be accompanied by basic data and a description of the qualifications of the individual for the position recommended.

Send materials for committee, officer, and councilor nominations to Ruth Harrison, GSA, P.O. Box 9140, Boulder, CO 80301-9140, (303) 357-1000, ext. 0, 1-800-472-1988, ext. 0, rharrison@geosociety.org.

Congressional Science Fellowship
Applications Due January 24, 2003
For application information for the 2003–2004 GSA–U.S. Geological Survey Congressional Science Fellowship, visit www.geosociety.org/science/csf/, or contact Karlon Blythe, Program Officer, GSA Headquarters, (303) 357-1036, kblythe@geosociety.org.

Student Research Grants
Applications Must Be Postmarked by February 1, 2003
For information on 2003 Research Grant Program for Students, see the October issue of GSA Today or visit www.geosociety.org. Application forms are available online, at the geology departments of colleges and universities offering graduate degrees in earth sciences, or from Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301, lcarter@geosociety.org.

2003 Doris M. Curtis Memorial Fund for Women in Science Award
(Sponsored in part by Subaru of America, Inc.)
Nominations Due February 1, 2003
This award is given to a woman or group of women who have impacted the field of the geosciences in a major way based on their Ph.D. research. For nomination, eligibility, and award details, see the October issue of GSA Today, or visit www.geosociety.org. Send nominations and supporting material to Grants, Awards, and Medals, P.O. Box 9140, Boulder, CO 80301-9140.

GSA Fellows
Nominations Due February 15, 2003
The Committee on Membership requests nominations of members to be elevated to GSA Fellow status. Any GSA Fellow may nominate a member for this honor. Two other supporting signatures are needed, along with a letter stating the member’s qualifications to be evaluated on the basis of eight established criteria. For more information, a list of the criteria, and a nomination form, please see www.geosociety.org/members/fellow.htm or contact Nancy Williams, (303) 357-1017, nwilliams@geosociety.org.

John C. Frye Environmental Geology Award
Nominations Due March 31, 2003
In cooperation with the Association of American State Geologists, GSA makes an annual award for the best paper on environmental geology published either by GSA or by one of the state geological surveys. For details, see the October issue of GSA Today or visit www.geosociety.org. Nominations must be sent to Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140.

National Awards
Nominations Due April 30, 2003
Candidate nominations are needed for the following national awards: William T. Pecora Award, National Medal of Science, Vannevar Bush Award, and Alan T. Waterman Award. For details, see the October issue of GSA Today. Nominations should be sent to GSA, Grants, Awards, and Medals, P.O. Box 9140, Boulder, CO 80301-9140.
Call for Geological Papers: 2003 GSA Section Meetings

<table>
<thead>
<tr>
<th>Section</th>
<th>Date</th>
<th>Location</th>
<th>Abstract Deadline</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeastern Section</td>
<td>March 27–29, 2003</td>
<td>Westin Hotel, Halifax, Nova Scotia</td>
<td>December 18, 2002</td>
<td>Jane Barrett, Dept. of Earth Sciences, Dalhousie University, Halifax, NS B3H 3J5, Canada, (902) 494-1473, <a href="mailto:jmbarret@is.dal.ca">jmbarret@is.dal.ca</a>.</td>
</tr>
<tr>
<td>Cordilleran Section</td>
<td>April 1–3, 2003</td>
<td>Hotel NH Krystal, Puerto Vallarta, Mexico</td>
<td>December 16, 2002</td>
<td>Elena Centeno-García, Instituto de Geología, Universidad Nacional Autónoma de México, (National Autonomous University of Mexico), Ciudad Universitaria, México, D.F. 04510, México, <a href="mailto:centeno@servidor.unam.mx">centeno@servidor.unam.mx</a>.</td>
</tr>
<tr>
<td>Rocky Mountain Section</td>
<td>May 7–9, 2003</td>
<td>Fort Lewis College, Durango, Colorado</td>
<td>January 30, 2003</td>
<td>James Collier, Dept. of Geosciences, Fort Lewis College, 1000 Rim Dr., Durango, CO 81301-3999, (970) 247-7129, <a href="mailto:collier_j@fortlewis.edu">collier_j@fortlewis.edu</a>.</td>
</tr>
</tbody>
</table>

1. Cordilleran Section
2. Rocky Mountain Section
3. North-Central Section
4. South-Central Section
5. Northeastern Section
6. Southeastern Section
Call for Proposals for Keynote Symposia and Topical Sessions

Proposal deadline: January 16, 2003
Submit proposals at www.geosociety.org

The 2003 GSA Annual Meeting returns to Seattle, hub of the Pacific Northwest. Seattle’s geological landscape reminds us of the value of our annual meeting—the interplay of a tremendous range of geologic processes and their influence on both natural and human environments. This setting provides a fitting backdrop for the great variety of ongoing national and international geoscience investigations for which GSA provides the broadest forum.

At GSA’s annual meeting, the topics presented are the topics you propose. If you have a special interest you would like to see scheduled, propose a topical session or Pardee Keynote Symposium.

Program Opportunities
We welcome proposals for Pardee Keynote Symposia and topical sessions. Submit proposals electronically on or before January 16, 2003, via the link at www.geosociety.org.

The annual meeting program structure offers opportunities for effective and dynamic program building, allowing a mixture of invited and volunteered papers and different session formats. Joint Technical Program Committee (JTPC) representatives from GSA Divisions play a large role in decisions. Please read the various program options and guidelines at www.geosociety.org carefully before submitting a proposal of one of two types:

Pardee Keynote Symposia, made possible by a grant from the Joseph T. Pardee Memorial Fund, are special events of wide interest to the geoscience community. Topics appropriate for these symposia are those that: are on the leading edge in a scientific discipline or area of public policy; address broad, fundamental problems; are interdisciplinary; or focus on global problems. The primary criterion for selection is excellence; and selection is on a competitive basis. All speakers will be invited; each convener is provided with a budget of $2,000. We strive for high-profile sessions on important developments that have an impact on our science.

Oral and Poster General Sessions
Consisting entirely of volunteered papers, these sessions remain an important component of the GSA Annual Meeting. The number of abstracts received determines the number of general sessions in each discipline. The goal of the Technical Program Chair and the JTPC representatives is to provide presenters the best possible opportunity for communicating new scientific information rather than to dictate what can or will be presented. Poster sessions have been expanded to allow presentation of more papers. To allow for well-attended, dynamic sessions, an effort will be made in scheduling to avoid overlap of poster and oral sessions in the same discipline.

Hot Topics
The focus of these popular lunchtime forums held Sunday through Wednesday, is on discussion, with plenty of audience participation. Depending on the subject, a debate format is recommended, and panels are discouraged. Each session must have a moderator. Titles should be catchy and provocative. If you are interested in organizing a Hot Topic session, contact Hot Topics Chair Fred Schwab, schwab.f@wu.edu.

Make Yours the Session Everyone Talks About
Topical session organizers have the ability to select topics that bear on a specific topic. Organizers (advocates) may invite specific papers to ensure a successful and excellent session and are encouraged to solicit volunteered contributions. A maximum of four invited speakers may be allowed. An advocate may request more invitations if he or she can justify the larger number. However, sessions must include volunteered abstracts, which are solicited in GSA Today for all approved topical sessions. Advocates may request special formats. All requests are reviewed by the JTPC. All topical sessions must receive a minimum of 12 abstracts to be part of the technical program.

September 2003 Dates and Deadlines
Jan. 16 Proposals due by midnight, MST.
April 1 Electronic submission required.
April 1st announcement in April GSA Today.
June 2nd announcement in June GSA Today.
July 15 Abstracts due by midnight, MST.
Aug. 4 Technical program schedule finalized.

Propose a Session: Who Knows Where It Could Lead?
When you organize a session, you can help ensure that your area of expertise gets exposure through meeting attendees and the widely cited Abstracts with Programs volume. You’ll also make valuable contacts, and you’ll see your name in lights! (Well, on poster board.)

“I think it’s a rewarding experience for session organizers to see their sessions unfold,” says Nancy Carlson, GSA technical program officer. “As the abstracts come in, organizers are able to see what is being submitted for their sessions.” And organizers aren’t the only ones watching. GSA’s marketing and communications staff keeps tabs on the sessions with an eye out for items the media may want to pick up, and GSA’s publications staff is always looking for that next best-selling Special Paper.
Preliminary Announcement and Call for Papers

ROCKY MOUNTAIN SECTION, GSA

55th Annual Meeting • Fort Lewis College, Durango, Colorado • May 7–9, 2003

ENVIRONMENT

Durango is located in southwestern Colorado, in an area commonly referred to as the Four Corners. Known for its spectacular natural beauty and outdoor recreation, Durango is a popular tourist destination. Durango is approximately six hours from Denver and three hours from Albuquerque by car. It is also served by a regional airport.

Fort Lewis College sits at an elevation of 6850 feet on a mesa of glacial outwash with spectacular views of the glacio-fluvial Animas River Valley and the historic mining districts of the La Plata and San Juan mountains. Approximately 16,000 feet of sedimentary rocks are exposed in the Durango area, representing a nearly complete stratigraphic column. Precambrian igneous and metamorphic rocks and Tertiary volcanic rocks can be reached by a short drive. Examples of virtually every type of geological phenomenon can be found within a short distance of Fort Lewis College. Of particular interest to this meeting is the San Juan Basin to the south, which has become one of the nation’s largest coal-bed methane producing districts. Also, recent wildfires have created an opportunity to study the effects of fire on geologic processes (to the dismay of homeowners and the delight of geomorphologists).

CALL FOR PAPERS

Papers are invited for technical sessions, theme sessions, and poster sessions. Authors interested in volunteering papers for symposia should contact the appropriate symposium conveners before submitting abstracts. Technical sessions will generally be 12 minutes in length with three minutes for questions. Some sessions may use a longer format. Speakers will have access to three 35 mm slide projectors and screens (speakers must provide their own carousels), an overhead projector, and a PC and data projector. Speakers wishing to use digital media are restricted to PowerPoint presentations and must submit CDs prior to the meeting to test for compatibility. Speakers are not permitted to use their own laptops.

Poster space will be 4 × 8 feet. Authors will be required to be present for at least two hours.

ABSTRACTS

Abstract deadline: January 30, 2003

Abstracts for all sessions should be submitted online at www.geosociety.org. If you cannot submit your abstract electronically, contact Nancy Carlson, (303) 357-1061, ncarlson@geosociety.org.

REGISTRATION

Information on preregistration, including dates and fees, will appear in the January 2003 issue of GSA Today.

ACCESSIBILITY

GSA is committed to making its meetings accessible to all people interested in attending. Indicate special requirements (wheelchair accessibility, etc.) on the registration form. Fort Lewis College is ADA compliant.

FIELD TRIPS

For further details on field trips, please contact either the trip leader or the field trip chair, Gary Gianniny, (970) 247-7254, gianniny_g@fortlewis.edu, or visit www.geosociety.org/sectdiv/rockymtn/03rmmtg.htm.

Premeeting

1. Geology and Mining History of the San Juan Mountains. (2 days.) Mon. and Tues., May 5–6. Mike Williams, University of Massachusetts, mlw@geo.umass.edu; Karl Karlstrom, University of New Mexico, Dept. of Earth and Planetary Sciences, (505) 277-4346, kek1@unm.edu; Peter Davis; Joe Kopera.

2. Proterozoic Rocks of the Tusas Mountains and the Quartzite-Rhyolite Problem. Mon. and Tues., May 5–6. David Gonzales, Fort Lewis College, Dept. of Geosciences, (970) 247-7378, gonzales_d@fortlewis.edu; Duane Smith.


Concurrent

5. Geochronology of the Darkmold Site. Wed., May 7, 1–5 p.m. Mary L. Gillam, independent geologist, 115 Meadow Road East, Durango, CO 81301, (970) 259-0966, fax 970-259-6064, gillam@nmi.net; Mona C. Charles, Fort Lewis College, Anthropology Dept. Max.: 30.

Postmeeting


7. Investigations of Seeps in the Fruitland Formation, La Plata County, Colorado. Sat., May 10. W.C. Riese, BP America; niese1@bp.com; Tom Ann Casey, EnerVest Operating, (970) 247-1500, ext. 204, tacasey@enervestdgo.com.

8. Durango to Silverton Historic Train Ride and Tour of Silverton’s Old Hundred Mine. Sat., May 10. This trip is appropriate for guests and non-geologists. Fort Lewis College Geology Club, David Gonzales, (970) 247-7378, gonzales_d@fortlewis.edu.


SYMPOSIA

Complete descriptions are posted at www.geosociety.org/sectdiv/rockymtn/03rmmtg.htm.

1. The San Juan Mountains: A Dynamic Earth System. Sponsored by the Mountain Studies Institute. (Invited papers.) Rob Blair, Fort Lewis College, Dept. of Geosciences, (970) 247-2703, blair_r@fortlewis.edu; Thomas Casadevall, U.S. Geological Survey, (303) 202-4740, tcasadev@usgs.gov.

(303) 236-1822; Shemin Ge. University of Colorado, Boulder, GES@spot.colorado.edu, (303) 492-8323.

3. Relationships of Physical Systems to Archaeological Records and Prehistoric Cultures in the Four Corners Area. Kenneth E. Kolm, Washington State University and Argonne National Laboratory, Lakewood, Colorado, (303) 986-1140, ext. 247-7463, kkolm@mines.edu; Mary L. Gillam, independent geologist, 115 Meadow Road East, Durango, CO 81301, (970) 259-0966, fax 970-259-6064, gillam@rmi.net.

4. Rise and Fall of the Rocky Mountains: Proterozoic Lithospheric Evolution and Influence of Basement Fabric on Younger Tectonism in the Rocky Mountains. (Part 1 of 4.) Karl Karlstrom, University of New Mexico, Dept. of Earth and Planetary Sciences, (505) 277-4346, kek1@unm.edu; David Gonzales, Fort Lewis College, Dept. of Geosciences, (970) 247-7378, gonzales_d@fortlewis.edu.

5. Rise and Fall of the Rocky Mountains: The Late Paleozoic Ancestral Rocky Mountains—Intraplate Orogeny in Equatorial Pangaea. (Part 2 of 4.) Lynn Soreghan, University of Oklahoma, Geology and Geophysics, 100 East Boyd Street, Norman, OK 73019, (405) 325-4482, lsoreg@ou.edu; Gary Gianniny, Fort Lewis College, Dept. of Geosciences, 1000 Rim Drive, Durango, CO 81301, (970) 247-7254, gianniny_g@fortlewis.edu; Dave Barbeau, Dept. of Geosciences, University of Arizona, Tucson, AZ 85721, (520) 621-4910, dbarbeau@geo.arizona.edu.

6. Rise and Fall of the Rocky Mountains: Tectonics, Eustasy, and Climate Change During the Age of Dinosaurs. (Part 3 of 4.) Spencer Lucas, New Mexico Museum of Natural History & Science, (505) 841-2873, slucas@nmnh.state.nm.us; Andrew Heckert, New Mexico Museum of Natural History & Science, (505) 841-2842, aheckert@nmnh.state.nm.us.


8. Seeps, Science, and Myth: Geology and Hydrology of Shallow Hydrocarbons. Sponsored by the Four Corners Geological Society. Tom Ann Casey, EnerVest Operating, (970) 247-1500, ext. 204, tacasey@enervestdo.com; Ed Heath, independent geologist, (970) 375-1997, ewheath@frontier.net; Matt Janowiak, Bureau of Land Management, (970) 247-4874, matthew_janowiak@co.blm.gov.

THEME SESSIONS

1. Undergraduate Research Poster Session. Sponsored by the Council on Undergraduate Research, Geoscience Division. Kim Hannula, (970) 247-7463, hannula_k@fortlewis.edu. (Student must be listed as lead author and be the major preparer of the poster.)

2. Artful Eye in Geology. Ray Kenny, (970) 247-7462, kenny_r@fortlewis.edu.


4. Paleontology Society Session: Regional Topics in Paleontology.

5. Geologic Processes in the Post-fire Environment. Chris Wilbur, (970) 247-1488, wilbureng@frontier.net.


7. Regional Topics in Archaeogeology. E. Craig Simmons, Dept. of Chemistry & Geosciences, Colorado School of Mines, (303) 273-3644, csimmons@mines.edu.

8. The Western San Juan Volcanic Field, Colorado Structural Setting, Evolution, and Geomorphology. Allen Stork, Western State College, astork@western.edu; Steve Semken, Dine College, Shiprock, NM, scsemken@shiprock.ncc.cc.nm.us, (505) 368-3630.

WORKSHOPS

Roy J. Shiemon Mentor Program in Applied Geology. Sponsored by GSA Foundation. Thurs., May 8, 11:30 a.m.–1 p.m. Karlon Blythe, GSA, (303) 357-1036, kbleythe@geosociety.org. Free (includes lunch). This interactive and informative workshop for undergraduate and graduate students is led by practicing geoscientists and covers real-life issues such as the professional opportunities and challenges that await students after graduation. Students will receive in their registration packet a FREE LUNCH ticket to attend the Shiemon Program. However, space is limited. First come, first served.

Other workshops: Details are not available as of press time.

SPECIAL EVENTS

Ice Breaker. Tues., May 6, 5 p.m. College amphitheater.


Annual Banquet and Business Meeting. Thurs., May 8, 7 p.m. College Union Building.

Rocky Mountain Section Board Meeting. Fri., May 9, 7 a.m., Rochester Hotel.

SPOUSE AND GUEST ACTIVITIES

The Durango area offers a variety of activities including shopping, hiking, mountain biking, whitewater boating, and archeological tours. For information on these and other activities, contact the Durango Area Chamber Resort Association, 1-800-463-8726, www.dacra.com. In addition, a special historic train ride and mine tour will be held on Saturday, May 10 (see field trips).

STUDENT TRAVEL

The Rocky Mountain Section and the GSA Foundation have made travel grants available for students who are presenting oral or poster papers. Students must be currently enrolled and must be Rocky Mountain GSA members. Students should contact Kenneth Kolm, Argonne National Laboratories, (303) 986-1140, ext. 251, kkolm@anl.gov.

STUDENT AWARDS

Awards will be given for best student oral (undergraduate or graduate) and poster (undergraduate only) presentations. To be eligible, students must be lead authors and presenters and should clearly identify their abstracts as student work.

EXHIBITS

Exhibit space will be available at $250 per booth for commercial organizations and $100 per booth for nonprofits. Contact Scott White, (970) 247-7475, white_s@fortlewis.edu.

ACCOMMODATIONS

A wide selection of hotels and motels is available. Special GSA rates will appear in the January 2003 GSA Today. For students or those on a budget, on-campus apartments will be available for $16 per night or dormitories for $13 per night.

ADDITIONAL INFORMATION

Still have questions? Contact the general chair, James Collier, (970) 247-7129, collier_j@fortlewis.edu, the technical program chair, David Gonzales, (970) 247-7378, gonzales_d@fortlewis.edu, or the field trip chair, Gary Gianniny, (970) 247-7254, gianniny_g@fortlewis.edu.
Call for Nominations:

**Planetary Geoscience Student Paper Award**

**The Award**
Planetary geologist Stephen E. Dwornik established this award in 1991 to provide encouragement, motivation, and recognition to outstanding future scientists. Two awards are given annually: one for the best oral presentation, the other for the best poster presentation, with each winner receiving a citation and $500. The program is administered through GSA’s Planetary Geology Division. The GSA Foundation manages the award fund. For further details, see www.lpi.usra.edu/meetings/lpsc2003/.

**Criteria**
The Dwornik Student Paper Award applies to papers presented at the annual Lunar and Planetary Science Conference held each March in Texas. Student applicants must be (1) the senior author of the abstract (the paper may be presented orally or in a poster session), (2) a U.S. citizen, and (3) enrolled in a college or university, at any level of their education, in the field of planetary geosciences. Papers will be judged on the quality of the scientific contributions, including methods and results; clarity of material presented; and methods of delivery, oral or display.

**To Apply**
The application form and instructions are found in the Call for Papers for the 34th Lunar and Planetary Science Conference, to be held March 17–21, 2003, at NASA Johnson Space Center in League City, Texas. For additional information, contact the LPI Publications and Program Services Department; (281) 486-2188, fax 281-486-2125, publish@lpi.usra.edu.

**Deadline**
The deadline for electronic submissions in PDF format is 5 p.m. (CST) Tuesday, January 14, 2003; authors unable to produce PDF files must submit their abstracts electronically by 5 p.m. (CST) Tuesday, January 7, 2003; authors who are unable to submit electronically must send their hard-copy abstracts to the LPI by January 7, 2003. Non-PDF submissions or hard-copy submissions that arrive after January 7 will not be considered for the conference.

---

GSA Offers Awards in Geomorphology and Micropaleontology

Two of GSA’s most prestigious awards supporting research are made possible by the generosity of the late W. Storrs Cole. Qualified GSA Members and Fellows are urged to apply.

**The Gladys W. Cole Memorial Research Award** provides support for the investigation of the geomorphology of semiarid and arid terrains in the United States and Mexico. GSA Members and Fellows between the ages of 30 and 65 who have published one or more significant papers on geomorphology are eligible for the award. While the funds may not be used for work that is already finished, recipients of previous awards may reapply if they need additional support to complete their work. The 2003 award is for $9,500.

**The W. Storrs Cole Memorial Research Award** supports research in invertebrate micropaleontology. This award carries a stipend of $8,700 in 2003 and will go to a GSA Member or Fellow between the ages of 30 and 65 who has published one or more significant papers on micropaleontology.

For application forms or for more information, contact Leah Carter, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140, lcarter@geosociety.org. Application forms are also available at www.geosociety.org.

Applications must be mailed and must be postmarked on or before February 1, 2003. Applications sent by facsimile or e-mail will not be accepted. The Committee on Research Grants will report its actions to each applicant in April 2003.

The Gladys W. and W. Storrs Cole Award funds are managed by the GSA Foundation.
### JOINT MEETING

37th Annual Meeting, South-Central Section, GSA, and 52nd Annual Meeting, Southeastern Section, GSA • Memphis, Tennessee • March 12-14, 2003

---

**HEADQUARTERS, ACCOMMODATIONS, AND REGISTRATION**

Preregistration deadline: February 7, 2003

Cancellation deadline: February 14, 2003

Register online at www.geosociety.org

Located along the Mississippi River and the boundary between the south-central and southeastern sections, Memphis, Tennessee, is the perfect site for a joint South-Central and Southeastern Section meeting. Centered in the Mississippi Embayment, the Memphis area has many field locations pertinent to Quaternary geology, neotectonic processes, geologic hazards, and fluvial geomorphology. Field trip destinations in the Ouachita Mountains, Ozark Plateau, St. Francis Mountains, and central Tennessee are all within a few hours by car. The meeting will be held at the University of Memphis Conference Center, located on the northwest side of the campus area. The conference center includes the Fogelman Executive Center and Wilson School of Hospitality and Resort Management.

A block of rooms has been reserved at the University of Memphis Conference Center (Holiday Inn) for meeting attendees, with several room options available ranging in cost from $85 to $105 per room per night. Meeting attendees are responsible for making their own housing arrangements. Please call the University of Memphis conference center for reservations at (901) 678-8200 and refer to the Geological Society of America room block.

For more information on registration, lodging, and schedules, please visit www.geosociety.org/sectdiv/southc/03sc-semtg.htm. Please preregister online or download the PDF preregistration form at www.geosociety.org. If you are unable to preregister this way, contact GSA Member Services, 1-888-443-4472, member@geosociety.org. Preregistration rates will apply until February 7, 2003. After that date, on-site rates will apply.

---

### Abstracts

Abstract deadline: December 10, 2002

Papers are invited for symposia, theme sessions, and general sessions, in both oral and poster formats. Volunteered abstracts submitted without designating a scheduled symposium or theme session will be placed in theme or general sessions as deemed appropriate by the technical program chairs. All abstracts must be submitted online at www.geosociety.org/sectdiv/southc/03sc-semtg.htm.

Only one volunteered paper may be presented by an individual; however, a person may be a co-author on other papers. Also, those invited for symposia may present other papers.

The proposed symposia and theme sessions follow. For more information, please contact the technical program co-chairs: Gregg Davidson, (662) 915-5824, davidson@olemiss.edu, or Roy Dokka, (225) 578-2975, rdokka@c4g.lsu.edu. For more details, visit www.geosociety.org/sectdiv/southc/03sc-semtg.htm.

---

### Symposia

1. **History of Geologic Investigation of Crystalline Rocks of Alabama, with Emphasis on the Past 40 Years: How We Saw It Then; How We See It Now.** Robert Deininger, University of Memphis, (901) 682-4324, mdeinini100@aol.com; Thornton L. Neatherly, tineatherly@prodigy.net.

2. **A 21st Century Look at the Cretaceous Coon Creek Formation.** Stan Dunagan, (731) 587-7430, dunagans@charter.net; Michael Gibson, (731) 587-7435, mgibson@utm.edu.

3. **Cenozoic Paleodrainage in the Southeastern United States.** Robert Self, University of Tennessee at Martin, (731) 587-7444, rself@utm.edu.

4. **Environmental Research and Remediation at Department of Energy’s Savannah River Site.** Mary Harris, Savannah River Technology Center, (803) 725-4184, mary.harris@srs.gov; Chris Romanek, Savannah River Ecology Laboratory, (803) 725-5883, romanek@srerl.gov.

---

### Theme Sessions

1. **Petrotectonic History of the Blue Ridge Belt: Faults, Fault Blocks, Terrains, and Ophiolites.** Loren Raymond, Appalachian State University, (828) 262-2749, raymondla@appstate.edu; Calvin Miller, Vanderbilt University, (615) 322-2232, millercf@ctrvax.vanderbilt.edu.

2. **Post-Mesozoic Tectonics of the Southern Midcontinent.** Paul A. Washington, University of Louisiana at Monroe, (318) 342-1898, gewashington@ulm.edu.

3. **Seismicity and Neotectonics in the Southern United States.** Terry Panhorst, University of Mississippi, (662) 915-5825, panhorst@olemiss.edu; James Harris, Millsaps College, (601) 974-1343, harrjb@okra.millsaps.edu.

---

4. **Connections and Timing in the Appalachian-Ouachita Orogen.** Kent C. Nielsen, University of Texas at Dallas, (972) 883-6837, knielsen@utdallas.edu; William A. Thomas, University of Kentucky, (859) 257-6222, geowat@pop.uky.edu.

5. **Late Paleozoic Intraplate Deformation of Central North America.** Randy Cox, University of Memphis, (901) 678-4361, randyc@memphis.edu; Mark Hudson, U.S. Geological Survey, (303) 236-7446, mhhudson@usgs.gov.

6. **Oh Southern Stars! Planetary Geology in the South.** Keith A. Milam, (865) 974-2789, kmilam@utk.edu, and Karen R. Strockill, (865) 974-5324, kstockst@utk.edu, both at University of Tennessee.

7. **Earth Science and Earthquake Education Resources for K–12 Science Teachers in the Central and Eastern United States.** Sponsored by National Association of Geoscience Teachers. Gary Patterson, (901) 678-2007, patterson@ceri.memphis.edu, and Michelle Dry, mdry@memphis.edu, both at University of Memphis.

8. **Innovative Initiatives in Geoscience Education.** Shelley Miller, Saint Mary’s School, Raleigh, N.C., (919) 424-4050, samiller@st-marys.edu.


10. **Coastal Plain Stratigraphy of the Southeastern United States.** Charles Swann, University of Mississippi, (662) 915-7320, cts@mmri.olemiss.edu.

11. **Hydrostratigraphy and Hydrology of Cenozoic Aquifer Systems of the Southeastern Coastal Plain, Gulf Coast, and Mississippi Embayment.** Randy Gentry, University of Tennessee at Knoxville, (865) 607-8328, rgentry@utk.edu; Dan Larsen, University of Memphis, (901) 678-4358, dlarsen@memphis.edu.

---

**Cancellation deadline:** February 14, 2003

**Preregistration deadline:** February 7, 2003

**Abstract deadline:** December 10, 2002

**Symposia deadline:** December 10, 2002

**Theme Sessions deadline:** December 10, 2002

**Final Announcement:** March 12-14, 2003
12. The Role of Fieldwork in the Study of Carbonate Rock Aquifer/Landscape Systems. Chris Groves, Western Kentucky University, (270) 454-4169, chris.groves@WKU.edu; Joe Meiman, Mammoth Cave National Park, (270) 758-2137, jmeiman@nps.gov.


15. Water Rock Life: Interactions Between Hydrology and Biology. Nate Bickford, (870) 972-3087, nbickfor@mail.astate.edu; Robyn Hannigan, (870) 972-3086, hannigan@mail.astate.edu, both at Arkansas State University.

16. Advances in Environmental Biogeochemistry. Dibyendu Sarkar, University of Texas at San Antonio, (210) 458-5453, dsarkar@utsa.edu.

17. Radioisotopes as Tracers of Sedimentary and Pore-Water Processes in the Coastal Zone. Sam Bentley, (225) 578-2954, sjb@lsu.edu, and Jaye Cable, (225) 578-9402, kjable@lsu.edu, both at Louisiana State University; John Jaeger, University of Florida, (352) 846-1381, jaeger@geology.ufl.edu.

18. Geomorphology, Sedimentation, and Environmental Geology of the Loess Region of the South-Central United States. Sean J. Bennett, (662) 232-2926, sjbennett@ars.usda.gov, and Andrew Simon, (662) 232-2918, asimon@ars.usda.gov, both at USDA-ARS National Sedimentation Laboratory.


Workshops

Workshops will be held on the University of Memphis campus. For additional information please check the meeting Web site, www.geosociety.org/sectdiv/southc/03sc-semtg.htm, or contact the workshop chair, Roy Van Arsdale, rvanrsdl@memphis.edu, (901) 678-2177, or the workshop conveners.

1. Introduction to ArcGIS with Geohydrology Applications (ESRI's ArcGIS 8.2). Sat., March 15, 8 a.m.–noon. Brian Waldron, University of Memphis, (901) 678-3913, bwaldron@memphis.edu. Max.: 24; min.: 8. Cost: $30.


Field Trips

Field trips are planned. Registration for some trips is limited. Field trip costs include transportation, field guide, food, and lodging during the excursion, unless otherwise indicated. For additional information please visit www.geosociety.org/sectdiv/southc/03sc-semtg.htm, or contact the field trip chair, Roy B. Van Arsdale, University of Memphis, rvanrsdl@memphis.edu. Max.: 24; min.: 12. Cost: $30.


4. Sedimentology, Stratigraphy, Paleontology, and History of Cretaceous Coon Creek Formation of Western Tennessee. Fri. and Sat., March 14–15. Michael A. Gibson, mgibson@utm.edu, and Stan Dunagan, sdunagan@utm.edu, both at University of Tennessee at Martin. Max.: 40; min.: 26. Cost: $140.

5. Hands-on Earth Science at the Coon Creek Science Center. Fri. and Sat., March 14–15. Pam Riddick, Pink Palace Museum, pam.riddick@cityofmemphis.org; Michael A. Gibson, University of Tennessee at Martin, mgibson@utm.edu. Max.: 40; min.: 26. Cost: $140.


10. Paleoenvironment, Depositional Setting, and Plant Fossil Diversity Found in the Claiborne Formation (Middle Eocene) Clay Deposits of Western Tennessee. Sun., March 16. B. Roger Moore, University of Tennessee at Martin, bmoore@clink1.net; David L. Dilcher, Florida Museum of Natural History; Michael A. Gibson, University of Tennessee at Martin, mgibson@utm.edu. Max.: 20; min.: 14. Cost: $85.

Student Travel Grants

The Southeastern Section, in cooperation with the GSA Foundation, is giving travel grants to students who are presenting papers at the meeting. All eligible students will receive some support, the amount depending on the number of applicants. The application form can be found at www.geology.ecu.edu/geology/segas/ travel.html. Applications must be received no later than February 15, 2003. Additional information may be obtained from Donald Neal, (252) 328-4392, neald@mail.ecu.edu.

Travel grants are also available from the South-Central Section, in cooperation with the GSA Foundation. These grants are available for GSA Student Associates who are presenting oral or poster papers. Students must be currently
enrolled as GSA members to be eligible. Please visit the GSA Web site, www.geosociety.org, for details regarding application instructions for these grants. Applications must be received no later than February 15, 2003. For more information, please contact Elizabeth Y. Anthony, eanthony@geo.utep.edu.

**Guest Activities**

All guest activities will depart from the Holiday Inn. Please check the GSA Web page, www.geosociety.org/sectdiv/southc/03sc-semtg.htm, or contact Jim Dorman, (901) 678-2007, dorman@ceri.memphis.edu, for more information.

**Campus Tour I.** Thurs., March 13. Tour leaves at 9 a.m. and returns before noon. An escorted campus walking tour will visit the Groundwater Institute and the Center for Earthquake Research & Information on the University of Memphis campus. Cost: Free.

**Campus Tour II.** Thurs., March 13. Tour leaves at 1:30 p.m. and returns by 4 p.m. An escorted campus walking tour will visit the Egyptian Museum on the University of Memphis campus. Cost: Free.

**Off-Campus Tours**

Below are listed unescorted off-campus trips for which van transportation is being provided. A $6 van ticket entitles the holder to board the van on any scheduled March 13 or March 14 trip. Van tickets purchased during preregistration will help guarantee that this van service is provided.

**Memphis Brooks Museum of Art** and the **Memphis Zoo.** Thurs., March 13, 9:45 a.m. Van returns at 1 p.m. for trip back to the Holiday Inn. Museum and zoo admissions are sold separately at the respective locations and are not included with the van ticket.

**Dixon Gallery & Gardens.** Thurs., March 13, 1:30 p.m. Van returns at 4:30 p.m. for trip back to the Holiday Inn. Dixon Gallery and Garden admission is sold separately and is not included with the van ticket.

**Memphis Downtown.** Fri., March 14, various times. Van shuttle will take guests from the Holiday Inn to the drop-off/pick-up point at Peabody Place with intermediate stops at the Memphis Pink Palace Museum and Palladio International Antique Market. Downtown attractions include: Peabody Place Retail and Entertainment Center, The Chinese Museum at Peabody Place, National Civil Rights Museum, historic Beale Street, and The Memphis Queen Line.

**Special Events and Business Meetings**

- Societies and groups that wish to schedule meeting space during the meeting should contact Lenysl Urbano, (901) 678-4543, lurbanon@memphis.edu. Limited space is available at the Holiday Inn for group meetings; catering and audio-visual services are available at additional cost.

**Welcoming Party.** Wed., March 12, 6–8 p.m., Holiday Inn Ballroom 2. You must be registered for the meeting to attend the Welcoming Party.

**Southeastern Section GSA Management Board Meeting.** Wed., March 12, 4 p.m., Holiday Inn.

**Southeastern Section GSA Geology and Public Policy Breakfast.** Thurs., March 13, 7 a.m., Holiday Inn.

**Roy J. Shlemon Mentor Program in Applied Geoscience.** Thurs., March 13, 11:30 a.m.–1:30 p.m., location to be announced.

**South-Central and Southeastern Sections of the Paleontological Society Joint Luncheon.** Thurs., March 13, noon, Holiday Inn.

**Southeastern Section NAGT Business Meeting.** Thurs., March 13, 5 p.m., location to be announced.

**Southeastern Section GSA Business Meeting and Party.** Thurs., March 13, 5–8 p.m., Ballroom 1, Holiday Inn.

**Southeastern Section GSA Campus Representatives Breakfast.** Fri., March 14, 7 a.m., Holiday Inn.

**Southeastern Section GSA Ph.D. Granting Earth Sciences Chairs Breakfast.** Fri., March 14, 7 a.m., Holiday Inn.

**Roy J. Shlemon Mentor Program Student Workshop and Luncheon.** Fri., March 14, 11:30 a.m.–1:30 p.m., location to be announced.

**Exhibits**

- Exhibit space will be available in an exhibit hall together with the poster sessions. Exhibits hours: 6–8 p.m., Wed., March 12; 9 a.m.–5 p.m., Thursday, March 13; and 9 a.m.–noon, Friday, March 14. For more information on exhibit space, visit www.geosociety.org/sectdiv/southc/03sc-semtg.htm, or contact Robyn Hannigan, (870) 972-3086, hannigan@mail.astate.edu.

**Sponsorship Information**

Corporate and government sponsorship is welcome and is an important part of funding the meeting. Sponsors will be recognized during the meeting and with a corporate listing and acknowledgment in the printed program, as well as on the local Web site. If desired, sponsors may designate their gift for a special event or technical session during the meeting, with recognition for that event. For more information on sponsorship of the meeting, please contact Robyn Hannigan, (870) 972-3086, hannigan@mail.astate.edu.

**Detailed Information**

For more information, please contact the meeting chairman: Dan Larsen, (901) 678-4358, dlarsen@memphis.edu, or visit www.geosociety.org/sectdiv/southc/03sc-semtg.htm. GSA is committed to making all events at the 2003 meeting accessible to all people interested in attending. You can indicate special requirements (wheelchair accessibility, dietary concerns, etc.) on the registration forms.

---

**www.terraplus.com**

Geophysical Instruments that meet your needs

Littleton, Colorado, 303 799-4140 info@terraplus.com
Sixty-nine Years of Research Grants

The GSA Committee on Research Grants recently announced 2002 awards of $450,000 to 243 graduate students. An overview of the awards and funding, as well as a summary of 28 proposals recognized for their exceptionally high merit, was included in the September 2002 GSA Today. Recipients of student research grants awarded by GSA Divisions and Sections are listed on pages 26 and 27 of this issue.

The 243 awards represent only 44% of grant proposals received in 2002. The average award was $1,852, slightly lower than last year and only 73% of the average amount requested.

The Research Grant Program has been enormously popular and successful for 69 years. Since its inception in 1933, over $7.6 million has been awarded through 7,047 grants. The impact on both the individuals who received them and our geological science in general has been incalculable. The program supports students in a wide variety of fields including structure and tectonics, Quaternary geology and geomorphology, geochemistry, igneous and metamorphic petrology, sedimentology and stratigraphy, paleontology, hydrocarbon and economic geology, hydrogeology, geophysics, environmental geology, and engineering geology.

The review and selection of proposals, a process that requires a tremendous amount of dedication and time, is conducted primarily by volunteers. The Research Grant Committee consists of 16 GSA members as well as GSA staff.

Funding for Research Grants comes chiefly from private contributions. The $450,000 budget in 2002 is among the largest ever granted. The National Science Foundation continued its support of the program, contributing $150,000; the remainder came primarily from GSA investments and from the GSA Foundation and GSA Divisions. These sources cannot meet the existing, much less growing, demand.

The GSA Foundation was established in 1980 to seek financial support for Society initiatives. The Research Grant Program is considered a GSA cornerstone initiative, but funding, particularly these days, is becoming more difficult to obtain. The Society wishes to increase the number as well as the size of grants over the next decade in order to help keep pace with the rising costs of conducting research and to fund all projects deemed meritorious by the Research Grant Committee.

We Need Your Help

We have formed a subcommittee of GSA Foundation Trustees whose charge is to help secure contributions that will enable the Research Grant Program to continue its support of students. We are appealing to you for your help. We trust you share the Society’s desire to foster student research and hope you will make a donation to the GSA Foundation for this cause. Our preference is for you to contribute to the GEOSTAR Fund, which has been created as an endowment to support the advancement of research. It is set up as a long-term fund that distributes only a portion of its assets each year. The Research Fund is also available should you want your contribution distributed in one year. Your donation to the GEOSTAR Fund or the Research Fund may be structured as a pledge over three to five years if a one-time contribution is not convenient. Your donation may include gifts other than cash.

Your donation can go even further. If you or your spouse have a matching donation program at work, make the donation in both your names and send us the name and address of your (and your spouse’s) employer with your gift. We will take care of the rest.

Your contributions may be made on the coupon below. Should you have questions, or if you are considering a multiple-year pledge or gifts other than cash, please contact the Foundation at (303) 357-1054 or 1-800-472-1988, ext. 1054.

Thanks for doing your part to perpetuate and expand this worthwhile program.

GSA Foundation Research Grant Subcommittee
David Dunn
Farouk El-Baz
Bill Muehlberger
George Sharp
Catherine Skinner

Donate Online

It’s easy! It’s quick! It’s secure!
Go to www.geosociety.org/gasf and follow the directions.

Enclosed is my contribution in the amount of $___________.
Please credit my contribution for the:

☐ Greatest need  ☐ Other: ____________________ Fund
☐ Research (disbursed annually)  ☐ GEOSTAR (endowment fund for research)
☐ I have named GSA Foundation in my will.

PLEASE PRINT
Name ____________________________________________________________
Address ___________________________________________________________________
City/State/ZIP ____________________________________________________________
Phone ____________________________________________
KANSAS CITY

Pennsylvanian shales and limestones underlie Kansas City, which is noted for secondary use of underground space in room and pillar limestone mines. Kansas City straddles the confluence of the Missouri and Kansas Rivers and the terminus of Pleistocene glaciation, both of which have heavily influenced land usage. Floods occur in upland valleys such as Brush Creek as well as major rivers. Field trips feature Pennsylvanian stratigraphy, urban environmental geology and paleontology, secondary commercial usage of underground space, and Quaternary landscape evolution.

Theme sessions and symposia will focus on health and the environment, urban geology, paleobiology and stratigraphy, and K–16 geoscience education. We encourage those interested in presenting papers at a symposium to contact the symposium organizers in advance of submitting abstracts.

REGISTRATION
Preregistration and hotel accommodations deadline: February 14, 2003
Cancellation deadline: February 21, 2003
Register online at www.geosociety.org.

Field trip participants must preregister for the meeting. Please preregister online or download the PDF preregistration form at www.geosociety.org. If you are unable to preregister this way, contact GSA Member Services, 1-888-443-4472, member@geosociety.org.

ACCOMMODATIONS

The meeting organizers strongly encourage you to lodge at the Airport Hilton, the site of the meeting. Selected for its reasonable room rates, the Hilton Inn is a full service hotel with free in-room Web access, and exercise facilities ranging from swimming pools to basketball and tennis courts to a selection of cardiovascular fitness machines.

The Kansas City Airport Hilton (8801 NW 112th Street, Kansas City, MO 64153) is near exit 12, just east of I-29. Free parking and airport shuttle are available. The conference room rate is $82 (single or sharing, with up to four to a room permissible.) Go to www.kansascityairport.hilton.com, and click on "Book a Room." When you reach the question "What rate type do you want to see?" click "Packages/Promotions/Special Offers." Type "GSA" for the group code, and click on "Rate & Availability." Or, call 1-800-HILTONS for reservations. All meeting rooms are ADA accessible. In addition, the Hilton features 10 ADA compliant rooms.

ABSTRACTS
Abstract deadline: December 10, 2002

Use the online electronic abstract form from the GSA Web site. An abstract submission fee of $10 will be charged. If you cannot submit your abstract electronically, contact Nancy Carlson at ncarlson@geosociety.org, (303) 357-1061. For information on technical sessions and symposia, please contact the symposium organizers listed below or the technical program chair, Syed E. Hasan, at hasans@umkc.edu, (816) 235-2976.

FIELD TRIPS

For inquiries concerning field trips please contact individual field trip leaders or field trip coordinator, Tina M. Niemi, at niemit@umkc.edu, (816) 235-5342. A preliminary list of trips follows.


This trip will give participants an overview of the exposed rock section that underlies Kansas City and its environs. Excellent exposures of Pennsylvanian strata (Kansas City Group) will be seen in excavations for roads and highways. The section of Pennsylvanian rocks consists predominately of limestone and shale with minor amounts of sandstone, coal, and conglomerate. These lithologic types occur as "bundles" of strata that alternate in cyclical fashion throughout the section and are commonly called cyclothems. The Pennsylvanian bedrock is overlain by surficial deposits of Pleistocene and Holocene age, which include glacial drift, windblown silt (loess), valley-fill
alluvium, and soil. A cover of loess overlies the glacial drift except in areas where the drift is absent. At these places the loess rests directly on Pennsylvanian bedrock. Discussion at exposures of fossiliferous carbonate buildups, sediment-filled tidal channels, and a text book example of normal faulting in the “stable” interior of the Midcontinent.

2. Latest Pennsylvanian and Earliest Permian Cyclic Sedimentation and Paleoeoclogy in Southeastern Nebraska.

Wed., March 26, 7:30 a.m.–6:30 p.m. Roger Pabian, ppabian@unnotes.unl.edu, (402) 472-7564, and Robert F. Diffendal Jr., rdf@unl.edu, (402) 472-7546, both at Conservation and Survey Division, University of Nebraska—Lincoln. Cost: $55. Students: $20.

Exposures in Richardson and Pawnee counties, Nebraska, provide a graphic account of the impact of Gondwana glaciation upon the sedimentology and paleoecology of the Midcontinent. We will examine continental and marine facies in the Wabashan (Virgilian), Admire, and Council Grove Groups that expose nearly 10 separate levels of early, and three other localities in Missouri and Kansas.

This one-day trip will visit several localities of Pennsylvanian Dark Shales of the Kansas City region. Cosponsored by the Pander Society. Sun., March 23, 7 a.m.–6 p.m. Philip Heckel, University of Iowa, phlcek@uiowa.edu, (319) 335-1804; Jim Barrick, Texas Tech University, Jim.Barrick@TTU.edu, (806) 742-3107. Cost: $50. Students: $30.

This one-day trip will visit several localities of conodont-rich dark phosphatic shales in the Kansas City area, from which the first Pennsylvanian conodonts were described and many of the early species of Idiognathodus and Streptognathodus were named. It includes Gunnell's original 1931 locality from which the genus Idiognathodus was named near Lexington, Missouri, and which exposes four separate levels of abundant late Desmoinesian conodonts, now correctly correlated with the Midcontinent cyclothem succession. It also includes at least three other localities in Missouri and Kansas that expose nearly 10 separate levels of early, middle, and late Missourian conodonts, close to many of Gunnell's 1933 localities and Ellison's 1941 localities, from which the majority of Missourian conodont species were named. Sedimentary aspects of the conodont-rich shales will also be discussed.


Sun., March 23, 7 a.m.–8 p.m. Virginia Ragan, Maple Woods Community College, raganv@maplewoods.cc.mo.us, (816) 437-3355; David Drake, Environmental Protection Agency, Region 7, David.Drake@epamail.epa.gov, (913) 551-7626. Cost: $60. Students: $20.

This one-day trip to the Tri-State mining district of Kansas, Missouri, and Oklahoma provides a working example of the problems associated with remediation of a former world-class zinc-lead mining district. Representative field localities will show untreated areas including mining waste piles and chat piles, Environmental Protection Agency active remediation and fully remediated sites in Kansas, a tour of the Everett Ritchie Tri-State Mineral Museum containing exceptional Tri-State specimens and mining memorabilia, and a side trip to Big Brutus, the second largest electric shovel in the world. Participants will have opportunities to collect minerals and specimens. A luncheon slide presentation will feature planning remediation of a large-scale environmental project.

5. Quaternary Landscape Evolution and Stratigraphy in Northeastern Kansas.

Sun., March 23, 8 a.m.–4 p.m. Rolfe Mandel, Kansas Geological Survey, mandel@kgs.ku.edu, (785) 864-2171; E. Arthur Bettis III, University of Iowa, art-bettis@uiowa.edu. Cost: $45. Students: $20.

This one-day trip will focus on Quaternary landforms and stratigraphy in river valleys of northeastern Kansas. The type locality of the newly established Severance Formation, a lithostratigraphic unit consisting of late Wisconsinan alluvium and colluvium, will be visited in the Wolf River valley. Stops will also include sections of Holocene alluvium, late Pleistocene loess, and pre-Illinoian till. The trip will provide opportunities for participants to see the effects of more than 600,000 years of landscape evolution.


Sat., March 22, 8 a.m.–4 p.m. Raymond Coverey, University of Missouri—Kansas City, covereyr@umkc.edu, (816) 235-2980. Cost: $45. Students: $20.

This one-day trip will visit five exposures of phosphatic black shales in the greater Kansas City area, featuring the Hushpuckney and Stark Shale Members of the Kansas City Group, which are well exposed in road cuts and underground space sites and are consistently enriched in metals, containing an average of 2000 ppm Zn in the form of sphalerite. Metal origins have been variously attributed to seawater, hydrothermal fluids, and diageneric events. The presence of minor occurrences of Mississippi Valley type mineralization in adjacent limestones and recent radiometric dating of zinc mineralization in the Tri-State Mining District at 251 Ma suggests the likelihood of a post-sedimentary hydrothermal overprint, but the matter is far from settled.


Sat., March 22, 1–5 p.m. Charles Spencer, University of Missouri—Kansas City, gentiler@umkc.edu, (816) 235-2983. Cost: $22. Students: $15.

Extensive use of underground space in the area around Kansas City has been possible due to a combination of favorable stratigraphy, structure, and topography. The uniformity of thickness and lithology of the local Pennsylvanian-age limestones, the more-or-less consistent and gentle dip of beds, and the exposures of mineable units along hill-sides have combined to provide favorable conditions for underground space developments. The trip itinerary includes visits to several of the underground space developments in the Kansas City area, containing a wide variety of secondary adaptations of mined-out space (including warehousing, offices, library, and refrigeration-freezer storage). At each stop, representatives of the developments will discuss the types of secondary uses and geotechnical issues related to the development of space at their facility.

8. Kansas City on the Rocks: Field Trip for K–16 Teachers. Sponsored by the Central Section of the National Association of Geoscience Teachers.

Sat., March 22, 8:30 a.m.–3 p.m. Carl Priessendorf, Longview Community College, PriesenC@longview.cc.mo.us, (816) 672-2549; Janis Treworgy, Principia College, jdt@prin.edu, (618) 374-5294. Cost: $40. Students: $30.

Visit roadcuts and outcrops in the Kansas City area. Determine from rock types and fossils how these rocks were deposited some 300 million years ago. Analyze some potential environmental hazards. Good fossil and rock collecting opportunities. Useful teaching materials and activities for geology classes will be included in your packet.
Council on Undergraduate Research. James B. Murowchick, University of Missouri—Kansas City, murowchick@umkc.edu, (816) 235-2979.

5. Quaternary Geology of the U.S. Midwest. Rolfe D. Mandel, University of Kansas, mandel@falcon.cc.ukans.edu, (785) 864-2171.

EQUIPMENT FOR ORAL PRESENTATIONS

Each meeting room will have one projection screen. Windows-compatible PowerPoint will be the standard format for oral presentations. Speakers are advised to provide Windows-compatible CDs with their presentation saved as a show. As an alternative, for those who wish, one standard 35 mm carousel projector will be available in each meeting room as well. The speaker ready room will be equipped with slide and PowerPoint projectors. CDs or slide carousels, clearly labeled with the speaker’s name, session number, and speaker number, must be provided to the projectionists no later than 15 minutes prior to the start of the session. Borrowed carousels should be returned to the projectionist.

POLICY ON CAMERAS, SOUND EQUIPMENT, AND SMOKING

North-Central Section GSA regulations prohibit the use of cameras or sound equipment at technical sessions. A no-smoking policy applies to all North-Central Section GSA annual meeting events and will be followed in technical sessions, workshops, and social events.

POSTER SESSIONS

Each poster booth contains a 4 by 8 foot landscape-format panel. The panels consist of felt covered cardboard. Materials may be mounted with Velcro, tacks, or pushpins. Posters are available for four hours during each session.

EXHIBITS

Exhibitors: please contact James B. Murowchick, murowchickj@umkc.edu, (816) 235-2979.

SPECIAL EVENTS


WORKSHOP

Roy J. Shlemon Mentor Program In Applied Geoscience. Sponsored by GSA Foundation. Mon., March 24, 11:30 a.m.–1 p.m., location to be announced. Karlon Blythe, kbleythe@geoscience.org. This interactive and informal program for undergraduate and graduate students, led by professional geoscientists, will cover real-life issues such as the professional opportunities and challenges that await students after graduation. Students will receive in their registration packet a FREE LUNCH ticket to attend the Shlemon Program. However, space is limited. First come, first served.

GUEST ACTIVITIES

A hospitality room with continental breakfast and refreshments will be provided throughout the day at the Airport Hilton. Shuttle service to local attractions will also be available as needed.

Nongeologic attractions of Kansas City include the Country Club Plaza and Westport shopping and dining district, 18th and Vine Jazz district, Nelson-Atkins Art Gallery, UMKC Belger Center for the Arts and Creativity, Kemper Museum of Modern Art, Crown Center and Hallmark Cards Visitor Center including the Crayola Cafe, Union Station Science City, the Library Memorial, Linda Hall Library of Science, Technology and Engineering, the Toy and Miniature Museum, University of Missouri—Kansas City, and the Harry S. Truman Presidential Library.

TRAVEL GRANTS AVAILABLE FROM THE NORTH-CENTRAL SECTION AND THE GSA FOUNDATION

Grants are available for GSA Student Associates who are presenting oral or poster papers. Students must be currently enrolled as GSA members to be eligible, and requests for funding should be made through North-Central Section Chair, Raymond M. Coveney Jr., geosciences@umkc.edu, (816) 235-1334.

STUDENT AWARDS

Cash awards for the best paper will be given to students by the Great Lakes Section SEPM—Society of Sedimentary Geology and the North-Central Section of GSA.

OTHER

For other matters, please contact North-Central Section Chair, Raymond M. Coveney Jr., geosciences@umkc.edu, (816) 235-1334, or Co-Chair, Syed E. Hasan, hasans@umkc.edu, (816) 235-2976.
Biological Clocks and Tenure Timetables: Restructuring the Academic Timeline

Carol B. de Wet, Department of Geosciences, Franklin & Marshall College, Lancaster, Pennsylvania 17604, c_dewet@email.fandm.edu

Gail M. Ashley, Department of Geological Sciences, Rutgers, The State University of New Jersey, Piscataway, New Jersey 08854-8066, gmashley@rci.rutgers.edu

Daniel P. Kegel, OB-GYN Associates, Columbia Avenue, Lancaster, Pennsylvania 17603

The objectives of this paper are to (1) reaffirm the need for gender equity; (2) examine contributing factors to the attrition of women faculty; and (3) suggest alternative strategies to promote the full participation of women in geoscience higher education. Sections of the complete Commentary are abstracted below; the full text is posted at www.geosociety.org/pubs/gsatoday/.

Abstract

Despite decades of progressive social change by an active women's movement, federal and state legislation, and adoption of academic affirmative action policies, women geoscientists have not reached a critical mass in higher education. Women comprise only 12.5% of geoscience faculty in U.S. colleges and universities and only 10% at Ph.D. granting institutions. Senior women faculty tend to be marginalized from the academic power structure. A combination of biological factors, lifestyle choices, dual career pressures, double standards for social and professional interactions, and gender-based discrimination creates an effective filter, reducing women in geoscience departments to a surprisingly low level. There are two rungs on the ladder where women proportionally leave the discipline at a higher rate than men. One is continuing on to obtain a Ph.D.; the other is prior to, or at tenure. The present time frame for achieving tenure and promotion was established by men, for men, decades ago. Such a time frame is incompatible with women's biologic reproductive constraints, and as such, puts an unequal level of pressure and stress on women relative to their male professional counterparts. Only a significant change in the culture of science, and its traditional pathways, will create a geoscience community that has a sound base of gender equity.

Strong leadership from innovative and far-sighted administrators and colleagues is required to introduce and foster institutional change that will reduce the conditions that leave women disadvantaged.

Biological Factors—Childbearing Years and Tenure Trajectory

Due to the inevitable tick of the biological clock, there is an unavoidable collision between a woman's optimum childbearing years and her career trajectory. Although career and family issues affect both men and women, there are issues unique to women who are starting a family.

The most fundamental gender specific issue is childbearing. Women face a difficult choice: wait to have children until their professional life is secure, but risk serious health consequences for their children (or selves), or bear their children earlier and risk their professional success. Maternal mortality rates are four times higher among women 35 to 39 years old than those of ages 20 to 24, and babies of older women have higher mortality rates as well. In women age 35 or older, there is a four-fold increase in serious fetal complications, including stillbirth. This kind of emotional dilemma is what may lead some women to leave the discipline. Those who stay in the profession experience tension that may seriously impact their quality of life, their career (research productivity, field and lab work), and their ability to successfully compete for jobs and grants. The overlap in biological and professional imperatives lasts for only a minor portion of a woman's life, perhaps only 6 years out of a 35-year career.

The risk of giving birth to a child with Down syndrome at age 35 is ~1:270. By age 40 this risk is 1:106. Lethal chromosomal abnormalities are also more common with advanced maternal age, and risk of miscarriage is a significant concern. Only ~10% of woman under the age of 20 experience spontaneous miscarriage. By age 40 this risk has more than doubled, to almost 34%. Aging eggs, not simply overall good health, also affect a woman's fertility, and the natural incidence of chronic illnesses that complicate pregnancy increases with maternal age.

Conclusions

Attrition from the geosciences is higher for women than men at two critical points: after the M.Sc. degree, and between assistant and associate professor. Due to the inevitable tick of the biological clock, there is an unavoidable collision between a woman's optimum childbearing years and her career trajectory. Assuming that gender equity in science makes sense in terms of resources, diversified types of study, and balance, then causes for the rate of women's attrition must be sought.

Biological realities should be acknowledged if we are to attain a critical mass of women in the geosciences. Stopping the tenure clock, allowing part time work for given time periods, and encouraging split positions are policies that already exist in some institutions. More responsive, flexible schemes for integrating work and family are essential to ensure women's full participation in higher education. At one time, it was considered impossible for female students to go on field excursions because of a lack of facilities. This "impossible situation" has been overcome, and there is no reason to doubt that the issues we have described can also be overcome.

Only by the retention and advancement of women can critical mass be achieved, after which women can begin to fill positions of power and influence. Women then can serve as role models for the next generation of scientists, encouraging more of them to enter and stay in science. This pool will then form the teaching basis for both academia and industry, and will potentially lead to a generation of managers and department heads who will be part of the ongoing transformation of the sciences. Only strong leadership today, by both administrators and faculty, can change the academic culture of priorities, workloads, reward structure and values to more closely reflect all of its constituencies and begin such a transformation.

Read the full text at www.geosociety.org/pubs/gsatoday/.
A Dissident’s View of the Society’s New Logo

A few months ago, and with considerable fanfare, the Society announced the adoption of a fresh logo: “A New Symbol for a Great Vision” (GSA Today, March 2002, p. 26–27). Here I present a dissident’s view, and propose that the new logo is counter-productive and will prove harmful to the Society’s constructive and firmly established global image.

On page 26 of the issue of GSA Today cited above, we read “GSA’s seal is widely recognized and respected in the field of geosciences.” Indeed it is! The seal first appeared in vol. 2 of the Bulletin (1891), having been chosen by a committee made up of G.K. Gilbert, H.S. Williams, and C.H. Hitchcock. Now, well over a century later; even where viewed at a distance too great to read the encircling text, the seal is recognized instantly by geoscientists worldwide as that of the Geological Society of America. One does not need a page of instructions to interpret it. Alone it is clear, vivid, and respected. Period. We are now offered a new logo that resembles greatly the symbol of a multi-national shoe manufacturer, and like that logo, to the uninitiated it signifies absolutely nothing.

The present situation recalls an unfortunate incident that took place in 1968 when I was working for the USGS. The Department of the Interior abandoned its long-standing and broadly recognized logo—the bison with the sun over its shoulder—for some sort of warm and fuzzy stylized pair of hands, pointed skyward, and holding an unidentifiable object. That “new and improved” logo was mercifully shelved after less than a year and the bison was brought back. It is my sincere hope that the Society’s “New Symbol for a Great Vision” will suffer the same fate as did the Interior’s fuzzy hands, and that it will be seen for what it is: a bad decision.

Beyond the speedy abandonment of the new logo, what should we do? Here I maintain that we do nothing. Aren’t we fortunate to operate under a seal so honored and so widely recognized? Aren’t we lucky to possess one of the rare benchmark symbols in the sciences anywhere? No, fellow members of GSA, we really have no need of a new “elegant, classy, modern” logo. We already have one!

Tomas Feininger
Université Laval, Québec City
GeoNord
feininger@ggl.ulaval.ca

Ed. note: Mr. Feininger’s letter is a representative sample of the dissenting viewpoints expressed by a minority of members voicing opinions on the logo that was adopted by Council in November 2001. GSA remains firm in its belief that the new logo will represent the vision and the mission of the Society well in building a strong future for the geosciences.
Division Research Grants

Nine of the fourteen GSA divisions offer grants for outstanding student research within the fields of the respective divisions. Recipients of these grants for 2002 are listed below. The five divisions that do not currently offer any awards to students are Geoscience Education, Geobiology and Geomicrobiology, History of Geology, Limnogeology, and International.

The Archaeological Geology Division awarded two grants this year for the Claude C. Albritton, Jr., Memorial Student Research Award. The recipients are Jenny Bennett, University of Exeter, UK, for “Mesolithic Environments and Environmental Change in the Exe Basin, SW England”, and Sidney Carter, Stanford University, for “Exploring the Strontium Isotopic Compositions of Geological Sources of Ceramic Raw Materials in Northern Arizona as a Basis for Provenance Analysis of Cohonina and Anasazi Ceramics.” The Claude C. Albritton, Jr. Memorial Fund was established at the GSA Foundation in 1991 with contributions from the family and friends of Claude Albritton. The division continues to seek contributions to the fund in memory of Dr. Albritton to provide scholarships for graduate students in the earth sciences and archaeology. The GSA Foundation manages this fund.

The Coal Geology Division presented the annual Antoinette Lieman Medlin Research Awards for 2002. The Field Award went to David S. Jacks, University of California, Davis, for “Productivity Growth in English Coal Mining, 1740-1870.” The Research Award went to Eric G. Ober, University of Tennessee, for “A Study of Paleohydrological History of Coal Underclays Based on Pennsylvanian Paleosols in Eastern Tennessee.” The GSA Foundation manages this fund.

The Engineering Geology Division presented the Roy J. Shlemon Scholarship Awards for 2002 as follows: Kyu Ho Cho, First Place Doctorate Level; Sergio A. Sepulveda, Second Place Doctorate Level; Jamie Marie Monte, First Place Master’s Level; Eric Fossett, Second Place Master’s Level. The GSA Foundation manages this fund.

The Geophysics Division presented the Allan V. Cox Student Research Award for this year for outstanding student research proposal submitted to the GSA Research Grants Program. The 2002 Cox award goes to Edwin V. Apel III, University of Idaho, for “GPS Geodesy and 3D Boundary Element Modeling: Assessing the Seismic Hazard along the Devil’s Mountain Fault Zone, Northwest Washington.” The 2002 Geophysics Division award was presented to France Lagroix, University of Minnesota, for “A Magnetic Investigation of Alaska’s Climate and Surface Air Circulation Since the Late Pleistocene.”


The Planetary Geology Division presents the Stephen E. Dwornik Best Student Paper Awards annually to students who are U.S. citizens pursuing advanced degrees in Planetary Sciences. The awards are presented each year for papers given in March at the Lunar and Planetary Science Conference. The recipient of the 2002 Oral Presentation Award is Kelly Wilbur, Brown University, for, “The Effect of Coriolis Effect on Distal Ejecta Deposits on Mars,” and the Oral Honorable Mention Awardee are Molly McCanta, Brown University, for, “An Experimental Study of Eu/Gd Partitioning Between a Shergottite Melt and Pigeonite: Implications for the Oxygen Fugacity of the Martian Interior” and Chris Okubo, University of Nevada, Reno, for “Fault Geometry below Wrinkle Ridges Based on Slope Asymmetry and Implications for Mechanical Stratigraphy.” The recipient of the Best Poster Award is Nicholas Warner, State University of New York at Buffalo, for “Lava Flow Field Southwest of Arsia Mons, Mars: Estimates and Comparisons of Rheologic Properties.” Recipients of the awards are presented with a citation and a $500 cash prize, and the honorable mention winners receive a certificate in an awards ceremony held at NASA Headquarters in Washington, D.C., early in the summer. The GSA Foundation manages this fund.

The Quaternary Geology and Geomorphology Division awarded the 2002 J. Hoover Mackin Award to Greg Balco, University of Washington, for ”Erosion Beneath the Laurentide Ice Sheet, and Its Role in Pleistocene Ice Age Dynamics.” The Arthur D. Howard Research Grant was awarded this year to Nicole Davis, Montana State University, for “Investigations of Glacial Lake Musselshell, Central Montana.” The GSA Foundation manages this fund.

The Sedimentary Geology Division presented the award for outstanding student research in 2002 to Guillaume Dupont-Nivet, University of Arizona, for “Testing Northward Propagation of the Tibetan Uplift by Magnetostratigraphic Dating in Eastern Tibet.”
GSA Division and Section Grants for 2002

The Structural Geology and Tectonics Division presented its 17th annual awards for outstanding student research this year to Jeffrey M. Rahl, Yale University, for “Does Pressure Solution Control the Location of the Brittle-Ductile Transition? A Case Study on the High-Pressure, Low-Temperature Metamorphic Rocks of Crete, Greece,” and Phillip G. Resor; Stanford University, for “Deformation Associated with Continental Normal Faults, Western Grand Canyon, Arizona.”

Section Research Grants

Four of the six GSA regional sections award grants for research to students attending colleges and universities within each section’s respective geographical boundaries. The Cordilleran and Rocky Mountain Sections do not currently offer student research grants. Grants awarded in 2002 by the other sections are listed below.

The North-Central Section awarded grants for undergraduate research projects to students who attend a college or university within the North-Central Section geographic area. Research proposals are submitted and evaluated competitively. Recipients for fall 2001 are: Joel Fassbinder; University of Iowa, for “Geochemical Analysis of Exotic Chert Found at Archaeological Sites in Northwest Iowa”; Kasey Hutchinson, University of Iowa, for “Petrogenetic History of the Cowhole Mountain Volcanics, SE Mojave, California”; Lisa King, University of Cincinnati, for “Seeking High-Frequency Signals in Glaciolacustrine Sediment During the Last Glacial Maximum”; Erik Kneller, University of Toledo, for “Microscopic Textures of the Red, High Silica Rhyolite Lavas of the Precambrian St. Francois Mountains, S.E. Missouri”; Jennifer Berry, DePauw University, for “Mineralogy of a Calcite Vein-Dyke Complex at Bear Lake Diggings, Monmouth Township, Ontario, Canada”; Michael Iacoboni, Eastern Michigan University, for “Fault and Joint Orientations as Evidence for Subglacial Deformation in Drumlins Formation”; and Rebekah Shepard, Oberlin College, for “Microbial Ecology, Texture, and Morphology in Bahamian Stromatolites.”

The South-Central Section did not award any grants in 2002.

The Northeastern Section awarded grants to six undergraduate students.

The Southeastern Section awarded undergraduate and graduate research grants in 2002. The undergraduate students are Christopher W. Helper, Clemson University; Michael P. Lucas, Florida Gulf Coast University; and Caroline E. Webber, College of William and Mary. The graduate students are John K. Cooper, East Carolina University; Michael Rasbury, University of Alabama; Sandra A. Smith, University of Tennessee at Knoxville; Michael A. Crump, University of North Carolina at Wilmington; John P. Foudy, University of North Carolina at Chapel Hill; Abhijit Mukherjee, University of Kentucky; Leslie A. Shaver, University of Tennessee at Knoxville; Alfred M. Elser, Georgia State University; and Carlos A. Zuluaga, University of Alabama.

E&EG Call for Papers

Environmental & Engineering Geoscience (E&EG), a quarterly journal copublished by GSA and the Association of Engineering Geologists, is seeking new manuscripts. E&EG publishes peer-reviewed contributions, based on original work, in the broadly defined areas of environmental and engineering geosciences (including geomorphology, hydrogeology, low-temperature geochemistry, neotectonics, and other earth surface processes). Both theoretical and empirical contributions related to these areas are welcome, although preference will be given to papers of an applied nature. Specifically, E&EG encourages the submission of the following kinds of papers.

- Results of original research in the environmental and engineering geosciences.
- Case histories describing the solution of new or unusually difficult problems in the applied geosciences.
- Review papers that summarize the state of the science or professional practice in a branch of the applied geosciences, including contributions describing relevant aspects of local or regional geology or the history of environmental and engineering geosciences.
- Short technical notes (six published pages or less) describing new techniques, novel case histories or other topics in the environmental and engineering geosciences.
- Brief critical discussions of papers and technical notes published in E&EG.

Authors should submit six copies of manuscripts for review to:
Abdul Shakoor, Co-Editor
Environmental & Engineering Geoscience
Department of Geology
Kent State University, Kent, OH 44242

All text, captions, tables, and references should be double spaced and printed on one side of the paper only. Good quality copies of illustrations should be sent until the originals are requested. Charges for color figures are $450 per page. Each author receives 25 free offprints of the published paper.

For more information, contact Shako or (330) 672-2968, ashakoor@kent.edu, or Co-Editor Alan Fryar, (859) 257-4392, afryar1@uky.edu.
About People

GSA Fellow and Past President **Gail M. Ashley** received the 2002 Association for Women Geoscientists Foundation Outstanding Educator Award on October 28 at the GSA Annual Meeting in Denver.

GSA Members **Nancy E. Bowers** and **Penny M. Taylor** were awarded the 2002 Chrysalis Scholarships by the Association for Women Geoscientists. This financial aid is given to exemplary women graduate students in the geosciences who have experienced an interruption in their formal education and are in the final stages of writing their theses. More information is posted at www.awg.org.

**SEG Foundation Student Research Grants**

Students of mineral resources throughout the world may apply for thesis research grants available in 2003 from the Society of Economic Geologists Foundation. The grants provide partial support of master’s and doctoral thesis research for graduate students. Grants also are available to undergraduate students to support exceptional honors degree research projects.

Individual grants usually range from US$500 to US$3000, but larger awards may be made to particularly meritorious candidates. Awards are competitive and are intended to fund specific thesis research expenses. Applicants must describe what the project is, why the research is important, and how it is to be done, and provide a budget summary.

For application forms and details on the grants, contact Chair, SEG F Student Research Grants, 7811 Shaffer Parkway, Littleton, CO 80127, USA, (720) 981-7882, ext. 204, fax: 720-981-7874, seg@segweb.org, or visit www.segweb.org. Applications must be postmarked by February 1, 2003; awards will be announced by April 15, 2003.

**National Security Education Program’s 2003 Fellowships**

The Academy for Educational Development (AED) invites applications for the 2003 National Security Education Program’s David L. Boren Graduate Fellowships competition. Fellowships are awarded in a broad range of academic and professional disciplines including business, economics, history, international affairs, law, applied sciences and engineering, health and biomedical sciences, political science, and other social sciences. Award recipients incur a requirement to work for an agency or office of the federal government involved in national security affairs or in the field of U.S. higher education in an area of study for which the fellowship was awarded. For details and eligibility and application information, see www.aed.org/nsep, or contact AED at 1-800-498-9360, (202) 884-825, or nsep@aed.org. Applications must be postmarked by January 31, 2003.

**In Memoriam**

**Roger G. Alexander Jr.**
Walnut Creek, California
June 8, 2002

**Charles S. Content**
Danville, California
February 21, 2002

**Alden Loomis**
Altadena, California
August 17, 2002

**Gladys P. Louke**
Martinez, California
August 4, 2002
The University of South Florida (USF) Department of Geology (www.cas.usf.edu/geology) is accepting applications for a tenure-earning Assistant Professor position to begin in August of 2003, pending available funding. We are looking for an individual with a commitment to research, education, and professional growth who will be able to teach a wide range of water-related issues. The expected teaching load is three courses/yr, including undergraduate and graduate-level courses. The USF Geology Department offers an innovative undergraduate curriculum, and grants B.S., M.S., and Ph.D. degrees in Geology. A Ph.D. is required at the time of employment. Salary is negotiable.

The University of South Florida is an Equal Opportunity/Affirmative Action Employer. Applications are solicited on a wide range of water-related issues. To apply, send a letter of interest, current curriculum vitae, a statement of research goals, teaching goals and arrange for at least three letters of reference to be sent to: Dr. Thomas Pichler, Chair, Hydrogeology Search Committee, Department of Geology, University of South Florida, 4202 E. Fowler Ave., SCA 528, Tampa, FL 33620-5201.

Applications will be accepted through January 15, 2003. For additional information contact Thomas Pichler (813)-974-0321, pichler@chuma.cas.usf.edu).

USF is an equal opportunity/affirmative action/equal access employer. Women and minorities are strongly encouraged to apply. Those persons requiring reasonable accommodation under the Americans with Disabilities Act should contact Thomas Pichler at the mail or e-mail addresses above. According to Florida law, applications and meetings regarding them are open to the public.

FLORIDA ATLANTIC UNIVERSITY
BOCA RATON, FLORIDA
CHARLES E. SCHMIDT COLLEGE OF SCIENCE
GEOGRAPHIC INFORMATION SCIENCE
CLASSIFIED ADVERTISING

Positions Open

Hydrogeology, University of South Florida

The Department of Geography invites applications for a tenure track faculty position in Hydrogeology to begin in August 2003. The University of South Florida (USF) Department of Geography (www.cas.usf.edu/geography) is an active and growing program that offers a B.S., M.S. and Ph.D. degrees in Geography. The successful candidate will be expected to develop an interdisciplinary research program and teach courses at the undergraduate and graduate levels.

Applications should include a letter of qualifications and interests, academic transcript, curriculum vitae, and the names of three references with email addresses. Please visit our web site at: www.geoggeo.fau.edu for further information on our current faculty interests. Applications should be sent to:

Chair Search Committee Position 1 or Position 2, Department of Geography and Geology, Florida Atlantic University, Boca Raton, FL 33431. Phone 561-297-3250, Fax -2745, email SchultzR@fau.edu. FAU is an Equal Opportunity/Equal Access/Affirmative Action Institution.

Structural Geology Faculty Position

University of Alabama

The Department of Geological Sciences invites applications for a structural geology position at the Assistant Professor level beginning in August 2003. This position is funded by grant, education and general student services. Preference will be given to candidates with demonstrated research and teaching interests in physical and structural geology, and experience teaching courses at the undergraduate and graduate levels.

Applications should consist of a letter of interest, a curriculum vitae, academic transcript, and letters of reference. Applications must be received by December 1, 2002, and positions will be filled until the position is filled.

Applications should be sent to:

Department of Geological Sciences, University of Alabama, Tuscaloosa, AL 35487-0368

The University of Alabama is an Equal-Opportunity, Affirmative-Action Employer. Applications are solicited from women and minority candidates.
 interesting, a list of publications, and the names and addresses of at least four references to: Mark R. Abbott, Dean; College of Oceanic & Atmospheric Sciences; Oregon State University; 104 Ocean Admin Bldg; Corvallis, OR 97331-5033. For full consideration complete applications must arrive by 16 December 2002. Inquiries about the position may be directed to Dr. Robert Collier by phone (541-737-4367), e-mail (rcollier@coas.oregonstate.edu), or go to COAS web site at: http://www.coas.oregonstate.edu/employment. Oregon State University is an AA EOE.

RESEARCH SCIENTIST, STINSON UNIVERSITY: Stinson University invites applications for a four-year position as Research Scientist in Quaternary Geology with Emphasis on Stratigraphy/Glacial Sedimentology at the Department of Physical Geography and Quaternary Geology (Ref. no. SU 614-2255-02). The Department has a long research tradition in the fields of geomorphology, glaciology, Quaternary stratigraphy, paleoclimate and paleoenvironment and seeks to complement its research staff with a dynamic person, who is willing to establish her/his own research platform within Quaternary stratigraphy/glacial sedimentology. The position provides four years of salary; applicants are expected to apply for external research funding and participate in undergraduate and graduate education (at most 20% teaching). Knowledge of the Swedish language is not necessary.

Applicants should be researchers who received their Ph.D. within the last five years and who possess documented and verified research experience in Quaternary stratigraphy/glacial sedimentology. Special weight shall be given to academic expertise in hiring of verified research experience. Planned starting date is April 2003.

For more information about the position, please contact Professor Barbara Wolfarth, +46 (08)-164813, bbarbara@geo.su.se or Professor Johan Kleman, Head of Department, +46 (08)-164813, kleman@mateo.su.se. Department website: http://www.pb.su.se/english-documents.html, which shall be consulted by the applicant.

The application, marked with reference number SU 614-2255-02, must arrive no later than November 20, 2002, at: Stockholms Universitet, SE-106 91 Stockholm, Sweden, Fax +46-(08)-163866. Whenever an application is sent by fax or e-mail, it should immediately be followed by sending a signed hard-copy version.

UNIVERSITY OF MINNESOTA
DIRECTOR, MINNESOTA GEOLOGICAL SURVEY

The University of Minnesota seeks to fill the position of Director of the Minnesota Geological Survey (MGS). The Director is the scientific and administrative leader of an earth science research and service organization and as such leads the MGS with considerable autonomy. The MGS is staffed by 30 professional geologists, hydrogeologists, geophysicists, and support personnel, and operates on an annual budget of approximately $5 million. The Director, administratively, is the unit of a School of Earth Sciences in the Institute of Technology. The MGS Director is a tenured faculty member in the geology and Geophysics and reports to the Head of the School. The Minnesota Geological Survey carries out an active program of basic and applied geological research and provides service and education in geological matters to the people of Minnesota. Principal activities include geologic mapping of Precambrian and sedimentary terranes, (2) essentially undeformed sedimentary strata of Paleozoic and Mesozoic age, and (3) varied glacial deposits of Quaternary age. Survey mapping is integrated with vigorous programs in applied geophysics, applied stratigraphy and hydrogeology, and glacial geology. MGS staff members serve the needs of scientists, decision-makers, and resource managers at all public and private levels concerned with ground water, environmental issues, State's mineral and water resources data, and for providing geological information and evaluation to various governmental agencies and the public. The Director is expected to work closely with University administration in presenting program proposals to the State Legislature. The Director is responsible for establishing and maintaining close working relationships with local, State and Federal agencies as well as other University departments involved in geologic research, and to make use of geological information in public policy and resource development.

Candidates for the position must hold a Ph.D. in geology or related fields of professional experience, demonstrated management and personnel skills, and credentials qualifying them for a senior level academic appointment in Geology and Geophysics. The appointment as Director is full time for an initial period of 3 years and is renewable.

Interested persons should send a resume and the names, addresses, and telephone numbers of three references to Professor James Stout, Chair, MGS Director Search Committee, Department of Geology and Geophysics, 108 Pillsbury Hall, University of Minnesota, Minneapolis, MN 55455. Inquiries may also be made to Dr. Stout at 612 643-4304 or stout@umn.edu. The position is available as of July 1, 2003, and the closing date for applications is December 2, 2002.

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

GEOLICAL SCIENCES AND SCIENCE EDUCATION UNIVERSITY OF CALIFORNIA, LONG BEACH

The Department of Geology at California State University, Long Beach invites applications for a joint appointment tenure-track position at the assistant professor level beginning August 2003. The successful candidate will have a Ph.D. in geology or earth sciences with research and teaching in any area of geological sciences. BS in geology, substantial experience in K-12 education, science education, and/or teacher preparation at the time of appointment. All areas of geological sciences are considered for the candidate's field of specialization. The incumbent will develop externally funded research programs involving undergraduate and graduate students in their specialty, presentation, and teach effectively within an ethnically and culturally diverse campus community. For complete position description, see http://seis.natsci.csulb.edu/HOMEPAGE/default.htm, or contact Dr. Stanley Finney, Chair, Geology, California State University, Long Beach, 652-985.4809, scfinney@csulb.edu. CSULB is an EEO/AA Employer.

ENVIRONMENTAL SCIENCE AND POLICY UNIVERSITY OF SOUTH FLORIDA

The Department of Environmental Science and Policy (ESP), University of South Florida, invites applications for a full-time tenure-track position, at the professor level in the area of environmental karst studies beginning August 2003, subject to funding. Responsibilities include teaching at all levels of the program, leadership in the Department's Undergraduate Program, and developing an active, externally funded research program. Minimum Qualifications: Ph.D. in Geology, Geophysics, Environmental Science, or other cognate field in hand by August 7, 2003 in order to be appointed as Assistant Professor; expertise in karst science, preferably with environmental applications, plus potential for publication and external funding. Preferred Qualifications: College level teaching experience. Applicants should submit a letter describing research and teaching interests and possible contributions to our program, a complete curriculum vitae, and the names, addresses, E-mail, and telephone numbers of three referees by January 6, 2003.

The University Department draws from the expertise of more than 70 interdisciplinary faculty, has over 200 undergraduate majors and 30+ Masters students, and is planning a Ph.D. program which is expected to be available in August 2003. ESP will be moving into the new Natural and Environmental Sciences Building, a state-of-the-art research and learning facility. Interested inquiries should contact Dr. Ronatjea Doctor/Research Extensive University, USF offers degree programs in 79 undergraduate disciplines, 89 masters and specialist programs and 26 doctoral programs, including the M.D.; the Faculty numbers more than 2,000 members, with 36,000 students in ten colleges on four campuses. The University of South Florida is an equal opportunity, affirmative action, equal access institution. For disability accommodations, please contact Sue Vieris on the phone (1-813-974-5855) or e-mail sviers@chuma1.usf.edu, at least five working days in advance. According to Florida law, applications and meetings are open to the public. Applications should include a letter and a resume. Apply to: Dr. Rick Oches, Search Committee Chair, Department of Environmental Science and Policy, SCA238, 4202 East Fowler Ave, Tampa, FL 33620, e-mail: oches@chuma1.usf.edu. For information about the program, visit the department’s website at: http://www.cas.usf.edu/esp/.

SONOMA STATE UNIVERSITY, CALIFORNIA ASSISTANT OR ASSOCIATE PROFESSOR OF GEOLOGY AND DEPARTMENT CHAIR

The Department of Geology at Sonoma State University invites applications for a tenure-track chair position starting August 2003. We seek an outstanding scholar-administrator with a strong commitment to undergraduate education who will serve as Chair of the Department for a minimum of three years and begin in August 2003. The successful candidate will oversee the hiring of several new tenure-track faculty members and a visiting professor, and bring new ideas for departmental growth and curricular development for the next phase of the department's life. Areas of specialty that will be included include all traditional disciplines in geology, except paleontology. The allocation of time in the position is 1/3 as Chair and 2/3 in teaching. Rank and salary are to be negotiated. Courses to be taught include lecture, laboratory and field courses in the major, and general education courses. The successful candidate will be expected to coordinate fundraising in support of departmental activities, and to develop an active research program involving SSU undergraduate students.

The Department of Geology was formed in 1969, has 365 graduates and offers both BA and BS degrees. The Department has five tenured faculty and averages 50 majors, almost all of whom take the BS path. The BA and BS are traditional, emphasizing mineralogy, petrology, and field studies. Both degree programs include the first two years of field classes, which is, as far as we know, more than required at any other school in the United States.

Required: A Ph.D. in geology with demonstrated administrative experience at the department chair or equivalent or higher level. The successful candidate will also have a strong record of excellence at the undergraduate level, supported by teaching evaluations and/or peer reviews, and demonstrated research experience.

Applications must be postmarked by December 1, 2002, in order to be considered. For the full position details, see the SONOMA STATE UNIVERSITY employment website at: http://www.cas.usf.edu/esp/.

CLASSIFIED ADVERTISING
HYDROGEOLOGY-STRUCTURAL GEOLOGY ASSISTANT PROFESSOR
TUFTS UNIVERSITY

Tufts University has a full-time tenure-track position as an Assistant Professor of Geology in the area of Hydrogeology and Structural Geology, beginning September 1, 2003. Applicants should include the Ph.D. or equivalent degree, although candidates about to complete the Ph.D. will be considered. We will also consider candidates for Professor for those with experience. We are seeking an individual with expertise in hydrogeology and structural geology. The applicant should be able to teach at a small, well-equipped, undergraduate teaching department where research is encouraged and expected. The person hired will be expected to teach Hydrogeology, Structural Geology, and one or more related courses, and to assist in teaching the elementary courses. He or she will develop his/her own research program and seek outside funding for that research. Familiarity with the Geology and Geophysics Department at Tufts, Applications, including references from three qualified persons, transcripts, and resume, should be sent to Anne F. Gardulska, Chair, Department of Geology, Tufts University, Medford, MA 02155. Review of applications will begin December 15, 2002, and will continue until the position is filled. Tufts University is an Affirmative Action/Equal Opportunity employer. We are committed to increasing the diversity of our faculty. Members of underrepresented groups are strongly encouraged to apply.

ENDOWED CHAIR IN EXPLORATION GEOPHYSICS
OKLAHOMA STATE UNIVERSITY

The Department of Geology, College of Natural Sciences and Mathematics, Oklahoma State University, Fullerton, P.O. Box 6850, Fullerton, CA 92834-6850. Review of applications will begin December 16, 2002. CSUF is an Affirmative Action/Equal Opportunity/TITLE IX/Americans With Disabilities.

ENDEWCHAIR IN EXPLORATION GEOPHYSICS
OKLAHOMA STATE UNIVERSITY

The Department of Geology, College of Natural Sciences and Mathematics, Oklahoma State University, Fullerton, P.O. Box 6850, Fullerton, CA 92834-6850. Review of applications will begin December 15, 2002. CSUF is an Affirmative Action/Equal Opportunity/TITLE IX/Americans With Disabilities.

GEOLOGY FACULTY OPENINGS
GRAND VALLEY STATE UNIVERSITY

The Department of Earth Science Education, Grand Valley State University, invites applications for tenure-track positions in Geological Sciences. Candidates are sought with expertise in Geology and Geophysics with a strong background in one or more of the following: structural geology, sedimentary geology, stratigraphy, physical geology, geomorphology, and paleoclimates. The University is an equal opportunity/affirmative action employer. Women and minorities are strongly encouraged to apply.

ENVIRONMENTAL GEOCHEMISTRY/GEOPHYSICS
UNIVERSITY OF SOUTHERN INDIANA

The Department of Geology and Geography, University of Southern Indiana, invites applications for a new tenure-track position in Environmental Geochemistry and Geophysics. This is a 12-month, 9-month tenured-track faculty position with the department's September 1, 2003, which will include a one-month sabbatical in Fall 2003. The successful candidate will be expected to teach, advise, and mentor undergraduate and graduate students and maintain an active research program. The salary is competitive and includes appropriate benefits. Applications are encouraged from individuals who have an earned Ph.D. in environmental geochemistry or environmental geophysics with a strong emphasis on applications in biogeochemistry, environmental research, or environmental geophysics. Responsibilities include teaching upper-division and graduate courses in environmental chemistry and geophysics. Additional responsibilities may include supervision of student research and public service activities. The application deadline is January 10, 2003, but may be extended until position is filled. The University is an Equal Employment Opportunity/Affirmative Action employer.

UNIVERSITY OF SOUTHERN INDIANA

The Department of Geology and Geography, University of Southern Indiana, invites applications for a full-time tenure-track position in Earth Science Education. Candidates will need to have a Ph.D. in Earth Science Education, or be within 3 years of having a Ph.D. in Earth Science Education. The University is an Equal Opportunity/Affirmative Action employer. Women and minorities are strongly encouraged to apply.
CLASSIFIED ADVERTISING

HYDROGEOLOGY FACULTY POSITION UNIVERSITY OF ALABAMA

DEPARTMENT OF GEOLOGICAL SCIENCES

The Department of Geological Sciences invites applications for a tenure-track position in Hydrogeology beginning fall 2003. The position will be at the Assistant Professor level. We seek an outstanding individual who combines field-based research with theoretical studies. The position will involve teaching a complete course load, advising students, and participating in university and professional activities. Applicants should send a curriculum vitae, statement of research and teaching interests, and information for 4 references to Dr. Chunchuan Zheng, Hydrogeology Search Committee Chair, The University of Alabama, Department of Geologi- cal Sciences, Box 807138, Tuscaloosa, AL 35487-0318.

The Department of Geological Sciences is housed in a modern research facility that provides laboratory space as well as state-of-the-art analytical instrumentation and computer equipment. Further information is available on our website at http://www.geo.ua.edu. Review of applications will begin on December 1, 2002 and continue until the position is filled.

The University of Alabama is an Equal-Opportunity, Affirmative-Action Employer. Applicants are solicited from women and minority candidates.

GEOPHYSICS FACULTY POSITION UNIVERSITY OF ALABAMA

DEPARTMENT OF GEOLOGICAL SCIENCES

Reflection Seismology/Applied Geophysics—The Department of Geological Sciences invites applications for a tenure-track faculty position in applied geophysics, beginning August 2003. The position will be filled at the Assistant Professor level. Candidates must have a strong record in both teaching and research in geophysics or a related field. The candidate will be expected to teach graduate courses in geochemistry and geophysical methods, to attract and supervise masters and doctoral students, and to obtain external research funding. Experience with the acquisition, processing, and interpretation of multichannel seismic reflection data and geologic and geophysical software used to construct 3-D earth models is desired. This position complements programs in basin analysis, hydrogeology, coastal geology, and petroleum systems. The department has recently been awarded a NSF geophysical field grant to enhance our geophysical research program. Equipment available includes a multichannel seismic data acquisition system, 3-D modeling software, high-resolution marine seismic systems, and a state-of-the-art computing facility supporting seismic data processing, interpretation, and visualization. Applicants should send a curriculum vitae, statements of research and teaching interests, copies of transcripts, and contact information for four referees to Dr. Rich A. Vink, Seismic Search Committee Chair, The University of Alabama, Department of Geologi- cal Sciences, Box 807138, Tuscaloosa, AL 35487-0318.

Further information is available on our Web site at http://www.geo.ua.edu. Review of applications will begin on December 1, 2002 and continue until the position is filled.

The University of Alabama is an Equal-Opportunity, Affirmative-Action Employer. Applicants are solicited from women and minority candidates.

STABLE ISOTOPE GEOCHEMISTRY UNIVERSITY OF IOWA

The Department of Geoscience at the University of Iowa invites applications for a full-time tenure-track Assistant or Associate Professorship in stable isotope geochemistry. We are seeking an outstanding researcher and teacher, who will develop an internationally recognized research program involving the interpretation of multichannel seismic reflection data and geologic and geophysical software used to construct 3-D earth models is desired. This position complements programs in basin analysis, hydrogeology, coastal geology, and petroleum systems. The department has recently been awarded a NSF grant to enhance our geophysical research program. Equipment available includes a multichannel seismic data acquisition system, 3-D modeling software, high-resolution marine seismic systems, and a state-of-the-art computer facility supporting seismic data processing, interpretation, and visualization. Applicants should send a curriculum vitae, statements of research and teaching interests, copies of transcripts, and contact information for four referees to the Department of Geoscience B.S./B.A. degree. Applicants must have their Ph.D. by the time the appointment begins in August 2003. Women and minorities are especially encouraged to apply. Applicants are expected to develop an internationally recognized research program involving the interpretation of multichannel seismic reflection data and geologic and geophysical software used to construct 3-D earth models is desired. This position complements programs in basin analysis, hydrogeology, coastal geology, and petroleum systems. The department has recently been awarded a NSF grant to enhance our geophysical research program. Equipment available includes a multichannel seismic data acquisition system, 3-D modeling software, high-resolution marine seismic systems, and a state-of-the-art computer facility supporting seismic data processing, interpretation, and visualization. Applicants should send a curriculum vitae, statements of research and teaching interests, copies of transcripts, and contact information for four referees to the Department of Geoscience.

Hydrology and graduate-level courses in specialized topics. The Department of Geological Sciences at the University of Iowa invites applications for a tenure-track Assistant Professor position in hydrogeology and environmental geochemistry beginning Fall 2003. The position will be effective starting fall 2003. To ensure full consideration, applications should be received by November 15, 2002. The position will remain open until filled.

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

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) OFFICE OF RESEARCH AND DEVELOPMENT (ORD)

EPA is seeking three highly qualified scientific leaders who are currently engaged in bench-level work and research and development in the physical, biological, medical, or engineering sciences. Further rounds of hires are possible. The incumbent should be a nationally recognized authority and leader in an area of widespread scientific interest and investigation. He/she will typically have received honors and awards from major national organizations. This position is part of a campus-wide initiative in Nanophases in the Environment, Agriculture and Technology (NEAT), and the candidate is expected to develop campus-wide, interdisciplinary collaborations. For more information about the U.C. Davis Geology Department, visit our Web page at http://www.ee geo.ucdavis.edu.

Washington State University invites applications for a full-time tenure-track Assistant Professor position in paleoecology, to begin August 2003. Required: Ph.D. in anthropology or related field completed by May 2003 and a paleoecological research focus. Preferred: specialty in paleoecological reconstruction of human ecosystems; demonstrated excellence in research and teaching; ability to teach graduate level course in paleoecology and undergraduate introductory courses in general anthropology. Administrative specialties should include pollen, phytoliths, macrofossils, or stable isotopes as applied to paleobotany or paleoethnobotany. Preference also given to those with paleoecological and archaeological experience in western North America. Experience with GIS desirable. WSU is an EEO/AA educator and employer. Protected group members are encouraged to apply. Send letter of interest, names of 3-5 references (with current phone numbers and email addresses), and curriculum vitae by November 15, 2002 to: Search Committee Chair, Department of Geoscience, University of Iowa, Iowa City, IA 52242-1379 (phone 319-335-1818; Fax 319-335-1842; Email: geology@uiowa.edu). Screening of applications will begin on January 20, 2003 and continue until the position is filled. The University of Iowa is an affirmative action/equal-opportunity employer.

ANTHROPOLOGY WASHINGTON STATE UNIVERSITY

Washington State University, Department of Anthropology, invites applications for an assistant professor position, to begin August 18, 2003. Required: Ph.D. in anthropology or related field completed by May 2003 and a paleoecological research focus. Preferred: specialty in paleoecological reconstruction of human ecosystems; demonstrated excellence in research and teaching; ability to teach graduate level course in paleoecology and undergraduate introductory courses in general anthropology. Administrative specialties should include pollen, phytoliths, macrofossils, or stable isotopes as applied to paleobotany or paleoethnobotany. Preference also given to those with paleoecological and archaeological experience in western North America. Experience with GIS desirable. WSU is an EEO/AA educator and employer. Protected group members are encouraged to apply. Send letter of interest, names of 3-5 references (with current phone numbers and email addresses), and curriculum vitae by November 15, 2002 to: Search Committee Chair, Department of Geoscience, University of Washington, 1600 Sword, Pullman, WA 99164-4910.

ASSISTANT PROFESSOR HYDROLOGY NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY

New Mexico Institute of Mining and Technology invites applications for a new tenure-track position in Hydrology Program. Appointment at a higher level may be considered for exceptional candidates. The position is a joint appointment between the Department of Earth and Environmental Science and the Geological Research Center, a state-funded research agency. Applicants should have a Ph.D. in Earth sciences or a closely related field at the time of appointment. We seek candidates with expertise in watershed hydrology, hydrogeomorphology, or hydroclimatology. Send letter of interest, names of 3-5 references (with current phone numbers and email addresses), and curriculum vitae by November 15, 2002 to: Search Committee Chair, Department of Geology, New Mexico Tech, Socorro, NM 87801, Attn: Paleoecology Search Committee. For more information, please go to http://www.ees.nmt.edu/professional_ops.html. Applicants should submit a letter of interest, resume, college transcripts, and the names of three references to: Human Resources, Box 1048, New Mexico Institute of Mining and Technology, Socorro, New Mexico 87801. To receive full consideration, applications must be received by 1 November 2002. Email applications are not accepted. New Mexico Tech is an equal opportunity/affirmative action employer.

NANOGEOSCIENCE, U.C. DAVIS

Assistant/Associate Professor in Nanogeoscience. The Department of Geology invites applications from scientists specializing in geology, geochronology, or geophysics, with specific research in geobiomorphology, biomineralization, and/or chemical reactions at mineral surfaces. The Department of Geology seeks a scientist who will expand upon, and complement, our existing strengths in biogeology and Earth System Science, low-temperature and stable isotope geochemistry, and environmental geochemistry. This position is part of a campus-wide initiative in Nanophases in the Environment, Agriculture and Technology (NEAT), and the candidate is expected to develop campus-wide, interdisciplinary collaborations. For more information about the U.C. Davis Geology Department, visit our Web page at http://www.eegg.ucdavis.edu.

A Ph.D. in the earth sciences or related field is required at the time of appointment. Applicants should send a curriculum vitae, statement of research and teaching inter- ests, and names, addresses, phone numbers and e-mail addresses of at least three people who can be contacted for references. Applications should include a bibliography and a statement of teaching and research interests and should have at least three letters of recommendation sent directly to: Search Committee Chair, Department of Geoscience, University of Iowa, Iowa City, IA 52242-1379 (phone 319-335-1818; Fax 319-335-1842; Email: geology@uiowa.edu). Review of applications will begin on January 20, 2003 and continue until the position is filled. The University of Iowa is an affirmative action/equal-opportunity employer.

The University of California is an affirmative action/equal-opportunity employer. The University under- takes affirmative action to assure equal employment opportunity for minorities and women, for persons with disabilities, and for special disabled veterans, Vietnam era veterans and other covered veterans on active duty during a war or in a campaign or expedition for which a campaign badge has been authorized.
The Geology and Public Policy Committee is pleased to announce the first annual Speaker’s Tour for 2003. Daniel Sarewitz, managing director and senior research scholar at the Center for Science, Policy, and Outcomes at Columbia University in Washington, D.C., has been selected as the 2003 Distinguished Lecturer, sponsored by the committee. At the request of interested institutions, Sarewitz will present one of three lectures for audiences interested in broad geologic aspects of public policy: “Use and Abuse of Scientific Predictions in Environmental Policy,” “An Excess of Objectivity: Science and the Myth of Rational Decision Making,” and “Science and Democracy: Who’s in charge around here?”

Sarewitz’s work focuses on understanding the connections between scientific research and social benefit, and on developing policies to strengthen such connections. He is the co-editor of Prediction: Science, Decision-Making, and the Future of Nature (Island Press, 2000) and the author of Frontiers of Illusion: Science, Technology, and the Politics of Progress (Temple University Press, 1996). He has also written many other articles, speeches, and reports about the relationship between science and social progress.

Prior to taking his current position, Sarewitz was the director of GSA’s Institute for Environmental Education. From 1989 to 1993, he worked on Capitol Hill, first as a congressional science fellow and then as science consultant to the House of Representatives Committee on Science, Space, and Technology. His policy-analysis responsibilities included federal research policy, international scientific cooperation, and science education. He was also principal speechwriter for Committee Chairman George E. Brown Jr. Sarewitz received his Ph.D. in geological sciences from Cornell University in 1986.

The tour subcommittee will organize the presentation schedule to best suit the speaker and budget constraints. Host institutions are expected to provide local accommodations. To request a visit to your institution, contact Melanie Barnes, head of G&PPC Speaker’s Tour Subcommittee, Texas Tech University, Department of Geosciences, P.O. Box 41053, Lubbock, TX 79409-1053, melanie.barnes@ttu.edu.

This first annual speaker’s tour is limited to the area located within a one-day roundtrip from Washington, D.C. The committee hopes in subsequent tours to provide speakers to the entire United States.
The Petroleum Institute in Abu Dhabi

Program Faculty, Petroleum Geosciences Engineering

The Petroleum Institute in Abu Dhabi is seeking applications for faculty for the Petroleum Geosciences Engineering program. Program faculty report directly to the Program Director who has overall responsibility for leadership of the Petroleum Geosciences Engineering program. Applicants should possess an earned PhD degree in Geology, Geological Engineering, Geophysics, Geophysical Engineering, or a closely related field; relevant industrial experience is also highly desirable. Appointments at all levels (Assistant Professor, Associate Professor, Professor) are available.

Program faculty in Petroleum Geosciences Engineering will teach undergraduate and graduate courses, develop an active research program, and will engage in professional service and institutional and professional committee work. Opportunities to interact with PI industrial stakeholders and local industries will be a key feature in the development of a research program. Petroleum Geosciences Engineering faculty will work closely with the Program Head to develop departmental budgets and appropriate departmental and institutional staffing plans.

The Petroleum Institute opened in September of 2001 in newly-constructed “start-up” facilities, which provides interim space required for instruction while a new grass-roots permanent campus is built. Architectural design for the permanent campus is complete, with a view to occupancy in the fall of 2004. Petroleum Geosciences Engineering program faculty will have the opportunity to interact with the facilities design process, and will be involved in decisions on the specification of departmental infrastructure as well as for acquisition of equipment and hiring of faculty and program administrative staff. The Program will have an operating budget that is being sized for excellence in the area of faculty development and the provision of program resources.

The total compensation package includes a 12-month base salary, an expatriation allowance, and a benefits allowance that covers housing, utilities, initial furnishings, transportation (automobile purchase loan), health insurance and annual leave travel.

An appointment is desired in early summer, 2003, and should continue for at least three years. The Petroleum Institute is affiliated with the Colorado School of Mines, and additional information can be found at the PI provisional website: www.mines.edu/pi.

Interested candidates should submit a letter of application and a detailed resume to:

Ms. Dixie Termin
Center for the Development of the Petroleum Institute
1700 Illinois St., Colorado School of Mines
Golden, Colorado  80401  USA

Candidates are encouraged to submit applications as soon as possible but no later than January 31, 2003; transmission of materials by email is encouraged. Please send all electronic submissions to piapp@mines.edu.
The Department of Geological Sciences at Mississippi State University invites applications for a new full-time, non-tenure track instructor (9-month appointment with annual summer teaching and salary available and expected) position. An M.S. degree in geology or related discipline is required. This position is with the Geoscience Distance Learning Programs and will begin 1 January 2003. The instructor will be teaching a wide variety of geology courses online as part of the Geoscience Distance Learning program. Courses to be taught may include Geology of North America, geomorphology, and introductory geology. The instructor should be an enthusiastic teacher who is well qualified to teach at the undergraduate level and demonstrated potential for research. More detailed information about the position is available at http://geo.msu.edu.

The Department of Geosciences invites applications for a tenure-track position in Mineralogy/ Petrology, Geomorphology, or Marine Geoscience/Geophysics. Mississippi State University is an Affirmative Action/Equal Opportunity Employer. Women and minorities are highly encouraged to apply. Mississippi State University is an Affirmative Action/Equal Opportunity Employer. Women and minorities are highly encouraged to apply. Mississipp
HARRY HESS FELLOWS PROGRAM

The Department of Geosciences at Princeton University announces competition for the Harry Hess Fellowships for the 2003-2004 academic year. This honorific postdoctoral fellowship program has been established to provide opportunities for outstanding young geoscientists to work in the field of their choice. Research may be carried out independently or in collaboration with members of the Geosciences Department. One or more Hess fellows are usually appointed each year. Applicants must have obtained a Ph.D. at the time of the start of the fellowship, but not more than five years before. Current areas of research include:

- Geochemistry
- Biogeochemical Cycles
- Paleontology
- Mineral Physics
- Tectonics
- Petrology
- Structural Geology
- Geophysics
- Seismology
- Geomicrobiology

Candidates should send a letter of application and the supporting materials listed below to the HESS FELLOWS COMMITTEE, c/o Professor F. A. Dahlen, Department of Geosciences, Guyot Hall, Princeton University, Princeton, NJ 08544. Applications will continue to be accepted until the available positions are filled, but no later than December 31, 2002.

- Curriculum vitae
- List of publications and preprints
- Brief statement of research interests and goals
- Name, address and email address of three referees familiar with the candidate’s work

Hess fellowships provide a competitive annual salary, depending upon experience, along with an allowance for travel to meetings and research support. Initial awards are for one year, with a starting date that must be before January 1, 2004. Extensions for an additional year are generally granted depending upon satisfactory performance. Applications will continue to be accepted until the available positions are filled, but no later than December 31, 2002. Hess fellowship applicants will also be considered for other available postdoctoral positions in the Geosciences Department.

Princeton University is an Affirmative Action/Equal Opportunity employer and particularly welcomes applications from women and members of minority groups.

Information about the research activities of the Department of Geosciences may be viewed at http://geoweb.princeton.edu.

OPTICAL MINERALOGY/GEOTECTONICS
GEOHYDROLOGY/ENGINEERING GEOLOGY
CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

The Geological Sciences Dept. invites applications for a tenure track faculty position at the Associate Professor level beginning September 2003. Applicants must have an earned doctorate in Geology or a closely related field, and a minimum of five years of full-time, documented, effective, high quality college-level undergraduate teaching experience and a record of good publication commensurate with an associate professor-level appointment. Applicants must be actively involved in the field study of the southwest U.S. and should have experience directing undergraduate research projects. Preference will be given to applicants who possess knowledge of GIS software and GIS/GPS applications to Geology and who can teach a broad range of general education and service courses. Successful candidates must be committed to working with a diverse student body. Responsibilities broadly include teaching and developing courses in the above-mentioned areas as well as general education and service courses, directing undergraduates in field-oriented research in the southwest U.S., integrating GIS into the geoscience curriculum, advising students and carrying out committee assignments. Applicants must submit a resume, a statement of teaching and research interests, three reference letters, and evidence of research productivity. Letters of reference as well as names and contact information for three references should be included in the application materials. Mail requests and materials to: Dr. John A. Klasik, Chair, Geological Sciences Department, Cal Poly Pomona, Pomona, CA, 91768. Initial screening: January 6, 2003. Position open until filled or terminated. EO/AA employer.
Climate Office and share space with the National Weather Service. The department has extensive computational resources from the NC Supercomputing Center. North Carolina State University is located in Raleigh, which forms the eastern apex of the Research Triangle. The state of North Carolina is an active research location for many government laboratories, research institutes, and a thriving private sector. Further details concerning the department and the university can be found at our websites http://www.meas.ncsu.edu, http://www.ncsu.edu.

JOURNAL OF GEOSYSTEMS AND ENVIRONMENTAL RESEARCH

COASTAL PHYSICAL OCEANOGRAPHY: We are particularly looking for candidates with strong backgrounds in field-based physical oceanographic processes. This position will be located on main campus and will have access to extensive marine science facilities both on campus and on the coast. Facilities available on main campus include the Oceanographic Remote Sensing Facility, the Ocean Science Technology and Engineering Facility (for equipment maintenance and interventions in support of field and laboratory activities), and a machine shop. Comparable facilities are available off-campus at CMAST. The successful candidate will develop and execute coastal oceanographic field activities of relevance to North Carolina. This is a position that will be located on main campus and will have access to extensive marine science facilities both on campus and on the coast.

POSTDOCTORAL FELLOWSHIPS IN GEORHEOLOGY, GEOCHEMISTRY, AND ENVIRONMENTAL SCIENCE:

The Department of Geological Sciences at Ohio University invites applications for a tenure-track appointment at the assistant professor level in the field of earth science teacher education, effective August 2003. A Ph.D. is required at the time of appointment. Teaching experience at the K–12 level is a plus, but not required. Applicants should have a strong background in science for elementary teachers course, develop upper-level courses in earth science specifically geared for K–12 teachers, and work with faculty in earth science specifically geared for K–12 teachers, and work with faculty in

EDUCATION COURSE, DEVELOP UPPER-LEVEL COURSES IN EARTH SCIENCE SPECIFICALLY GEARED FOR K–12 TEACHERS, AND WORK WITH FACULTY IN EARTH SCIENCE SPECIFICALLY GEARED FOR K–12 TEACHERS, AND WORK WITH FACULTY IN

Applications for a tenure-track appointment at the assistant professor level in Geochemistry Education to begin in September 2003 are invited. We are seeking an individual who is committed to teaching and educational research, and who will enhance the active learning environment of the department’s instructional courses. Preference will be given to individuals with positions in public school or junior college teaching experience, experience teaching geoscience courses designed for students preparing to become teachers, faculty teaching with technology, and research interests in the teaching and learning of geoscience in secondary and post-secondary educational settings. The successful candidate will be expected to develop an externally funded, academically oriented research program, and contribute to teaching at both the undergraduate and graduate levels. Experience in traditional and online teaching is required and postdoctoral research experience is desirable. Applicants should send a Curriculum vita, statement of teaching and research interests, teaching statements for each of the courses and interviews, and telephone numbers to: Posting #F0310, Eastern Michigan University, 202 Bone Hall, Ypsilanti, MI 48197.

The review of applications will begin November 15, 2002 and continue until the position is filled. Eastern Michigan University is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply. For additional information about The Department and the University see our website: www.emich.edu/public/geo/welcome.html.

GEOCHEMISTRY POSITION, UNIVERSITY OF OREGON

The Department of Geological Sciences invites applications for a faculty position to begin in Fall 2003. While it is likely that the position will be filled at the assistant professor level, exceptional candidates may be considered at the associate professor level. We seek an individual who is interested in teaching, conducting research, and developing educational activities in geological education.

The successful candidate will be expected to establish a laboratory appropriate for her or his research, develop an externally funded, academically oriented research program, and teach courses at both the undergraduate and graduate levels.

Applications for a tenure-track appointment at the assistant professor level in Geochemistry Education to begin in September 2003 are invited. We are seeking an individual who is committed to teaching and educational research, and who will enhance the active learning environment of the department’s instructional courses. Preference will be given to individuals with positions in public school or junior college teaching experience, experience teaching geoscience courses designed for students preparing to become teachers, faculty teaching with technology, and research interests in the teaching and learning of geoscience in secondary and post-secondary educational settings. The successful candidate will be expected to develop an externally funded, academically oriented research program, and contribute to teaching at both the undergraduate and graduate levels. Experience in traditional and online teaching is required and postdoctoral research experience is desirable. Applicants should send a Curriculum vita, statement of teaching and research interests, teaching statements for each of the courses and interviews, and telephone numbers to: Posting #F0310, Eastern Michigan University, 202 Bone Hall, Ypsilanti, MI 48197.

The review of applications will begin November 15, 2002 and continue until the position is filled. Eastern Michigan University is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply. For additional information about The Department and the University see our website: www.emich.edu/public/geo/welcome.html.

GEOCHEMISTRY POSITION, UNIVERSITY OF OREGON

The Department of Geological Sciences invites applications for a faculty position to begin in Fall 2003. While it is likely that the position will be filled at the assistant profes-

sor level, exceptional candidates may be considered at the associate professor level. We seek an individual who is interested in teaching, conducting research, and developing educational activities in geological education.

The successful candidate will be expected to establish a laboratory appropriate for her or his research, develop an externally funded, academically oriented research program, and teach courses at both the undergraduate and graduate levels. Experience in traditional and online teaching is required and postdoctoral research experience is desirable. Applicants should send a Curriculum vita, statement of teaching and research interests, teaching statements for each of the courses and interviews, and telephone numbers to: Posting #F0310, Eastern Michigan University, 202 Bone Hall, Ypsilanti, MI 48197.

The review of applications will begin November 15, 2002 and continue until the position is filled. Eastern Michigan University is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply. For additional information about The Department and the University see our website: www.emich.edu/public/geo/welcome.html.

GEOCHEMISTRY POSITION, UNIVERSITY OF OREGON

The Department of Geological Sciences invites applications for a faculty position to begin in Fall 2003. While it is likely that the position will be filled at the assistant profes-
sor level, exceptional candidates may be considered at the associate professor level. We seek an individual who is interested in teaching, conducting research, and developing educational activities in geological education.

The successful candidate will be expected to establish a laboratory appropriate for her or his research, develop an externally funded, academically oriented research program, and teach courses at both the undergraduate and graduate levels. Experience in traditional and online teaching is required and postdoctoral research experience is desirable. Applicants should send a Curriculum vita, statement of teaching and research interests, teaching statements for each of the courses and interviews, and telephone numbers to: Posting #F0310, Eastern Michigan University, 202 Bone Hall, Ypsilanti, MI 48197.

The review of applications will begin November 15, 2002 and continue until the position is filled. Eastern Michigan University is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply. For additional information about The Department and the University see our website: www.emich.edu/public/geo/welcome.html.

GEOCHEMISTRY POSITION, UNIVERSITY OF OREGON

The Department of Geological Sciences invites applications for a faculty position to begin in Fall 2003. While it is likely that the position will be filled at the assistant profes-
sor level, exceptional candidates may be considered at the associate professor level. We seek an individual who is interested in teaching, conducting research, and developing educational activities in geological education.

The successful candidate will be expected to establish a laboratory appropriate for her or his research, develop an externally funded, academically oriented research program, and teach courses at both the undergraduate and graduate levels. Experience in traditional and online teaching is required and postdoctoral research experience is desirable. Applicants should send a Curriculum vita, statement of teaching and research interests, teaching statements for each of the courses and interviews, and telephone numbers to: Posting #F0310, Eastern Michigan University, 202 Bone Hall, Ypsilanti, MI 48197.

The review of applications will begin November 15, 2002 and continue until the position is filled. Eastern Michigan University is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply. For additional information about The Department and the University see our website: www.emich.edu/public/geo/welcome.html.

GEOCHEMISTRY POSITION, UNIVERSITY OF OREGON

The Department of Geological Sciences invites applications for a faculty position to begin in Fall 2003. While it is likely that the position will be filled at the assistant profes-
sor level, exceptional candidates may be considered at the associate professor level. We seek an individual who is interested in teaching, conducting research, and developing educational activities in geological education.

The successful candidate will be expected to establish a laboratory appropriate for her or his research, develop an externally funded, academically oriented research program, and teach courses at both the undergraduate and graduate levels. Experience in traditional and online teaching is required and postdoctoral research experience is desirable. Applicants should send a Curriculum vita, statement of teaching and research interests, teaching statements for each of the courses and interviews, and telephone numbers to: Posting #F0310, Eastern Michigan University, 202 Bone Hall, Ypsilanti, MI 48197.

The review of applications will begin November 15, 2002 and continue until the position is filled. Eastern Michigan University is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply. For additional information about The Department and the University see our website: www.emich.edu/public/geo/welcome.html.

GEOCHEMISTRY POSITION, UNIVERSITY OF OREGON

The Department of Geological Sciences invites applications for a faculty position to begin in Fall 2003. While it is likely that the position will be filled at the assistant profes-
sor level, exceptional candidates may be considered at the associate professor level. We seek an individual who is interested in teaching, conducting research, and developing educational activities in geological education.

The successful candidate will be expected to establish a laboratory appropriate for her or his research, develop an externally funded, academically oriented research program, and teach courses at both the undergraduate and graduate levels. Experience in traditional and online teaching is required and postdoctoral research experience is desirable. Applicants should send a Curriculum vita, statement of teaching and research interests, teaching statements for each of the courses and interviews, and telephone numbers to: Posting #F0310, Eastern Michigan University, 202 Bone Hall, Ypsilanti, MI 48197.

The review of applications will begin November 15, 2002 and continue until the position is filled. Eastern Michigan University is an Equal Opportunity/Affirmative Action employer. Women and minorities are encouraged to apply. For additional information about The Department and the University see our website: www.emich.edu/public/geo/welcome.html.
The University of Oregon is an equal opportunity/affirmative action institution committed to cultural diversity and compliance with the Americans with Disabilities Act.

**WELLESLEY COLLEGE**

**ASSISTANT OR ASSOCIATE PROFESSOR**

The Geology Department at Wellesley College invites applications for a tenure-track faculty position at the rank of second-level assistant or first-level associate professor beginning September 2003. We seek an exceptional scientist whose teaching and research will expand our current geologically oriented program into some area of environmental problem solving. Applicants should have expertise in hydrology, low temperature geochemistry, soil science or civil and environmental engineering with geo-environmental emphasis. Candidates are also expected to have at least three years of undergraduate teaching experience and an established, externally funded research program that can engage undergraduate students.

Applicants should send their curriculum vitae, a statement of teaching and research interests and the names and contact information (including email address) of three referees to Dr. Margaret D. Thompson, Chair, Geology Department, Wellesley College, Wellesley, MA 02481. Applications will be accepted until December 1, 2002.

Wellesley College is an Equal Opportunity/Affirmative Action educational institution and employer. Successful candidates must be able to work effectively in a culturally diverse environment. Applications from women, minorities, veterans, and candidates with disabilities are encouraged.

**TWO POSITIONS**

**INDIANA UNIVERSITY NORTHWEST**

The Department of Geosciences seeks to fill two full-time, tenure-track positions at the Assistant Professor level beginning mid-August 2003 (pending final budgetary approval in late October 2002). The candidates should be broadly trained with a strong desire to work in an undergraduate department that values excellence in teaching and research and involving students in research. Candidates are expected to incorporate field trips into courses and participate in a regional field course. IUN is developing an interdisciplinary MS degree in environmental studies and both faculty would be expected to contribute to the program. Normal teaching load is 3 courses per semester. Opportunities, resources available for summer teaching and research. Ph.D. in geology required at time of appointment.

Sedimentologist/Stratigrapher—primary teaching in sedimentology, stratigraphy, hydrogeology, historical geology, introductory course in earth science and upper division courses in area of expertise.

Surficial Geology—primary teaching in geomorphology, introductory course in Earth sciences, upper division courses in area of expertise.

A detailed position announcement is available at: www.iun.edu/~jobsw. Send letter of application, statement of teaching and research interest, detailed curriculum vitae, undergraduate and graduate transcripts and names and contact information (including e-mail) of three references to Dr. Kristin Huysken, Search Chair, Geosciences, IUN, 3400 Broadway, Gary, IN 46408-1197.

Applications should be received by January 15, 2003, to ensure full consideration. Additional information is available at: www.iun.edu/~geos. AA/EEO Employer.

**Opportunities for Students**

**Ph.D. Student Assistantships.** Oregon State and Portland State Universities are offering fifteen Ph.D. research assistantships to explore all aspects of the Earth’s subsurface microbial biosphere. Tuition and stipend are provided by the NSF IGERT program and the two universities. Students will work in interdisciplinary teams of engineers, oceanographers, microbiologists, microbial ecologists, geologists, soil scientists, and chemists to solve environmental problems, to understand global chemical cycles, and to determine the impact of subsurface microorganisms on surface ecosystems. More information can be found at: http://oregonstate.edu/dept/igert, or Martin R. Fisk, College of Oceanic and Atmospheric Sciences, Oregon State University, mfisk@coas.oregonstate.edu. Students from all scientific backgrounds are encouraged to apply to departments represented by IGERT faculty at either institution. U.S. citizens or permanent residents can be supported by IGERT funds, however students of all nations can participate in the program. Review of applications starts 2/1/02. Oregon State and Portland State Universities are committed to equality in education.

**Research/Teaching Assistantships.** Graduate Program of Hydrologic Sciences, University of Nevada, Reno. Applications are encouraged for graduate research assistantships beginning July 1, 2003. Positions carry an annual stipend of approximately $14,000 including tuition and fees. Students interested in the area of ground water, surface water and aqueous geochemistry are encouraged to apply. Additionally, funded research assistantship are available in paleohydrology, contaminant transport, watershed hydrology and numerical simulation, as well as scholarships and doctoral fellowships offered through UNR and the Desert Research Institute. Completed application packages are due January 10, 2003 and should be mailed to: Graduate Program of Hydrologic Sciences, Mail Stop 175, LMR 267, Reno, NV 89557-0180. Information on assistantships and fellowships in the Hydrologic Sciences Graduate Program can be found at www.hydro.unr.edu or by calling 775-784-6250.
Nearshore Marine Paleoclimatic Regions, Increasing Zoogeographic Provincuality, Molluscan Extinctions, and Paleoshorelines, California: Late Oligocene (27 Ma) to Late Pliocene (2.5 Ma)

Approximately 3000 middle and late Cenozoic nearshore marine molluscan taxa from western California are assigned to six time periods, spanning ~25 m.y. In this interdisciplinary study, western California is palinspastically restored for each of the time periods by backsliding and back-rotating large fault blocks or crustal units. Marine fossil assemblages are assigned to nearshore paleoclimatic regions or water masses within palinspastically restored California. In addition, this volume reveals positive feedback mechanisms between paleolatitudinal changes in sea-surface paleotemperature gradients and changes in the diversity of marine mollusks along the California coast through time; defines "equable" based effective temperatures; and analyzes extinction rates among macroinvertebrate marine taxa from coastal California and the possible causes of these extinctions. The late Paleogene to Neogene faunas reflect an increase in faunal diversity related to strengthened temperature gradients, greater extremes in sea-surface temperatures, reduction in temperateness, and the development of an embayed California coastline.

by Clarence A. Hall Jr.
**Logplot**

New Version!

**RockWare**

Visual Seismic 2.0

2D, 3D & 4D Reservoir Analysis, Visualization & Interpretation

RockWare Visual Seismic is a PC-based 3D seismic visualization and interpretation system written by a career geophysicist.

New in RVS 2.0

- Interpret 2D Seismic Lines in 3D
- Opening Dialog box (improved usability)
- New 3D Seismic Viewing Object - Surface Straddle
- New 3D Seismic Viewing Object - Fault Bounded
- Geography - Import TIFF image
- Geography - Import DXF files
- Geography - Setting Geography time level
- Visualization Volumes can be exported as a SEGY files.
- Multiple Windows
- Multiple Volumes - Independent of one another
- SEGY File Information Dialog - Now easier to load SEGY files.
- Color Bar - Several pre-created color pallets included.

$1,299 Introductory Price  $499 Academic

**Surfer 8**

$575.00

- New in Version 8:
  - Object Manager
  - Rotate and Tilt Raster Maps
  - Grid Mosaic and Cross Validation
  - New Variogram Models
  - Uses USGS SDTS DEM and DLG Files in Native Format
  - Maximum Plot Size Increased

**RockWare**

Earthe Science & GIS Software

Over 200 Software Solutions at http://www.rockware.com

2221 East St.  Suite 101, Golden  Colorado 80401
1-800-775-6745 or 303-278-3534  Fax 303-278-4099

RockWare Europe: vicolo dei Saroli 1  6944 Cureglia  Switzerland
Tel: 0041 91 967 52 53  Fax: 0041 91 967 55 50 Email: europe@rockware.com