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Footprint of the Expanded West Antarctic Ice Sheet: Ice Stream History and Behavior

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On the cover: Wrecked whaling ship in Wilhelmina Bay, Northern Antarctic Peninsula. Photo taken by Julia Smith Wellner at the end of the 1999 cruise during which multibeam data was collected; this data is presented in the paper, "Footprint of the Expanded West Antarctic Ice Sheet: Ice Stream History and Behavior," Anderson et al., p. 4–9.

Ed. note: "The Evolution of GSA: Part II" will appear in a future issue.

Footprint of the Expanded West Antarctic Ice Sheet: Ice Stream History and Behavior

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ABSTRACT

Evaluating the stability of the West Antarctic Ice Sheet and its regulating role in global climate and eustasy hinges on our ability to understand the interaction of ice streams and the bed on which they rest. Rapid streaming of ice is enabled by flow across a deformable till bed produced by the incorporation of basal meltwater into unconsolidated sedimentary material. These ice streams are shown to have flowed across extensive deformable till beds characterized by megascale glacial lineations composed of soft deformation till. The onset of rapid ice discharge occurs at the transition from crystalline bedrock to seaward-dipping sedimentary strata. In most locations, the deformed bed extends tens of kilometers to the outer continental shelf, which implies a thin ice sheet margin. Furthermore, most of the lateral boundaries of these ancestral ice streams were not constrained geologically, and there is evidence that these boundaries migrated a few tens of kilometers.

The extent of the deformable till bed, the nature of the boundaries, and the location of grounding-zone wedges, which record grounding-line positions of individual ice streams, vary from trough to trough, implying unique ice advance and retreat histories. These are all critical parameters in glaciological models and, therefore, predictions of the West Antarctic Ice Sheet's stability.

INTRODUCTION

The configuration of the West Antarctic Ice Sheet has long been considered unstable. The ice sheet typically is grounded (i.e., in direct contact with the underlying rock or sediment) at depths of ≥ 800 m below sea level. However, it is thin at the margins, so it floats in deep embayments, such as the Ross or Weddell Seas. The potential instability arises from the fact that sea-level rise and/or ice-margin thinning could cause rapid landward shifts in the ice sheet grounding line, with resultant melting (Hollin, 1964; Weertman, 1974; Thomas and Bentley, 1978). The most rapid flow occurs in areas of converging drainage known as ice streams. Ice stream flow velocities are typically a few hundred meters per year versus a few tens of meters per year in nonstreaming portions of the ice sheet. Currently, the dominant ablation of the West Antarctic Ice Sheet occurs through ice streams. The areas of maximum discharge are characterized by low ice sheet profiles that typically terminate in ice shelves (e.g., the Ross and Ronne-Filchner ice shelves). The long-term behavior of these ice streams is considered the most critical factor controlling the stability of the West Antarctic Ice Sheet (Hughes, 1977;

Bentley, 1987). Understanding those factors that regulate ice stream behavior over centuries to millennia is crucial to assessing West Antarctic Ice Sheet stability (Bindschadler et al., 1998).

The interaction of ice streams and their subglacial beds is increasingly being recognized as an important control on ice stream behavior (Boulton and Jones, 1979; Alley et al., 1987; Engelhardt et al., 1990; Tulaczyk et al., 1998; Bell et al., 1998; Anandakrishnan et al., 1998; Bindschadler et al., 2001). The working model demonstrates that rapid flow of ice streams is due, at least in part, to flow over a deforming bed that is produced by the mixing of basal meltwater with sedimentary material. Support for this model comes from airborne and over-ice geophysical surveys (Bell et al., 1998; Anandakrishnan et al., 1998) and drilling through the modern ice streams and into the underlying bed (Engelhardt et al., 1990).

Around West Antarctica, the flow of the ice sheet converges as it passes over structural embayments on its journey to the

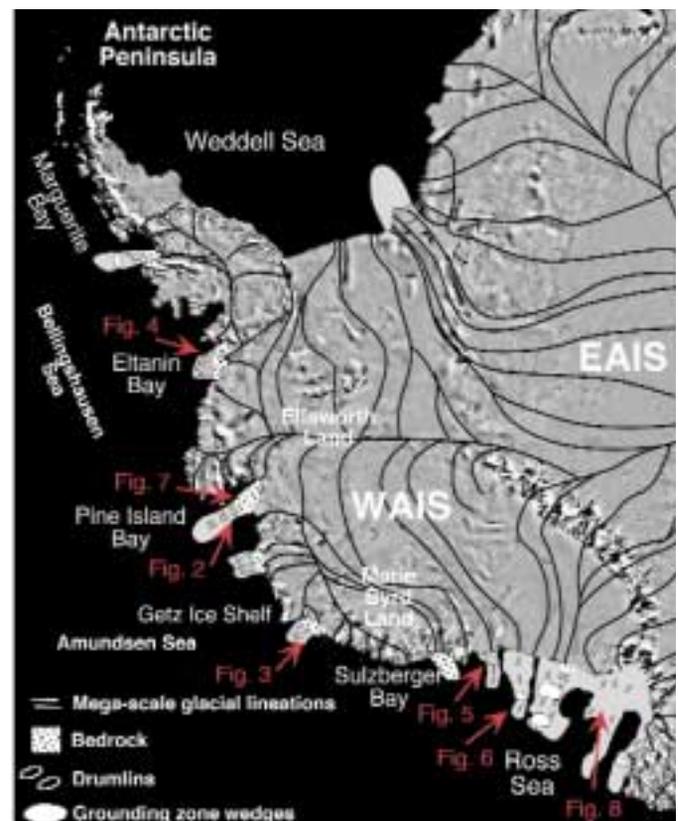


Figure 1. Satellite mosaic showing major drainage outlets of West Antarctica and locations of glacial troughs (light gray), located offshore of drainage outlets. Only larger troughs that extend beyond inner shelf are shown. Marine geophysical surveys were conducted in all of these troughs, except those in the Weddell Sea. Also shown are distribution patterns of large-scale geomorphic features, grounding-zone wedges, and areas where bedrock is present at or near seafloor. WAIS—West Antarctic Ice Sheet. EAIS—East Antarctic Ice Sheet.

coast. Without exception, deep, elongate bathymetric depressions (glacial troughs) occupy the continental shelf offshore of the larger drainage outlets (Fig. 1). This association supports Hughes' (1977) suggestion that glacial troughs mark the locations of former ice streams. There is strong evidence that the West Antarctic Ice Sheet advanced onto the shelf during the Last Glacial Maximum (Anderson, 1999; Anderson and Shipp, 2001). Hence, the troughs should contain a geological record of past ice stream behavior. In this paper, we present results from high-resolution seismic and swath bathymetry surveys and sedimentological examination of cores acquired from many of the large glacial troughs of West Antarctica. The spatial resolution provided by these data allows us to address the following questions about past ice stream behavior, and about the interaction of ice streams and the bed on which they rest.

- Did the expanded West Antarctic Ice Sheet have ice streams and, if so, how extensive were they?
- What geological conditions influenced the onset of paleo-ice streams?
- What geologic conditions control the boundaries of ice streams? Did these boundaries migrate and, if so, over what distances?
- Is there evidence that expansion of ice streams resulted ultimately in rapid retreat of the West Antarctic Ice Sheet?

DATABASE

Geophysical data and sediment cores were acquired within, and in selected areas between, the troughs of the Ross, Amundsen, and Bellingshausen Seas

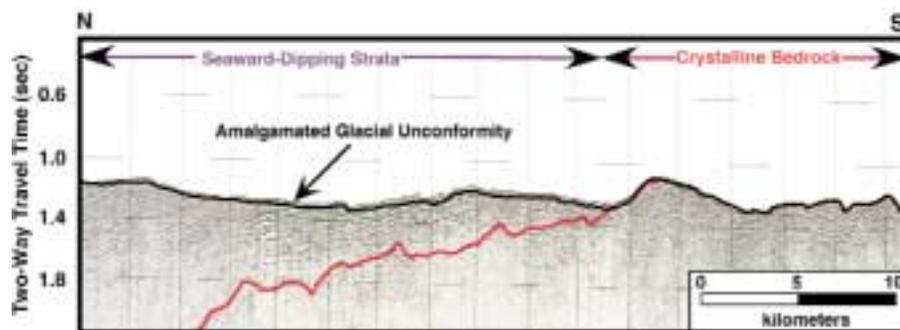


Figure 2. Seismic profile across axis of a large glacial trough, Pine Island Bay, showing rugged crystalline bedrock on inner shelf extending offshore into seaward-dipping sedimentary strata.

during four separate cruises of the RV/IB *NB Palmer* between 1994 and 1999. Seismic profiles were collected along the axes of the troughs to examine the nature of the bed over which the ice sheet was flowing and image sedimentary deposits formed at and beneath the grounding line (Fig. 2). High-resolution (Chirp) subbottom profiles were acquired to image thin sedimentary units (minimum thickness of ~1 m). Multibeam and deep-tow side-scan sonar images record geomorphic features of various scales and yield information about processes occurring at and within the ice/bed interface. Sediment cores are used to characterize subglacial and glacial-marine deposits; they provide information about subglacial conditions and about the retreat history of the individual ice streams.

RESULTS AND DISCUSSION

Subglacial Conditions

The different troughs of the West Antarctic continental shelf occupy a range of geological settings, based mainly on the extent of bedrock versus sedimentary strata over which the ex-

panded ice sheet flowed. At one end of the spectrum is the crystalline bedrock underlying the continental shelf off western Marie Byrd Land (Fig. 1). In contrast, the Ross Sea continental shelf is underlain by a seaward-dipping succession of incompletely lithified Tertiary and Quaternary age sedimentary strata. Offshore of eastern Marie Byrd Land and Ellsworth Land, the inner shelf is floored by crystalline basement, whereas the outer shelf is underlain by sedimentary strata (Figs. 1 and 2).

Integration of geomorphic information from geophysical data with lithologic data from cores has allowed us to reconstruct the behavior of the ice sheet and characteristics of landforms generated as it moved over different substrates exposed on the continental shelf. The landforms and inferred rate of ice flow/conditions are discussed below and summarized in Table 1.

Shelf areas floored by crystalline bedrock are characterized by narrow, deep troughs that follow the structural grain. Grooves and streamlined spurs on rock surfaces indicate that the ice was in direct contact with the bedrock (Fig. 3).

TABLE 1. GEOMORPHIC EVIDENCE FOR SUBGLACIAL CONDITIONS

Landform	Substrate	Inferred Ice Conditions/Rate of Flow	Example Areas	Figure
<u>Depositional</u>				
Megascale glacial lineations	Sedimentary	Fast	R.S., Getz, PIB, Eltanin Bay	Figures 4, 5, 7
<u>Erosional</u>				
Grooves	Crystalline	Slow	R.S., Pennell, Sulzberger, PIB, Getz	Figures 3, 7
Roches moutonnées	Crystalline	Slow	PIB, Sulzberger	Figure 3
Meltwater channels	Crystalline	Sporadic?	PIB	Figure 6
Gullies	Sedimentary	Meltwater, ice at shelf break	Western R.S., PIB, Pennell, Sulzberger slopes	Figure 5
<u>Intermediate</u>				
Drumlins	Crystalline-sedimentary transition	Accelerating	Central R.S., Getz, PIB, Eltanin, Marguerite	Figures 3, 4

Note: See Anderson (1999) and Wellner et al. (2001) for more detailed descriptions of features. PIB—Pine Island Bay; R.S.—Ross Sea.

In general, the ice traversed younger, less consolidated, increasingly mud-rich sedimentary material more prone to erosion as it advanced seaward across the shelf.

Drumlins occur at the contact between bedrock and sedimentary deposits (Fig. 4), marking the zone where ice first encounters a sedimentary bed. Theoretically, this is the location where flow begins to accelerate (Wellner et al.,

2001). Seaward of the drumlinized transition zone and above the sedimentary strata, megascale glacial lineations extend tens of kilometers across the shelf (Figs. 4 and 5). They are ridges that are confined to troughs and oriented parallel to trough axes. On average, the lineations are 10–20 m high and have transverse wavelengths of a few hundred meters. High-resolution seismic profiles show that the lineations are part

of a homogeneous seismic unit that rests above a glacial unconformity (Shipp et al., 1999). They are identical to lineations observed on previously glaciated landscapes and seascapes that have been attributed to overriding by paleo-ice streams (Clark, 1993; Canals et al., 2000).

Deformation of the bed implies high rates of sediment transport at the bed (Alley et al., 1987; Clark, 1993). Typically, megascale lineations extend seaward into wedges of strata that contain seaward-dipping foreset beds. These are referred to as grounding-zone wedges (Anderson, 1999). We believe that these grounding-zone wedges are composed of sediment that was moving seaward within the subglacial conveyor belt. They are equivalent to the “till deltas” of Alley et al. (1987). Grounding-zone wedges that rest above older lineated surfaces are interpreted to have formed during pauses in the retreat of the ice sheet (Shipp et al., 1999).

Where the lineations extend to the shelf break, as in the eastern Ross Sea, they are bounded on the upper slope by gullies that extend downslope into small sediment fans (Fig. 5). Anderson (1999) interpreted these gullies as having been cut by sediment-laden meltwater emanating from the ice sheet-grounding line.

Sediment cores that penetrated megascale glacial lineations produced diamict samples with relatively low shear strengths and high water content compared to tills deposited by plastering of debris onto the bed (lodgment till) (Anderson, 1999). Otherwise, these diamictos show the same properties as lodgment tills, such as strong homogeneity in composition and grain size (Anderson, 1999). They are similar to the modern deformable till beds that occur beneath Ice Stream B (Engelhardt et al., 1990; Tulaczyk et al., 1998).

In summary, drumlins mark the transition between ice that is resting on bedrock and ice that is flowing across a deformable till bed. Thus, they appear to mark the onset area of former ice streams. But, do ice streams occur only over deformable sedimentary beds? Seismic data from Pine Island Bay show that the inner portions of the bay are floored by crystalline bedrock (Fig. 2). Yet, Pine Island Glacier flows into the bay at velocities between 1.0 and 2.5

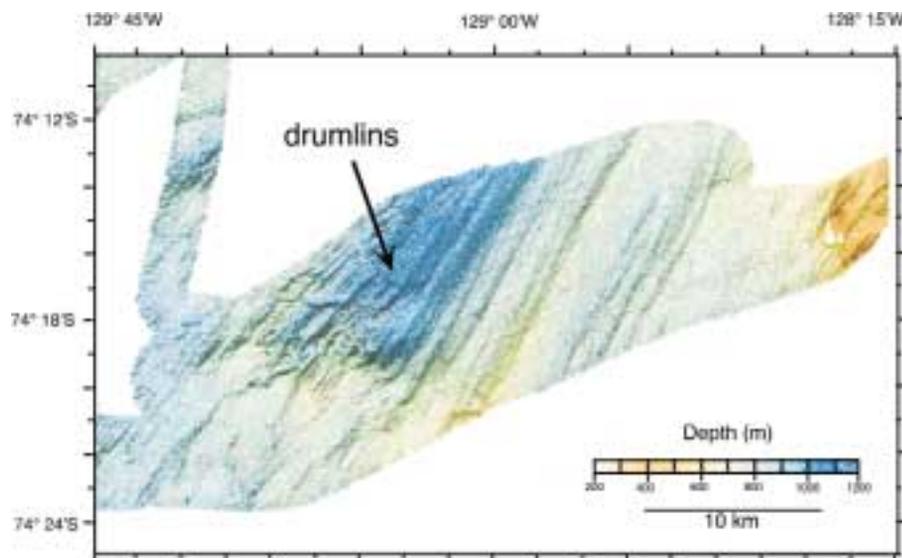


Figure 3. Multibeam mosaic from offshore of Getz Ice Shelf showing grooves and drumlins on crystalline bedrock surface.

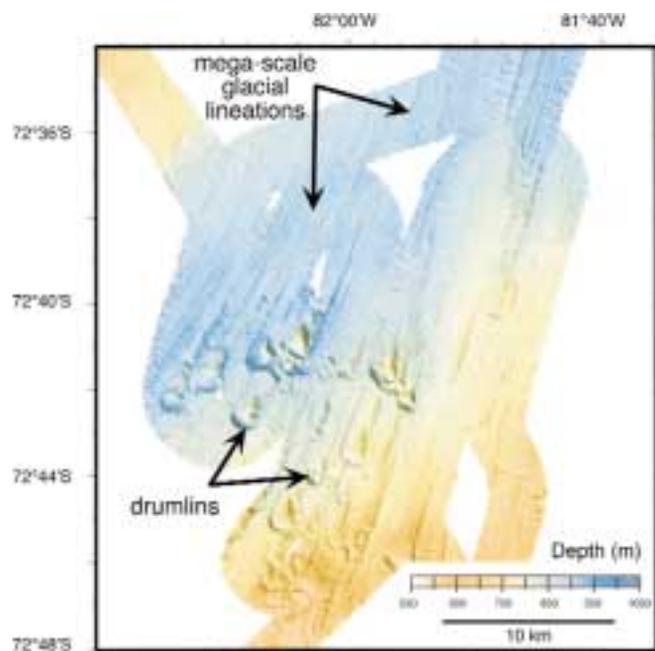


Figure 4. Multibeam mosaic showing drumlins within glacial trough in Eltanin Bay (see Fig. 1). These drumlins occur where the ice sheet first flows from crystalline bedrock across sedimentary strata.

km/yr. (Lucchitta and Rosanova, 1997).

The bedrock surface in the Pine Island Bay trough is incised by an anastomosing network of meltwater channels (Fig. 6). These channels occur at water depths of up to 1400 m, so they are interpreted as subglacial features. The channels indicate that significant volumes of subglacial meltwater may have existed beneath Pine Island Glacier when it was grounded on the shelf.

Currently, the floor of Pine Island Bay is blanketed by terrigenous mud that virtually lacks ice-rafted material and increases in thickness toward the glacier terminus. This is interpreted as a meltwater deposit. Radiocarbon ages reveal that accumulation of meltwater deposits is occurring today and, therefore, that meltwater is currently flowing from beneath Pine Island Glacier (Lowe, 2001). Perhaps basal meltwater is present in large enough quantities to support basal sliding of Pine Island Glacier across a crystalline bed.

On the outer shelf of Pine Island Bay, megascale glacial lineations and associated deformation till occur where there are sedimentary strata; meltwater channels are absent. This implies that once the ice advanced onto the sedimentary strata, meltwater was incorporated into the bed. Hence, the mechanism for basal sliding changed. This is consistent with arguments by Tulaczyk et al. (2000) and Raymond et al. (2001) that channelized drainage is unlikely to occur over deformable beds.

In the eastern Ross Sea, megascale glacial lineations extend virtually uninterrupted from the margin of the Ross Ice Shelf to the continental shelf edge (Fig. 5). This implies that once the bed starts to deform, it will continue to deform as long as the ice flows across sedimentary deposits.

Ice Stream Boundaries

The lateral margins of modern ice streams are shear margins between fast-moving and slow-moving ice. These margins are marked by crevasses that typically extend transverse to flow. Raymond et al. (2001) argue that shifting ice stream boundaries would alter the velocity and width of the streaming flow and thus discharge. The issue of ice stream margins is critical to the stability of the ice sheet. One of the important

questions raised in recent years concerns the degree to which subglacial geology and topography control the boundaries of ice streams (Shabtaie and Bentley, 1987; Bell et al., 1998; Anandakrishnan et al., 1998; Bentley, 1998). Modern ice stream boundaries are rather broad (typically several kilometers wide).

How distinct are the paleo-ice stream boundaries in West Antarctica, and are they associated with geological boundaries? For the most part, the paleo-ice stream boundaries we have examined are not associated with geological boundaries. The exception to this is on the inner shelf, where the ice first began to encounter deformable sediments and where bedrock highs regulated the movement of the ice. Our geomorphic data demonstrate that megascale glacial lineations, the best geomorphic evidence for paleo-ice streams, are confined to troughs. However, the lateral boundaries of lineated and nonlineated seafloor are diffuse, spanning several

kilometers (Figs. 5 and 7).

Seismic records show that depositional features (ice stream boundary ridges) or erosional escarpments mark the lateral margins of some paleo-ice streams (Fig. 8), (Anderson et al., 1992). For the most part, these margins do not correspond to bedrock or stratigraphic boundaries. Indeed, seismic images of some ice stream boundary ridges show evidence of tens of kilometers of lateral migration of ice stream boundaries across relatively uniform Pliocene-Pleistocene strata (Fig. 8).

CONCLUSIONS

The results from this investigation provide strong evidence that ice streams occupied glacial troughs on the West Antarctic continental shelf during past glacial maxima. Our results also corroborate those from previous over-ice and aerial geophysical surveys, which indicate that ice stream onset coincides with the boundary between crystalline bedrock and sedimentary strata.

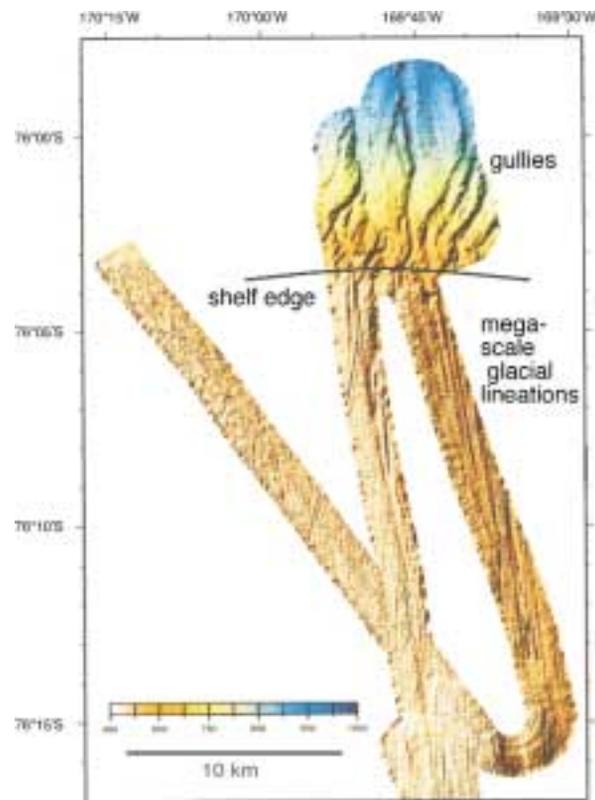


Figure 5. Multibeam mosaic from outer shelf in eastern Ross Sea showing megascale glacial lineations that extend to shelf break. Gullies are present on upper slope, seaward of the lineations. These gullies are believed to have been cut by sediment-laden meltwater emanating from grounding line of expanded ice sheet. Meltwater was no longer being incorporated into a deformable till bed.

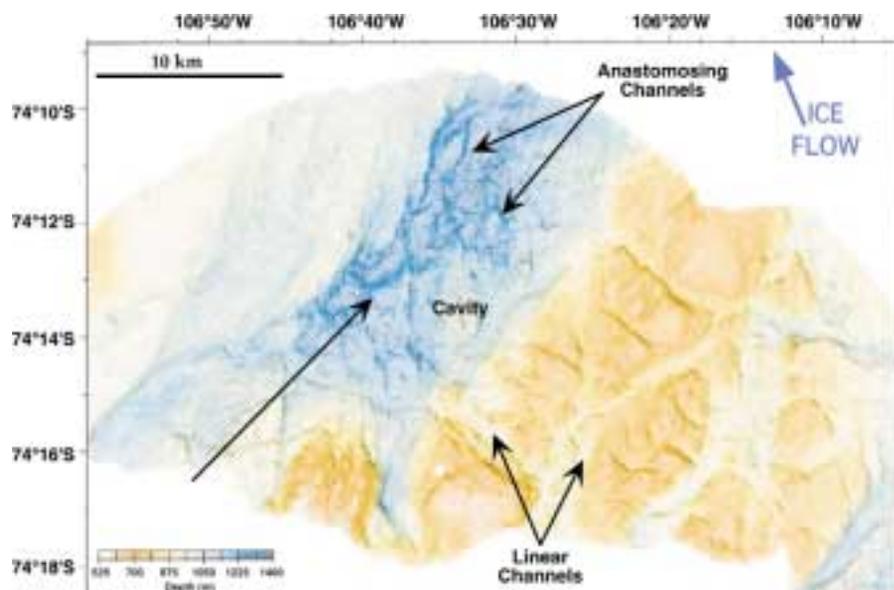


Figure 6. Multibeam mosaic showing anastomosing subglacial meltwater channels in inner part of Pine Island Bay.

However, there is also evidence that channelized basal meltwater may, in some cases, provide the necessary lubricant for subglacial sliding over crystalline bedrock. As the ice sheet advanced across the shelf, it encountered more deformable substrates. In most locations, the deformed bed extends tens of kilometers to the outer continental shelf, which implies greatly extended ice streams. The ice streams in the Ross Sea and Pine Island Bay were 2–4 times more extensive than they are today.

For the most part, the lateral boundaries (shear margins) of ancestral ice

streams were not constrained geologically, and there is evidence of a few tens of kilometers migration of these boundaries in unconsolidated sedimentary strata.

Our results suggest that there may be a self-regulating control on West Antarctic Ice Sheet expansion and retreat. The advance of the ice sheet onto the shelf results in more extensive ice streams. This in turn favors a thinner, unstable ice sheet margin that possibly contributes to retreat.

The distribution and extent of megascale glacial lineations, the extent of the drumlinized transition zone, and the dis-

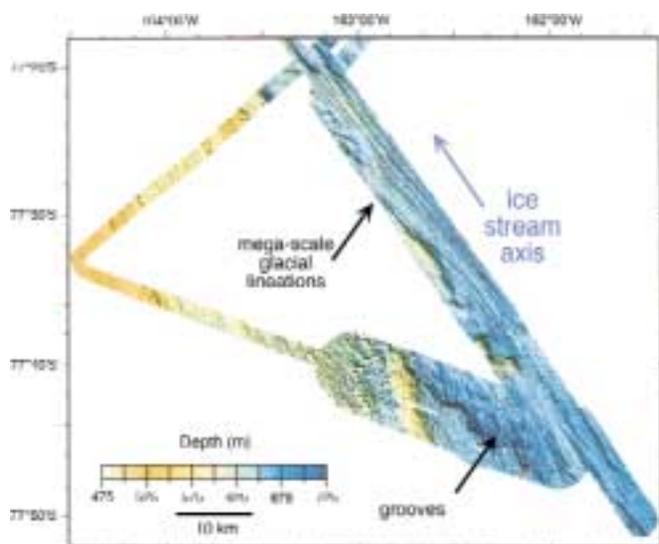


Figure 7. Megascale glacial lineations are the main geomorphic expression of a deformable till bed beneath paleo-ice streams. In this example from the eastern Ross Sea, the boundary between lineated seafloor within trough axis grades into nonlineated seafloor to west of trough.

tribution of grounding-zone wedges varies from trough to trough, even within the Ross Sea, where several ice streams existed (Fig. 1). These variations indicate that rates of ice stream flow and discharge varied between the different paleo-ice streams and that retreat of some ice streams was episodic. The fact that subglacial features are so well preserved and buried beneath relatively thin recessional glacial-marine deposits implies rapid retreat. The key is to determine which ice streams have a history of rapid retreat, how rapidly they retreated, and what factors led to rapid retreat.

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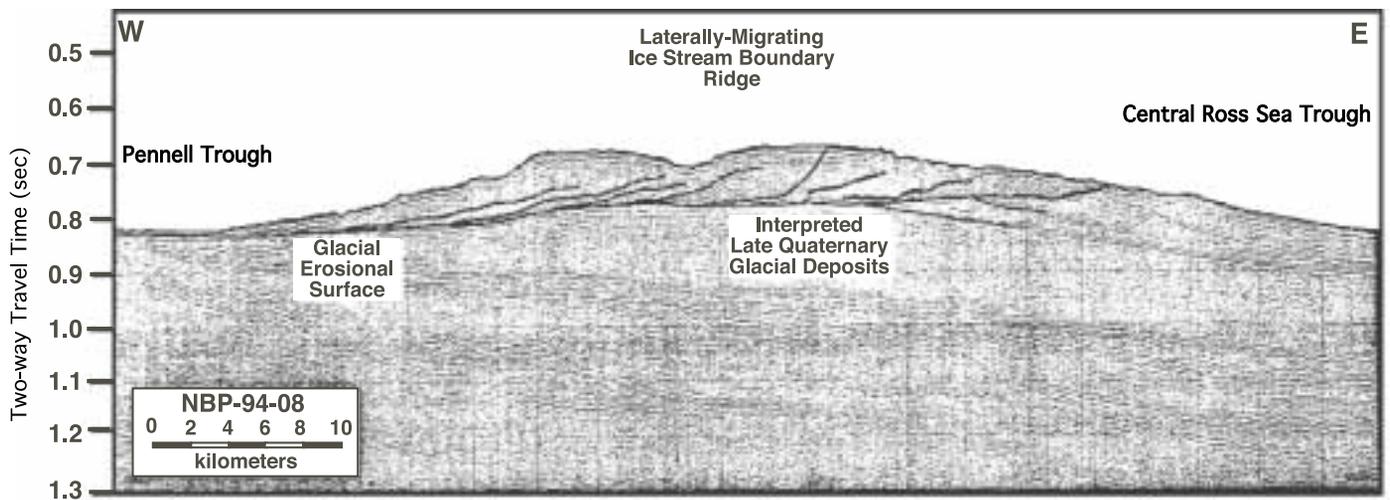


Figure 8. Seismic profile from western Ross Sea showing ice stream boundary ridge. Ridge separates two paleo-ice streams that occupied the Pennell Trough and the Central Ross Sea Trough. Note westward lateral accretion, which indicates significant shifts in ice stream boundary with time. There are no significant differences in substrate conditions across these boundaries.

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Manuscript received July 2, 2001; accepted August 6, 2001. ★

On behalf of the Geological Society of America, we would like to express our sympathy and condolences to all GSA members and staff for whom the horrible events on September 11 were a personal tragedy. The hostile actions have affected us all in ways that are hard to describe. GSA has received a number of messages for our members from societies and individuals around the world. We would like to pass them on to you and have posted them at GSA's Web site, www.geosociety.org.

In the days to come, we will go back to our usual business, and air travel will become more secure. We anticipate no changes in our plans for the GSA Annual Meeting in Boston, and we look forward to seeing a great many of you there.

Again, we would like to add our condolences to those from abroad.

Sharon Mosher, President, and Dave Stephenson, Acting Executive Director

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Geobiology and Geomicrobiology in the 21st Century

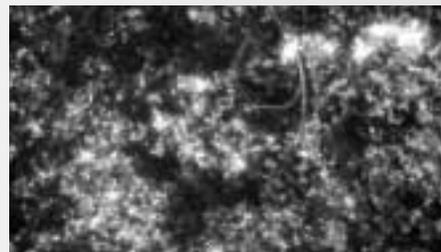
*Jan P. Amend, Chair, Chris Fedo, Vice-Chair,
Sherry L. Cady, Second Vice-Chair, Gordon
Southam, Secretary, and Kurt O. Konhauser,
Treasurer, GSA Division of Geobiology and
Geomicrobiology*

The direct link between life and Earth's environmental history establishes the purviews of the emerging fields of geobiology and geomicrobiology. Owing to mankind's renewed fascination with the life sciences combined with technological advances in microscopy, molecular biology, sampling equipment, in situ (bio)chemical analyses, and computing, we are poised to make significant discoveries at the biotic-abiotic interface. This communiqué highlights advancing research areas of interest to the committee of the new GSA Division of Geobiology and Geomicrobiology.

Studying modern ecosystems along with the fossil and stratigraphic records can elucidate events that led to the emergence of life and evolution of the biosphere. Both records, however, are notoriously fragmented and complex. To place the evidence for early life in a proper context, we must understand the role subsequent geologic events had on that fossil record, especially when those events involved open geochemical systems for time periods lasting hundreds of millions of years or longer. Complementary modern ecosystem studies provide a means to understanding the biogeochemical processes by which life interacted with its environment through time, and these processes are ultimately the source of biosignatures in the geological record. Understanding how life's biosignatures are formed, preserved, and altered by taphonomic processes is important in deciphering Earth's history and in the search for extraterrestrial life. Astrobiology is, after all, the extension of geobiology beyond Earth.

Further geologic context for life and its cellular processes throughout Earth's history will come from investigations of the vast phylogenetic and metabolic diversity found in microorganisms. Of particular interest are the deep-branching Archaea and Bacteria in the tree of life and the diverse habitats they favor. From a geologic perspective, the subsurface biosphere and other largely unexplored environments harbor interesting microbes living at geophysical and geochemical extremes. Though exploration of the vast array of subsurface niches has just begun, continental and oceanic drilling projects and the study of systems where deep hydrothermal fluids emanate naturally at the surface afford glimpses into this potentially expansive biosphere.

DIALOGUE



Fluorescence microscope image of thermophilic bacteria in a biofilm on a glass slide. Specimen from a hot spring in Yellowstone National Park. Photo courtesy of S.L. Cady.

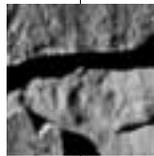
New information on microbial diversity, metabolic capabilities, and environmental constraints links directly to a fundamental characteristic dictating the progression of microbial processes: the amount of energy consumed or released in a metabolic reaction. A quantitative assessment of geochemical energy sources in a natural environment provides a framework for investigating the variability, extent, and kinetics of microbial substrate utilization. It follows that the future of geomicrobiological studies in extreme environments will shine brightest if in situ microbial processes are explicitly tied to geochemical constraints on metabolism; in particular, metabolic energy resulting from disequilibrium among minerals, gases, and organic and inorganic aqueous compounds.

In biomineralization, for example, microbial metabolism is commonly coupled, directly or indirectly, to the dissolution of a wide variety of minerals, and microorganisms can be instrumental in precipitating minerals both extra- and intracellularly. Although some microbes expend metabolic energy on biomineralization if the minerals serve biologic functions, biomineralization often occurs independently as a by-product of interactions between the activity of microorganisms and their surrounding environment (i.e., indirect biomineralization). In this indirect process, cell-surface reactivity and complexation are of paramount importance, but it remains unresolved whether cells exert control over the mineralization process, and perhaps more significantly, whether indirect extracellular biomineralization is in any way fortuitous to the encrusted microbial cells.

By driving Earth's global C, N, S, and metal biogeochemical cycles, mediating mineral dissolution and precipitation, and facilitating aqueous redox processes, life has left and continues to leave its mark on our planet. Our understanding of the role of organisms as geologic agents is still in its infancy, and imminent discoveries and advances in geobiology and geomicrobiology are likely to come from all areas of these expanding disciplines.

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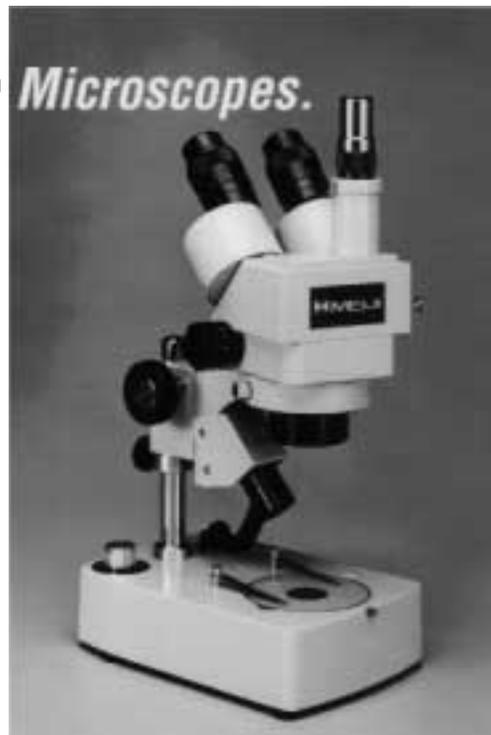
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Glenda Robinson is on a mission. After inspiring kids to get fired up about science and pursue engineering careers, she wants to do the same thing with geology. That's why she's been chosen as the Subaru Distinguished Earth Science Educator at GSA for the 2001–2002 school year.

"I scream for teachers and kids," she said. "When I feel we're being overlooked, I get mad. As an African-American teacher, teaching in a predominantly African-American school, I know how underrepresented we are in the math, science, and engineering work force. A number of my students got turned on to engineering, and now I'd like to get the same thing going for geology—and then, voilà, we'll get more people into geology."

The Subaru Distinguished Earth Science Educator is a master teacher selected by GSA to act as an educator in residence. During this second year of the program, Robinson will work with Science, Education, and Outreach staff, the Committee on Education, and other GSA members to serve the K–12 geoscience education community, providing insight and practical wisdom gleaned from classroom experience to assist educators and other professionals. One of her goals is to begin developing geology lessons on video that GSA could one day donate to teachers.

2001–2002 SUBARU DISTINGUISHED EARTH SCIENCE EDUCATOR NAMED



Glenda Robinson

Robinson, a Colorado native, has been teaching seventh and eighth grade science for 14 years. She earned a B.A. in science education and an M.A. in middle education from the University of Northern Colorado in Greeley. But when she graduated, teaching jobs were not available, so she worked as a geophysical assistant for Amoco from 1973 to 1986.

"I have always felt that my corporate experience helped me to be a successful teacher and enrich those I teach," she said. This experience also helped Robinson to steer students into higher education and enter the professional world.

By their eighth grade year, some students in Robinson's school have already decided to quit school. Robinson wants to catch them at that point (the same age she was when she first got interested in science), get them excited about science, and motivate them to stay in school.

"This opportunity will take my knowledge and skills to a new level. As with other science topics, I will be able to develop creative lesson plans and share information with my co-workers." Robinson can be reached at GSA Headquarters at (303) 357-1082 or grobinson@geosociety.org. See www.geosociety.org/educate/index.htm for more information on the Subaru program.

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CALL FOR SHORT COURSE PROPOSALS Due December 3, 2001

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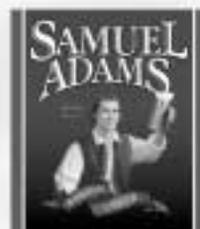
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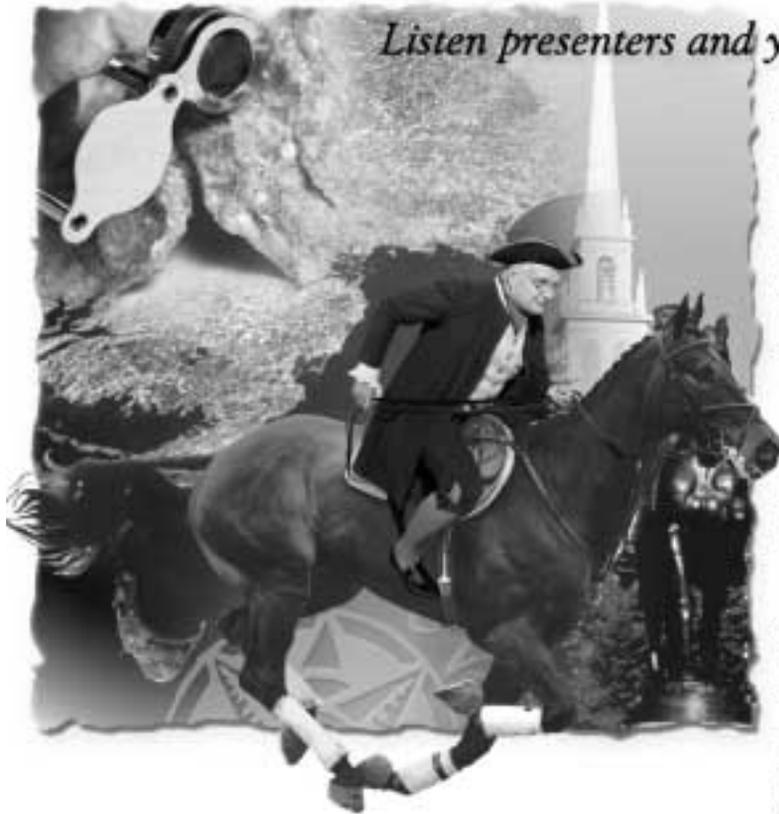
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Session	Title	Time	Location
SUNDAY, NOVEMBER 4			
1	SEG Special Session I: Iron-Oxide(-Copper-Gold) Systems—Deposit Studies to Global Context	8:30 a.m.	Room 302
2	SEG Special Session II: Iron-Oxide(-Copper-Gold) Systems—Deposit Studies to Global Context	1:30 p.m.	Room 302
MONDAY, NOVEMBER 5			
3	Geomicrobiology (Posters)	8 a.m.	Hall D
4	Hydrogeology I: Karst Hydrology, Heterogeneity, and General Hydrology (Posters)	8 a.m.	Hall D
5	Marine Paleontology (Posters)	8 a.m.	Hall D
6	Metamorphic Petrology I	8 a.m.	Room 210
7	Paleoclimatology and Paleoceanography (Posters)	8 a.m.	Hall D
8	Paleoclimatology and Paleoceanography I	8 a.m.	Room 103
9	Structural Geology I: Faulting and Folding—Timing, Geometry, and Processes	8 a.m.	Room 304
10	K5. The Emerging Discipline of Medical Geology (<i>Institute for Earth Science and the Environment; Armed Forces Institute of Pathology; International Union of Geological Sciences; U.S. Geological Survey; COGENENVIRONMENT; International Geologic Correlation Program #454; Swedish Geological Survey; Institute for Metal Biology</i>)	8 a.m.	Ballroom B

Session	Title	Time	Location
11	T2. Proterozoic Tectonic Evolution of the Grenville Orogen in Eastern North America I	8 a.m.	Room 100
12	T12. Stratigraphic Paleobiology (<i>Paleontological Society</i>)	8 a.m.	Room 310
13	T14. Partnerships in Paleontology: Involving the Public in Collaborative Research (<i>Paleontological Society</i>)	8 a.m.	Room 102
14	T21. Recent Advances in Deep-Water Facies Models (<i>GSA Sedimentary Geology Division, SEPM [Society for Sedimentary Geology], Sequence Stratigraphy Research Group</i>)	8 a.m.	Room 106
15	T30. Anoxia and Black Shale Deposition I	8 a.m.	Room 202
16	T32. America's Coastal Crisis—Providing the Geoscience Information Needed to Conserve and Protect Coastal Resources (<i>GSA Quaternary Geology and Geomorphology Division</i>)	8 a.m.	Room 112
17	T42. Groundwater Discharge to Estuaries I (<i>GSA Hydrogeology Division; National Ground Water Association</i>)	8 a.m.	Room 313
18	T46. Applications of Sedimentology and Geophysics in Hydrogeology (<i>GSA Hydrogeology Division; GSA Sedimentology Division</i>)	8 a.m.	Room 311
19	T53. Geology and Tunneling: Case Histories (<i>GSA Engineering Geology Division; American Rock Mechanics Association</i>)	8 a.m.	Room 306
20	T58. Construction and Geology of the Massachusetts Water Resources Authority Tunnel, Eastern Massachusetts, I	8 a.m.	Ballroom A
21	T59. Rheological Effects of Fluid-Rock Interactions at Depth: From Experimental Constraints to Interpretations of Field Observations (<i>GSA Structural Geology and Tectonics Division; GSA Geophysics Division</i>)	8 a.m.	Room 200
22	T61. Natural Arsenic in Groundwater: Science, Regulation, and Health Implications (Posters) (<i>GSA Hydrogeology Division</i>)	8 a.m.	Hall D
23	T66. Coal Systems Analysis: A New Approach to the Understanding of Coal Formation, Coal Quality, and Environmental Considerations, and Coal as a Source Rock for Hydrocarbons (<i>GSA Coal Geology Division; U.S. Geological Survey</i>)	8 a.m.	Room 309
24	T69. Geobiography: Life Histories of Geologists as a Way to Understand How Science Operates (<i>GSA History of Geology Division; History of Earth Sciences Society</i>)	8 a.m.	Room 206
25	T72. Geoscience Information: A Dynamic Odyssey (<i>Geoscience Information Society</i>)	8 a.m.	Room 208
26	T81. Strategies for Promoting Active Learning in Large Entry-Level Courses (<i>National Association of Geoscience Teachers</i>)	8 a.m.	Room 302
27	Engineering Geology (Posters)	1:30 p.m.	Hall D
28	Paleobotany	1:30 p.m.	Room 112
29	Quaternary Geology and Geomorphology I	1:30 p.m.	Ballroom A
30	Stratigraphy I: Siliciclastic (Posters)	1:30 p.m.	Hall D
31	Stratigraphy II (Posters)	1:30 p.m.	Hall D
32	Tectonics (Posters)	1:30 p.m.	Hall D
33	Volcanology and Experimental Petrology	1:30 p.m.	Room 106
34	K4. Ophiolites as Problem and Solution in the Evolution of Geological Thinking (<i>GSA History of Geology Division; GSA Structural Geology and Tectonics Division; International Geology Division; Society of Economic Geologists; History of Earth Sciences Society</i>)	1:30 p.m.	Ballroom B
35	T2. Proterozoic Tectonic Evolution of the Grenville Orogen in Eastern North America II	1:30 p.m.	Room 100
36	T7. The Proterozoic of the Eastern Midcontinent and Beyond (<i>GSA Geophysics Division; Illinois Basin Consortium</i>)	1:30 p.m.	Room 206
37	T11. Sulfur Cycling in Precambrian to Recent Ocean-Atmosphere Systems: A Session Honoring the Career of William T. Holser (<i>Geochemical Society; GSA International Division</i>)	1:30 p.m.	Room 102
38	T15. Special Session in Honor of Half Zantop (<i>Society of Economic Geologists</i>)	1:30 p.m.	Room 103
39	T19. New Perspectives on the Character and Origin of Late Cretaceous–Cenozoic Sequences on the U.S. Atlantic Margin	1:30 p.m.	Room 311
40	T30. Anoxia and Black Shale Deposition II	1:30 p.m.	Room 202
41	T32. America's Coastal Crisis—Providing the Geoscience Information Needed to Conserve and Protect Coastal Resources (Posters) (<i>GSA Quaternary Geology and Geomorphology Division</i>)	1:30 p.m.	Hall D
42	T40. Isotopic Tracers and Thermal Anomaly Data as Constraints on Groundwater Flow Patterns and Climate History within Sedimentary Systems (<i>GSA Hydrogeology Division</i>)	1:30 p.m.	Room 312
43	T42. Groundwater Discharge to Estuaries II (<i>GSA Hydrogeology Division</i>)	1:30 p.m.	Room 313
44	T48. Application of Geochemistry to Understanding Groundwater–Surface Water Interactions (<i>GSA Hydrogeology Division</i>)	1:30 p.m.	Room 309
45	T50. High-Resolution Geochemical Bioarchives: Recognition of Signals and Implications for Evolution, Paleocology, and Paleoclimatology (<i>Paleontological Society</i>)	1:30 p.m.	Room 200



Session	Title	Time	Location
46	T58. Construction and Geology of the Massachusetts Water Resources Authority Tunnel, Eastern Massachusetts, II	1:30 p.m.	Room 310
47	T61. Natural Arsenic in Groundwater: Science, Regulation, and Health Implications (<i>GSA Hydrogeology Division</i>)	1:30 p.m.	Room 210
48	T62. Munitions: Sources, Fate, and Transport (<i>U.S. Army Environmental Center</i>)	1:30 p.m.	Room 302
49	T73. Databases to Knowledge Bases: The Informatics Revolution (<i>Association of American State Geologists</i>)	1:30 p.m.	Room 208
50	T76. Geology in the National Parks: Research, Mapping, Education, and Interpretation	1:30 p.m.	Room 304
51	T77. Increasing Student Engagement in Geoscience Courses Through Information Technology: A Component of Enrollment Management (<i>National Association of Geoscience Teachers</i>)	1:30 p.m.	Room 306

TUESDAY, NOVEMBER 6

52	Archaeological Geology (Posters)	8 a.m.	Hall D
53	Economic Geology I: Fe-Oxide(-Cu-Au) Deposits, Fe-Sulfides in Black Shales, Taconite Ores, Geochronology	8 a.m.	Room 112
54	Engineering Geology I	8 a.m.	Room 306
55	Environmental Geoscience I	8 a.m.	Room 208
56	Hydrogeology I: Fracture Flow, Unsaturated Flow, and Modeling Uncertainty	8 a.m.	Room 313
57	Igneous Petrology I	8 a.m.	Room 202
58	Paleontology I: Assessing Biodiversity	8 a.m.	Room 106
59	Precambrian (Posters)	8 a.m.	Hall D
60	Quaternary Geology and Geomorphology II	8 a.m.	Room 310
61	Structural Geology: Faulting, Folding, and Fabric Development (Posters)	8 a.m.	Hall D
62	K2. Melt in the Crust and Upper Mantle: How Much, Where, for How Long, and What Significance for Geodynamics? (<i>GSA Structural Geology and Tectonics Division; Geochemical Society; Mineralogical Society of America</i>)	8:20 a.m.	Ballroom B
63	T3. Focus on IGCP: Modern and Ancient Plate Boundaries and Orogens I—In Memory of Christopher McA. Powell (<i>GSA International Division; U.S. National Committee on the Geological Sciences; International Geologic Correlation Program projects 453, 426, 440, 436, 433</i>)	8 a.m.	Room 100
64	T4. Crustal Architecture of Rifted Continental Margins I	8 a.m.	Room 103
65	T10. Holocene Climate Change: Seasonal Variability to Centennial Trends I	8 a.m.	Room 206
66	T13. Foraminifera: Barometers of the Biotic and Abiotic World I (<i>Cushman Foundation</i>)	8 a.m.	Room 312
67	T24. Dynamics of Sediments and Sedimentary Environments I: A Session in Honor of John B. Southard (<i>GSA Sedimentary Geology Division; SEPM [Society for Sedimentary Geology]</i>)	8 a.m.	Room 311
68	T34. Coastal Geology of the National Parks (<i>GSA Sedimentary Geology Division; Institute for Earth Science and the Environment</i>)	8 a.m.	Room 210
69	T38. Flow and Transport in Fractured Aquifers—From Field Characterization to Model Construction (<i>GSA Hydrogeology Division</i>)	8 a.m.	Ballroom A
70	T51. Novel Applications of Bulk and Compound Specific Stable and Radiogenic Isotopes for the Solution of Problems in Organic Geochemistry	8 a.m.	Room 200
71	T70. Ophiolites as Problem and Solution in the Evolution of Geological Thinking I (<i>GSA History of Geology Division; GSA Structural Geology and Tectonics Division; International Geology Division; History of Earth Sciences Society</i>)	8 a.m.	Room 302
72	T74. Geoinformatics: Extracting Knowledge from the Rock Record Through Construction of Disciplinary Databases and Information Networks (Posters)	8 a.m.	Hall D
73	T80. Models and Approaches to Teaching Geology to Pre- and In-Service Teachers (<i>National Association of Geoscience Teachers</i>)	8 a.m.	Room 309
74	T82. Models of Successful Undergraduate Research Programs in the Geosciences (Posters) (<i>Council on Undergraduate Research—Geosciences Division</i>)	8 a.m.	Hall D
75	Aqueous Geochemistry (Posters)	1:30 p.m.	Hall D
76	Economic Geology II: Reserve/Resource Classification; MVT, VMS, SEDEX, and Layered Intrusions	2 p.m.	Room 112
77	Environmental Geoscience II	1:30 p.m.	Room 208
78	Geochemistry of Health and Environmental Transport	1:30 p.m.	Room 102
79	Geoscience Education I: Undergraduate Curricula, Environmental Education	1:30 p.m.	Room 309
80	Marine and Coastal Science (Posters)	1:30 p.m.	Hall D
81	Mineralogical Society of America Presidential Address	4 p.m.	Room 210



Session	Title	Time	Location
82	Paleontology and Paleobotany: Non-Marine (Posters)	1:30 p.m.	Hall D
83	Public Policy	1:30 p.m.	Room 313
84	Stratigraphy I: Impacts and Extinctions	1:30 p.m.	Room 202
85	K6. The Future of Biogeochemistry: A Symposium in Honor of Harold C. Helgeson (<i>Geochemical Society</i>)	1:30 p.m.	Ballroom B
86	T1. Arc Terranes in the Appalachians and Caledonides and their Role in Paleozoic Orogenesis I	1:30 p.m.	Room 304
87	T3. Focus on IGCP: Modern and Ancient Plate Boundaries and Orogens II—In Memory of Christopher McA. Powell (<i>GSA International Division; U.S. National Committee on the Geological Sciences; International Geologic Correlation Program projects 453, 426, 440, 436, 433</i>)	1:30 p.m.	Room 100
88	T4. Crustal Architecture of Rifted Continental Margins II	1:30 p.m.	Room 103
89	T5. Melt in the Crust and Upper Mantle: How Much, Where, for How Long, and What Significance for Geodynamics? (<i>GSA Structural Geology and Tectonics Division; Mineralogical Society of America; Geochemical Society; GSA International Division</i>)	1:30 p.m.	Ballroom A
90	T9. New Insights into Late Ordovician Climate, Oceanography, and Tectonics (<i>GSA Sedimentary Geology Division</i>)	1:30 p.m.	Room 306
91	T10. Holocene Climate Change: Seasonal Variability to Centennial Trends II	1:30 p.m.	Room 206
92	T13. Foraminifera: Barometers of the Biotic and Abiotic World II (<i>Cushman Foundation</i>)	1:30 p.m.	Room 312
93	T24. Dynamics of Sediments and Sedimentary Environments II: A Session in Honor of John B. Southard (<i>GSA Sedimentary Geology Division; SEPM [Society for Sedimentary Geology]</i>)	1:30 p.m.	Room 311
94	T25. Geochemistry of Siliciclastic Materials: Provenance, Paleoclimates, and Plate Tectonic Settings (<i>GSA Sedimentary Geology Division</i>)	1:30 p.m.	Room 200
95	T26. Geochemistry of Organic-Rich Sediments from Estuaries, Continental Shelves, Basins, and Upwelling Zones	1:30 p.m.	Room 106
96	T70. Ophiolites as Problem and Solution in the Evolution of Geological Thinking II (<i>GSA History of Geology Division; GSA Structural Geology and Tectonics Division; International Geology Division; History of Earth Sciences Society</i>)	1:30 p.m.	Room 302
97	T70. Ophiolites as Problem and Solution in the Evolution of Geological Thinking (Posters) (<i>GSA History of Geology Division; GSA Structural Geology and Tectonics Division; International Geology Division; History of Earth Sciences Society</i>)	1:30 p.m.	Hall D
98	T83. Sigma Gamma Epsilon Student Research Poster Session (Posters) (<i>Sigma Gamma Epsilon</i>)	1:30 p.m.	Hall D

WEDNESDAY, NOVEMBER 7

99	Aqueous Geochemistry	8 a.m.	Room 208
100	Geochemistry (Posters)	8 a.m.	Hall D
101	Geophysics, Tectonophysics, and Seismology	8:45 a.m.	Room 102
102	Geoscience Education (Posters)	8 a.m.	Hall D
103	History of Geology	8 a.m.	Room 309
104	Marine Invertebrate Paleontology I	8 a.m.	Room 106
105	Metamorphic Petrology II	8 a.m.	Ballroom A
106	Quaternary Geology and Geomorphology III	8 a.m.	Room 210
107	Stratigraphy II: Carbonate Sedimentology and Diagenesis	8 a.m.	Room 202
108	Tectonics I: Thermochronology—Tectonic Controls on Landscape Evolution	8 a.m.	Room 302
109	K8. Water's Many Forms in the Solar System: Implications for Geology, Exploration, and Life (<i>GSA Planetary Geology Division</i>)	8 a.m.	Ballroom B
110	T1. Arc Terranes in the Appalachians and Caledonides and their Role in Paleozoic Orogenesis II	8 a.m.	Room 304
111	T3. Focus on IGCP: Modern and Ancient Plate Boundaries and Orogens: In Memory of Christopher McA. Powell (Posters) (<i>GSA International Division; U.S. National Committee on the Geological Sciences; International Geologic Correlation Program projects 453, 426, 440, 436, 433</i>)	8 a.m.	Hall D
112	T16. Insects and Terrestrial Arthropods in the Fossil Record: Are So Many Really Represented by So Few? (<i>Paleontological Society</i>)	8 a.m.	Room 112
113	T22. Quaternary Stratigraphy in Glaciated Terranes: Techniques, Tools, and Mapping (Posters) (<i>GSA Quaternary Geology and Geomorphology Division</i>)	8 a.m.	Hall D
114	T23. Sediment-Hosted Lead-Zinc Deposits: Roles of Basin Evolution, Tectonics, and Geochemistry in Ore Genesis I (<i>Society of Economic Geologists</i>)	8 a.m.	Room 306
115	T28. High-Resolution Investigations of the Morphodynamics and Sedimentary Evolution of Estuaries	8 a.m.	Room 200



Session	Title	Time	Location
116	T35. Diffusive Transport Processes in the Subsurface (<i>GSA Hydrogeology Division</i>)	8 a.m.	Room 311
117	T37. Recent Advancements in Aquifer Hydraulics and Their Applications to Aquifer and Vadose Zone Characterization, Remediation, and Dewatering (<i>GSA Hydrogeology Division</i>)	8 a.m.	Room 312
118	T43. Iron in Sedimentary Aquifers: Biological, Chemical, and Physical Controls on Iron Mobility (<i>GSA Hydrogeology Division; SEPM [Society for Sedimentary Geology]</i>)	8 a.m.	Room 313
119	T44. Hydrology and Hydrogeology of Extreme Environments (<i>GSA Hydrogeology Division</i>)	10:30 a.m.	Room 313
120	T64. Nothing Ventured, Nothing Gained: Geology and Risk Assessment in the 21st Century (<i>GSA Engineering Geology Division; Association of Engineering Geologists</i>)	8 a.m.	Room 310
121	T65. Erosion of Non-Lithified Sediments; Observations and Models from Millimeter to Hillslope Scales (<i>GSA Quaternary Geology and Geomorphology Division</i>)	8 a.m.	Room 103
122	T67. Archaeological Geology and the Pleistocene-Holocene Transition (<i>GSA Archaeological Geology Division</i>)	8 a.m.	Room 206
123	T75. Applications and New Opportunities in Geologic Remote Sensing (Posters) (<i>GSA Geophysics Division</i>)	8 a.m.	Hall D
124	T88. New Topics in Grenville Tectonics: A New Look at Some Old Rocks	8 a.m.	Room 100
125	Archaeological Geology	1:30 p.m.	Room 200
126	Geomicrobiology	1:30 p.m.	Room 100
127	Geophysics, Tectonophysics, and Seismology (Posters)	1:30 p.m.	Hall D
128	Hydrogeology II: Hydrochemistry and Hydrogeology	1:30 p.m.	Room 311
129	Igneous Petrology II	1:30 p.m.	Room 208
130	Marine Invertebrate Paleontology II	1:30 p.m.	Room 106
131	Michel T. Halbouty Distinguished Lecturer: John D. Bredehoeft, "Who Uses the Water West of the 100th Meridian?"	4:30 p.m.	Ballroom A
132	Planetary Geology (Posters)	1:30 p.m.	Hall D
133	Quaternary Geology and Geomorphology I (Posters)	1:30 p.m.	Hall D
134	Remote Sensing and Geographic Information Systems (Posters)	1:30 p.m.	Hall D
135	Stratigraphy III: Phanerozoic Sequence Stratigraphy	1:30 p.m.	Room 202
136	Structural Geology II: Strain and Kinematics from Conglomerates to Plutons	1:30 p.m.	Room 304
137	Tectonics II: Fold-Thrust Belts and Collisional Processes	1:30 p.m.	Room 302
138	K7. The Watershed Within: Scientific and Moral Reflections on Water in the 21st Century (<i>Critical Issues Subcommittee of Geology and Public Policy; GSA Quaternary Geology and Geomorphology Division; Institute for Earth Science and the Environment</i>)	1:30 p.m.	Ballroom B
139	T5. Melt in the Crust and Upper Mantle: How Much, Where, for How Long, and What Significance for Geodynamics? (Posters) (<i>GSA Structural Geology and Tectonics Division; Mineralogical Society of America; Geochemical Society; GSA International Division</i>)	1:30 p.m.	Hall D
140	T8. "Traces" of Soil Ecosystems through the Phanerozoic: New Insights into Terrestrial Paleocology, Paleohydrology, and Paleoclimate (<i>Paleontological Society</i>)	1:30 p.m.	Room 102
141	T23. Sediment-Hosted Lead-Zinc Deposits: Roles of Basin Evolution, Tectonics, and Geochemistry in Ore Genesis II (<i>Society of Economic Geologists</i>)	1:30 p.m.	Room 306
142	T33. Coastal Erosion Programs: Collaborative Geologic Research in Action	1:30 p.m.	Room 310
143	T39. Geochemistry of Karst Waters: A Window on Hydrogeology and Biota	1:30 p.m.	Room 312
144	T63. Contributions of High-Resolution Geophysics to Understanding Neotectonics and Seismic Hazard (<i>GSA Geophysics Division; GSA Engineering Geology Division</i>)	1:30 p.m.	Room 210
145	T75. Applications and New Opportunities in Geologic Remote Sensing (<i>GSA Geophysics Division</i>)	1:30 p.m.	Room 206
146	T79. Innovative Approaches to Undergraduate Teaching of Oceanography (<i>National Association of Geoscience Teachers</i>)	1:30 p.m.	Room 309
147	T85. The Coming Revolution in Earth and Space Science Education (<i>National Association of Geoscience Teachers; National Earth Science Teachers Association</i>)	1:30 p.m.	Room 112
148	T87. Fossil Fuel on Federal Land (<i>GSA Coal Geology Division; U.S. Geological Survey; GSA International Division</i>)	1:30 p.m.	Room 313

THURSDAY, NOVEMBER 8

149	Clastic Sediments: New Insights into Fluvial, Deltaic, and Shallow Marine Sedimentation	8 a.m.	Room 206
150	Economic Geology III: Remote Sensing; Porphyry, Skarn, Replacement, Epithermal, and Supergene Deposits	8 a.m.	Room 302



Session	Title	Time	Location
151	Environmental Geoscience (Posters)	8 a.m.	Hall D
152	General Geochemistry	8 a.m.	Room 200
153	Geoscience Education II: K–12, Teaching Strategies	8 a.m.	Room 310
154	Geoscience Information (Posters)	8 a.m.	Hall D
155	Igneous Petrology (Posters)	8 a.m.	Hall D
156	Marine Invertebrate Paleontology III	8 a.m.	Room 102
157	Metamorphic Petrology (Posters)	8 a.m.	Hall D
158	Mineralogy and Crystallography	8 a.m.	Room 202
159	Paleoclimatology and Paleoceanography II	8 a.m.	Room 103
160	Paleontology II: Vertebrate Paleontology and Terrestrial Systems	8 a.m.	Room 106
161	Structural Geology II: Tectonics and Neotectonics (Posters)	8 a.m.	Hall D
162	Tectonics III: Wrench Systems—Oceanic and Global Tectonics	8 a.m.	Room 210
163	Volcanology (Posters)	8 a.m.	Hall D
164	K1. Geobiology: Applications to Sedimentary Geology (<i>NASA Astrobiology Institute</i>)	8 a.m.	Ballroom B
165	T6. Evolution of the Precambrian Earth (<i>GSA Geophysics Division; GSA Structural Geology and Tectonics Division; GSA International Division</i>)	8 a.m.	Room 112
166	T27. Evaporite Systems I: The Geology, Paleontology, and Biology of Evaporite and Near-Evaporite Systems in Both Terrestrial and Extraterrestrial Environments (<i>Paleontological Society; NASA Astrobiology Institute—Johnson Space Center</i>)	8 a.m.	Room 100
167	T29. Linking Sediment Dynamics and Stratigraphy in Modern-Holocene Estuaries I (<i>GSA Sedimentary Geology Division</i>)	8 a.m.	Room 311
168	T31. The Margins of Reefs and Carbonate Platforms (<i>GSA Sedimentary Geology Division; SEPM [Society for Sedimentary Geology]</i>)	8 a.m.	Room 304
169	T41. Groundwater Availability Modeling (<i>GSA Hydrogeology Division</i>)	8 a.m.	Room 312
170	T45. Borehole Geophysical Analysis Techniques for the Definition of Aquifer Properties (<i>GSA Hydrogeology Division</i>)	8 a.m.	Room 313
171	T54. Case Histories in Site Characterization (<i>GSA Engineering Geology Division; Association of Engineering Geologists</i>)	8 a.m.	Room 306
172	Coal Geology (Posters)	1:30 p.m.	Hall D
173	Economic Geology (Posters)	1:30 p.m.	Hall D
174	Engineering Geology II	1:30 p.m.	Room 312
175	Hydrogeology II: Water Quality and Hydrochemistry (Posters)	1:30 p.m.	Hall D
176	Metamorphic Petrology III	1:30 p.m.	Room 206
177	Paleontology III: Early Life	1:30 p.m.	Room 106
178	Planetary Geology	1:30 p.m.	Room 304
179	Precambrian Potpourri	1:30 p.m.	Room 208
180	Quaternary Geology and Geomorphology II (Posters)	1:30 p.m.	Hall D
181	Quaternary Geology and Geomorphology IV	1:30 p.m.	Room 306
182	Sedimentology: Carbonate Sediments, Diagenesis, Paleoclimate, and Paleosols (Posters)	1:30 p.m.	Hall D
183	Tectonics IV: Appalachian Tectonics—Evolution of Orogens	1:30 p.m.	Room 200
184	K3. Nanogeology: The Application of Nanotechnology in Earth Sciences	1:30 p.m.	Ballroom B
185	T6. Evolution of the Precambrian Earth (Posters) (<i>GSA Geophysics Division; GSA Structural Geology and Tectonics Division; GSA International Division</i>)	1:30 p.m.	Hall D
186	T27. Evaporite Systems II: The Geology, Paleontology, and Biology of Evaporite and Near-Evaporite Systems in Both Terrestrial and Extraterrestrial Environments (<i>Paleontological Society; NASA Astrobiology Institute—Johnson Space Center</i>)	1:30 p.m.	Room 100
187	T29. Linking Sediment Dynamics and Stratigraphy in Modern-Holocene Estuaries II (<i>GSA Sedimentary Geology Division</i>)	1:30 p.m.	Room 311
188	T71. Prospecting for Humor in a Geological Vein: Mining a Renewable Resource	1:30 p.m.	Room 202



Graduate School Information Forum

Hynes Convention Center, Hall D

Mon.–Wed., Nov. 5–7, 8 a.m.–5:30 p.m. Searching for the right graduate school? Make one trip—to GSA's Geo-Odyssey—and you can meet with university representatives from across the nation at GSA's Annual Meeting in Boston.

The schools participating (as of press time) are listed below. For a complete list of schools, including those with booths in the Exhibit Hall, go to our Web site, www.geosociety.org/meetings/2001/index.htm, or contact GSA's exhibit sales coordinator, Brenda Martinez, at (303) 357-1038, bmartinez@geosociety.org.

Institution	Mon.	Tues.	Wed.	Institution	Mon.	Tues.	Wed.
Binghamton University	★			University of Delaware	★	★	
Boise State University		★	★	University of Houston		★	★
Bowling Green State University	★			University of Idaho	★	★	
Clemson University		★		University of Iowa		★	
Colorado School of Mines		★		University of Kansas	★		
Cornell University	★	★		University of Maryland	★	★	
Duke University	★	★	★	University of Massachusetts—Amherst	★		
East Carolina University	★	★		University of Missouri—Rolla	★	★	
Florida State University	★			University of New Hampshire			★
Indiana University	★	★	★	University of North Carolina at Chapel Hill	★		
Miami University	★	★		University of Notre Dame			
Mississippi State University	★	★		University of Oklahoma	★	★	
New Mexico State University		★		University of South Carolina	★	★	★
Northwestern University	★	★		University of South Florida	★	★	★
Old Dominion University	★	★		University of Tennessee	★		
Rice University	★	★		University of Texas at El Paso			★
Southern Methodist University	★		★	University of Toronto	★		
Texas A&M University	★	★		University of Utah		★	
Texas Christian University	★	★	★	University of Vermont		★	★
University of Alabama	★			Vanderbilt University	★		
University of Alaska—Fairbanks	★	★		Virginia Tech	★	★	
University of California—Davis	★	★	★	Washington State University	★		
University of California—Riverside	★	★	★	Western Michigan University	★	★	
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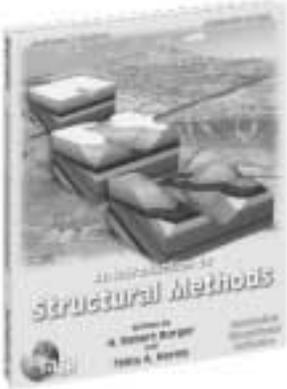
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Hynes Convention Center, Boston**



REGISTRATION

You can still register online, by mail, or by fax until October 17; on-site rates apply. (Preregistration ended September 28.)

Online: www.geosociety.org

By mail: GSA
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Boulder, CO 80301-9140

By fax: 303-443-1510 or 303-447-0648

After October 17: Do not mail or fax registrations.
You must register on-site at Registration in the Hynes Convention Center.



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As a Student Volunteer during the 2001 GSA Annual Meeting in Boston, you can offset some of your cost of attending the meeting.

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For more information and to apply, visit
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Go to Boston 2001, then Student Programs.

Preregistered before Sept. 28?

Your badge will be sent by mail. Pick up your badge holder and program on-site at Registration in the Hynes Convention Center, at the Sheraton Boston Hotel, or the Boston Park Plaza Hotel.

If you register after September 28, you won't receive your badge in the mail. Pick up your badge at Registration in the Hynes Convention Center.

**Cancellation deadline: October 5. NO REFUNDS
WILL BE MADE AFTER OCTOBER 5.**



Hotels

- ❶ Sheraton Boston Hotel
- ❷ Boston Park Plaza
- ❸ Colonnade Hotel
- ❹ Copley Square Hotel
- ❺ Hilton Boston Back Bay
- ❻ Lenox Hotel
- ❼ Midtown Hotel
- ❽ Radisson Boston
- ❾ Swissotel Boston
- ❿ Tremont Hotel Boston
- ⓫ Westin Copley Place

Shuttle Service

Shuttles will run Sunday through Thursday, November 4–8, during most regularly scheduled events. Shuttle service will be provided from the following four hotels to the Hynes Convention Center:

- ❷ Boston Park Plaza
- ❽ Radisson Boston
- ❾ Swissotel Boston
- ❿ Tremont Hotel Boston

Please check our Web site at www.geosociety.org as we get closer to the Annual Meeting for the exact shuttle times.

Child Care

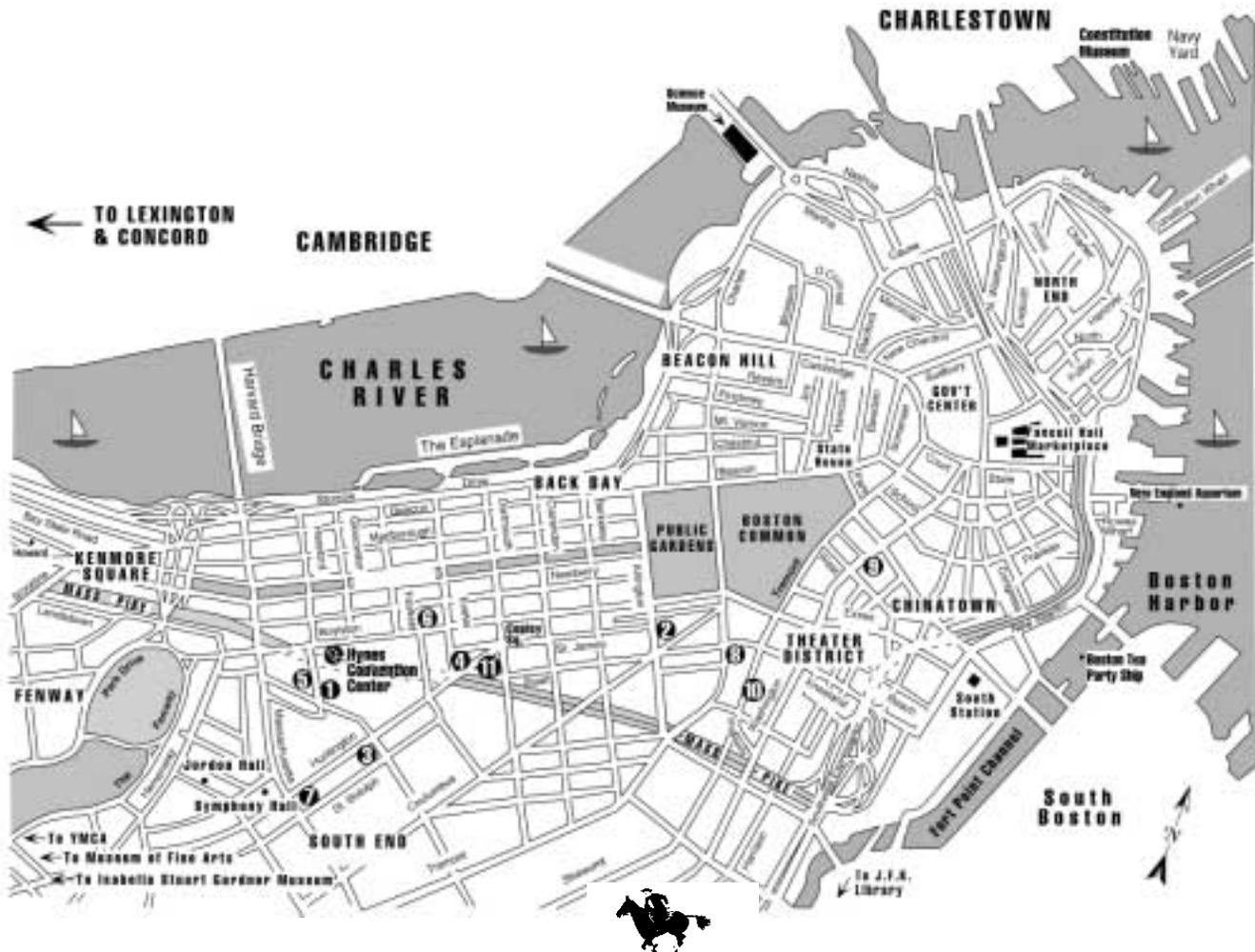
Please contact your hotel concierge for child-care options during the meeting. The Westin Copley Place also suggests the child-care services listed below. Please contact them directly for further information or reservations.

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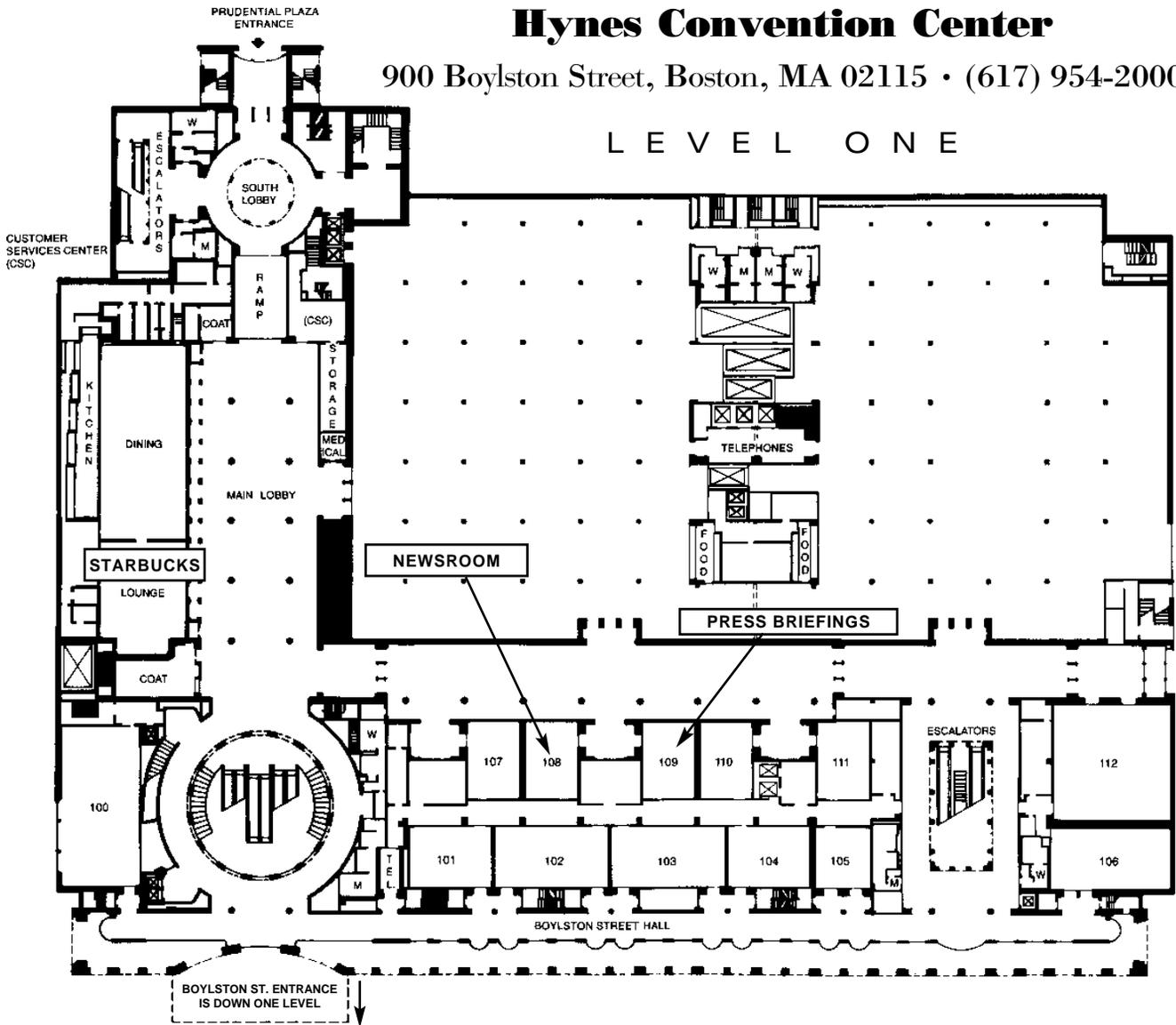
Location of Hotels



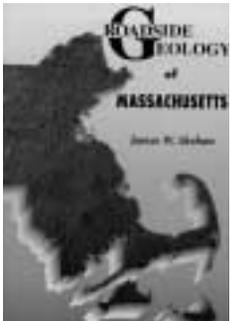
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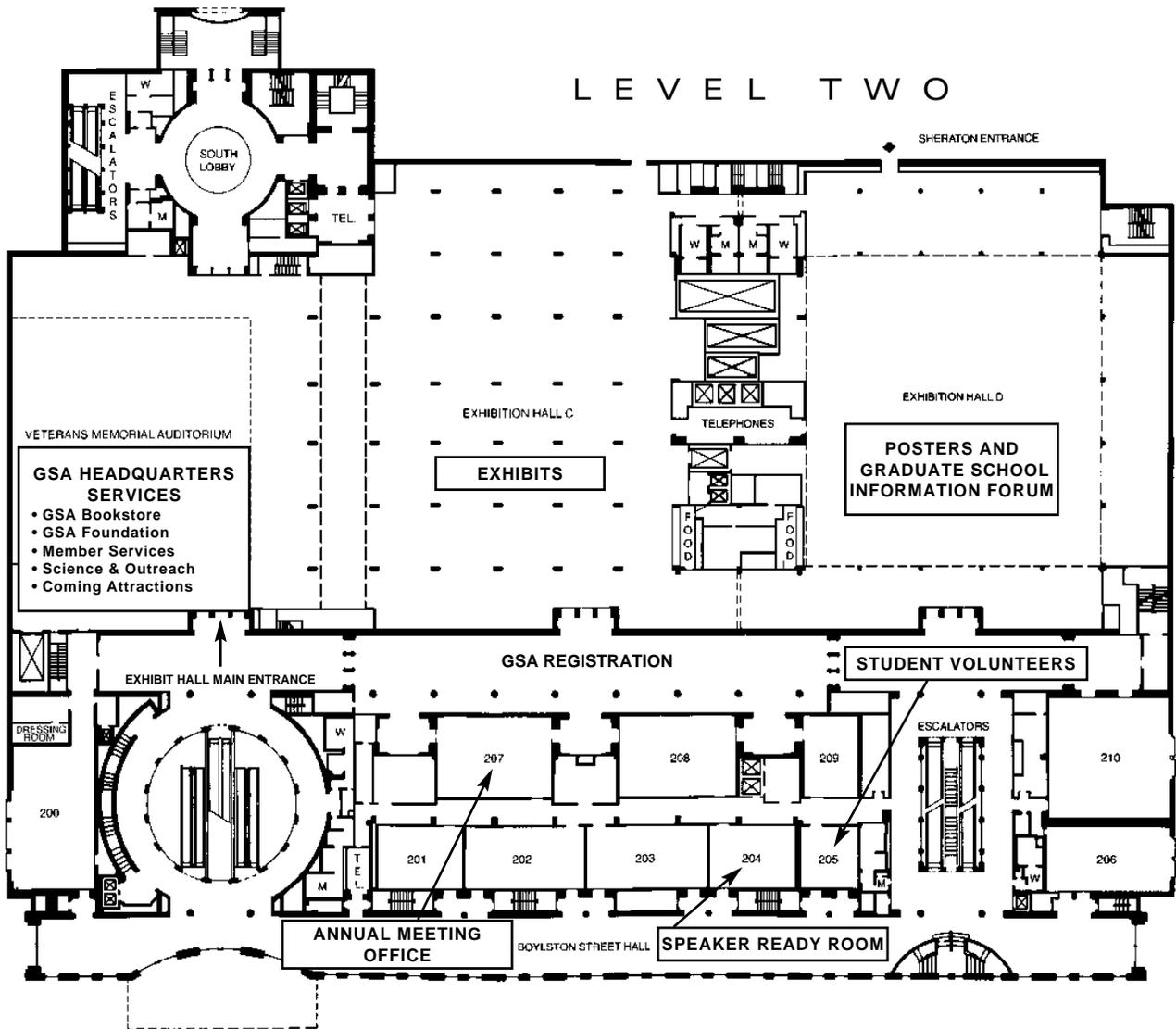
James Skehan
Roadside Geology of Massachusetts

Take to the highways of the Bay State with this guide in hand and the Mass Pike becomes a path back in time and deep into Earth's crust, while I-95 takes you from Early Cambrian fossils to granites galore. This well-illustrated exploration of the geologic history of Massachusetts covers the state from seaside and harbor to the mountainous Berkshires. Fascinating and understandable for nongeologists, this contribution to the *Roadside Geology* series is an eye-opening reference for the scientist.

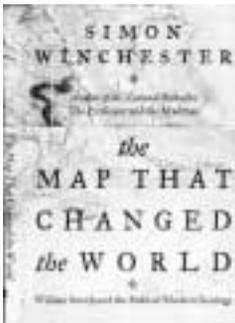
Bradford Washburn
*Bradford Washburn
Mountain Photography*

Ansel Adams called him the "roving genius of mind and mountains." Traveling the world for eight decades, mountaineer, explorer, cartographer, and aerial photographer Bradford Washburn has documented the landscape from the Grand Canyon to the Alps, Mount McKinley to Mount Everest. Also: Visit Panopticon Gallery in the Exhibit Hall (booth #1303) for a look at Washburn's photography in a display sponsored by GSA.





Book signing: GSA Bookstore Exhibit Hall, Sunday, 6–8 p.m.



Simon Winchester
The Map That Changed the World

Best-selling author Simon Winchester tells the fascinating story of William Smith—the orphaned son of an English country blacksmith—who became obsessed with creating the world's first geological map and who ultimately became the father of modern geology.

“Winchester brings Smith’s struggle to life in clear and beautiful language.” —New York Times Book Review

Pick up these titles in the GSA Bookstore, meet the authors, and have them autograph your copy. Don't miss this event!

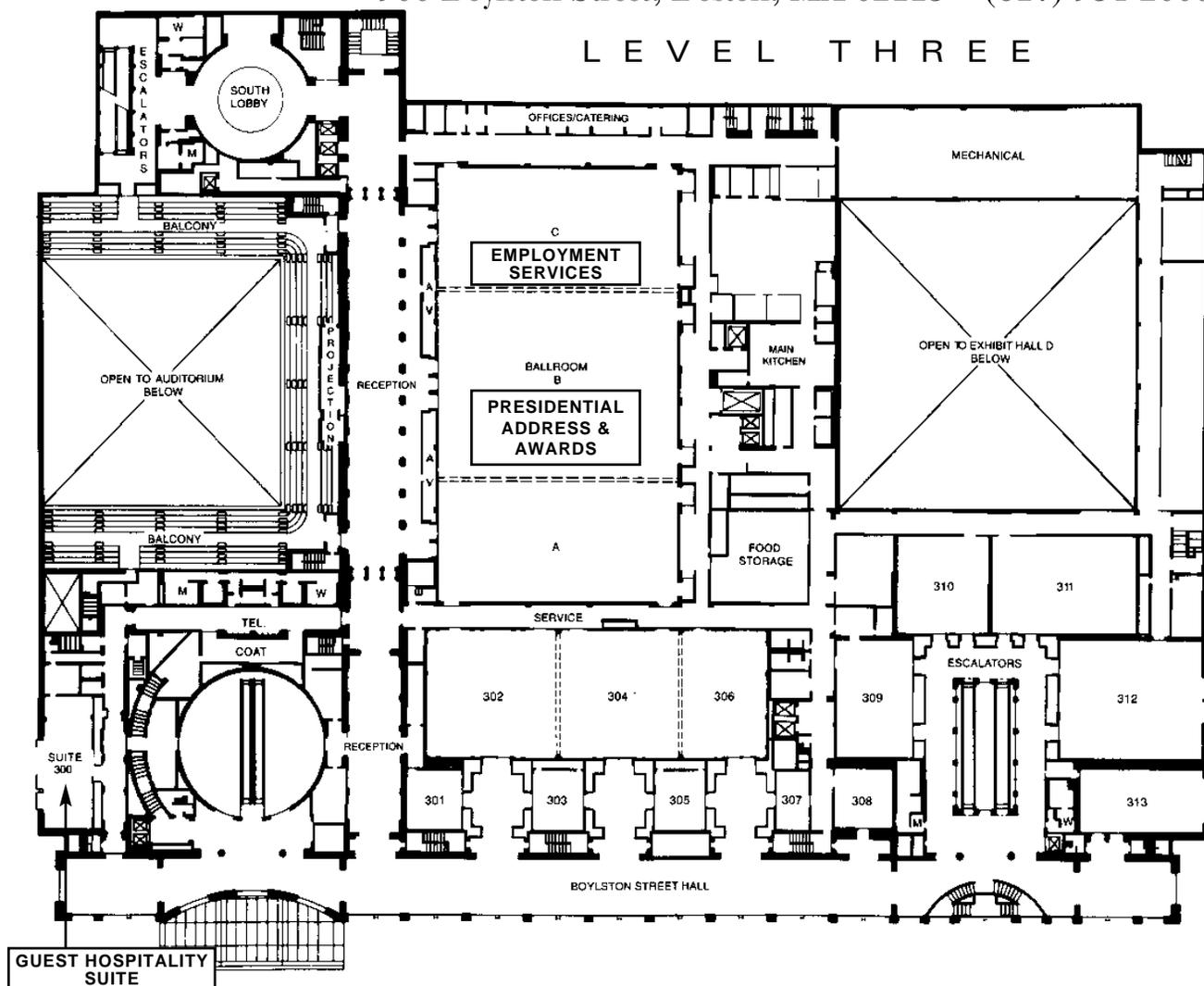
Meet Simon Winchester
 Monday, 10 a.m.–noon
 Author of *The Map That Changed the World*, Simon Winchester will be at the bookstore to give a presentation and talk with attendees.



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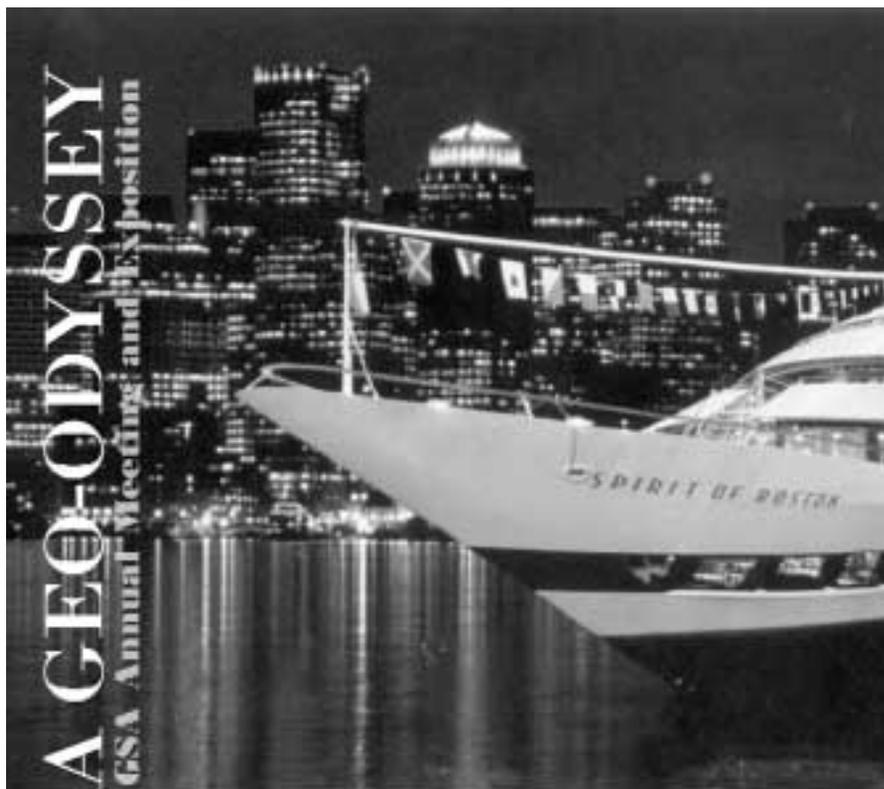
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The Editors Are In

GSA science editors and GSA staff members from *GSA Bulletin*, *Geology*, *Books*, *Maps and Charts*, and *GSA Today* will be available at the Annual Meeting in Boston to answer your questions and demonstrate the online manuscript submission system now used by *GSA Bulletin* and *Geology*. Look for the Editors' Corner by the GSA Bookstore in the Exhibit Hall, Hynes Convention Center.



Special Events to Attend



Boston 2001:

Dinner and Boston Symphony
Sat., Nov 3, 6 p.m.
Tiger Lilly Restaurant.
Cost: \$90 per person.

GSA Presidential Address and Awards Ceremony
Sun., Nov 4, 4–6 p.m.
Ballroom B, Hynes Convention Center

Exhibits Open and Welcoming Party
Sun., Nov 4, 6–8 p.m.
Exhibit Hall C, Hynes Convention Center

Group Alumni Party
Mon., Nov 5, 7–9:30 p.m.
Sheraton Boston Hotel

Private Alumni Receptions
Mon., Nov 5, 7–10 p.m.
Sheraton Boston Hotel and Boston Park Plaza

A Celebration of Barrier Islands
Tues., Nov 6, 6–8 p.m.
Hynes Convention Center

Harvard Museum of Natural History Reception
Tues., Nov 6, 7–9:30 p.m.
Harvard Museum of Natural History. Cost \$35 per person.

Ice Hockey
Tues., Nov 6, or Wed., Nov 7.
Date, time, and location will be determined based on interest. If you're interested in a non-contact, social game for fun and exercise, call Grant Garven at (410) 516-8689.

Harborlight Dinner Cruise
Wed., Nov 7, 7–10 p.m.
On board *The Spirit of Boston*.
Cost: \$62 per person.

New Division Event at Boston Meeting

History of Geology Division Reception

Tues., Nov. 6, 5–7:30 p.m.

FREE

Hynes Convention Center
Room 110

Meet Division members, find out about their projects exploring the history and the heroes of our science, and get inspired to make some history of your own!

Refreshments will be served.

GEOSCIENCE DAY

Geoscience Day, a field trip for students from a middle school with a large proportion of minority students, will be held Wed., Nov. 7, 9 a.m.–2 p.m. This program, sponsored by the GSA Foundation and the GSA Committee on Minorities and Women, began at the 1976 Annual Meeting in Denver, Colorado. At nearly every Annual Meeting since, geologists have joined the students and their teachers on day-long field trips of the geology of the host city.

“Highways, Hazards, and Hot Springs” was the theme of last year’s Geoscience Day in Reno. D.D. La Pointe of the Nevada Bureau of Mines and Geology organized the trip for a group of about 60 students and teachers from the Fred Traner Middle School. The group was joined by professional geologists attending the GSA Annual Meeting.

This year students from a Boston city middle school will examine late Proterozoic glacial deposits from the Boston Basin area with Anna Tary from Bentley College. If you are interested in participating in the Boston Geoscience Day, or in otherwise supporting the activity, contact Lisa White, San Francisco State University, Lwhite@sfsu.edu, (415) 338-1778.

GO TO

www.geosociety.org for more information on:

Whale Watching, Sun., Nov 4

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Institute for Earth Science and the Environment Events

Geology, Public Lands, and You

Sun., Nov. 4, 8 a.m.–3:45 p.m.
Sheraton Boston Hotel, Fairfax B
Registration is required.

Learn the differences between federal land management agencies and their missions, and find out what you need to know about gaining access to your special areas of geologic interest in national parks, national forests, and Bureau of Land Management lands. Get pointers on conducting research and getting permits on different types of public lands. Take a crash course in the National Environmental Policy Act (public input to agency decisions). Learn how you can influence management of public lands and resources.

Pardee Symposium—The Emerging Discipline of Medical Geology

Monday, Nov. 5, 8 a.m.–noon
Hynes Convention Center, Ballroom B

The emerging discipline of medical geology assesses the effects

of static and dynamic earth science factors—natural and anthropogenic—on ecological and human health. Health issues related to earth science factors will likely affect each of us within our lifetime. More geoscientists need to become aware of the field and involved in research. This symposium will bring together geoscientists and medical professionals to increase the awareness of these impacts and the need and/or potential for research.

Technical Session # 68—Coastal Geology of the National Parks

Tues., Nov. 6, 8 a.m.–noon
Hynes Convention Center, Room 210

Geology in Government Program

Wed., Nov. 7, 11:30 a.m.–1:30 p.m. (Free lunch is included.)
Sheraton Boston Hotel, Republic Ballroom

Register on-site at GSA's registration desk. Seats are limited.

Students: Are you coming to GSA's Annual Meeting in Boston? If so, be sure to register for the FREE lunch to be served at the Geology in Government Program, sponsored by GSA's Science and Outreach Department. Come grab a lunch and a seat and learn about what geoscientists are doing on our nation's public lands, at the U.S. Geological Survey (USGS), at state surveys, and in the public-policy arena. This is your opportunity to learn about potential job opportunities within these entities. Bring your questions—you can expect straight answers from this panel of speakers, which includes Larry Gadt, U.S. Department of Agriculture Forest Service; Bob Higgins, National Park Service; Linda Gundersen, USGS; Mimi Garstang, Missouri State Geologist; David Applegate, Director of Government Affairs from the American Geological Institute; and Jamie Robertson, Wisconsin State Geologist, who will guide the discussion.

Earth Scientists on Capitol Hill: Report from Rachel Sours-Page, GSA-USGS 2000–2001 Congressional Science Fellow

Wed., Nov. 7, noon–1 p.m. Free.
Hynes Convention Center, Room 309

Pardee Symposium—The Watershed Within: Scientific and Moral Reflections on Water in the 21st Century

Wed., Nov. 7, 1:30–5:30 p.m.
Hynes Convention Center, Ballroom B

Water use and allocation are critical global policy issues. One-third of the world lives in areas subject to water stress. Discussions of water use must consider availability, human equity, and the needs of both ecosystems and future generations. They require both a scientific understanding of water resources and a moral sense of how stakeholders value water and understand equity. This symposium will explore both the scientific and moral dimensions of global water issues.

National Park Service Opportunities

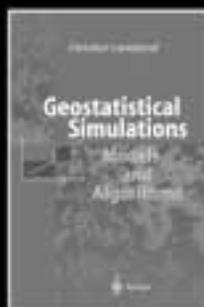
Wed., Nov. 7, 5:30–7 p.m.
Sheraton Boston Hotel, Fairfax B

For more information, see the on-site Annual Meeting Program.

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New from Springer



Geostatistical Models and Simulations

C. LANTUJOU, *École des Mines, Fontainebleau, France*

Within the geoscience community, the estimation of natural resources is perceived as a difficult subject. This is due to the specificity of the underlying phenomena and the complexity of the different variables, which interact and need to be estimated. Under such circumstances it is necessary to resort to geostatistical simulations. The combination of such simulations allows us to not only construct estimators but also to study their variability. This volume differs from previous publications devoted to Monte Carlo simulation methods in that it discusses a wide range of spatial models, including random sets and functions, point processes and object populations. Furthermore, it addresses only those simulations that conform to the conditioning data and that can

considerably reduce the variability of the estimator. It does however require the design of specific algorithms. This publication is the first book to discuss geostatistical simulation techniques in such a systematic way.

2001/270 PP., 62 ILLUS., 5 TABLES, WITH CD-ROM/HARDCOVER/\$54.95
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Global Positioning System

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R. HOFMANN-WELLENHOF, H. LICHTENEGGER, both, *Technical University of Graz, Austria*; and J. COLLINS, *Rockville, MD*

This new edition covers the most recent advances in GPS technology. *Global Positioning System* explains in a comprehensive manner, the concepts of GPS as well as the latest applications in surveying and navigation. Descriptions of project planning, observation, and data processing are present for novice GPS users. Special emphasis is put on the modernization of GPS, covering the new signal structure and improvements in the space and the control segment.

2000/390 PP., 40 ILLUS./SOFTCOVER/\$59.95
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Understanding the Earth System

Compartment, Processes and Interactions

E. EHLERS, *Bonn, Germany*; and T. KRAFFT BONN, *Germany* (eds.)

Understanding the Earth System contributes to the timely discussion on global change of the earth system. The discussion centers around the synthesis of procedures affecting both the natural and social sciences. The concept of earth system analysis, both pros and cons, will be the focus of future scientific programs related to global change. The main problems are overpopulation, water shortages, and climate change.

2001/225 PP., 40 ILLUS., 13 TABLES/HARDCOVER \$99.00/ISBN 3-540-67515-9

Remote Sensing and Climate Change

The Role of Earth Observation

A. P. CRACKNELL, *University of Dundee, UK*

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ISBN 1-85233-321-9

Geological and Biological Effects of Impact Events

E. HUFFETAUT, *CNRS, Paris, France*; and C. KOEBERL, *University of Vienna, Austria* (eds.)

This collection of papers on the geological and biological effects of impact events covers a wide time span, ranging from the late Devonian mass extinction to the Tuguska event in 1908. It focuses on impact processes affecting the Earth system and consequently biodiversity of ecosystems. In addition, some theoretical papers on impact models are also included.

2001/APPROX. 312 PP., 102 ILLUS., 23 TABLES
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IMPACT STUDIES

Wastewater Treatment

Biological and Chemical Processes

Third Edition

M. HENZE, *Technical University of Denmark*; et al.

This book reviews the theories behind modern wastewater treatment processes. It provides an up-to-date description of wastewater characteristics and the theories of biological processes and their modeling. The large amount of figures, tables, and examples help the reader understand the theories so that the book can serve at the same time as an advanced textbook for graduate students and a handbook for professionals.

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Dynamics of Rockslides and Rockfalls

T.H. ERISMANN, *Neuchâten, Switzerland*; and G. ABELE

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The Northern North Atlantic

A Changing Environment

P. SCHÄFER, *University of Kiel, Germany*; et al. (ed.)

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River, Coastal and Estuarine Morphodynamics

G. SEMENARA, *University of Genova, Italy*; and P. BLONDEAUX, *University of Genova, Italy* (eds.)

This book provides a comprehensive overview of the recent developments in river, coastal, and estuarine morphodynamics. Apart from geoscientists, it is also of special interest to people involved in fluid mechanics who want to understand near wall turbulence and the effects of coherent structures on the mechanisms of sediment transports. The book is well illustrated with splendid pictures of various morphodynamic natural patterns.

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Springs and Bottled Waters of the World

Ancient History, Source, Occurrence, Quality and Use

P.E. LAMOREAUX, and J.T. TANNER, both, *Tucson, AZ* (eds.)

Springs and Bottled Waters of the World provides information for the general public, legal and scientific professionals, and governmental scientists about springs, mineral water, and thermal waters used for municipal, industrial, and agricultural water supplies as well as for the rapidly expanding bottled water industry. The role of springs is described for ancient civilizations, military campaigns and, in more recent times, for tourism and health spas of the world.

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Fundamentals of Physics and Chemistry of the Atmosphere

G. VISCONTI, *Università degli Studi L'Aquila, Coppito, L'Aquila, Italy*

This book is an introduction to the physics and chemistry of the atmosphere and to climate dynamics. The basics of thermodynamics, fluid dynamics, radiation and chemistry are given and aimed at explaining the most interesting problems existing in the study of the atmospheres of the Earth and planets. In addition, the book includes FORTRAN computer programs to solve these problems on the accompanying CD-ROM.

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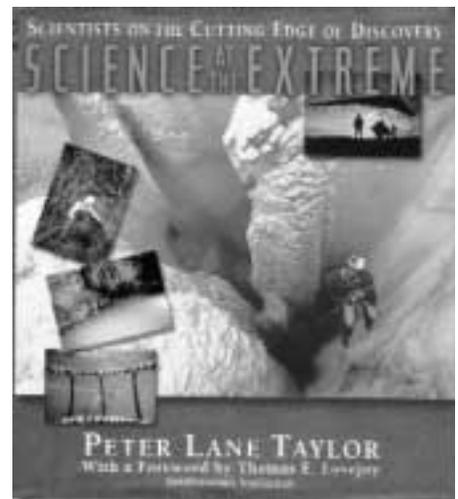


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Louise Hose, *Science at the Extreme* contributing author, shares her experiences in subterranean cave environments during the Hot Topic discussion, "Doing Science in Extreme Environments," Wed., 12:15–1:15 p.m., Hynes Convention Center, Room 208.

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Winning Tenure in Geoscience Departments: Some Unsolicited Advice to Faculty Aspirants

Donald I. Siegel, Syracuse University

Every year, I externally review three to five tenure and promotion packages in the geologic sciences. Lately, I have had to write too many equivocal letters. Are our junior faculty deceiving themselves about what it takes to win a lifetime contract in academia?

When students apply to study with me for their doctorate, I ask them, "So when did you discover you wanted to be a writer?" They look blankly at me and say, "What?" They simply don't have a clue.

New faculty members are still told the falsehood by their administrators that tenure consists of three parts: teaching, research, and service. Winning tenure really is about getting external reviewers to say "yes" to the questions asked in cover letters soliciting tenure package reviews:

Would the candidate win tenure at your institution?

Does the candidate have a national reputation?

Is the candidate potentially an intellectual

leader in their specialty?

The only way to receive a "yes" to these questions is to publish research frequently and to network in an almost Machiavellian way. Winning a teaching award means little, because there is no peer-reviewed "common currency" for teaching. In contrast, all institutions recognize papers in peer-reviewed research publications, such as *Geology*. Although laudable and necessary for the health of an institution, outstanding university service means nothing to anyone not from that school.

What is a tenure package that would prompt me almost always to answer "yes" to the three questions?

First, an applicant should submit at least one paper to a peer-reviewed journal every year for the 5 years prior to the tenure decision. Some papers should be submitted to geoscience journals if the applicant is part of a geoscience faculty. Meeting this requirement is hard! Research has to be carefully devised, organized, and paced. Do I philosophically agree that junior faculty everywhere should publish a paper a year to win tenure? Absolutely not, but I still have to answer those three questions. If a candidate does publish punctually, I can at least argue as to productivity. Publishing papers is the most powerful ammunition to advance a tenure case—period.

It can take 1½–2 years for papers to get into print from first submission. I ask junior faculty how things are going after they've had an academic job for a few years. Many respond, "OK," except they

have to get some papers out. I nod in agreement, but my junior friends are already lame ducks. Papers accepted for publication the year before the tenure decision lead to unfair accusations that they are in the "last gasp" of research productivity.

Second, the junior faculty member should win one large research grant (>\$100,000) from a peer-reviewed funding source (National Science Foundation, Department of Energy, Environmental Protection Agency, foundations). Being given money by one's peers confirms the scientific merit of your research. Junior faculty members have trouble winning grants because they seldom get useful training in proposal writing. Postdoctoral experience is one way junior scientists can learn how to write proposals. Typical rejection rates for proposals are 80%, and junior faculty need tremendous self-discipline and willpower to hunker down and do what has to be done—rewrite and resubmit—despite being rejected.

Third, junior faculty should do professional society service work. For example, GSA and the American Geophysical Union are always looking for proposals to organize and chair special and topical symposiums at their national conferences. Organizing a topical session at a national professional meeting is the best way to spread your name. Invite major specialists in your field. They will remember your name if they are asked to review your tenure package. This relatively small amount of professional service shows your scientific community you wish to be a "player," someone interested in your profession beyond your own institution.

I hope junior faculty will help me out and put together better packages to advance their careers. An attorney once told me he was astonished that junior faculty did not understand the academic game. He said that in law, junior partners are routinely fired after 5 years if they don't bring in sufficient clients or win a sufficient number of cases. Professors don't generally make as much as lawyers, but I for one, would not have had any other career, despite the hard work.

Comments on this issue may be sent to jhammann@geosociety.org or GSA Today, P.O. Box 9140, Boulder, CO 80301-9140.

Related Events Scheduled for Boston 2001

Donald Siegel, Syracuse University, and Suzanne O'Connell, Trinity College and Wesleyan University, are offering a day-long short course at GSA's Annual Meeting in Boston. Sponsored by the Association for Women Geoscientists (AWG), "Surviving Academia—From Getting the Job to Winning Tenure," will be held Sunday, Nov. 4, 8 a.m.–4 p.m., Independence West Ballroom, Sheraton Boston Hotel. Cost: \$20 (includes lunch, course materials). The course contains lectures on every aspect of making a successful academic career, and Siegel urges faculty aspirants to attend. Registration: Donald Siegel, disiegel@mailbox.syr.edu, (315) 443-3607. Also on Sunday (from 11 a.m.–1 p.m., Republic B Ballroom, Sheraton Boston Hotel) is a free, AWG-sponsored panel discussion, "Tenure and Promotion: Letting the Cat Out of the Bag." Registration: Mary Ann Holmes, mholmes2@unl.edu, (402) 472-5211.

Council Approves Two Position Statements

At the request of GSA Council, two panels developed statements on GSA's position on evolution and creationism and on scholarship and professional activity. The following statements were approved by Council at its May 2001 meeting.

Scholarship and Professional Activity in Geoscience Public Policy and Geoscience Education

The purpose of the Geological Society of America "is the promotion of the science of geology." Through the Committee on Geology and Public Policy, the society actively encourages its members to involve themselves professionally in issues of public policy and education. GSA believes that specific efforts by geoscientists, directed toward the enhancement of earth science in the public policy affairs and education arenas, may constitute valuable scholarship and professional activity. Such scholarly activity may include publications and presentations on geology and public policy, active participation in land use and management policy development, efforts on behalf of substantive curricular reform, publications and presentations on pedagogy and curriculum innovations, and service-learning initiatives. Recognized community service and professional activity may include service on community, regional, or national policy and planning commissions, and service on education committees.

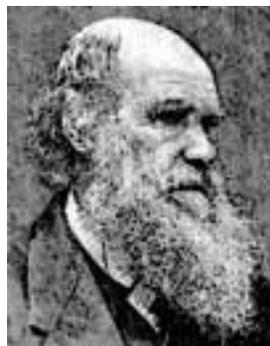
GSA believes the science of geology, the perception of the geosciences by the public, and the professional stature of individual geoscientists benefit from the time, effort, talent, and scholarly activity invested by geoscientists in public policy and education. As such, GSA recommends that geoscientists in academia, government service, and in the private sector should receive formal recognition for such efforts from their performance, reappointment, promotion, and tenure review committees and their supervisors. GSA also encourages mission-appropriate support, by means of appropriate reassigned time or travel assistance when possible, to those individual geoscientists engaged in substantive scholarly and professional activity on issues of public policy and education.

Scholarship and Professional Activity Position Statement Panel Members

Paul Doss, Chair
Geoffrey Feiss
Lisa Rossbacher

Evolution

The Geological Society of America recognizes that the evolution of life stands as one of the central concepts of modern science. Research in numerous fields of science during the past two centuries has produced an increasingly detailed picture of how life has evolved on Earth.



Charles Darwin

The rock record is a treasure trove of fossils, and by 1841, 18 years before Charles Darwin published *On the Origin of Species*, geologists had not only assembled much of the geologic time scale from physical relationships among bodies of rock, but they had also recognized that fossils document profound changes in life throughout Earth's history. Darwin showed that biological evolution provides an explanation for these changes. Since the time of Darwin, geologists have continued to uncover details of life's history, and biologists have continued to elucidate the process of evolution. Thus, our understanding of life's evolution has expanded through diverse kinds of research, much of it in fields unknown to Darwin such as genetics, biochemistry, and micropaleontology. In short, the concept of organic evolution has not only withstood the test of time—the ultimate test of any scientific construct—but it has been greatly enriched.

In recent years, certain individuals motivated by religious views have mounted an attack on evolution. This group favors what it calls "creation science," which is not really science at all because it

invokes supernatural phenomena. Science, in contrast, is based on observations of the natural world. All beliefs that entail supernatural creation, including the idea known as intelligent design, fall within the domain of religion rather than science. For this reason, they must be excluded from science courses in our public schools.

This separation of domains does not mean that science and religion are fundamentally incompatible. Many scientists who conduct research on the evolution of life are religious, and many major religions formally accept the importance of biological evolution.

Misinterpreting the Bible's creation narratives as scientific statements, many creationists go so far as to attack the validity of geologic time—time that extends back billions of years. "Deep time" is the foundation of modern geology. It was actually well established, though not quantified, by geologists decades before Darwin published his ideas or most scientists came to accept evolution as the explanation for the history of life. Furthermore, thousands of geologists employing many new modes of research refined the geologic time scale during the twentieth century. Near the start of that century, the discovery of naturally occurring radioactive substances provided clocks for measuring actual ages for segments of the geologic record. Today, some billion-year-old rocks can be dated with a precision of less than a tenth of one percent. Moreover, modern geologists can identify particular environments where sediments that are now rocks accumulated hundreds of millions of years ago: margins of ancient oceans where tides rose and fell, for example, valley floors across which rivers meandered back and forth, and ancient reefs that grew to thicknesses of hundreds of meters but were built by organisms that could not have grown faster than a few millimeters a year. By studying the fossil record that forms part of this rich archive of Earth's history, paleontologists continue to uncover details of the long and complex history of life.

Acceptance of deep time is not confined to academic science. If commercial geologists could find more fossil fuel by interpreting the rock record as having resulted from a single flood or otherwise

encompassing no more than a few thousand years, they would surely accept this unconventional view, but they do not. In fact, these profit-oriented geologists have joined with academic researchers in refining the standard geologic time scale and bringing to light the details of deep earth history.

Modern studies of the evolution of Earth and its life are not only aiding us in the search for natural resources, but also helping us to understand how the Earth-life system functions. Annual layers of ice in the Greenland glacier, for example, range back more than a hundred thousand years. These ice records warn that Earth's climate may change with devastating speed in the future. The geologic record also reveals how various forms of life have responded to past environmental change, sometimes migrating, sometimes evolving, and sometimes becoming extinct. In the present world, bacteria are now evolving rapidly in ways that render antibiotics ineffective; to respond to bacterial evolution, we must understand evolution in general.

The immensity of geologic time and the evolutionary origin of species are concepts that pervade modern geology and biology. These concepts must therefore be central themes of science courses in public schools; creationist ideas have no place in these courses because they are based on religion rather than science. Without knowledge of deep time and the evolution of life, students will not understand where they and their world have come from, and they will lack valuable insight for making decisions about the future of their species and its environment.

Evolution and Creationism Position Statement Panel Members

Steven M. Stanley, Chair
Richard Bambach
David Dunn
George Fisher
Patricia Kelley
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Preliminary Announcement and Call for Papers

JOINT MEETING

Lexington, Kentucky, April 3–5, 2002

36th Annual Meeting North-Central Section, GSA, and 51st Annual Meeting Southeastern Section, GSA

The Kentucky Geological Survey and Department of Geological Sciences, University of Kentucky, and the Department of Geology, University of Cincinnati, will host a joint meeting of the North-Central and Southeastern Sections of GSA, with premeeting and postmeeting field trips and workshops.

ACCOMMODATIONS AND REGISTRATION

Preregistration deadline:

February 22, 2002

Cancellation deadline:

March 1, 2002

Lexington, Kentucky, is an ideal site for this joint meeting of the North-Central and Southeastern Sections. The surrounding area contains excellent exposures of Ordovician through Pennsylvanian rocks, many of which will be examined during field trips. The meeting will be held at the Hyatt Regency Hotel and adjacent Lexington Center in downtown Lexington. A block of rooms has been reserved at the Hyatt for meeting attendees, with a single meeting rate of \$110 for 1–4 persons per room. For more information on registration, lodging, and schedules, please visit the meeting Web site at: www.uky.edu/KGS/gsa2002.

GSA headquarters will handle preregistration. Registration details will be in the January 2002 issue of *GSA Today* and at www.geosociety.org. You'll be able to preregister online at www.geosociety.org beginning in January 2002.

ABSTRACTS

Abstract deadline: December 19, 2001

Papers are invited for symposia, theme sessions, and general sessions, in both oral and poster formats. Volunteered abstracts not included in symposia will be scheduled for regular sessions. All abstracts must be submitted online at the GSA Web site, www.geosociety.org.

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 additional papers.

Following are the proposed symposia and theme sessions. Additional symposia

and theme session topics may still be accommodated. For more information, please contact the technical program chair Dave Harris, harris@kgs.mm.uky.edu, (859) 257-5500. For more details on a proposed session, please check the meeting Web site, www.uky.edu/KGS/gsa2002, or contact the chairpersons listed for each session.

SYMPOSIA

1. High-Resolution Event Stratigraphy in the Paleozoic Midcontinent.

Warren Huff, warren.huff@uc.edu, (513) 556-3731, and Carl Brett, carlton.brett@uc.edu, (513) 556-4556, both of University of Cincinnati.

2. Pander Society Symposium. Oral

and poster session on all aspects of conodonts, sponsored by the Pander Society. Jeff Bauer, [shawnee.edu](mailto:jbauer@shawnee.edu), (740) 355-2421; Mark Kleffner, Ohio State University—Lima, Kleffner.1@osu.edu, (419) 995-8208.

3. Shoreline Processes: Ocean Coastal and Great Lakes Issues. Sponsored

by the Southeast Section, SEPM (*Society for Sedimentary Geology*). David Bush, State University of West Georgia, dbush@westga.edu, (770) 836-4369.

4. Lacustrine Geology and Geochemistry.

David Long, Michigan State University, long@msu.edu, (517) 353-9618; George Kipphut, Murray State University, George.Kipphut@murraystate.edu, (270) 762-2847.

5. Applied Coal Geology. Cosponsored

by the Society for Organic Petrology and GSA Coal Geology Division. Jim Hower, Center for Applied Energy Research, University of Kentucky, hower@caer.uky.edu, (859) 257-0261; John Popp, Alliance Coal, johnp@arlp.com, (859) 224-7219.

6. Geology and Public Policy. Jim

Cobb, cobb@kgs.mm.uky.edu, (859) 257-5500, and John Kiefer, [kief@kgs.mm.uky.edu](mailto:kiefer@kgs.mm.uky.edu), (859) 257-5500, both of Kentucky Geological Survey, University of Kentucky.

7. Ancient Basement Faults and Modern

Earthquakes. Bill Thomas, University of Kentucky, geowat@uky.edu, (859) 257-6222; Russ Wheeler, U.S. Geological Survey, wheeler@usgs.gov, (303) 273-8589; John McBride, Illinois State Geological Survey, mcbride@geoserv.isgs.uiuc.edu, (217) 333-5107.

8. A River Runs Through It. (Landscape

evolution, glaciation, paleohydrology, geoarcheology, sedimentation, and engineering geology in the Ohio River basin.) Steven Kite, West Virginia University, kite@geo.wvu.edu, (304) 293-5603, ext. 4330; Darryl Granger, Purdue University, dgranger@purdue.edu, (765) 494-0043.

9. Energy and Environmental Issues

in the Illinois Basin. Sponsored by the Illinois Basin Consortium. Beverly Herzog, Illinois State Geological Survey, herzog@isgs.uiuc.edu, (217) 244-2788; Dave Williams, Kentucky Geological Survey, University of Kentucky, williams@kgs.mm.uky.edu, (270) 827-3414.

10. Large-Scale Glacial Geomorphology

—What Can It Tell Us? Tom Lowell, University of Cincinnati, thomas.lowell@uc.edu, (513) 556-4165; Gregory Wiles, College of Wooster, gwiles@wooster.edu, (330) 263-2298; Don Pair, University of Dayton, don.pair@notes.udayton.edu, (937) 229-2936.

THEME SESSIONS

1. Groundwater Flow and Geochemistry in Carbonate Terranes.

Chris Groves, Western Kentucky University, chris.groves@wku.edu, (270) 745-5974; Alan Fryar, University of Kentucky, afryar1@uky.edu, (859) 257-4392; Jim Currens, Kentucky Geological Survey, University of Kentucky, currens@kgs.mm.uky.edu, (859) 257-5500.

2. Geologic Sequestration of CO₂.

Jim Drahovzal, Kentucky Geological Survey, University of Kentucky, drahovzal@kgs.mm.uky.edu, (859) 257-5500; Larry Wickstrom, Ohio Division of Geological Survey, larry.wickstrom@dnr.state.oh.us, (614) 265-6598.

3. **Geologic Hazards.** John Kiefer, Kentucky Geological Survey, University of Kentucky, kiefer@kgs.mm.uky.edu, (859) 257-5500.
4. **Black Shales—Old Problems, New Solutions.** *Sponsored by the Society for Organic Petrology.* Sue Rimmer, University of Kentucky, srimmer@uky.edu, (859) 257-4607; Maria Mastalerz, Indiana Geological Survey, mmastale@indiana.edu, (812) 855-9416.
5. **Geology and Human History.** William Andrews, Kentucky Geological Survey, University of Kentucky, wandrews@kgs.mm.uky.edu, (859) 257-5500; Bob Whisonant, Radford University, rwhisona@radford.edu, (540) 831-5224.
6. **Wetlands Hydrology and Biogeochemistry.** Alan Fryar, afryar1@uky.edu, (859) 257-4392, Elisa D'Angelo, edangelo@ca.uky.edu, (859) 257-8651, and A.D. Karathanasis, akaratha@ca.uky.edu, (859) 257-5925, all of University of Kentucky; Abinash Agrawal, Wright State University, abinash.agrawal@wright.edu, (937) 775-3452.
7. **Ancient Seismites.** Frank Ettensohn, University of Kentucky, fettens@uky.edu, (859) 257-1401; Carl Brett, University of Cincinnati, carlton.brett@uc.edu, (513) 556-4556.
8. **Geoarcheology.** Chris Pool, University of Kentucky, capool0@uky.edu, (859) 257-2793.
9. **Precambrian of North-Central and Southeastern United States: Craton to Continental Margin.** Dave Moecher, University of Kentucky, moker@uky.edu, (859) 257-6939.
10. **Geologic Data Distribution on the World Wide Web.** Dan Carey, Kentucky Geological Survey, University of Kentucky, carey@kgs.mm.uky.edu, (859) 257-5500.
11. **Geology and Public Health.** Jim Dinger, Kentucky Geological Survey, University of Kentucky, dinger@kgs.mm.uky.edu, (859) 257-5500, Ed Mehnert, Illinois State Geological Survey, mehnert@isgs.uiuc.edu, (217) 244-2765.
12. **Technology Transfer and Scientific Communication.** Marie-France Dufour, Illinois Geological Survey, dufour@isgs.uiuc.edu, (217) 333-5115; Deborah DeChurch, Indiana Geological Survey, ddechurc@indiana.edu, (812) 855-1941.
13. **Neotectonics and Liquefaction Phenomena.** Ed Woolery, University of Kentucky, ewoolery@kgs.mm.uky.edu, (859) 257-5500; John McBride, Illinois State Geological Survey, mcbride@geoserv.isgs.uiuc.edu, (217) 333-5107; Russ Wheeler, U.S. Geological Survey, wheeler@usgs.gov, (303) 273-8589.
14. **Digital Geologic Mapping.** Jerry Weisenfluh, jerryw@kgs.mm.uky.edu, (859) 257-5500, and Warren Anderson, wanderson@kgs.mm.uky.edu, (859) 257-5500, both of Kentucky Geological Survey, University of Kentucky.
15. **New Challenges in Paleontological Education.** *Sponsored by National Association of Geoscience Teachers and the Southeast Section of the Paleontological Society.* Michael Gibson, University of Tennessee—Martin, mgibson@utm.edu, (731) 587-7435; Michael Savarese, Florida Gulf Coast University, msavares@fgcu.edu, (941) 590-7165.
16. **Expanding Earth Science Inquiry-Based Education, K–16.** *Sponsored by the Southeast Section of the National Association of Geoscience Teachers.* Roderic Brame, Wright State University, roderic.brame@wright.edu, (937) 775-3455.
17. **Technology for Inquiry-Based Earth Science Education.** *Sponsored by the National Association of Geoscience Teachers.* Roderic Brame, Wright State University, roderic.brame@wright.edu, (937) 775-3455.
18. **Undergraduate Research.** *Sponsored by the Council for Undergraduate Research.* Robert Shuster, University of Nebraska—Omaha, Robert_Shuster@unomaha.edu, (402) 554-2457; David Matty, Central Michigan University, David.J.Matty@cmich.edu, (517) 774-3179. POSTERS ONLY
19. **Weathering and Landscape Evolution.** Jonathan D. Phillips, University of Kentucky, jdp@uky.edu, (859) 257-6950.
20. **Carboniferous Paleontology and Biostratigraphy.** Glenn Storrs, Cincinnati Museum Center, storrgw@email.uc.edu, (513) 287-7000, ext. 2374; Steve Greb, Kentucky Geological Survey, University of Kentucky, greb@kgs.mm.uky.edu, (859) 257-5500.

the meeting, on April 1, 2, 3, and 6. Registration for some workshops is limited. For additional information, please check the meeting Web site, www.uky.edu/KGS/gsa2002, or contact the workshop chair, Steve Greb, greb@kgs.mm.uky.edu, (859) 257-5500, or the workshop conveners.

1. **Digital Collection of Geologic and Geotechnical Data using a Personal Digital Assistant and a Global Positioning System Receiver.** *Sponsored by the Southeast Section, SEPM.* Randy Kath, State University of West Georgia, rkath@westga.edu, (770) 836-6480; Lester Williams, U.S. Geological Survey, lesterw@usgs.gov, (770) 903-9100.
2. **Earth Science Education and the Development of Reasoning.** *Sponsored by the National Association of Geoscience Teachers.* Roderic Brame, Wright State University, roderic.brame@wright.edu, (937) 775-3455; David McConnell, University of Akron, dmccconnell@uakron.edu, (330) 972-8047.
3. **Planning and Reviewing for Professional Geology Examinations.** William Andrews, Kentucky Geological Survey, University of Kentucky, wandrews@kgs.mm.uky.edu, (859) 257-5500.
4. **Introduction to ArcView Geographic Information System.** Dan Carey, Kentucky Geological Survey, University of Kentucky, carey@kgs.mm.uky.edu, (859) 257-5500.
5. **RockWare Earth Science Software.** Jim Reed, RockWare, Inc., jim@rockware.com, (303) 278-3534.

ROY SHLEMON MENTORING PROGRAM IN APPLIED GEOLOGY

Workshop for graduate and advanced undergraduate students about professional opportunities and challenges in the real world. Free lunch provided. Karlon Blythe, Program Officer, kblythe@geosociety.org. *Meeting registration is not required to attend only this workshop.*

FIELD TRIPS

Both premeeting and postmeeting field trips are planned. Registration for some trips is limited. For additional information, please check the meeting Web site, www.uky.edu/KGS/gsa2002, or contact the field trip chair, Frank Ettensohn, University of Kentucky, fettens@uky.edu, (859) 257-1401, or the field trip leader.

WORKSHOPS

Workshops will be held before and after

continued on p. 36

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- 1. Carbonate Mud Mounds in the Fort Payne Formation (Lower Mississippian), Cumberland County, Kentucky.** David Meyer, David.Meyer@uc.edu, (513) 556-4530, and Richard Krause Jr., rakrause@fuse.net, (513) 961-3389, both of University of Cincinnati; William Ausich, Ohio State University, ausich.1@osu.edu, (614) 292-3353.
- 2. Mississippian Stratigraphy and Karst Geology of the Mammoth Cave Region, Kentucky.** Walter Johnson, University of Kentucky, wkjohn1@uky.edu, (859) 257-3758; Joe Meiman, Mammoth Cave National Park, joe_meiman@nps.gov, (270) 758-2508.
- 3. Middle and Upper Mississippian Stratigraphy and Depositional Environments in East-Central Ken-**

tucky: The New Big Hill Exposure. Frank Ettensohn, University of Kentucky, fettens@uky.edu, (859) 257-1401; A. Stewart, akstew0@uky.edu; Mike Solis and Tina White, University of Kentucky, tmwhit1@uky.edu, (859) 257-3758.

- 4. Silurian through Lower Mississippian Geology, Paleontology, and Economic Influence in the Falls of the Ohio Region, North-Central Kentucky.** Todd Hendricks, Kentucky Division of Waste Management, todd.hendricks@mail.state.ky.us, (502) 564-6716; Frank Ettensohn, University of Kentucky, fettens@uky.edu, (859) 257-1401; R. Whittemore, General Shale Brick, (423) 282-4661.
- 5. Middle and Late Paleozoic Trace Fossils from East-Central Kentucky.** Charlie Mason, Morehead State University, c.mason@morehead-st.edu, (606) 783-2166.
- 6. Lower Pennsylvanian Stratigraphy, Sedimentology, and Coal Geology in Eastern Kentucky.** Cortland Eble, Kentucky Geological Survey, University of Kentucky, eble@kgs.mm.uky.edu, (859) 257-5500; Steve Greb, Kentucky Geological Survey, University of Kentucky, greb@kgs.mm.uky.edu, (859) 257-5500; Ron Martino, Marshall University, martinor@marshall.edu, (304) 696-2715.
- 7. The Influence of Geology on the Military and Cultural History of the Bluegrass Region, Central Kentucky.** William Andrews, Kentucky Geological Survey, University of Kentucky, wandrews@kgs.mm.uky.edu, (859) 257-5500.
- 8. The Geology of Pound Gap on the Pine Mountain Thrust Sheet: Eastern Kentucky and Virginia.** Steve Greb, Kentucky Geological Survey, University of Kentucky, greb@kgs.mm.uky.edu, (859) 257-5500.
- 9. Middle and Late Ordovician Seismites from Central Kentucky.** Frank Ettensohn, University of Kentucky, fettens@uky.edu, (859) 257-1401; Carl Brett, University of Cincinnati, carlton.brett@uc.edu, (513) 556-4556.
- 10. Middle and Late Ordovician Stratigraphy and Depositional Environments in Central and North-Central Kentucky.** Carl Brett, University of Cincinnati, carlton.brett@uc.edu, (513) 556-4556; Frank Ettensohn, University of Kentucky, fettens@uky.edu, (859) 257-1401.

STUDENT TRAVEL GRANTS

The Southeastern Section is giving travel grants to students who are presenting papers at the meeting. All eligible students in the Southeastern Section will receive some support, the amount depending on the number of applicants. The application form can be found at www.geology.ecu.edu/geology/segsa/travel.html. Applications must be postmarked no later than March 1, 2002. For more information, contact Donald Neal, (252) 328-4392, neald@mail.ecu.edu.

The North-Central Section of GSA, in cooperation with the GSA Foundation, will provide grants of up to \$200 for travel assistance (exclusive of field-trip fees) to student members and associates of GSA. Assistance will be offered on a first-come, first-served basis, with priority given to students presenting papers at the meeting. Application information is available from GSA campus representatives.

EXHIBITS

Exhibit space will be available in an exhibit hall together with the poster sessions. Exhibits will open at noon on Wednesday, April 3, and will be highlighted during the Wednesday evening icebreaker reception. For more information on exhibit space, please contact Doug Reynolds, (859) 257-5500, dreynolds@kgs.mm.uky.edu.

DETAILED INFORMATION

For more information, please contact any of the meeting co-chairs: Jim Cobb and John Kiefer, Kentucky Geological Survey, (859) 257-5500, cobb@kgs.mm.uky.edu, kiefer@kgs.mm.uky.edu; Frank Ettensohn, University of Kentucky, fettens@uky.edu, (859) 257-1401; or Tom Lowell, University of Cincinnati, thomas.lowell@uc.edu, (513) 556-4165. Additional information is available at www.geosociety.org or www.uky.edu/KGS/gsa2002, or request a printout of the announcement from GSA Meetings, P.O. Box 9140, Boulder, CO 80301-9140, (303) 447-2020.

GSA is committed to making all events at the 2002 meeting accessible to all people interested in attending. You can indicate special requirements (wheelchair accessibility, dietary concerns, etc.) on the registration forms.

Preliminary Announcement and Call for Papers

SOUTH-CENTRAL SECTION, GSA

36th Annual Meeting • Alpine, Texas, Sul Ross State University, • April 11–12, 2002

The South-Central Section Meeting of GSA is sponsored by the Department of Earth and Physical Sciences, Sul Ross State University. It will be held in the University Center, Sul Ross State University. The center is compliant with the Americans with Disabilities Act.

LOCATION

Located in the southern foothills of the Davis Mountains, the campus of Sul Ross State University in Alpine, Texas, is ideally situated for the 2002 GSA South-Central meeting and celebrates the geology of Texas' only two National Parks.

Proterozoic metamorphic rocks that represent the Grenville orogeny in Trans-Pecos Texas are exposed in the Sierra Diablo and Van Horn Mountains, less than 100 miles to the northwest. Folded and thrust marine strata ranging in age from Cambrian to Pennsylvanian that were deformed during the Ouachita-Marathon orogeny are well exposed in geologically classic areas like the Marathon Basin, 30 miles to the east, and in the Solitario, 75 miles to the south. The world-famous Permian Reef forms several nearby mountain ranges, including the Guadalupe Mountains, 150 miles to the north, the Apache Mountains, 100 miles to the north, and the Glass Mountains, 30 miles to the east. Like much of central and west Texas, very thick sequences of Cretaceous limestone crop out throughout the Trans-Pecos area. In and near Big Bend National Park, 80 miles to the south, important fossil discoveries, including the pterosaur *Quetzalcoatlus* and the largest *Alamosaurus* ever found, have been excavated from these Cretaceous strata. Volcanic activity dominated the Trans-Pecos area in the mid-Tertiary, resulting in the creation of several large mountain ranges. These include the Davis Mountains, which represent the largest contiguous outcrop of alkalic rocks in the United States; the Chinati Mountains; the Bofecillos Mountains in Big Bend Ranch State Park; and the Chisos Mountains in Big Bend National Park, all within 100 miles of Alpine. The Trans-Pecos area is also situated in the easternmost part of the Basin and Range province in the United States.

One goal of this meeting is to focus on recent research in the National Parks and

to discuss opportunities for acquisition of funding for continued work, including possibilities for revising the existing geologic maps of the parks.

REGISTRATION

Preregistration deadline: March 1, 2002

Cancellation deadline: March 8, 2002

Participants are encouraged to preregister to assist the local committee with scheduling details. Registration can be completed online at www.geosociety.org. Registration is required for all who attend technical sessions, guest activities, or the exhibit area.

CALL FOR PAPERS

Papers are invited for technical sessions, symposia, theme sessions, and poster presentations. The technical sessions will provide 15 minutes for presentation and 5 minutes for discussion. Symposia conveners may assign more time to invited key speakers. Two 35 mm carousel projectors (please bring your own trays), two screens, and an overhead projector will be provided for each oral session. Computer projection equipment may be available. Papers of regional interest to earth and environmental scientists in the South-Central areas as well as those of general interest will be considered for the program.

Poster presentations are encouraged and will allow at least 3 hours of display time. Authors must be present for at least 2 hours.

ABSTRACTS

Abstracts deadline: January 5, 2002

All abstracts must be submitted online at the GSA Web site, www.geosociety.org. If you cannot submit your abstract electronically, contact Nancy Carlson, (303) 357-1061, ncarlson@geosociety.org.

FIELD TRIPS

Premeeting and postmeeting field trips are scheduled. All trips will begin and end in Alpine. For details of scheduled trips, contact the field trip leaders listed below or the field trip chair, John White, jwhite@sulross.edu.

Premeeting

1. Middle Permian Stratotypes of the

Guadalupe Mountains National

Park. Visit the Permian Reef Complex and see the type section for the Guadalupian. Dave Rohr, drohr@sulross.edu, and Bruce Wardlaw, bwardlaw@usgs.gov.

Postmeeting

2. Geology of Big Bend National Park: What Have We Learned Since Maxwell and Others?

This trip is intended to provide an interdisciplinary overview of the diverse geology of the National Park. Field trip stops will cover as many aspects (petrology, hydrology, geomorphology, paleontology, and others) of the basic geology of the park as possible. Coordinated by John White, jwhite@sulross.edu. See our Web site for field trip presenters, www.sulross.edu/~geology/gsa/bibe.html.

3. Geology of Precambrian Rocks in the Van Horn area.

SYMPOSIA

The following symposia are planned for the Alpine meeting. Anyone interested in proposing an additional symposia topic should contact Kevin Urbanczyk, kevinu@sulross.edu.

1. Geology of Big Bend National Park: What Have We Learned Since Maxwell and Others, 1967?

A symposium designed to bring together researchers from various disciplines to discuss recent research results in the park. Kevin Urbanczyk, kevinu@sulross.edu, and Robert Scott, rbscott@usgs.gov.

2. The Permian of the Southwest.

Dave Rohr, drohr@sulross.edu, and Bruce Wardlaw, bwardlaw@usgs.gov.

3. Water Resource Frontiers.

Andrew Chastain-Howley, WaterProspecting@cs.com, and Diane Doser, doser@slman.geo.utep.edu.

4. Long-Term Biogeochemical Responses to Global Change.

A variety

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of topics expected, including effects of anthropogenic atmospheric inputs on biogeochemical cycles. Bob Stottlemeyer, Robert_stottlemeyer@usgs.gov, and John Zak, yjzoz@ttacs.ttu.edu.

5. Precambrian Geology of Southern Laurentia.

6. **Geoarchaeology.** This symposium is cosponsored by the Sul Ross State University Center for Big Bend Studies. Bob Mallouf, mallouf@sulross.edu.

THEME SESSION

Undergraduate Research Poster Session. *Sponsored by the Geology Division of the Council on Undergraduate Research.* This session is designed to allow undergraduate students to present research results. A student must be listed as the lead author and be the major preparer of the poster. For further information, contact Jeff Connelly, University of Arkansas at Little Rock, (501) 569-3543, jbconnelly@ualr.edu.

SHORT COURSE

Introduction to GIS/GPS for Geologic Field Studies. A short course (2 days) designed to introduce students to basic geographic information system fundamentals and the acquisition and manipulation of field Global Positioning System data. The course is designed for, but not limited to, undergraduate students. Funding for student travel, lodging, and course fee is available via a grant from the Brown Foundation. Contact Kevin Urbanczyk, kevinu@sulross.edu, for details.

STUDENT SUPPORT

Travel grants are available from the South-Central Section of GSA. 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 check the GSA Web site, www.geosociety.org, South-Central Section, for details regarding application instructions for these grants. Also, see Brown Foundation support in the short course section above.

Awards for the best oral and poster student papers will be given. These awards will be based upon the quality of research and presentation. Eligible students must be the lead author and presenter of the work, and the abstract must be clearly identified as a student paper.

For more information, please contact Elizabeth Y. Anthony, eanthony@geo.utep.edu.

Application deadline: March 21, 2002.

EXHIBITS

Exhibit space is available in the meeting building. Any exhibitor interested in presenting information should contact Kevin Urbanczyk, kevinu@sulross.edu.

SOCIAL ACTIVITIES

Welcoming Party. Wednesday, April 10, Kokernot Lodge, 5–8 p.m.

Banquet. Thursday, April 11, Kokernot Lodge, 6–9 p.m.

Paleontological Society Luncheon. Friday, April 12, University Center, noon.

BUSINESS MEETINGS

South-Central Section Management

Board Meeting. Thursday, April 11, 4 p.m.

South-Central Section Business

Meeting. Thursday, April 11, Kokernot Lodge, held in conjunction with the banquet.

ROY SHLEMON MENTORING PROGRAM IN APPLIED GEOLOGY

Workshop for graduate and advanced undergraduate students about professional opportunities and challenges in the real world. Free lunch provided. Karlon Blythe, Program Officer, kblythe@geosociety.org. *Meeting registration is not required to attend only this workshop.*

ADDITIONAL INFORMATION

Information concerning registration, accommodations, and activities will appear in the January 2002 issue of *GSA Today*, at www.geosociety.org, and at the Sul Ross State University's Department of Earth and Physical Sciences Web page, www.sulross.edu/~geology/gsa/gsa.html. Requests for additional information or suggestions should be addressed to the General Chair, Kevin Urbanczyk, kevinu@sulross.edu; (915) 837-8110.

GSA is committed to making all events at the 2002 meeting accessible to all people interested in attending. You can indicate special requirements (wheelchair accessibility, dietary concerns, etc.) on the registration forms.

Statement of Ownership, Management, and Circulation

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2002 GSA Section Meetings

CALL FOR PAPERS

NORTHEASTERN SECTION

March 25–27, 2002
Sheraton Springfield, Springfield, Mass.

For meeting information: Sheila Seaman, Dept. of Geosciences, University of Massachusetts, 233 Morrill Science Center, Amherst, MA 01003-5820, (413) 545-2822, sjs@geo.umass.edu.

Abstract deadline: December 18, 2001

SOUTHEASTERN AND NORTH-CENTRAL SECTIONS

April 3–5, 2002
Hyatt Regency Hotel and Lexington Civic Center,
Lexington, Ky.

For meeting information: John D. Kiefer, kiefer@kgs.mm.uky.edu, or James C. Cobb, cobb@kgs.mm.uky.edu, Kentucky Geological Survey, (859) 257-5500.

Abstract deadline: December 19, 2001

SOUTH-CENTRAL SECTION

April 11–12, 2002
Sul Ross State University Center, Alpine, Texas.

For meeting information: Kevin Urbanczyk, Dept. of Earth & Physical Science, Sul Ross State University, SRSU Box C-143, Alpine, TX 79832-0001, (915) 837-8110, kevinu@sulross.edu.

Abstract deadline: January 5, 2002

ROCKY MOUNTAIN SECTION

May 7–8, 2002
Southern Utah University Campus, Cedar City, Utah.

For meeting information: Robert Eves, Dept. of Geology, Southern Utah University, Cedar City, Utah, (435) 586-1934, eves@suu.edu.

Abstract deadline: February 4, 2002

CORDILLERAN SECTION

May 13–15, 2002
Oregon State University, Corvallis, Oregon.

For meeting information: Robert S. Yeats, Dept. of Geosciences, Oregon State University, 104 Wilkinson Hall, Corvallis, OR 97331-5506, (541) 737-1226, yeatsr@geo.orst.edu.

Abstract deadline: February 7, 2002



Environmental Research Conference



Aquifer heterogeneity and environmental implications: Ancient and Modern Coastal Plain Depositional Environments

Embassy Suites, Charleston, SC

March 24–27, 2002

Abstract Deadline – December 1, 2001

Participation is limited – submit early!

Day One: Core Workshop & Field Characterization Exhibits

Day Two: Characterization & Data Manipulation

Day Three: Coastal field trip “*Modern Shoreline Depositional Environments – Aquifer and Aquitard Heterogeneity*” by boat to Price Inlet and vicinity along the South Carolina coast

Day Four: Modeling Techniques for Heterogeneous coastal plain settings

Who should attend:

Sedimentologists, hydrogeologists, stratigraphers, geochemists, regulators, and modelers (engineers, mathematicians, and statisticians) for interaction to broaden cooperative research initiatives in the environmental arena.

For Information Contact:

Mary K. Harris
Savannah River Tech. Ctr.
803-725-4184

mary.harris@svs.gov

Judy Tarpley - SEPM

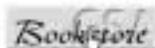
800-865-9765

jtarples@sepm.org

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Click on Education. Earth Science Week is Oct. 7–13. Find out how you can celebrate, and get tips for activities.



Click on Boston 2001: A Geo-Odyssey. Register for the Annual Meeting, view the Technical Program schedule, and build your own personal meeting itinerary.



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GSA Foundation Update

Donna L. Russell, Director of Operations

Sisson Joins the Board



Virginia B. Sisson

I am very pleased to announce that Virginia B. Sisson has joined the Foundation's Board of Trustees.

Sisson has been with Rice University in Houston, Texas, since 1986. Currently a research scientist, she has held a variety of positions, including research associate (1986–1987), lecturer (1987–1992), assistant professor (1992–1997), and clinical assistant professor

(1999–2001). Before going to Rice University, she had been a summer intern at the NASA Ames Research Center in California, a research associate at Princeton University, and a consultant in fluid inclusion studies for Exxon and ARCO, as well as Texaco.

Sisson earned her B.A. at Bryn Mawr College, where she graduated cum laude in geology in 1979. In 1981, she earned her M.A. at Princeton University, and in 1985, she received her Ph.D., also at Princeton. "Contact Metamorphism and Fluid Evolution Associated with the Ponder Pluton, Coast Plutonic Complex, British Columbia, Canada" was her dissertation.

Having joined GSA in 1980, Sisson was elected a Fellow in 1997. She has been very active in service to GSA, having served on the editorial board for *Geology*, on the Penrose Conference Committee from 1995 to 1997, and as chair of that committee in 1996. She co-convoked a 1994 Penrose Conference, reviewed abstracts for the 1993, 1995, and 1996 GSA Annual Meetings, and co-organized a symposium and theme session for the 1995 GSA Annual Meeting in New Orleans. She belongs to the American Geophysical Union, the Mineralogical Society of America, American Women in Science, the Association for Women Geoscientists, and the Mineralogical Association of Canada.

Sisson has published several books, has refereed many publications, and has several abstracts and presentations to her credit. She has received a variety of awards and honors, including the Rice University Women's Center Impact Award for excellence in teaching and mentoring women on campus.

Chair of the Foundation Board Morris W. "Brud" Leighton commented, "Jinny Sisson has demonstrated leadership, a remarkable history of contributions and dedicated service to the GSA, a distinguished professional background, and peer respect. We are extremely pleased to welcome Jinny as a member of the GSA Foundation Board of Trustees."

Focus on a Foundation Fund: The Unrestricted Fund

The Foundation's Unrestricted Fund has been a source of funding and support for many GSA programs over the years. Without the usual parameters of a restricted fund, the Foundation's Unrestricted Fund can be used in a variety of ways to meet the greatest needs. Most recently, this fund has supported:

- the Research Grants Program;
- GeoCorps America™ intern program;
- international travel to the Earth Systems Processes meeting;
- the GSA Public Service Award;
- the GSA Past President Memorial; and
- student travel grants for GSA Section Meetings with matching funds.

Continued support from GSA members to the Unrestricted Fund provides a necessary financial base that augments many GSA programs including science and outreach initiatives, electronic publications, and member services. As the unrestricted dollars increase, so will the available support for GSA.

Meet the President

Stop by the Foundation booth in Boston and meet Tom Fouch, the Foundation's new President.



Most memorable early geologic experience

Climbing to the top of Sheriff Mountain while helping Thor Karlstrom map the Hecla Mining District, Montana, in 1945.

—Charles G. Higgins

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Call for Nominations: **MEDALS AND AWARDS**



PENROSE MEDAL

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

DAY MEDAL

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

HONORARY FELLOWS

Each year this honor is bestowed on non-North Americans

who live and work outside of North America and have distinguished themselves in geological investigations or in notable service to the Society. Under exceptional circumstances, North Americans have been named Honorary Fellows. This amendment to the bylaws was made in 1969 when the Apollo II astronauts who first walked on the Moon were elected.

The GSA Council established the program in 1909, and since then, except during a few war years, one or more Honorary Fellows have been elected annually. Most Honorary Fellows have been elected after many years of outstanding and internationally recognized contributions to the science. At present there are 58 living geologists who have received this honor.

The GSA Council encourages the membership to submit names of qualified candidates for this honor. In preparing a nomination, it is imperative that the original research and scientific advances of the candidate be stressed. The nominator should also verify all supporting data, especially degrees received, publications, positions, etc.

HOW TO NOMINATE

To ensure thorough consideration by the respective committees, please submit for each candidate a brief biographical sketch, such as used in American Men and Women of Science and Who's Who in America, a summary (200 words or fewer) of the candidate's scientific contributions to geology that qualify the individual for the award, and a selected bibliography of no more than 20 titles.

A nomination for any one of these three awards *must be supported* by signed letters from each of five (5) GSA Fellows or Members in addition to the person making the nomination. The letters may be attached to the nomination form or may be sent to GSA separately. For Honorary Fellow nominations, please verify degrees received, publications, positions held, etc. The names of unsuccessful candidates proposed to the Council by the respective committees will remain for consideration by those committees for three years. For those still under consideration, it is recommended that an updated letter of renomination be sent to GSA.

The nomination form and instructions are available on the GSA Web site, www.geosociety.org/aboutus/admin/awards.htm, or contact the program officer for grants, awards, and medals, (303) 357-1037, lcarter@geosociety.org. **Deadline for receipt of nominations: February 1, 2002.**

YOUNG SCIENTIST AWARD (DONATH MEDAL)

The Young Scientist Award was established in 1988 to be awarded to a young scientist (35 or younger during the year in which the award is to be presented) for outstanding achievement in contributing to geologic knowledge through original research that marks a major advance in the earth sciences. The award, consisting of a gold medal called the Donath Medal, and a cash prize of \$20,000, was endowed by Dr. and Mrs. Fred A. Donath.

For the year 2002, only those candidates born on or after January 1, 1967, are eli-

gible for consideration. In choosing candidates for the Young Scientist Award, scientific achievement and age will be the sole criteria. Nominations for the 2002 award must include: biographical information, a summary of the candidate's scientific contributions to geology (200 words or fewer), a selected bibliography (no more than 10 titles), supporting letters from five scientists in addition to the person making the nomination.

The nomination form and instructions are available at www.geosociety.org/aboutus/admin/awards.htm, or contact the program officer for grants, awards, and medals, (303) 357-1037, [\[geosociety.org\]\(http://www.geosociety.org\). **Deadline for receipt of nominations: February 1, 2002.**](mailto:lcarter@</p></div><div data-bbox=)

GSA DISTINGUISHED SERVICE AWARD

Council established the GSA Distinguished Service Award in 1988 to recognize individuals for their exceptional service to the Society. GSA Members, Fellows, and Associates may be nominated for consideration. Any GSA Member or employee may nominate someone. The Executive Committee will select awardees, and the Council must ratify all selections. Awards may be made annually, or less frequently,

at the discretion of Council. This award will be presented during the Annual Meeting of the Society. A letter of nomination, a brief biographical sketch, and a summary (200 words or fewer) of the candidate's contributions to the Society that qualify the individual for the award should be addressed to Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140. **Deadline for nominations: February 1, 2002.**

GSA PUBLIC SERVICE AWARD

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

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

The award will usually go to a GSA member, with exceptions approved by Council. It may be presented posthumously to a descendant of the awardee.

Nominations must include a cover letter and biographical information that clearly demonstrates applicability to the selection criteria. A letter of nomination, a brief biographical sketch, a summary (200 words or fewer) of the candidate's contributions that qualify the individual for the award, and a selected bibliography of no more than 10 titles should be addressed to: Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140. **Deadline for receipt of nominations: February 1, 2002.**

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2002 JOHN C. FRYE ENVIRONMENTAL GEOLOGY AWARD

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

Criteria for Nomination

Anyone can nominate based on the following criteria: (1) paper must be selected from GSA or state geological survey publications; (2) paper must be selected from those published during the preceding three full calendar years; and (3) nomination must include a paragraph stating the pertinence of the paper. Send nominations to: Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140. **Deadline: March 31, 2002.**

Basis for Selection

Each nominated paper will be judged on its uniqueness or significance as a

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

2001 Award Recipient Named

The 2001 award will be presented at the GSA Annual Meeting in Boston to John P. Bluemle, Julie A. LeFever, and Ryan P. Waldkirch for their report by the North Dakota Geological Survey (Educational Series 25) entitled "Flooding in the Grand Forks-East Grand Forks North Dakota and Minnesota Area."

continued on p. 44

2002 DORIS M. CURTIS MEMORIAL FUND FOR WOMEN IN SCIENCE AWARD

Sponsored by Subaru of America, Inc.

In partnership with Subaru of America, GSA makes an annual Doris M. Curtis Memorial Fund for Women in Science Award.

Named in honor of a pioneer, this award will go to a woman or a group of women who have had a significant impact on the geosciences based on their Ph.D. research. Women are eligible for the first three years following receipt of their degree. The 2002 award of \$2,500 will be presented at the 2002 GSA Annual Meeting in Denver.

Doris Curtis was GSA's 103rd President. Her popularity was widespread, and she pioneered many new directions for geology, not the least of which was her tenure as GSA president after an unbroken chain of 102 men. Groups and causes important to Curtis included women, public awareness, minorities, and education.

GSA Seeks Nominations for the 2002 Award

Nominations should include a nominat-

ing letter that clearly states how the candidate's Ph.D. research has had a major impact on the geosciences, a short summary of the research, a short résumé with a list of publications and a copy of the dissertation abstract, and published abstracts and/or reprints as available.

Send nominations and supporting material to: Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140. **Deadline for receipt of nominations: February 1, 2002.**

PLANETARY GEOSCIENCE STUDENT PAPER 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. Each winner receives 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/lpsc2002/.

Criteria

The Dwornik Student Paper Award applies to papers presented at the annual

Lunar and Planetary Science Conference held each March in Houston. Student applicants must be: (1) senior authors of the abstract (papers may be presented orally or in a poster session); (2) U.S. citizens; 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 33rd Lunar and Planetary Science Conference, to be held March 4–8, 2002, at NASA Johnson Space Center in Houston, Texas. For additional information, contact the Lunar and Planetary Institute (LPI) Publications and Program Services Department; (281) 486-2123, fax 281-486-2160, perry@lpi.usra.edu.

Deadline for electronic submission: 5 p.m. (U.S. Central Standard Time), Wednesday, December 5, 2001. If you are unable to submit electronically, send hard-copy abstracts to the LPI by November 28, 2001. No hard-copy submissions that arrive after November 28 will be considered for the conference.

NATIONAL AWARDS FOR 2004

GSA Members are invited to nominate candidates for the following national awards being solicited for 2004.

The **William T. Pecora Award**, sponsored jointly by NASA and the U.S. Department of the Interior, is presented annually in recognition of outstanding contributions of individuals or groups toward the understanding of Earth by means of remote sensing. The award recognizes contributions of those in the scientific and technical community as well as those involved in the practical application of remote sensing. Consideration will be given to sustained or single contributions of major importance to the art or science of understanding Earth through observations made from space.

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

Many younger American scientists and engineers may now be reaching a point

where their contributions are worthy of recognition. The committee is giving increasing attention to these individuals as well as to those outstanding women and minority scientists who deserve recognition.

The Vannevar Bush Award is presented from time to time to a person who, through public service activities in science and technology, has made an outstanding contribution toward the welfare of mankind and the nation. The award is given to a senior statesman of science and technology and complements the National Science Foundation's (NSF) Alan T.

Waterman Award, which is given to a promising young scientist. The two awards are designed to encourage individuals to seek the highest levels of achievement in science, engineering, and service to humanity. The nomination should be accompanied by a complete biography and a brief citation summarizing the nominee's scientific or technological contributions to our national welfare in promotion of the progress of science.

The **Alan T. Waterman Award** is presented annually by the NSF and the National Science Board to an outstanding young researcher in any field of science

or engineering supported by the NSF. Candidates must be U.S. citizens or permanent residents and must be 35 years old or younger, OR not more than five years beyond receipt of the Ph.D. degree by December 31 of the year in which they are nominated. Candidates should have completed sufficient scientific or engineering research to demonstrate, through personal accomplishments, outstanding capability and exceptional promise for significant future achievement.

Nominations

On behalf of its member societies, the American Geological Institute (AGI) coordinates the nomination process, and the AGI Member Society Council will finalize a roster of candidates at its spring 2003 meeting for nomination to the respective offices sponsoring the national awards. Send your nominee's background information and vitae, specifying the award for which the candidate is being submitted, to: Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140, (303) 357-1037, fax 303-447-1133. **Deadline for receipt of all award nominations: April 30, 2002.**



The Geological Society of America 2002 Research Grant Program for Students



The primary role of the Research Grants Program is to provide partial support for research in earth science by graduate students at universities in the United States, Canada, Mexico, and Central America. GSA strongly encourages women, minorities, and persons with disabilities to participate fully in this grants program. **Eligibility is restricted to GSA members.**

New application forms are available each fall in the geology departments of colleges and universities offering graduate degrees in earth sciences. Forms are mailed to GSA Campus Representatives, department secretaries, and chairpersons in the United States, Canada, and Mexico. Application forms and information are available on GSA's Web site, www.geosociety.org. Applications may be downloaded from the Web but may **not** be submitted by facsimile or e-mail. They are also available upon request from the Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301, lcarter@geosociety.org. Please use only the current 2002 application and appraisal forms.

Confidential evaluations from two faculty members are required from candidates and must accompany applications. PLEASE USE THE "APPRAISAL OF APPLICANT" FORMS, WHICH ACCOMPANY THE 2002 APPLICATION FORMS. APPLICATION FORMS WILL NOT BE ACCEPTED BY FACSIMILE OR E-MAIL. ONLY COMPLETE APPLICATIONS WILL BE ACCEPTED.

In 2001, GSA awarded more than \$400,000 in grants to 224 students doing research for advanced degrees. The average amount awarded was \$1,882. The largest grant was \$3,450, but there is no predetermined maximum amount. Grants supported 39% of the applicants. Funding for this program is provided by a number of sources, including GSA's Penrose and Pardee endowments, the National Science Foundation, industry, individual GSA members through the GEOSTAR and Research Grants funds, and numerous dedicated research funds endowed at the GSA Foundation by members and families.

The Committee on Research Grants will meet soon after the deadline to evaluate applications and award grants. In late April, GSA's Executive Director will inform all applicants for grants of the committee's actions.

- Applicants must be GSA members.
- All applications must be submitted on the 2002 forms and postmarked by February 1, 2002.
- *Only complete applications will be accepted.*

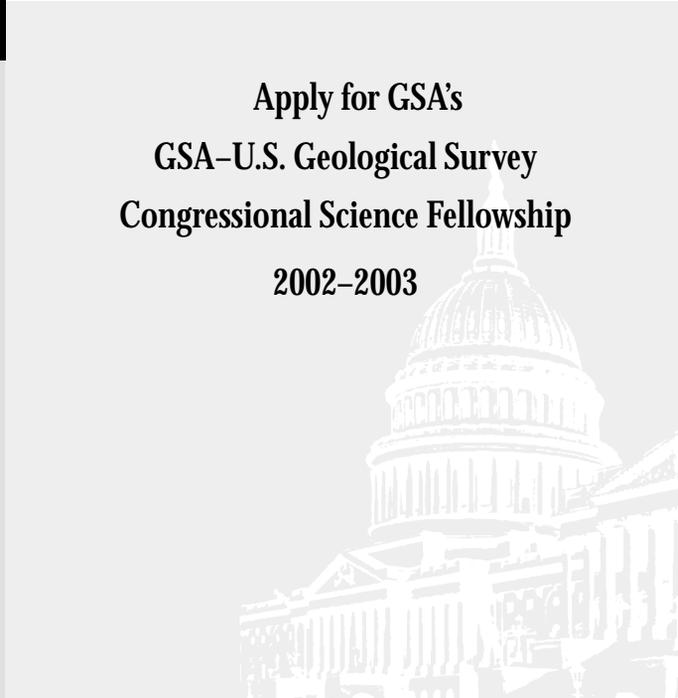
Call for Applications!

Opportunities to serve as a Congressional Science Fellow are rare, and the experience is unique. If you are interested in working with national leaders to help shape science and technology policy on Capitol Hill, this position may be a good fit for you.

The Congressional Science Fellow will be selected from top competitors early in 2002. Candidates must be **GSA Members** who possess either a Ph.D. in the earth sciences or a related field, or a master's degree in the earth sciences (or a related field) plus at least five years of professional experience.

If you have this professional background, are experienced in applying scientific knowledge to societal challenges, and want to help shape the future of the geoscience profession, put your expertise, experience, and passion for science to work where it counts! The fellowship is open to U.S. citizens or permanent residents of the U.S. **The deadline to apply is February 1, 2002.**

For application information, check the Web site at www.geosociety.org/science/csf/index.htm, or contact Karlon Blythe, Program Officer, GSA Headquarters, (303) 447-2020, kblythe@geosociety.org.



Apply for GSA's GSA-U.S. Geological Survey Congressional Science Fellowship 2002-2003

Call for GSA Committee Service Beginning July 2002

GSA is looking for candidates to serve on Society committees and as GSA representatives to other organizations. You can help by volunteering yourself or nominating others you think should be considered for any of the following openings. Younger members are especially encouraged to become involved in Society activities. If you volunteer or make recommendations, please give serious consideration to the special qualifications for serving on a particular committee. **Please be sure that your candidates are GSA Members or Fellows and that they fully meet the requested qualifications.**

The nomination form and instructions are available at www.geosociety.org/aboutus/committees/com_index.htm, or contact Member Services, (303) 447-2020, 1-888-443-4472, or member@geosociety.org.

Nominations received at GSA headquarters by February 1, 2002, on the official one-page form will be forwarded to the Committee on Nominations. *Council requires that the form be complete.* Information requested on the form will assist the committee members with their recommendations for the July 2002 committee vacancies. Please use one form per candidate. The committee will present at least two nominations for each open position to the Council at its May meeting. Appointees will then be contacted and asked to serve, thus completing the process of bringing new expertise into Society affairs.

Graduate Students: You are eligible to serve on GSA committees as full members, and Council encourages you to volunteer or nominate others for committee service.

July 2002 Committee Vacancies

KEY

-
- * Extensive time commitment required
 - AM—Meets at Annual Meeting
 - B/E—Meets in Boulder or elsewhere
 - T—Communicates by phone or electronically
-

Annual Program Committee* (AM, B/E)
3 vacancies: 1 councilor or former councilor;
1 member at large; 1 Technical Program Chair
(2004 Denver Meeting)

Develops a long-range plan for increasing the quality of the annual meeting in terms of science, education, and outreach. Evaluates the technical and scientific programs of the annual meeting. **Qualifications:** broad familiarity with different disciplines, previous program experience, or active involvement in applying geologic knowledge to benefit society and raising awareness of critical issues. The Technical Program Chair for the 2004 Denver Meeting has the final responsibility for the entire technical program, including the review and acceptance of keynote and topical session proposals (January–February) and the scheduling of all sessions for the Annual Meeting

(July–early August) in coordination with the Joint Technical Program (JTPC) Representatives. Prior experience on the JTPC is preferred.

Arthur L. Day Medal Award (T)
3 vacancies: 2 member-at-large vacancies;
1 councilor vacancy

Selects candidates for the Arthur L. Day Medal Award. **Qualifications:** knowledge of those who have made "distinct contributions to geologic knowledge through the application of physics and chemistry to the solution of geologic problems."

Education (AM, B/E)
2 vacancies: 1 member-at-large;
1 precollege (K–12) educator

Stimulates interest in the importance and acquisition of basic knowledge in the earth sciences at all levels of education and promotes the importance of earth-science education to the general public. **Qualifications:** ability to work with other interested scientific organizations and science teachers' groups to develop precollege earth science education objectives and initiatives.

Geology and Public Policy (AM, B/E)
3 member-at-large vacancies

Translates knowledge of earth sciences into forms most useful for public discussion and decision making. **Qualifications:** experience in public-policy issues involving the science of geology; ability to develop, disseminate, and translate information from the geologic sciences into useful forms for the general public and for GSA members; familiarity with appropriate techniques for the dissemination of information.

Honorary Fellows (T)
2 member-at-large vacancies

Selects candidates for Honorary Fellows, usually non–North Americans. **Qualifications:** knowledge of geologists throughout the world who have distinguished themselves through their contributions to the science.

Joint Technical Program Committee (T)
2 vacancies: 1 paleoceanography/paleoclimatology representative; 1 Precambrian geology representative

Assists in finalizing the technical program of the Annual Meeting; reviews abstracts or provides names of reviewers to evaluate abstracts, participates in the Web-based activities in the selection and scheduling of abstracts, participates in Topical Session proposal review.

Membership (B/E)
2 member-at-large vacancies: 1 student; 1 representative from industry

Evaluates membership benefits and develops recommendations that address the changing needs of the membership and attract new members. **Qualifications:** experience in benefit, recruitment, and retention programs is desired.

Minorities and Women in the Geosciences (AM)
3 member-at-large vacancies

Stimulates recruitment and promotes positive career development of minorities and women in the geoscience professions. **Qualifications:** familiarity with minority and female

education and employment issues; expertise and leadership experience in such areas as human resources and education.

Nominations (B/E)

2 member-at-large vacancies

Recommends to the Council nominees for the positions of GSA Officers and Councilors. **Qualifications:** familiarity with a broad range of well-known and highly respected geological scientists.

Penrose Conferences and Field Forums (T)

1 vacancy: conference attendee

Reviews and approves Penrose Conference proposals and recommends and implements guidelines for the success of the conferences.

Qualifications: Must be a member who has attended at least two or more Penrose Conferences and/or Field Forums.

Penrose Medal Award (T)

3 vacancies: 1 chair/councilor;

1 member-at-large or former councilor; 1 member-at-large

Selects candidates for the Penrose Medal Award. Emphasis is placed on "eminent research in pure geology which marks a major advance in the science of geology." **Qualifications:** familiarity with outstanding achievements in the geological community that are worthy of consideration for the honor.

Professional Development (formerly Continuing Education) (AM, B/E)

2 member-at-large vacancies

Directs, advises, and monitors GSA's professional development program, reviews and approves proposals, recommends and implements guideline changes, and monitors the scientific quality of courses offered.

Qualifications: familiarity with professional development programs or adult education teaching experience.

Publications* (AM, B/E)

4 vacancies: 2 members-at-large; 2 councilors

Nominates candidates for editors' positions; approves of editorial boards; reviews the quality and health of Society publications; explores the initiation of new ventures, including electronic publishing, as well as cessation of existing publications. **Qualifications:** extensive publications experience.

Research Grants* (B/E)

3 member-at-large vacancies:

one to be based in the Colorado area

Evaluates research grant applications and selects grant recipients.

Qualifications: should have experience in directing research projects and in evaluating research grant applications.

Young Scientist Award (T)

2 councilor or former councilor positions

Committee members investigate the achievements of young scientists who should be considered for this award and submit recommendations to Council.

Representative to the North American Commission on Stratigraphic Nomenclature

1 vacancy

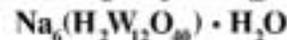
Must be familiar with and have expertise in stratigraphic nomenclature.

GSA Representatives to the Joint American Society of Civil Engineers—GSA—Association of Engineering Geologists

2 vacancies

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Committee, Section, and Division Volunteers: Council Thanks You!

The GSA Council acknowledges the many member-volunteers who, over the years, have stimulated growth and change through their involvement in the affairs of the Society.

Each year, GSA asks for volunteers to serve on committees, and many highly qualified candidates express their willingness to serve. Not everyone can be appointed to the limited number of vacancies; however, members are reminded that there are also opportunities to serve in the activities and initiatives of the sections and divisions. Annually, the Council asks sections and divisions to convey the names of potential candidates for committee service to the Committee on Nominations.

GSA Division and Section Grants for 2001

Division Research Grants

Nine of the 13 GSA Divisions offer grants for outstanding student research within their respective fields. Following are the grant recipients for 2001.

The Archaeological Geology

Division awarded two grants this year. The Claude C. Albritton, Jr., Memorial Student Research Award was awarded to a Ph.D. student and an M.A.–M.S. student. The Ph.D. student recipient is E. Christian Wells, Arizona State University, for “Chemical Analysis of Anthrosols at Late Classic El Coyote, Northwestern Honduras.” The M.A.–M.S. student recipient is Heidi Luchsinger, Texas A&M University, for “The Micromorphology of the Sediments and Soils from the Gault Site, Bell County, Texas (41BL323).” The GSA Foundation established the Claude C. Albritton, Jr., Memorial Fund in 1991 with contributions from the family and friends of Claude Albritton. The Division continues to seek contributions to the fund in memory of Albritton to provide scholarships for graduate students in the earth sciences and archaeology.

The Coal Geology Division presents the Antoinette Lierman Medlin Research Awards annually. The 2001 Field Award went to Michael C. Rygel, Dalhousie University, for “Channels and Coal-Floodplain Dynamics of the Pennsylvanian Joggins Formation.” The Research Award went to Jonson Miller, Virginia Polytechnic Institute and State University, for “Changes in Late Pennsylvanian Pedogenic Environments in the Central Appalachian Basin and Implications for Climate Controls on Sedimentation and Coal Formation.”

The Engineering Geology Division did not award the Roy J. Shlemon Scholarship Awards for 2001.

The Geophysics Division presented the Allan V. Cox Student Research Award this year for an outstanding student research proposal submitted to the GSA Research Grants Program to Emma Hill, University of Nevada, Reno, for “An Integration of GPS and InSAR Data for the Measurement of Interseismic

Deformation in the Yucca Mountain–Death Valley Area.” The Geophysics Division award was presented to Jason A. Crosswhite, University of Oregon, for “Seismic and Gravity Analyses in the Vicinity of the Cheyenne Belt: Seeking the Origin for a Long-Lived Root.”

The Hydrogeology Division presented awards for outstanding student research to four students: Daniel Obrist, University of Nevada, Reno, for “Influence of Fire and Subsequent Cheatgrass Invasion on the Spatial and Temporal Distribution of Soil Water in the Rooting Zone of a Sagebrush Ecosystem”; Mingjuan Shi, The University of Texas at Austin, for “Heterogeneity of Low-Permeability Stratified Units and Its Effects on Solute Transport”; Nathaniel Warner, Miami University, for “Groundwater Contamination in Nepal: A Regional Comparison and Assessment of Controlling Site Characteristics”; and Timothy R. Wineland, Iowa State University, for “Hydrogeological, Geochemical, and Geophysical Characterization of Alluvial Sediments for Implementation of Riparian Buffers in the Bear Creek Watershed.”

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 for papers given in March at the Lunar and Planetary Science Conference. The 2001 best oral presentation award went to Sarah T. Stewart, California Institute of Technology, for “The Relationship Between Rampart Crater Morphologies and the Amount of Subsurface Ice.” The best poster award was presented to Jennifer Anderson, Brown University, for “Oblique Impact Ejecta Flow Fields: An Application of Maxwell’s Z model.” Poster honorable mention awards were presented to Matthew Silver, Whitman College, for “Wrinkle Ridge Formation North of Orcus Patera, Mars”; and Kevin K. Williams, Arizona State University, for “Laboratory Measurements of Radar Transmission through Dust with

Implications for Radar Imaging on Mars.” Award recipients receive a citation and a \$500 cash prize, and honorable mention winners receive a certificate in an awards ceremony held at NASA Headquarters in Washington, D.C., in early summer.

The Quaternary Geology and Geomorphology Division awarded the 2001 J. Hoover Mackin Award to Kyle K. Nichols, University of Vermont, for “Quantifying Desert Piedmont Process Rates using In Situ–Produced Cosmogenic ¹⁰Be and ²⁶Al.” An honorable mention was presented to Jennifer L. Pierce, University of New Mexico, for “Holocene Variations in Fire Frequency and Sedimentation Rates in the Idaho Batholith: Implications for the Role of Climate Change.” The Arthur D. Howard Research Grant was awarded this year to Matthew D. Anders, Utah State University, for “Quaternary Stratigraphy and Landscape Evolution of Eastern Grand Canyon.” An honorable mention was presented to Kurt L. Frankel, Lehigh University, for “Post-Laramide Tectono-Geomorphic Evolution of Sierra Nacimiento, Southern Rocky Mountains.”

The Sedimentary Geology Division presented the award for outstanding student research in 2001 to Grant Y. Yip, University of California, Santa Barbara, for “Catastrophic Sedimentation in a K-T Coastal Paleovalley, Baja California, Mexico.”

The Structural Geology and Tectonics Division presented its 16th annual awards for outstanding student research this year to Katherine Maxine Scharer, University of Oregon, for “Extending the Record at Wrightwood: C-14 Analysis of Older Events,” and Matthew David Strine, University of Rochester, for “Implications of Three-Dimensional Thrust Sheet Geometry on Thrust Kinematics: A Study Along the Moine Thrust, Northwest Scotland.”

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 North-Central Section awarded grants for undergraduate research projects

to students who attend a college or university within the section's geographic area. Research proposals are submitted and evaluated competitively. Recipients for fall 2000 are: Tye Numelin, University of Iowa, for "Distribution and Geochemistry of Mineralizing Brines in the Southeast Missouri Lead District"; Nicholas Mertes, University of Iowa, for "Geochemical and Mineralogical Analysis of Lava Flows on Volcano Cerro Azul, Chile"; Melissa Kinder and Andrew Castor, Ball State University, for "Boulder Lithology Survey, Tibes Civic-Ceremonial Site, Ponce, Puerto Rico"; Kristin Van Kley, Calvin College, for "Sand Traps and Erosion Pins: Measuring Sediment Movement by Wind on the Eastern Lake Michigan Shoreline"; Robert Wilcox, University of Iowa, for "Compositional Analyses and Mineral Phases of Mafic Dikes in the Cowhole Mountains, Mojave Desert"; Brian Hartman, University of Iowa, for "Carbon and Oxygen Analysis of Speleothems from the Pokhara Valley, Central Nepal: A Record of Seasonal to Decadal Variability in the Indian Summer Monsoon"; and Alissa Naymark, University of Wisconsin—Madison, for "Timing of Hydrothermal Alteration of Proterozoic Quartzites in the Southern Lake Superior Region: A Petrologic and $^{40}\text{Ar}/^{39}\text{Ar}$ Study."

The South-Central Section awarded grants to four graduate students. The 2001 recipients are: Marta L. Clepper, University of Texas at El Paso, for "Stable Isotope Analysis of a 12 m.y. Record of Soil Carbonates in the Southern Rio Grande Rift"; Anita Eva Csoma, University of Kansas, for "Investigations of the Diagenetic Processes in the Meteoric-Marine Mixing Zone"; Kera Gautreau, Louisiana State University, for "Fluid Flow, Diagenesis, and the Development of Overpressuring at the Matagorda Island 519 Field, Offshore Texas"; and Jason Krothe, University of Texas at Austin, for "The Effect of Utility Trenches on Shallow Ground Water Flow."

The Northeastern Section awarded grants to nine undergraduate students: Lisa L. Berrios, Smith College; Sara M. Chmura, State University of New York, College at Buffalo; Juliette R. Hancock, Mount Holyoke College; Shawn D. Kerr, State University of New York, College at Buffalo; Erin E. Klauk, State University of New York, College at Buffalo; Laurel E. Mutti, Smith College; Jasmin Raymond, Canada; James M. Seagriff III, Slippery Rock University; and Darren A. Szuch, Bucknell University.

The Southeastern Section awarded a total of \$6,480 in research grants to 21 students—two bachelor's degree students, 16 master's degree students, and three Ph.D. students. They are: Matthew Kirwan, College of William and Mary; Melondee McInnish, State University of West Georgia; Adam Bedell, University of Georgia; Michael Crump, University of North Carolina—Wilmington; Lucio D'Alberto, University of North Carolina—Chapel Hill; Jean Pierre Dube, University of North Carolina—Chapel Hill; John Foudy, University of North Carolina—Chapel Hill; Elizabeth Hazelton, East Carolina University; Milan Heath, University of Tennessee; John Huntley, University of North Carolina—Wilmington; Kevin Jones, University of Virginia; Heyward Key, University of North Carolina—Wilmington; Gayle Levy, University of Georgia; J. Todd McFarland, University of Kentucky; Megan Murphy, East Carolina University; Mark Pollock, University of Tennessee; Jocelyn Smith, West Virginia University; Carlos Zuluaga, University of Alabama; Marcello Badali, University of Alabama; Alfred Elser, Georgia State University; and Jonson Miller, Virginia Polytechnic Institute and State University.



Deglacial History and Relative Sea-Level Changes, Northern New England and Adjacent Canada

Thomas K. Weddle and Michael J. Retelle, Editors

Northern New England and adjacent Canada are regions critical to understanding the late glacial history of the Laurentide ice Sheet. The importance of the deglaciation of this region to the timing of events in the midwest can be directly related to the opening of the St. Lawrence lowland to marine conditions. The 13 papers in this collection examine the coastal regions, the Gulf of Maine, and the continental shelf off of Atlantic Canada in context with new radiocarbon age analyses, providing a more detailed history of climate changes, marine transgression, emergence, and relative sea-level history. This volume complements GSA Special Paper 197, and updates work in the region from the past 15 years since that volume was published.

SPEC 1, ISBN 0-8137-2351-5, softcover, 304 p., indexed, \$120.00 Member price \$90.00

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ENVISION YOURSELF IN A GSA DIVISION PART 2

Last month, we featured six GSA Divisions: Archaeological Geology, Coal Geology, Planetary Geology, Quaternary Geology and Geomorphology, Sedimentary Geology, and Structural Geology and Tectonics (GSA Today, v. 11, no. 9, p. 29–31). Here, we present the remaining seven Divisions: Engineering Geology, Geobiology and Geomicrobiology, Geophysics, Geoscience Education, History of Geology, Hydrogeology, and International. The 13 GSA Divisions foster collaboration and communication among scientists by:

- sponsoring symposia, field trips, short courses, teacher workshops, and other events at GSA Annual Meetings and in other venues;
- supporting student research and participation in professional meetings;
- recognizing scientific achievement and service in their various disciplines; and
- communicating through newsletters and Web sites that share information and provide a forum for discussion of interests and issues.

Division members belong to a community of colleagues who not only share many professional concerns and interests but who also broaden the base of each other's experience and thought. Many Divisions are strongly interdisciplinary, with members' diverse interests leading to new and collaborative work. Through their sponsorship of meeting events and their facilitation of dialogue among members, GSA Divisions support and highlight their members' professional accomplishments, priorities, and needs and help to shape the future of GSA policy and practice.

Please consider joining one or more of our GSA Divisions. For more information, access the Division Web sites through www.geosociety.org/sectdiv/divisions.htm or at the individual sites given in the

descriptions below. You can also join the Division(s) of your choice by contacting GSA Member Services, member@geosociety.org, (303) 447-2020, toll-free at 1-888-443-4472, fax 303-443-1510.

Engineering Geology Division

Judy Ehlen, Division Secretary
jehlen@tec.army.mil

The Engineering Geology Division, established in 1947, is the oldest and one of the largest of GSA's Divisions. Its purpose is to improve and promote the science of geology as applied to engineering works, natural hazards, and environmental problems. One of the most important ways this is done is through the Division's very active awards program.

The Division's annual E.B. Burwell, Jr., Award is given to the author(s) of the top published book or paper in the field. The Distinguished Practice Award recognizes outstanding individuals for their continuing contributions to the technical and/or professional stature of engineering geology. The Meritorious Service Award is given for outstanding service to the Engineering Geology Division.

In addition, and in conjunction with the Association of Engineering Geologists, the Division annually confers the Richard H. Jahns Distinguished Lectureship, a series of lectures at academic institutions given to promote student awareness of engineering geology and to commemorate distinguished engineering geologist Richard H. Jahns.

The Division also supports student research and development through the Roy J. Shlemon awards established in 1999. Four Roy J. Shlemon Scholarship Awards for Research in Engineering are given annually to help support master's and doctoral thesis research in the broad field of engineering geology. In addition, Roy J. Shlemon Meeting Awards are given each year to graduate and undergraduate students to support their participation in short courses and particularly field trips at GSA Annual and Section Meetings.

In addition to field trips and short courses, the Division sponsors a variety of technical sessions, symposia, and other events at annual and sectional GSA meetings, where members can present and exchange ideas and the results of their work. Our Division newsletters also facilitate communication among members;

you can view recent past editions and learn more about our Division by visiting our Web site at <http://rock.geosociety.org/egd/index.html>.

Please consider joining the well-constructed and enduring Engineering Geology Division.

Geobiology and Geomicrobiology Division

Sherry L. Cady, Second Vice-Chair
cadys@pdx.edu

The Geobiology and Geomicrobiology Division joined the ranks of GSA's Divisions in May 2001. The new Division brings together scientists working at the interface of biology and geology. Relevant interests stretch from the depths of the sea to the limits of the universe, from the microscopic to the megascopic, from the ancient to the present and beyond. The Division anticipates having members who specialize in a very wide range of fields, among them biogeochemistry, biomineralogy, geochemical ecology, paleontology, micropaleontology, origins of life, coevolution of planets and life, astrobiology, paleobiology, paleoecology, molecular paleontology and ecology, and systems modeling and informatics. We will strive to simultaneously promote the broad collaborations and the detailed disciplinary work that will lead to rigorous scientific investigations and advances within this emerging network of fields.

It's a great time to join our Division. We will be working to highlight our interests in the coming years through awards for professionals and students, through symposia, technical sessions, short courses, and field trips at GSA Annual and Section Meetings, through conferences and other activities for members, colleagues, and students, and through dynamic new ideas from members like *you!* Please visit our Web site at www.geosociety.org/sectdiv/gbgm.htm and consider becoming the newest member of the energetic new Geobiology and Geomicrobiology Division.

Geophysics Division

G. Randy Keller, Secretary-Treasurer
keller@geo.utep.edu

Geophysics is an enormously broad field, and the Geophysics Division strives to include members with a variety

of interests whose interaction encourages new ideas and opportunities. In addition to long-standing applications in areas such as structural geology, stratigraphy, and exploration, today geophysics contributes to investigations in a wide range of fields, including archaeology and environmental sciences. The members of the Geophysics Division are engaged in a wide range of scientific interactions that demonstrate the relevance and value of geophysics to all the geoscientific disciplines.

The Geophysics Division sponsors the annual George P. Woollard Award to recognize outstanding contributions to geology through the application of the principles and techniques of geophysics. It also presents the annual Allen V. Cox Award to support an outstanding student research project that incorporates the principles and applications of geophysics. More than 90% of the Division's annual resources go to support of students, and when possible a second student research award is issued.

The Division supports a strong geophysical presence at GSA Annual Meetings. The Division and its members encourage, sponsor, and organize a variety of technical sessions, symposia, short courses, field trips, and other activities. In keeping with its strong commitment to interdisciplinary communication and collaboration, the Geophysics Division also holds a joint social function with GSA's Structural Geology and Tectonics Division.

The Geophysics Division encourages you to join us in the exciting, far-reaching world of geophysics.

Geoscience Education Division

David A. Stephenson, *Acting GSA Executive Director*
dstephenson@geosociety.org

Education: In one form or another, it's the concern of every geoscientist. Whether we're communicating the results of our research to our colleagues, perusing the latest in *Geology*, speaking about mining operations with a group of concerned citizens, or knee-deep in tidal flat mud with a group of eighth graders, we're teaching, or learning, or both. The Geoscience Education Division brings together members from every geoscientific discipline to foster discussion and active participation in the realm of geoscience education.

Division members recognize that learning is a lifelong process that operates in both formal and informal educational settings. Accordingly, the Division has collaborated with GSA Associated Societies such as the National Association of Geoscience Teachers and the National Earth Science Teachers Association and with other organizations, such as the National Science Teachers Association, while continuing to provide a distinct venue to address the needs and interests of GSA members. Division members' individual interests and activities extend from K-12 education, through undergraduate and graduate education, to adult education, professional education, and informal public education in senior groups; youth groups; civic and community groups; nature associations; national, state, and local parks; and more. The Division provides a professional forum in which K-12 teachers, informal educators, practicing geoscientists, students in geoscience, students in education, and other associates build bridges between educators and learners from a very broad spectrum of backgrounds and interests.

The Division sponsors and cosponsors theme sessions, symposia, field trips, and special activities for scientists, educators, and students at GSA Annual and Section Meetings. It also participates in sponsoring the annual Biggs Excellence in Earth Science Teaching Award to recognize outstanding teaching by a geoscience college faculty member with less than 10 years of teaching experience.

Please join us and lend your energy to the Geoscience Education Division and to the pursuit of high-quality, dynamic geoscience education for everyone, at every stage of life.

History of Geology Division

Sarah E. (Sally) Newcomb, *Chair*
senewcomb@earthlink.net

What is the value of the history of geology? Ask the members of the History of Geology Division, and you may get as many answers as the number of people you ask. But whether the answer is a utilitarian, "to avoid making the same mistakes again," or a more abstract reference to a fascination with the intricate process of building truth from inevitably incomplete and limited observations, we have common ground: the love of our science. History is invaluable in teaching

current "truth" in geology: It provides important insights about how a science grows and changes, and it increases our understanding of productive approaches.

Our membership is highly interdisciplinary and international, with historians of science and all facets of earth scientists represented. The exchange of ideas is continuous and lively. A 1994 Penrose Conference, "Insiders and Outsiders," investigated the links and tensions between history and science and concluded that we enhance each other's understanding of both disciplines.

The Division sponsors and cosponsors many sessions and events at GSA Annual and Section Meetings. At this year's GSA Annual Meeting in Boston, the Division is sponsoring a Pardee symposium on contributions of ophiolite studies to geological thought, an accompanying topical session, a session on geobiography relating geologists' lives to their work, a general session, three field trips, a reception, and a luncheon and awards ceremony. The Division annually presents a History of Geology Division Award to recognize important contributions to the understanding of the history of the geological sciences.

If you would like to become a member of a Division whose recent programs have spanned the time and space between Lamont and plate tectonics; histories of the oil industry and mining; the development of geologic mapping and geologic models; stromatoporoids in the 20th century; Desmarest's problems with the Paris Academy; biographies of geologic pioneers; and art, light, and uniformitarianism, please join us in the History of Geology Division. Visit our Web site at <http://gsahist.org> to view the latest Division newsletter and much more.

Hydrogeology Division

Jean M. Bahr, *Chair*
jmbahr@geology.wisc.edu

The Hydrogeology Division, established in 1959, is the third largest of GSA's 13 Divisions. Hydrogeology investigates the character, source, occurrence, movement, availability, and use of water, and applies its understandings at the intersection with societal needs, practices, policies, and concerns. Hydrogeology is a highly interdisciplinary specialty, with prominent connections to geochemistry, biology, meteorology, engineering geology,

continued on p. 52

continued from p. 51

environmental geology, sedimentology, and stratigraphy.

The Division strongly encourages and supports participation by student members. We sponsor a hydrogeology lecture tour, student research grants, and a strong technical program at the GSA Annual Meeting. The Division also hosts a student reception at the GSA Annual Meeting, where students enjoy free raffle prizes and lively discussions with other students, professionals, and emeritus scientists.

Each year, a leading geoscientist serves as the Birdsall-Dreiss Lecturer, presenting hydrogeology lectures at dozens of academic and research institutions across the country and internationally. The Division recognizes professional accomplishments in hydrogeology by presenting the annual O.E. Meinzer Award for recently published work and the Distinguished Service Award for career contributions to the field. The Division also sponsors representatives to GSA Sections and encourages members to participate in Section Meetings.

We invite you to join us. Please visit our Web site at www.uakron.edu/geology/gshydro for more information on the dynamic Hydrogeology Division.

International Division

M. Dean Kleinkopf, Secretary-Treasurer
mdkleinkopf@worldnet.att.net

The International Division plays a key role as GSA expands its activities in global geology. If you are interested in working with international geoscientists, consider becoming a member of the International Division. Current members of the Division include those whose research and teaching interests have led them to other countries and those whose scientific interests reach across U.S. borders.

The International Division serves the international community of geoscientists in various ways. First, it enriches the exchange of ideas and promotes professional collaborations by helping overseas scientists attend and participate in GSA Annual Meetings and selected international meetings. A principal activity of the Division in 2001 was to help 10 young scientists attend the GSA and Geological Society of London joint meeting on Earth Systems Processes in Edinburgh, Scotland. The Division is also providing partial funding to help young overseas students and professionals attend the GSA Annual Meeting in Boston.

Second, at GSA Annual Meetings and in other venues, the Division coordinates and sponsors meetings, symposia, conferences, and lecture tours on the geology of regions beyond North America. At this year's GSA Annual Meeting, the Division is cosponsoring a Pardee Keynote Symposium on the role of ophiolites in the development of geological thinking and a topical session on International Geologic Correlation Program projects related to modern and ancient plate boundaries and orogens.

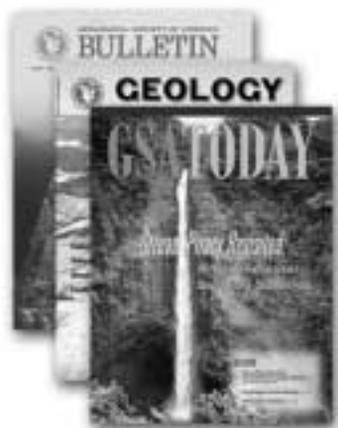
The Division also acts as a clearing center for the distribution of American journals and books to underfunded overseas institutions. It works to strengthen collaboration with overseas geoscience societies to help support projects such as joint meetings, volunteer training courses, assistance with effective English translations, and international exchange of professors, geoscientists, and students.

When you join the International Division, your \$10 annual dues lend support to these important efforts. Please visit our Web site at www.geosociety.org/sectdiv/idiv.htm and consider making an international difference by joining us.

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GSA and a number of other societies involved in the earth sciences collaborate on GSA Annual and/or Section Meetings, where the societies help develop scientific programs, Penrose Conferences, publications, issues of public policy or education, and professional development. "In the Spotlight" features these GSA Associated Societies. For information on how to become an Associated Society, contact gsa@geosociety.org.

In the Spotlight:

NAGT

The National Association of Geoscience Teachers: Dedicated to Geoscience Education

Steven Semken, NAGT President, Diné College, Shiprock, New Mexico, scsemken@shiprock.ncc.cc.nm.us

Carl Drummond, Editor, *Journal of Geoscience Education*, Indiana University–Purdue University, Fort Wayne, Indiana, jge@ipfw.edu

Vicki Harder, NAGT Webmaster, Santa Teresa, New Mexico, nagtweb@aol.com

The National Association of Geoscience Teachers (NAGT), founded in 1938 and a long-time Associated Society of GSA, fosters and promotes excellence in geoscience teaching and learning at all levels and by diverse means.

NAGT is organized into 11 sections, each representing a defined geographic region in which members reside and work, and collectively encompassing the United States and Canada. Many of these sections host annual conferences, field trips, and workshops for their members, sometimes concurrently with GSA Section Meetings. Some publish field-trip guidebooks and other educational materials. The sections also select the annual recipients of the NAGT Outstanding Earth Science Teacher Awards from among the secondary-school teachers in their regions.

NAGT organizes the technical program in geoscience education at every GSA Annual Meeting, and in this context also sponsors numerous technical sessions, workshops, and field trips. The national officers of NAGT also meet at this time and host the popular Monday luncheon, during which the Neil Miner Award (for excellence in college-level teaching and mentoring) and James H. Shea Award (for excellence in geoscience writing or editing) are presented.

NAGT also fosters advances in the teaching and learning of geoscience by means of scholarship aid to summer field-camp students, professional workshops for geoscience faculty, its Distinguished Speaker Series, and the *Journal of Geoscience Education* (now in its 51st year of publication) and through its partnership with the National Association for Black Geologists and Geophysicists.

Journal of Geoscience Education

The *Journal of Geoscience Education* is the publication of record for the NAGT, and serves as the only international forum for the publication of research concerning the pedagogy, assessment, and philosophy of teaching and learning about the geosciences. The *Journal* is the

best source for innovations in geoscience teaching.

Each volume of the *Journal* is published in five issues and runs to a total length of some 600 or 700 pages. The editorial review board consists of the editor and 11 associate editors. Each manuscript submitted to the *Journal* is subject to a standard review process consisting of two external peer reviews, a review by the associate editor assigned to the manuscript, and a review summary and editorial decision by the editor. Each issue typically consists of between six and 10 research papers as well as recurring columns on educational research, mathematical geology, precollege education, and common geological misconceptions. As described below, the *Journal* now offers online versions of the abstracts of published papers and will soon offer online supplemental instructional materials that accompany some publications.

NAGT.org

NAGT's Web site, www.NAGT.org, hosted by the American Geological Institute, offers current information about the association to members and nonmembers alike. The content, updated regularly, includes announcements of workshops, programs, and publications; a direct link to NAGT national and sectional officers; membership information; and many links of interest to geoscience educators.

The NAGT Web site is also becoming the electronic extension of the *Journal of Geoscience Education*. The site offers free access to the table of contents of the most recent editions, and the abstracts of all published articles, beginning with volume 49 (the 2001 volume). There is also an up-to-date author and subject index, instructions to authors, and a selection of editorials. Still under development, but expected soon, will be a series, "Revolving Reviews," featuring the various Web sites with links from NAGT.org, and a new information series, "Misconceptions in the Geosciences," which will focus on listing and then correcting earth science errors held by the general public and teachers, and found in textbooks.

For More Information

NAGT welcomes all those with an interest in practicing and advancing high-quality geoscience education. Information on NAGT membership, subscriptions to the *Journal of Geoscience Education*, and the NAGT section in your geographic region are available at www.NAGT.org. Or, contact the executive director, Robert Christman, xman@cc.wvu.edu, NAGT, P.O. Box 5443, Bellingham, WA 98227-5443.

ANNOUNCEMENTS

2001

- November 12–13 Canadian Aboriginal Minerals Association 9th Annual Conference—Tapping Aboriginal Resources: Opportunities for Aboriginal Community Development Mining Metals and Diamonds, Oil and Gas, Whitehorse, Yukon. Information: 1-800-443-6452, (416) 925-0866, cforum@on.aibn.com.
- December 7–9 National Ground Water Association's Ground Water Expo (also known as the National Convention), Nashville, Tennessee. Information: NGWA Customer Service, 1-800-551-7379, www.NGWA.org.

2002

- February 14–16 The International Deep Foundations Congress, Rosen Plaza Hotel, Orlando, Florida. Information: www.geoinstitute.org/events.html.
- March 4–9 18th Biennial Alaska Miners Conference, Mining in Alaska—The First 100 Years: Where Do We Go from Here?, Fairbanks, Alaska. Information: Tom Bundtzen, (907) 458-8951, fax 907-458-8511, bundtzen@mosquitonet.com; Rich Hughes, (907) 451-0663, fax 907-451-0668, raha@ptialaska.net; www.alaskaminers.org.
- March 24–27 SEPM (Society for Sedimentary Geology) Research Conference—Aquifer Heterogeneity & Environmental Implications, Charleston, South Carolina. Information: M.K. Harris, Savannah River Technology Center, P.O. Box 616, Bldg. 773-42A, Aiken, SC 29808, USA, (803) 725-4184, fax 803-725-7673; mary.harris@srs.gov; www.sepm.org. *Abstract deadline: December 1, 2001.*
- April 14–16 Society of Economic Geologists, Global Exploration 2002—Integrated Methods for Discovery, Denver, Colorado. Information: SEG2002@segweb.org, www.SEG2002.org
- June 8–13 The Clay Minerals Society 39th Annual Meeting, Boulder, Colorado. Information: Kathryn Nagy, Dept. of Geological Sciences, University of Colorado, Boulder, CO 80309, kathryn.nagy@colorado.edu, (303) 492-6187, fax 303-492-2602; Dennis Eberl, ddeberl@usgs.gov, (303) 541-3028, and Alex Blum, aebum@usgs.gov, (303) 541-3027, both of the Division of Water Resources, U.S. Geological Survey, 3215 Marine Street, Boulder, CO 80303, fax 303-447-2505; http://cms.lanl.gov, or www.colorado.edu/geolsci/cms/.
- June 9–14, 19th National Meeting of the American Society for Surface Mining and Reclamation, Lexington, Kentucky. Information: G.G. Marino, MEA, Inc., 907 Fairview Ave., Urbana, IL 61801, (217) 384-2288, fax 217-384-2291. (*Abstracts due: Oct. 15, 2001.*)

2003

- February 10–13 Geotechnical Grouting and Deep Mixing, Fairmont, New Orleans, Louisiana. Information: www.geoinstitute.org/events.html.
- June 22–25 12th Pan-American Conference on Soil Mechanics and Geotechnical Engineering, Massachusetts Institute of Technology, Boston, Massachusetts. Information: www.geoinstitute.org/events.html.

In Memoriam

William H. Allen

Austin, Texas
June 30, 2001

Bruce A. Bouley

Golden Colorado
August 26, 2001

H. Grady Collier Jr.

Metairie, Louisiana
January 3, 2001

William J. Furbish

Tallahassee, Florida
July 21, 2001

Cecil H. Kindle

West Richland, Washington
March 10, 2001

Dorothy LaLonde Stout

Whittier, California
August 26, 2001

John W. Marlette

Sacramento, California

Chris McA. Powell

Nedlands, Australia
July 22, 2001

Chadderdon Price

Cincinnati, Ohio
August 7, 2001

Neilson Rudd

Washington, North Carolina
April 4, 2001

Richard E. Stoiber

Norwich, Vermont
February 9, 2001

Please contact the GSA Foundation for information on contributing to the Memorial Fund.

About People

GSA Fellow **Christopher I. Chalokwu** has been named vice president for academic affairs and professor of science at Saint Xavier University in Chicago. Previously, Chalokwu was vice chancellor for academic affairs and professor of geology at the University of Tennessee at Martin. He also served as the founding dean of the School of Arts and Sciences at Benedict College in Columbia, South Carolina. Chalokwu received the doctorate in geology from Miami University in Ohio.

The Association of American State Geologists (AASG) elected several GSA members and Fellows as new leaders at their annual meeting, held near Butte, Montana, in June. GSA member **Vicki Cowart**, state geologist and director of the Colorado Geological Survey, will serve as president. Cowart has served as AASG's vice president, president-elect, and statistician. Other AASG officers who will serve through June 2002 include president-elect **Emery Cleaves**, state geologist and director of the Maryland Geological Survey. As president-elect, Cleaves, a GSA Fellow, will chair the AASG's Liaison Committee and lead the AASG delegation to visit Washington, D.C. AASG vice president will be GSA member **M. Lee Allison**, state geologist and director of the Kansas Geological Survey. GSA member **John Steinmetz**, state geologist and director of the Indiana Geological Survey, will serve as treasurer, and GSA Fellow **Robert Marvinney**, state geologist and director of the Maine Geological Survey, is the new secretary. Finishing his years of service on the AASG Executive Committee as past president will be GSA Fellow **Jonathan G. Price**, state geologist and director of the Nevada Bureau of Mines & Geology. More information about the AASG and links to all state geological surveys can be found at the AASG Web site, www.kgs.ukans.edu/AASG/AASG.html.

University of Texas at Austin Receives Major Gift

Retired Dallas oilman and noted philanthropist John A. Jackson gave \$25 million to the University of Texas at Austin to create the Jackson School of Geosciences. The school integrates the Department of Geological Sciences with the Institute for Geophysics and the Bureau of Economic Geology. Last year, Jackson and his late wife, Katherine, gave \$15 million to expand the university's Geological Sciences Building.

The intent of this gift is to promote and foster collaborative research among earth science disciplines. It will be used to support basic and applied geological research in all areas of the geosciences, including groundwater research, environmental studies, global climate change, and energy and minerals research. The endowment will support geological research, faculty and student fellowships, visiting scientists, and postdoctoral fellows. This gift is the third largest ever given to the university, and it represents a recognition of the important role the study of current and past geologic processes plays in shaping the future.

USGS Launches Water Data Web Site

In July, the U.S. Geological Survey (USGS) launched its online National Water Information System (NWISWeb), giving the public access to more than 100 years of water data. The site, <http://water.usgs.gov/nwis/>, posts several hundred million pieces of archival and real-time data.

During the floods in Texas from Tropical Storm Allison, one home user logged into the real-time NWISWeb information to determine how high and how fast waters in his area were rising. "We called our friend and woke him up soon enough for him to get his papers and photos up off the floor before he got 21 feet of water through the house," said Theodore Cleveland, University of Houston Department of Civil and Environmental Engineering.

"We have been providing real-time streamflow and historical streamflow data on the Web for several years now," said Robert Hirsch, USGS Associate Director for Water. "What this new system does is to improve that service and integrate it with many other types of water data, including historical water-quality data from rivers and aquifers, historical groundwater level data, and real-time water-quality, precipitation, and groundwater levels."

Society of Economic Geologists Foundation Student Research Grants

Students of mineral resources throughout the world may apply for thesis research grants available in 2002 from the Society of Economic Geologists Foundation. The grants help support master's and doctoral thesis research for graduate students. A limited number of grants are also available to undergraduate students to support exceptional honors degree thesis research projects. For details and application forms, contact: Chair, SEG Student Research Grants, 7811 Schaffer Parkway, Littleton, CO 80127, USA, (720) 981-7882, ext. 204, fax 720-981-7874, seg@segweb.org, www.segweb.org. **Applications must be postmarked by February 1, 2002.**

Ford Foundation Fellowships for Minorities

Approximately 60 predoctoral, 40 dissertation, and 30 postdoctoral fellowships, sponsored by the Ford Foundation and administered by the National Research Council, will be awarded in a national competition. Applicants must be U.S. citizens or nationals who are planning careers in teaching and research at the college or university level, and must be Native American Indian; Mexican American, Chicana, or Chicano; Alaska Native (Eskimo or Aleut); Native Pacific Islander (Polynesian or Micronesian); Black or African-American; or Puerto Rican. For complete details, contact: Fellowship Office, TJ-2041, National Research Council, 2101 Constitution Avenue, Washington, D.C. 20418, (202) 334-2872, fax 202-334-3419, infofell@nas.edu, <http://national-academies.org/fellowships>. **Application deadlines: predoctoral—Nov. 19, 2001; dissertation—Dec. 3, 2001; postdoctoral—Jan. 7, 2002.**

ILLINOIS STATE GEOLOGICAL SURVEY

The Illinois State Geological Survey, a division of the Illinois Department of Natural Resources located on the campus of the University of Illinois in Champaign-Urbana, is accepting applications for the following positions:

Engineering Geologist: Conduct applied research and provide service and expertise in the area of engineering geology and geotechnical engineering. Assist in engineering geology related mapping. Provide prompt, authoritative and current information as requested. Manage and coordinate small projects, teams and committees; may instruct staff as required. Assist in preparing contract reports, publications and/or presentations at local and national meetings. Establish professional contacts with peers in Illinois and around the country and work toward professional recognition. Starting salary range: \$38,000-\$45,000. Closing date: 11/15/01.

Hydrogeologist Mapper: Conduct and/or support original research in hydrogeology and geologic mapping (primarily 1:24,000-scale quadrangles) focusing on the surface and subsurface mapping of aquifers and the hydrogeologic properties of Quaternary (glacial and post-glacial) sediments and possibly shallow bedrock. Acquire, analyze and interpret data. Assist in preparing contract reports, internal and external publications, and/or presentations at local and national meetings. Coordinate activities of professional staff. Starting salary range: \$38,000-\$45,000. Closing date: 11/15/01.

Applied Sedimentologist: Conduct original research in glacial/fluvial sedimentology to define and map the distribution, thickness, variability and quality of sand and gravel deposits in Illinois. Prepare small and large scale maps. Develop three-dimensional models. Work with teams of geologists in mapping 1:24,000-scale quadrangles. Write and publish scientific/technical reports. Represent the Survey at scientific meetings. Visit pits and mines to build contacts within the industry and to gather geological information for research and mapping. Starting salary range: \$44,000-\$50,000. Closing date: 11/30/01.

Geologic Mapping Facilitator: Serve as a facilitator of the ISGS' Geologic Mapping Program. Plan, schedule, collaborate with, and advise scientists and technical personnel on the technical, operational and logistical components required for geoscientific data acquisition, analysis, editing and representation in map form. Determine resource requirements and monitor staff assignments, while contributing to the development, implementation and modification of mapping processes and procedures. Represent the mapping program at Group/Section meetings, committees and working groups to develop, discuss and maintain program standards, processes and procedures. Oversee the maintenance of mapping databases and data sets. Starting salary range: \$44,000-\$50,000. Closing date: 11/30/01.

Benefits for these positions include generous vacation, sick, and personal leave with 12 paid holidays; State Universities Retirement System; state-sponsored group health, dental, vision and life insurance; and University faculty/staff privileges.

For required application form and more information regarding these positions and their qualifications (including education and experience requirements) visit

www.isgs.uiuc.edu

or contact

walston@isgs.uiuc.edu

217-244-2401

Human Resources, ISGS, 615

Peabody, Champaign IL 61820.



EEO/ADA Employer.

Position Announcements

The following employers are among those participating in GSA's Employment Interview Service Nov. 4-7 at the GSA Annual Meeting in Boston.

Hydrogeology and/or Applied Geophysics: The Department of Geography-Geology at Illinois State University invites applications for one and possibly two tenure-track positions in hydrogeology and/or applied geophysics, pending final approval. The preferred starting date is August 16, 2002. The position(s) will be at the assistant-professor level, ABD is required, Ph.D. preferred. Appropriate areas of expertise include: ground-water hydrology, groundwater modeling, applied geophysics, engineering geology, environmental geology, and surface-water hydrology. Other specialty areas that complement the mission of the program will be considered. Applicants must show promise in research, be committed to excellence in teaching at the undergraduate and graduate levels, and have a good rapport with students. Supervision of M.S. research in our geohydrology graduate program is required.

For more information about Illinois State University, see our Web page at: www.ilstu.edu. Applicants must submit a curriculum vitae; official transcripts of all college work; a statement of teaching and research interests; and the names, addresses, telephone numbers, and e-mail addresses of three references to: Dr. David Malone, Department of Geography-Geology, Illinois State University, Campus Box 4400, Normal, IL 61790-4400. Telephone: (309) 438-2692; fax: 309-438-5310; e-mail: dhmalon@ilstu.edu. Review of applications will begin on November 30, 2001.

Environmental Geology: The Department of Geology and Geography at DePauw University invites applications for a tenure-track position in environmental geology to begin in August 2002. Rank and salary commensurate with credentials and experience. A Ph.D. is required, although persons with ABD will be considered.

We are seeking a person who is broadly trained in the geosciences with expertise in hydrogeology and/or geochemistry. The successful applicant will teach a variety of courses for undergraduate students, including Physical Geology, Physical Geography, Applied Hydrogeology, and Geochemistry, will develop research projects for undergraduate students, and will possess excellent field and/or computational skills. DePauw has an exceptional program for supporting its faculty, including startup funding and pre-tenure leaves for new faculty, and funding for professional and curriculum development activities (see <http://www.depauw.edu/admin/acadaffairs/facdev.htm>). Candidates should submit a letter of application, curriculum vitae, three letters of recommendation, transcripts, a statement of teaching interests and philosophy, professional development plans, and a statement of research interests to Dr. Frederick M. Soster, Chair, Department of Geology and Geography, DePauw University, Greencastle, IN 46135. Closing date for applications is November 15, 2001. DePauw University is an Equal Opportunity Affirmative Action Employer; women and minorities are strongly encouraged to apply. For more information about the department, visit www.depauw.edu/acad/geology.

Faculty Position, California State University, Hayward. The Department of Geological Sciences at California State University, Hayward, seeks a dynamic faculty member in applied geophysics. Expertise in sedimentology and stratigraphy is highly desirable, as is field experience using GPR, seismic and other geophysical techniques. A tenure-track position at the assistant-professor level will be offered beginning September 2002, conditional upon availability of funds. The individual hired will be expected to have talents in undergraduate and graduate teaching for a diverse student population, and become part of the research program in geology or environmental science. The department offers B.A., B.S., and M.S. degrees in geology and

plays a major role in the university's environmental science and teacher credential programs. The university and its San Francisco Bay setting offer a rich combination of cultural amenities, renowned geology and nearly limitless research opportunities. Applicants who will possess the Ph.D. by September 2002 should mail a letter of application; curriculum vitae; graduate transcripts; copies of peer-reviewed publications; statement of teaching interests; and three letters of recommendation to: Search Coordinator, Department of Geological Sciences, California State University, Hayward, 25800 Carlos Bee Boulevard, Hayward, CA, 94542-3088. Refer to position #02-03 GEOL-GEOPHYS/SEDIMENT-TT. Review of applications will begin December 15 and continue until a suitable candidate is found. California State University is an Equal Opportunity Employer, and is committed to principles of diversity in employment and education.

Boston 2001 Events, Nov. 4-7

Employment Interview Service

Hynes Convention Center, Ballroom C
Registration and scheduling:

Sun., noon-5 p.m.

Interviews and scheduling:

Mon.-Wed., 8 a.m.-5 p.m.

Roundtable Discussions on Opportunities in the Geological Sciences

Hynes Convention Center, Ballroom C
Sun., 1-3 p.m.

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GeoVentures for GSA Members and Friends

For complete details on GeoVentures or for full itineraries, contact Edna Collis, GeoVentures coordinator, 1-800-472-1988, fax 303-447-1133, ecollis@geosociety.org.

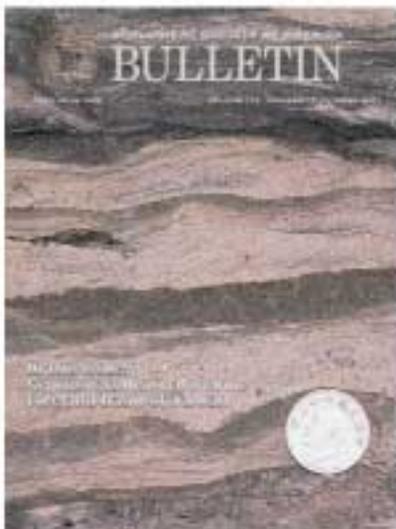
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to the cutoff date. Termination by result in a refund, and no refund accommodations and



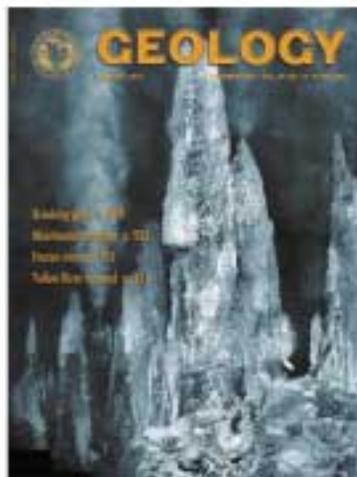
Diamond Peak is one of the many beautiful landforms that will be seen along the Colorado River corridor through Grand Canyon during the "Geology of Grand Canyon" GeoTrips, see p. 58. Photo by Joel L. Pederson



In October *Bulletin*

In this issue:

Cenozoic collisional marine foreland basin of Taiwan



GSA Bulletin and Geology **HIGHLIGHTS**

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In October *Geology*

Breaking glass
Meiofaunal rampage
Frozen vents
Yellow River squared

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Positions Open

CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

California State University Channel Islands invites applications for a full-time tenure-track faculty position within the discipline of geology/earth sciences. The selection will be made on a variety of bases, including tenure/tenure-track appointment at the assistant, associate, or full professor and lecturer levels. For further information and to apply online, please go to our Web site at www.csuci.edu.

AQUEOUS GEOCHEMISTRY AND HYDROLOGY LEHIGH UNIVERSITY

The Department of Earth and Environmental Sciences has an opening at the assistant-professor level for an aqueous geochemist with experience in hydrology. We are particularly interested in individuals who can bring their expertise to bear on interdisciplinary studies of earth systems.

We expect the successful candidate to develop a vigorous externally funded research program, teach undergraduate courses in aqueous geochemistry and groundwater hydrology, offer graduate courses in their specialty to complement our curriculum, and mentor Ph.D., M.S., and undergraduate students in internships and research.

Applicants should submit a letter of application, curriculum vitae, statement of research and teaching interests, up to 3 reprints, and the names of three referees to Gray Bebout, Search Committee Chair, Department of Earth and Environmental Sciences, 31 Williams Drive, Lehigh University, Bethlehem, PA 18015 (phone: 610-758-5831; e-mail: geb0@lehigh.edu). We will begin evaluating applications on November 1. For further information about the EES Department, see: <http://www.ees.lehigh.edu/>.

Lehigh University is committed to recruiting and retaining women and minorities.

UNIVERSITY OF KENTUCKY DEPARTMENT OF GEOLOGICAL SCIENCES TENURE-TRACK FACULTY POSITION IN STABLE ISOTOPE GEOCHEMISTRY

The Department of Geological Sciences at the University of Kentucky invites applications for a 9-month tenure-track position at the assistant-professor level beginning August 2002 in the field of stable isotope geochemistry. The successful applicant will be expected to establish a state-of-the-art stable isotope analytical facility with a research emphasis on low-temperature environmental systems and processes such as (but not limited to) groundwater and surface-water contamination, biogeochemistry, sedimentary geochemistry, organic geochemistry, and paleoclimatology. The candidate should also be able to collaborate with current faculty engaged in research in high-temperature stable isotope geochemistry (metamorphic processes, fluid-rock interaction, igneous petrogenesis, deformation

processes), organic petrology (dispersed organics and coal macerals), and hydrogeology (contaminant fate and transport). Applicants should possess the Ph.D. and have a proven publication and funding record. The successful applicant will be expected to establish a funded, productive research program, including supervision of graduate student research. In addition to current faculty within the department, opportunities exist for collaboration with scientists from the Kentucky Geological Survey, Department of Chemistry, Kentucky Water Resources Research Institute, College of Agriculture, and Medical Center. Teaching responsibilities include geochemistry courses at the graduate and undergraduate level. Interested applicants should send a cover letter, curriculum vita, a brief statement of research and teaching interests, copies of relevant research publications, and the names, addresses, phone numbers, and e-mail addresses of at least three references to: Dave Moecher, Chair, Stable Isotope Geochemistry Search, University of Kentucky, Department of Geological Sciences, Lexington KY 40506-0053.

The committee will begin reviewing applications immediately. For additional information on the Department of Geological Sciences, see www.uky.edu/AS/Geology. The University of Kentucky is an Affirmative Action employer, and applications from minority and female applicants are encouraged.

GEOSCIENCE EDUCATION BOWLING GREEN STATE UNIVERSITY

The Department of Geology invites applications for a tenure-track position at the assistant-professor level beginning August 2002. The position requires a faculty member with a primary research interest in geoscience education. We are seeking a creative and enthusiastic individual to develop and teach innovative undergraduate geoscience courses. Applicants whose interests complement the department's research strengths are preferred. Opportunities to teach upper-level courses in the applicant's geological specialty, as well as a graduate-level course in pedagogy for geology graduate students, will be available.

The successful applicant will be expected to establish a productive research program at BGSU in some area of geoscience education such as curriculum design, assessment, integration of technology, distance learning, K-12 teacher training reform, service learning, or community outreach. Research collaborations with the department's faculty, other science faculty, and faculty in BGSU's College of Education and Human Development are strongly encouraged. Evidence of success in research includes externally funded grants in geoscience education, peer-reviewed publications, or development of successful community outreach programs.

Applicants are required to have a Ph.D. in geology or related field, or a Ph.D. in science education and an M.S. in geology or related field, at the time of employment. Candidates should send a letter of application, curriculum vitae, statements of research and teaching interests and goals, and three current and original letters of recommendation to: Chair, Faculty Search Committee, Department of Geology, Bowling Green State University, Bowling Green, OH 43403. Finalists will be required to provide a transcript for the highest degree. Applications must be postmarked by January 2, 2002. Bowling Green State University is an Equal Employment Opportunity/Affirmative Action employer and encourages applications from women, minorities, veterans, and persons with disabilities.

Additional information regarding the Department of Geology may be found at <http://geosrv01.bgsu.edu>.

CALIFORNIA INSTITUTE OF TECHNOLOGY POSTDOCTORAL FELLOWSHIPS IN GEOLOGICAL AND PLANETARY SCIENCES

The California Institute of Technology announces two fellowships in earth and planetary sciences: **The O.K. Earl Postdoctoral Fellowship and The Texaco Postdoctoral Fellowship.**

These awards are from funds endowed by ORRIN K. EARL, JR. and by the TEXACO PHILANTHROPIC FOUNDATION. Each fellowship carries an annual stipend of \$40,000 and offers a research expense fund of \$1,000 per year and one-way travel to Pasadena. The duration of each appointment will normally be for two years, contingent upon good progress in the first year, and beginning with the 2001-2002 academic year. Fellows are eligible to participate in Caltech's health and dental program.

These fellowships have been established to support the research of scientists typically within two years after receipt of the Ph.D. The intent of the program is to identify and support innovative and creative work in the earth and planetary sciences, with particular emphasis on interdis-

iplinary work. Applicants with training in physics, chemistry, biology or computer sciences are urged to apply. The Caltech faculty is currently active in geobiology, geochemistry, geology, geophysics, petrology, seismology, environmental science and engineering, and atmospheric and planetary sciences. It is expected that each fellowship holder will be hosted by a division professor (designated by the division chairman) who will contribute to the fellowship support both financially and by providing intellectual guidance.

Application forms may be obtained by writing to Prof. E.M. Stolper, Chair, Division of Geological and Planetary Sciences, Mail Code 170-25, California Institute of Technology, Pasadena, California 91125, or send e-mail to: mmedley@gps.caltech.edu, or forms can be downloaded from our Web site: <http://www.gps.caltech.edu/positions/positions.html>.

Completed applications with references should arrive at Caltech by Thursday, December 20, 2001.

Fellowship candidates will automatically be considered for other available postdoctoral positions at Caltech in their fields of interest.

Caltech is an Affirmative Action/Equal Opportunity Employer. Women, minorities, veterans, and disabled persons are encouraged to apply.

RESEARCH SCIENTIST—PLANETARY SCIENCE THE JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LABORATORY

The Space Physics Group of The Johns Hopkins University Applied Physics Laboratory invites applications for a senior-level staff position in planetary science. Candidates should possess the ability to lead programs in several areas of space physics research.

As part of a nationally recognized research and development organization, you will work with an existing planetary science group involved with ongoing planetary missions including CONTOUR and MESSENGER, as well as the recently completed NEAR mission to asteroid 433 Eros. Will also lead research programs in planetary science involving space instrumentation, mission data analysis, and modeling, support major proposal efforts, and publish and present the results of your research.

Requirements include a strong publication record in planetary science, a Ph.D. in geology, geophysics, or the equivalent, and demonstrated communication skills. Although not required, experience in Mars geology/geophysics or icy satellites and a record of individual grant or mission support in these areas are a plus.

JHU/APL offers a comprehensive benefits package that includes a matching retirement program, educational assistance, and salaries commensurate with qualifications and experience.

Interested candidates should send a resume and cover letter that includes their qualifications, research interests and goals, a publication list, and three professional references.

The Johns Hopkins University Applied Physics Laboratory, Attn: Nora R. Rogers, c/o Dr. Andrew Cheng, Planetary Science Director, Recruiter21@jhuapl.edu, fax 240-228-0112, 11100 Johns Hopkins Road, Laurel, MD 20723-6099.

To learn more about JHU/APL, please visit our Web site at <http://www.jhuapl.edu/>.

EOE, M/F/N/D.

KOTTLAWSKI/BUREAU FELLOWSHIP NEW MEXICO BUREAU OF GEOLOGY & MINERAL RESOURCES NEW MEXICO TECH

The New Mexico Bureau of Geology & Mineral Resources (a division of New Mexico Tech) is seeking candidates for the newly established Kottlowski/Bureau Fellowship. The fellowship, for an incoming Ph.D. candidate in the earth sciences at NMTEch, offers a 12-month, \$18,000 salary plus actual tuition costs (guaranteed for 1 year, renewable for 3 years). Additional funding is available to cover some field and laboratory expenses. Applicants can have interests in any earth or environmental science specialty, but will be expected to do a project that is either within the state or of particular interest to the state in conjunction with advisors from both the Bureau and the Department. Application deadline is February 1, 2002. Applicants will automatically be considered for other forms of support through the department. NMTEch is a highly rated science and engineering school, located in Socorro, NM, with 1,600 students and more than 60 professional earth-science faculty and staff shared between the academic division and the Bureau.

A more complete description of the fellowship, NMTEch, and the Bureau is available on departmental and

bureau Web pages (<http://www.ees.nmt.edu> and <http://geoinfo.nmt.edu>). In addition to applying for graduate admission to the department, a letter indicating your interest in this fellowship should be addressed to: Director, Bureau of Geology & Mineral Resources, New Mexico Tech, 801 Leroy Place, Socorro, NM 87801.

MINERALOGIST/PETROLOGIST EASTERN MICHIGAN UNIVERSITY

The Department of Geography and Geology invites applications for a tenure-track faculty position at the assistant-professor level in the field of geology, effective August 2002. A Ph.D. is required at the time of appointment.

We seek a creative candidate with expertise in mineralogy/petrology, who is committed to excellence in undergraduate teaching. Teaching responsibilities will include mineralogy and a diverse array of undergraduate geology and earth science courses. Preference will be given to candidates with a record of research and publication. Strong computer skills and field experience are an asset.

Applicants should send a letter of application including a statement about how you meet the qualifications, your teaching and research interests, a detailed curriculum vitae that includes education, publications, experience; and the names, addresses, phone numbers, and e-mail addresses of at least three references familiar with your teaching and research potential. Send applications or requests for further information to: Posting #F 0207, Eastern Michigan University, 202 Boone Hall, Ypsilanti, MI 48197.

The selection process will begin January 1, 2002, and continue until the position is filled. Eastern Michigan University is an EO/AA employer. Women and minorities are encouraged to apply. For additional information about the department and the university, see our Web site: www.emich.edu/public/geo/welcome.html.

CARLETON COLLEGE DEPARTMENT OF GEOLOGY PETROLOGY AND DYNAMICS, CRUST AND UPPER MANTLE

The Geology Department at Carleton College invites applications for a tenure-track position (Ph.D. completed or substantially completed) at the assistant-professor level. We seek an individual with broad strengths in the processes and evolution of the crust and upper mantle, using the tools of petrology, geochronology, structural geology, and possibly geophysics. The ideal applicant will have demonstrated outstanding teaching skills with an emphasis on field- and laboratory-oriented, hands-on learning. In addition, we seek someone who will be actively engaged in a strong research program that can include undergraduate students in an integral way. All Carleton geology majors complete a senior thesis; we expect our new colleague to help students design and carry out these projects, many of which represent a half a year's worth of research and writing.

The successful candidate is expected to teach three or four courses and associated labs each year, including introductory courses, core courses for majors, and advanced courses. Core course responsibilities for petrology, structural geology, tectonics, and mineralogy will be shared with existing staff. Carleton's geology department averages between 16 and 30 majors in each graduating class; it is a vibrant place that emphasizes cooperation, discussion, field work, inquiry-based learning, creativity, and intellectual depth in a supportive atmosphere. Carleton's geology department has a strong, successful tradition of teaching geology as one of the liberal arts and we are looking for someone to help carry on that tradition.

The position begins in late August 2002. Interested individuals should submit a letter discussing their qualifications, statements of teaching and research interests (the latter addressing how undergraduate students will be incorporated), plus a curriculum vitae with the names and addresses of at least three references (we will solicit letters for applicants passing the initial selection) to Shelby J. Boardman, Acting Chair, Department of Geology, Carleton College, One North College Street, Northfield, MN 55057. Applications will be considered until an appointment has been made, but to ensure full consideration, applications should be received by October 15, 2001. Carleton College is an equal opportunity/affirmative action employer. Women and minorities are encouraged to apply.

AMHERST COLLEGE ASSISTANT PROFESSOR

The Department of Geology at Amherst College solicits applications for a tenure-track position at the level of assistant professor to begin in the fall of 2002. We seek a sedimentologist whose interests and expertise may also include stratigraphy, paleontology, paleoclimatology, marine geology, and/or oceanography.

The successful candidate will teach sedimentology and an additional upper-level course or courses that will strengthen our undergraduate major and complement the present departmental offerings in tectonics, structural geology, hydrogeology, aqueous geochemistry, petrology, and geophysics. All geology faculty teach at the introductory

level as well. Preference will be given to candidates with a demonstrated interest in continued development and teaching of our introductory course in surficial earth systems and the environment. Geology faculty also supervise undergraduate research projects annually.

Candidates must have an ongoing program of research. Amherst College provides competitive start-up funds in support of research. A Ph.D. is required and postdoctoral experience is desirable.

Submit a résumé, a brief statement of your research interests, transcripts, and three letters of recommendation to: Professor Tekla A. Harms, Chair of the Search Committee, Department of Geology, Amherst College, Amherst MA 01002-5000 (taharms@amherst.edu). Review of applications will begin on November 20, 2001, but applications will be accepted until a pool of qualified candidates is identified.

Amherst College is an equal opportunity/affirmative action employer. Women, minorities, and persons with disabilities are particularly encouraged to apply.

BAYLOR UNIVERSITY STRUCTURAL GEOLOGY

The Department of Geology at Baylor University invites applications to fill a vacancy in structural geology, rank and salary negotiable. A Ph.D. in geology or a related discipline is required at the time of appointment. Responsibilities will include introductory and advanced instruction in structural geology, supervision of graduate research, and the development of an active research program. The successful candidate will be expected to support the graduate program in petroleum geology, regardless of their area of specialty. Applications for this tenure-track position will be reviewed beginning immediately, and will be accepted until the position is filled. To ensure full consideration, your application must be completed by November 30, 2001.

Applicants should submit a letter of application addressing qualifications and experience, a curriculum vitae, description of teaching and research interests, transcripts of academic work, and the names of three professional references to: Dr. Stacy Atchley, Department of Geology, P.O. Box 97354, Baylor University, Waco, Texas 76798-7354. Phone: (254) 710-2361. E-mail: stacy_atchley@baylor.edu. Fax: 254-710-2673. The Baylor Geology Web site is www.Baylor.edu/~Geology.

Baylor is a Baptist university affiliated with the Baptist General Convention of Texas. As an Affirmative Action/Equal Opportunity employer, Baylor encourages minorities, women, veterans, and persons with disabilities to apply.

BIOGEOCHEMISTRY UNIVERSITY OF MASSACHUSETTS, AMHERST

The Department of Geosciences seeks applications for a full-time tenure-track position in biogeochemistry, to begin September 2002. The appointment will likely be at the assistant professor level, but exceptionally strong candidates above that level are encouraged to apply; a completed Ph.D. is required.

The area of specialization is open and could include, for example, application of organic or isotope chemistry to paleoceanography, sediment biogeochemistry, or geomicrobiology. Candidates with backgrounds in biogeochemical cycling of the elements in modern or ancient environments are particularly encouraged to apply. We expect the appointee to have an excellent grasp of analytical techniques and to establish a state-of-the-art laboratory in his or her field in our newly renovated Biogeochemistry Laboratory. Preference will be given to candidates whose expertise would lead to productive interactions with existing groups in the department (see the department's Web site at <http://www.geo.umass.edu>). The successful candidate will be expected to develop a vigorous, externally funded research program and to demonstrate excellence in both teaching and research. Teaching responsibilities include a course in earth history (every other year) and graduate and undergraduate courses/seminars in his/her research area.

The department offers a broad-based program in geology and earth systems at the undergraduate, M.S., and Ph.D. levels. In addition, the university has strong programs in microbiology and paleobiology, with the Graduate Program in Organismic and Evolutionary Biology housed with Geosciences in the same building. We would also encourage the successful candidate to foster strong synergies with relevant faculty within other departments on campus. Outside of UMass, the Pioneer Valley has a diverse and active community of earth scientists with geology programs at each of four nearby colleges (Smith, Hampshire, Amherst, and Mount Holyoke colleges).

Review of applicants will begin November 1; the position will remain open until a successful candidate is identified. Applicants should send a letter of interest outlining research and teaching plans, a curriculum vitae, and the names/addresses/fax numbers and e-mail addresses of at

least three referees to: Search Committee Chair, Department of Geosciences, Morrill Science Building, 611 North Pleasant Street, University of Massachusetts, Amherst, MA 01003-9297.

The University of Massachusetts is an Equal-Opportunity Affirmative-Action Employer; women and members of minority groups are encouraged to apply.

GEOMORPHOLOGY/SURFICIAL PROCESSES FURMAN UNIVERSITY

The Department of Earth and Environmental Sciences at Furman University invites applications for a tenure-track position at the assistant-professor level for the fall 2002.

The required qualifications are a Ph.D. in geology or physical geography, the ability to develop a strong undergraduate research program, and some teaching experience. Experience using current ESRI software and an interest in applying GIS to geological, environmental, and ecological research is desired. Teaching duties would include earth systems, geomorphology, and an advanced course in area of expertise. The successful candidate would be expected to excel in teaching and to develop a strong research program involving talented undergraduates. The department currently consists of four faculty with specializations in watershed hydrology, biogeochemistry, structure and tectonics, mineralogy and petrology, and sedimentation. Furman University is a private liberal arts university with a strong emphasis on undergraduate research and teaching. Furman's location in the Piedmont region of South Carolina at the base of the Blue Ridge escarpment provides many opportunities for field tripping and research in fluvial processes, neotectonics, and landscape evolution, including human impact on the landscape.

Applicants should send a vita including experience, publications, statement of teaching philosophy and research interests, and names of three references. Applicants should discuss how their research could be applied in the undergraduate setting.

Applications and requests for more information should be sent to Kenneth A. Sargent, Dept. of Earth and Environmental Sciences, Furman University, Greenville, SC 29613 or e-mailed to ken.sargent@furman.edu. Furman University is an equal opportunity, affirmative action employer.

TENURE-TRACK POSITION IN GEOPHYSICS INDIANA UNIVERSITY-PURDUE UNIVERSITY AT INDIANAPOLIS (IUPUI)

The Geology Department at IUPUI invites applications for a tenure-track, assistant professorship in geophysics. We seek an individual who will develop an externally funded research program and is committed to high quality undergraduate and graduate teaching. A research specialty in geophysics as applied to environmental issues is preferred, and applicants should demonstrate potential for collaboration with faculty in geochemistry, hydrology, and/or sedimentology. Preference will be given to individuals with ability to teach introductory geology and structural geology as well as geophysics.

IUPUI is Indiana's third largest university, with about 28,000 students. The Geology Department is composed of 10 full-time and nine adjunct faculty, with about 60 undergraduate and 15 graduate majors. The department is closely affiliated with the Center for Earth and Environmental Science, which provides opportunities for multidisciplinary collaboration in research and education. Further information about the department and the university is available at www.geology.iupui.edu.

A Ph.D. in geology or a related field is required at initial appointment, beginning in August 2002. Interested candidates should send a curriculum vitae, statements of research and teaching interests, and the names of three referees by November 15, 2001, to Dr. Andrew Barth, Search and Screen Committee, Department of Geology, Indiana University-Purdue University, 723 W. Michigan Street, Indianapolis, IN 46202-5132.

IUPUI is an equal opportunity, affirmative-action employer.

PALEONTOLOGY/BIOGEOSCIENCE UNIVERSITY OF OREGON

The Department of Geological Sciences of the University of Oregon invites applications for an entry-level, tenure-track position to begin in fall 2002. We seek a researcher with interests in fundamental problems of paleontology and biogeochemistries, including the origin and evolution of life, evolutionary radiations, mass extinctions, and relationships among organisms, geochemical cycles and environmental change. Our interests are broad and range from microbial biogeology to vertebrate paleontology.

The successful applicant will be expected to develop an academically oriented, externally funded, research program, and to contribute to the teaching of undergraduate paleontology and advanced courses in his/her research specialty. Completion of the Ph.D. is required.

Applicants should send a curriculum vitae, statement of teaching and research interests, and contact information for at least three referees to Biogeoscience Search Com-

ASSISTANT PROFESSOR

Aqueous Chemistry

Hydrology Program,
Dept. of Land, Air, and Water Resources
University of California, Davis

A tenure-track position is available for an Assistant Professor and Assistant Aqueous Chemist in the Agricultural Experiment Station. This is an academic year appointment; 11-month term employment will be offered and continued based on academic performance review.

We are especially interested in candidates with strong credentials for creating an internationally recognized and independent research program in aqueous chemistry/geochemistry. The candidate must be capable of addressing watershed and water quality issues across broad scales of time and space with particular attention to interfaces between chemically distinct environments. The appointee will interact with multidisciplinary research teams and is expected to teach, advise, and supervise undergraduate and graduate students, and to participate in outreach programs.

For application and inquiries, visit our website <http://LAWR.ucdavis.edu>, or contact Dr. Thomas Harter, Search Committee Chair, Hydrology Program, Dept. of Land, Air and Water Resources, University of California, Davis, CA 95616-8558. Ph: (530) 752-1120, E-mail: searchhwd@ucdavis.edu

These positions remain open until noon, to ensure consideration applications should be postmarked by November 30, 2001. The University of California, Davis, is an affirmative action and equal opportunity employer.

ASST./ASSOC. PROFESSOR

Environmental Chemistry

Department of Environmental Toxicology
University of California, Davis

A tenure-track position is available for an Assistant/Associate Professor and Assistant/Associate Environmental Chemist in the Agricultural Experiment Station. This is an academic year appointment; 11-month term employment will be offered and continued based on academic performance review.

We are especially interested in individuals who have, or will establish, a strong and innovative research program in chemistry that relates to the environment. Areas of interest could include sources, transport, and/or fate of organic toxicants in water, soil, air and/or biota. The successful applicant is expected to have or to develop an independent, internationally recognized and well-funded research program, to teach, train, and supervise undergraduate and graduate students and to collaborate with established programs within the University. Applicants at the Associate level should have demonstrated excellence in research and teaching.

For application and inquiries, visit our website <http://EToxEnvChem.ucdavis.edu> or contact Dr. Ronald Tyendema, Chair, Search Committee, Environmental Toxicology Dept., University of California, Davis, CA 95616-8558. Phone: (530) 754-5192. Email: LmChom@cmr.ucdavis.edu

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ENVIRONMENTAL AND ENGINEERING GEOPHYSICISTS required by Geo-Services International (UK) Ltd, Oxfordshire, UK. Apply to info@zetica.com. Visit www.zetica.com.

Opportunities for Students

2nd Rice Type Locale Field Trip: CUBA, Continent-Island Arc Collision, January 3-12, 2002, Rice University Department of Earth Science. The Department of Earth Science at Rice University will host a field trip to Cuba, examining a type example of a continent-island arc collision. Cuba not only has fascinating geology, but is beautiful. Before the Eocene, Cuba was part of the Caribbean plate, but after its collision with the Bahama Platform in Eocene time, Cuba became part of the North American plate. Cuba offers a wide variety of rock types and structures: ophiolites, serpentinites, island arc basalts, and eclogites; Jurassic/Cretaceous clastic sedimentary rocks and platform limestones; karst topography; Quaternary terraces and eolian deposits; and modern lagoons and reefs. There are also chaotic deposits related to the meteorite impact at Chicxulub, Yucatan, Mexico, that wiped out the dinosaurs and many other groups of plants and animals at the Cretaceous-Tertiary boundary. We will also visit a few tourist spots and have some time to roam the streets of Havana.

Undergraduate and graduate students of other universities who apply early (by October 15) for admission to the graduate program in the Department of Earth Science, Rice University, can also apply to attend this field trip. Student participants will receive a substantial subsidy from the Department. Some room is available for faculty from other universities and colleges. For application to the graduate program and the field trip, see the departmental Web page at <http://terra.rice.edu>, or contact Sandra Flechsig at sandraf@rice.edu.

mittee, Department of Geological Sciences, 1272 University of Oregon, Eugene, OR 97403-1272. We will begin reviewing applications November 1, 2001, and will continue until the position is filled.

The University of Oregon is an equal opportunity/affirmative action institution committed to cultural diversity and compliance with the Americans with Disabilities Act.

HYDROGEOLOGY UNIVERSITY OF MASSACHUSETTS AT AMHERST

The Department of Geosciences of the University of Massachusetts at Amherst intends to make a tenure-track faculty appointment in the field of **hydrogeology**. The University of Massachusetts at Amherst is a Research 1 University awarding both masters and Ph.D. degrees in geosciences. Further details can be found at our Web page <http://www.geo.umass.edu/>. The ideal candidate will be a geologist with research interests that apply the principles of ground water systems to the development of water resources or understanding subsurface transport. Research in all areas of hydrogeology are of interest, including for example, groundwater contaminant transport, vadose zone hydrology, flow through fractured systems, deterministic or stochastic models of fluid flow systems, hydroclimatology, geophysical characterization techniques, and chemical hydrogeology. The department has a long history of field-based research combined with experimental and modeling studies, and we wish to continue this focus. Developing an externally funded research program involving issues of national relevance is expected. This hydro-program will contribute to supporting the goals of our dynamic graduate program.

The department values good teaching, and the major instructional responsibilities will involve introductory hydrogeology on an annual basis along with appropriate upper-level courses in more specialized topics. The successful candidate will also be expected to share in teaching a large-enrollment general-education course on a rotating basis.

The expected appointment will be at the assistant-professor level but outstanding senior candidates will be considered; a completed Ph.D. is required. Please send application materials, including curriculum vitae, names of 3 references (with e-mail addresses and fax numbers) and a

letter discussing your plans for teaching and research by October 30, 2001. Review of applications will start November 1st until a short list is finalized. Please send materials to: Hydrogeology Search Committee, Department of Geosciences, University of Massachusetts, 611 North Pleasant Street, University of Massachusetts, Amherst, MA 01003-9297.

The University of Massachusetts is an Equal-Opportunity Affirmative-Action Employer. The position is contingent upon university funding.

FACULTY POSITION, REMOTE SENSING GEOSCIENTIST UNIVERSITY AT BUFFALO, THE STATE UNIVERSITY OF NEW YORK

The Department of Geology at the University at Buffalo, a Research I University, invites applications for a tenure-track faculty position in remote-sensing geoscience, starting in August 2002 at the rank of assistant or associate professor. The successful candidate will demonstrate a potential for research and teaching that will complement and integrate with our existing programs in volcanology and environmental geology. Existing research in the department includes studies of volcanoes, surficial processes, neotectonics, fractured rock systems, ground water, and basin analysis, including oil and gas exploration. All these research programs presently involve remote sensing. The successful candidate may also wish to collaborate with the National Center for Geographic Information and Analysis and the Center for Computational Research at the University at Buffalo. Teaching duties will involve undergraduate and graduate level courses in the candidate's specialties, and will include introductory structural geology. Successful candidates must have a Ph.D. degree at the time of appointment. Apply with a statement of teaching and research goals and a curriculum vitae, including published research, grant support, and names of at least three references to: Chair, Search Committee, Department of Geology, 876 Natural Science Complex, University at Buffalo, The State University of New York, Buffalo, NY 14260-3050. More information about our department can be found at: <http://www.geology.buffalo.edu>. We will begin evaluating applicants December 15, 2001. The University at Buffalo is an Equal Opportunity Employer/Recruiter.

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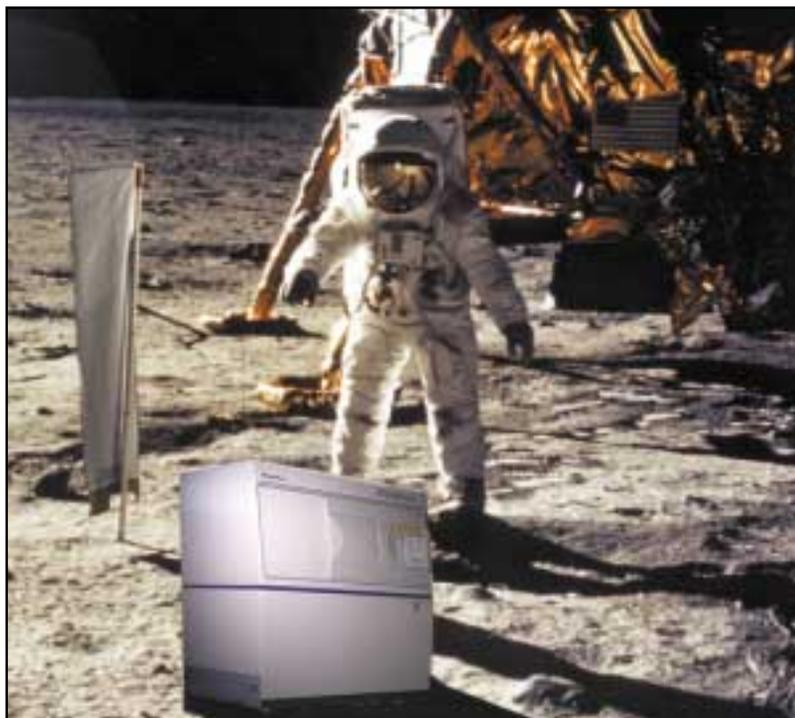
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