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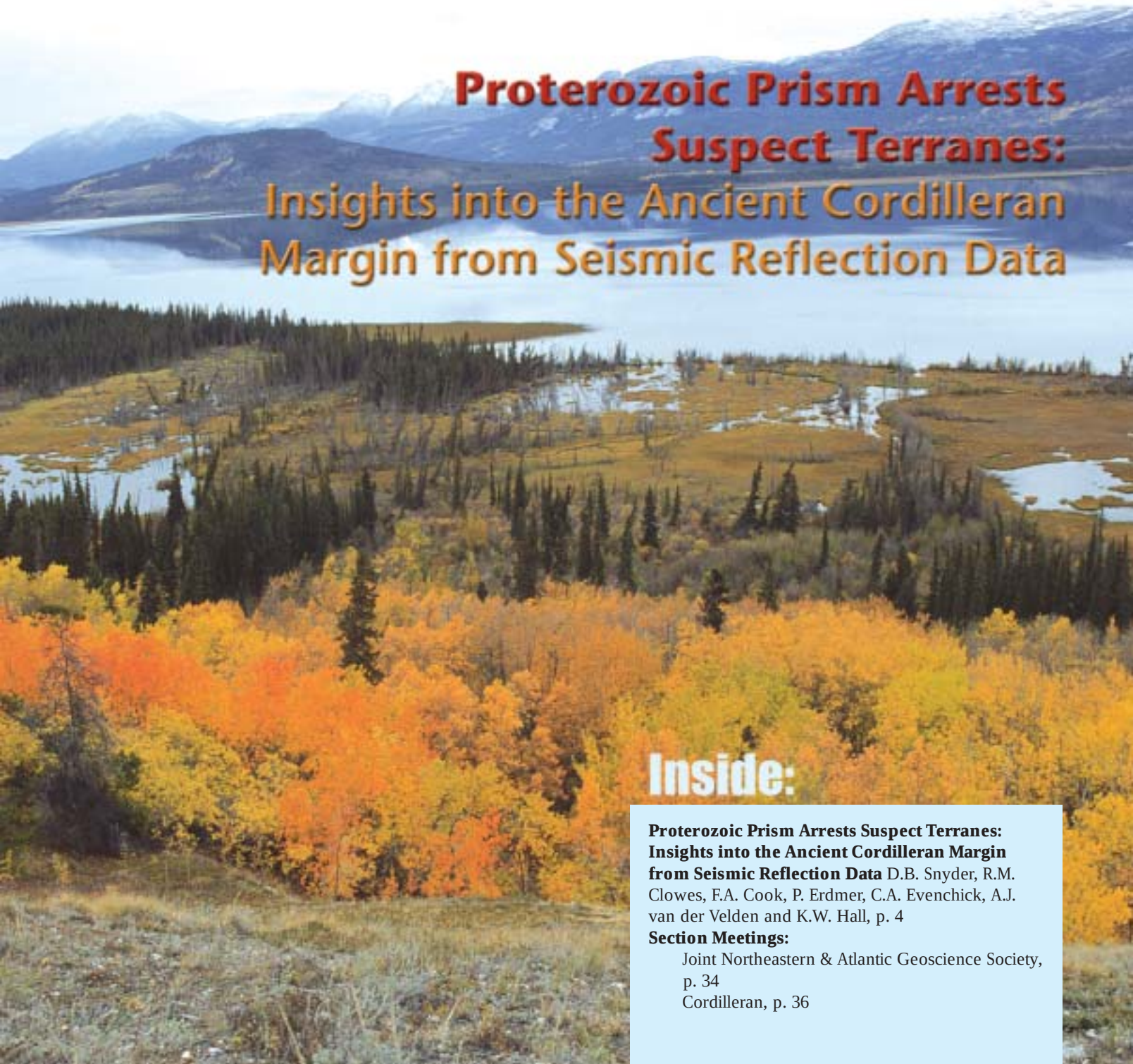

Proterozoic Prism Arrests Suspect Terranes: Insights into the Ancient Cordilleran Margin from Seismic Reflection Data

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Red Rocks, Denver, Colorado. Photo used with permission from Denver Metro Convention and Visitors Bureau.

On the cover: View looking west across Little Atlin Lake, Yukon Territory, Canada, near station 20000 on SNORCLE line 3. The mountains in the distance are part of the Cache Creek terrane, one of the allochthonous terranes of the northern Canadian Cordillera that was stripped off of its lithospheric roots and became arrested on North American strata. The Cache Creek terrane appears to be ≤10 km thick in this area. Photo by A. van der Velden. See "Proterozoic Prism Arrests Suspect Terranes: Insights into the Ancient Cordilleran Margin from Seismic Reflection Data," by Snyder et al., p. 4–10.

Proterozoic Prism Arrests Suspect Terranes: Insights into the Ancient Cordilleran Margin from Seismic Reflection Data

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ABSTRACT

The Canadian Cordillera is one of the principal regions from which the hypothesis of exotic, accreted, or suspect terranes was developed a few decades ago. In an important modification to this hypothesis, new field mapping and seismic reflection profiling reveal a vast volume of Proterozoic strata of largely North American affinity along the margin, leaving little room for the suspect terranes. The Proterozoic strata, deposited in at least three distinct periods between 1.85 and 0.54 Ga, form a reflective tectonodepositional prism or wedge that has a volume greater than a million cubic kilometers, extends over 1000 kilometers in length, and makes up most of the crust of the Canadian Cordillera. The suspect terranes apparently grounded upon and were arrested by this metamorphosed sedimentary prism during a complex interplay of thrusting and strike-slip displacements 190–170 Ma. Thus, the Cordilleran suspect terranes, excepting Stikinia, have shallow roots only a few kilometers deep, with no deep crust or mantle attached.

INTRODUCTION

Large sediment fans along continental margins at the mouths of rivers such as the Indus, Ganges, and Amazon are among the most impressive geological features on Earth today (e.g., Clift et al., 2001). Ancient sedimentary prisms along rifted margins such as those found beneath the North Sea, the Gulf of Mexico, or the north shelf of Australia (Stagg et al., 1999), while less easily recognized, are equally major features. New deep crustal seismic reflection profiles collected in western Canada as part of the LITHOPROBE program (Clowes et al., 1999) reveal a tapering wedge of layered rocks that is interpreted here to be an ancient sedimentary wedge. This wedge or reflective prism was deposited in a rift margin along western North America that may have persisted from 1.85 to 0.54 Ga. (Ross et al., 2001; Thorkelson et al., 2001).

The presence of a thick sedimentary prism beneath the western Canadian Cordillera has important implications for the suspect terrane hypothesis. This hypothesis states that North America grew by addition of a series of exotic (sometimes called "suspect") crustal and oceanic microplates along the Cordilleran (western) margin between 200 and 50 Ma (Coney et al., 1980). However, if much of the lower crust is of conformable North American affinity, as proposed here, the overlying exotic or suspect terranes must be thin thrust sheets, <10 km thick, with no deep crustal or mantle roots.

From 1999 to 2000, LITHOPROBE acquired nearly 1900 km of deep seismic reflection profiles in two transects of the North American Cordillera in British Columbia and the Yukon (Fig. 1). These profiles completed the SNORCLE (Slave Northern Cordillera Lithosphere Evolution) transect of western North America, which began with a 1996 survey from Yellowknife to Nahanni Butte in the Northwest Territories (Fig. 1; Cook et al., 1999). The combined SNORCLE profiles take advantage of the regional north-south orientation of Proterozoic and younger rocks in northwestern Canada to address the nature of continental evolution from the Early Archean of the Slave Province to the Modern convergent plate boundary between the North American and the Pacific plates in the area studied by the ACCRETE project (Fig. 1) (Morozov et al., 2001).

The Cordilleran survey used standard LITHOPROBE acquisition strategy for crustal scale profiling, this strategy being based on experience gained over two decades of similar activities. Five large Vibroseis trucks generated four 20 s 10–80 Hz sweeps at source points spaced 75 m apart. A 576-channel spread of 12-geophone receiver groups spaced 50 m apart recorded each sweep for 32 s. When processed, the data produced two continuous reflection cross sections across most of the Cordilleran mountain belt to depths as great as 100 km (equivalent to 22 s in Fig. 2).

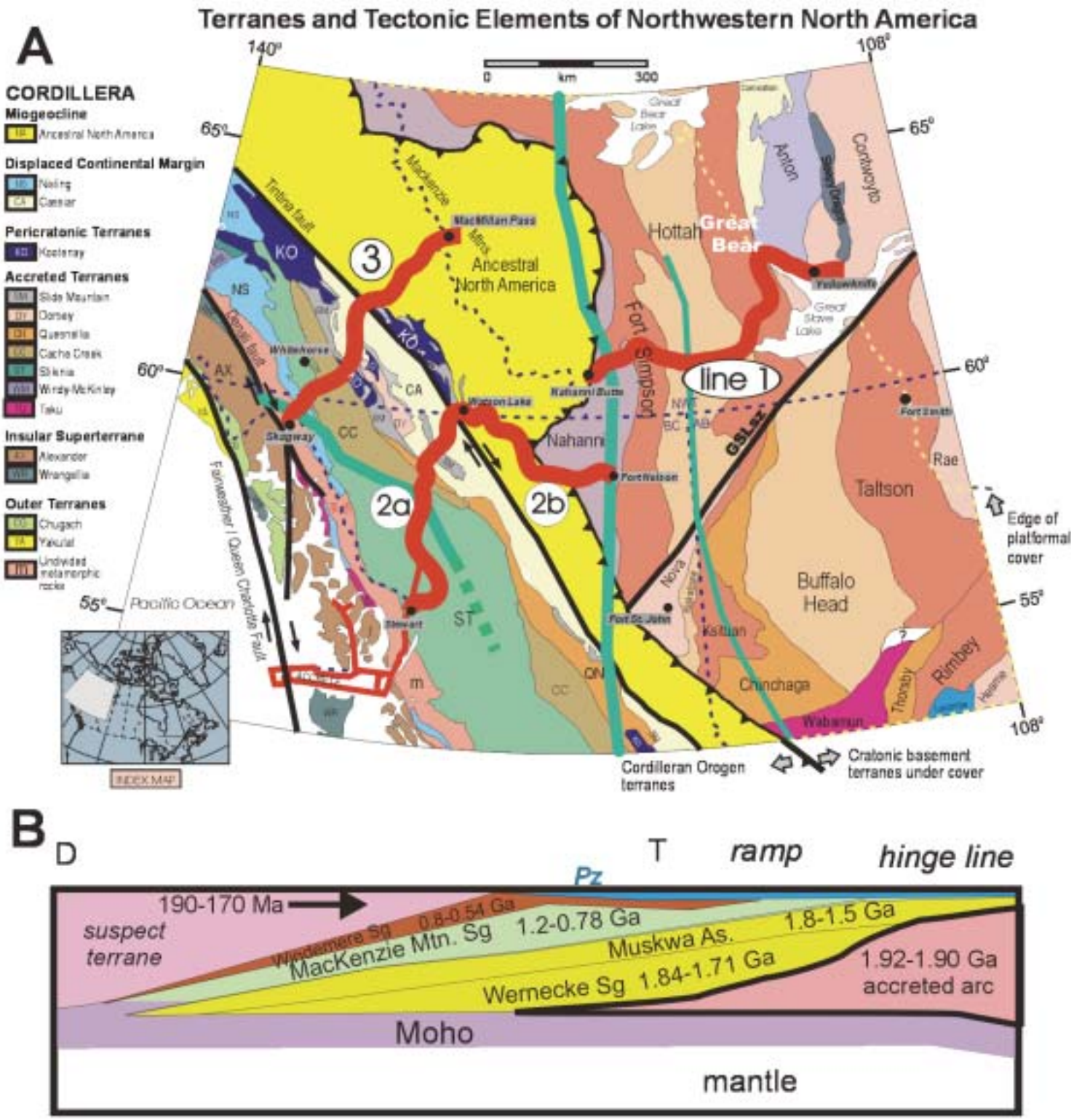
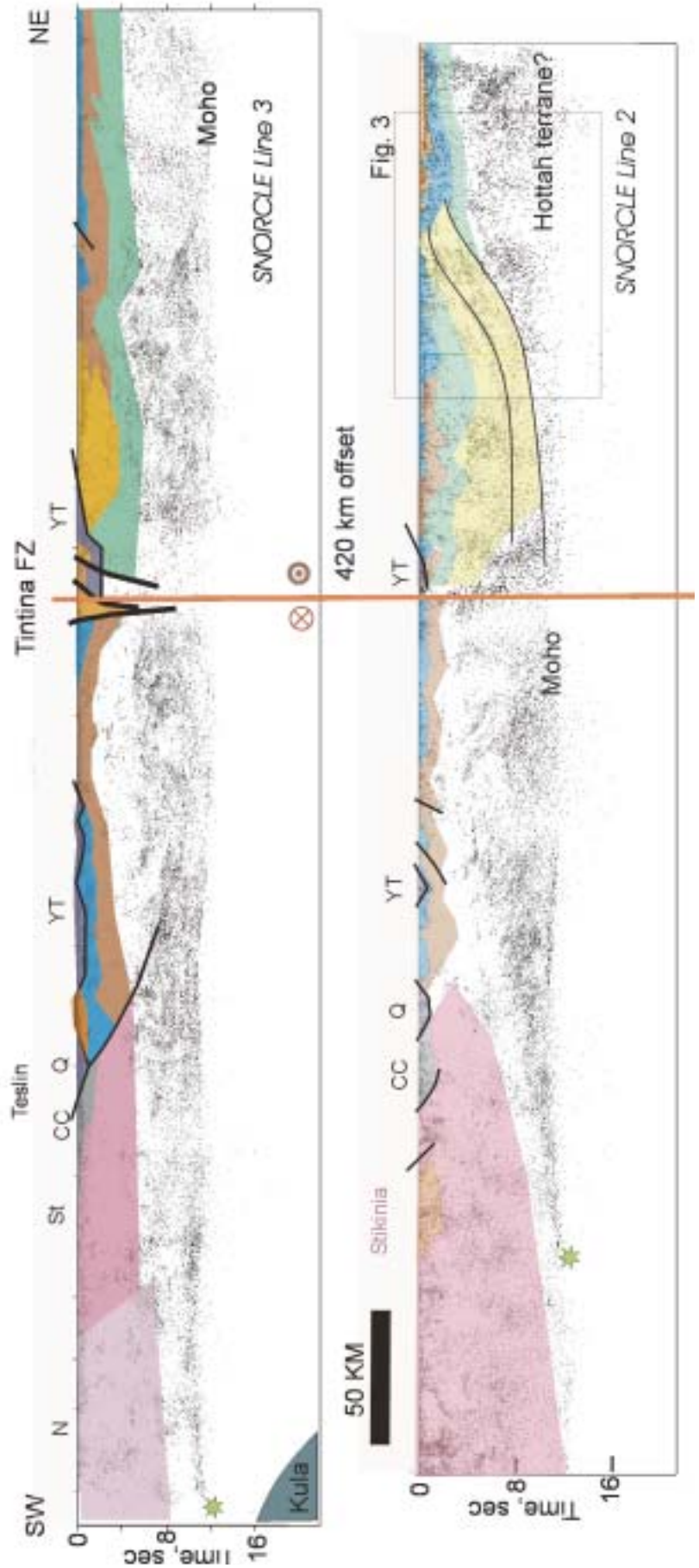


Figure 1. A: Location map of SNORCLE (Slave Northern Cordillera Lithosphere Evolution) transect study region and its four component seismic reflection profiles and related ACCRETE survey. Black dashed line with barbs marks structural frontal thrust of Cordillera. Thick blue-green lines mark limits of where Proterozoic strata are here interpreted to occupy much of the crust; thinner line marks continental "hinge line" where these sedimentary rocks begin to thicken significantly. **B:** Cartoon cross section illustrating main geological elements as interpreted from SNORCLE transect observations. Four main periods of sedimentation are indicated: 0.8–0.54 Ga Windermere, 1.2–0.78 Ga MacKenzie Mountain, and 1.84–1.71 Ga Wernecke Supergroups, and the lesser known 1.815–1.5 Ga Muskwa assemblage (Cook and MacLean, 1995; Ross et al., 2001). Ramp (Clark and Cook, 1992) coincides with eastern limit of thick strata shown in Fig. 1A. T, D are Tintina and Denali strike-slip fault zones. Section has 5:1 vertical exaggeration. Pz are Paleozoic strata.



NATURE OF SNORCLE REFLECTORS

When viewed as a whole, the newest SNORCLE seismic reflection sections are most notable for the triangular, or wedged-shaped, areas where reflections are more densely spaced or of higher amplitude than elsewhere (Fig. 2). Many earlier deep seismic sections showed prominent lower-crustal reflectivity (e.g., Klemperer and Hobbs, 1991), but none has shown systematic lateral variation or wedge-shaped areas as prominent as the westward tapering ones in the lower crust observed on the SNORCLE data.

The continuity of the SNORCLE profiles allows individual crustal reflective layers that make up these wedges to be mapped from the near surface along the eastern margin of the mountains, where they tie with outcrop (e.g., Young et al., 1979; Clark and Cook, 1992), to depths of 30 km beneath the western Cordillera (Fig. 2). Several decades of experience in acquiring deep seismic reflection data within the LITHOPROBE program and by similar international organizations have provided clues to the nature of these strong, continuous reflectors in the middle and lower crust. We know from up-dip projections and outcrop correlations in continental interior (shield) settings that the vast majority of the most prominent reflectors are mafic intrusions into the felsic upper crust, stratigraphic contacts, or major shear zones (Snyder and Hobbs, 1999, and references therein).

In an orogenic setting such as the Canadian Cordillera, such correlations are less certain because of complex structure. A series of sub-parallel reflections that correlates with stratigraphic contacts and

Figure 2. Composite seismic reflection section of SNORCLE lines 2 and 3. Line 3 is a single continuous section, compiled as it was acquired; line 2 is a composite of lines 2a and 2b with segments parallel to Cordilleran strike removed and the remaining segments projected onto a profile approximately parallel with line 3. Green star marks westernmost tip of reflective wedge on each profile. Black lines mark locations of faults, either mapped or inferred from offsets or truncations of reflections. Vertical orange line marks Tintina fault zone. If 420 km of right lateral offset is restored, the western part of line 3 will align with the eastern part of line 2 and the reflective wedge appears nearly continuous across this break. Suspect terranes: CC—Cache Creek; N—Nisling; Q—Quesnellia; St—Stikinia; YT—Yukon-Tanana. Orange colored units in near surface are Mesozoic igneous rocks or sedimentary rocks (at east end of Line 2). Paleozoic strata are colored blue, Windermere Supergroup strata are red-brown, MacKenzie Mountain Supergroup strata are green, and Muskwa-Wernecke Supergroup strata are yellow. Parts of the lower crust are left uncolored where interpretation is uncertain; our preference is that most parts in the eastern half are Muskwa-Wernecke Supergroup strata or basement. Hottah terrane is inferred Proterozoic magmatic arc crust. Kula is inferred subducted Kula oceanic plate based on clear dipping reflections from 16 to 20 s.

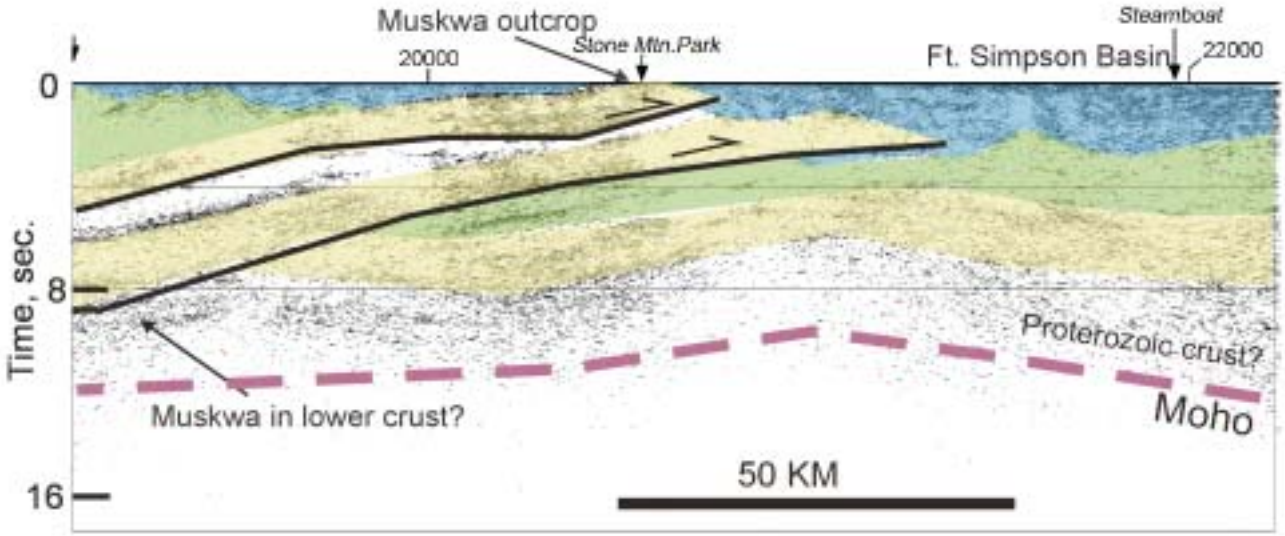


Figure 3. Detail of reflection section near Muskwa anticlinorium. This enlarged section illustrates that the westward-dipping geometries of thrust sheets (arrows show sense of offset), which bring Muskwa (Sequence A) strata to the surface near the Cordilleran frontal thrust (Fig. 1), can be traced continuously into the lower crust.

thrust faults at the surface, and that can be traced without breaks or offsets to depths of 20–25 km, can be assumed to represent those same features at depth. This is the case with the Muskwa anticlinorium (Figs. 2 and 3). Similarly, reflectors that correlate with outcrops of mafic intrusions and that continue into the mid-to-lower crust can be assumed to map the feeder system for those intrusions. Good examples of reflectors associated with mafic intrusions and unconformities appear on SNORCLE line 1 east of Yellowknife (Fig. 1) (Cook et al., 1999).

PROTEROZOIC STRATIGRAPHY

Within the part of the Cordillera studied by the SNORCLE profiles, outcrop correlations enable reflective layers to be matched with several Proterozoic sedimentary rock units that include the 0.8–0.54 Ga Windermere (Sequence C), the 1.2–0.78 Ga MacKenzie Mountain (Sequence B), and 1.84–1.71 Ga Wernecke Supergroups, and the lesser known 1.815–1.5 Ga Muskwa assemblage (Sequence A) (Fig. 1B) (Cook and MacLean, 1995; Ross et al., 2001). Collectively, these layers are interpreted as a clastic apron deposited along the rifting Proterozoic continental margin of ancient North America. The depositional environment of individual formations is described as varying from basin fill to prograding delta to shallow margin to deep-water turbidites (Aitken and McMechan, 1991). The sediment budget may be similar to that of the present-day Ganges-Brahmaputra system, where about one-third of the total sediment load that originates in the interior of the continent is stored in the Bengal fan (Goodbred and Kuehl, 1999). The other two-thirds are floodplain and deltaic components of the same sedimentary units, and in the Cordillera may be partly represented by the Athabasca and Thelon basins.

Stratigraphic studies of these Proterozoic sedimentary units, where type sections are exposed, document thicknesses of 7–21 km, but correlations with the seismic reflectors indicate a total sequence as thick as 25–30 km at the ancient continental slope or "ramp" (Fig. 1) (Clark and Cook, 1992; Cook et al., 1999). Within the eastern half of the clastic wedge, we estimate that 0–5 km of Windermere Supergroup strata overlie a combined 5–25 km sequence of Muskwa and Wernecke strata and crystalline basement layers or tectonically inserted thrust slices. These dimensions make the wedge comparable in scale to the modern Indus fan, but the Cordilleran wedge represents a compound feature deposited over a period up to 10 times longer.

We identify and map this distinctive wedge of predominantly lower continental crust using its characteristic bands of prominent reflectivity, as compared with the much less reflective overlying upper crust and underlying mantle. We interpret the wedge as predominantly Proterozoic strata through correlations with a few key outcrops in the east. Nevertheless, the depth to basement beneath the strata is uncertain.

Interpretation of SNORCLE line 1 in the Northwest Territories (Fig. 1) (Cook et al., 1999) indicates that older (1.92–1.845 Ga) magmatic arc crust underlies the wedge in the eastern part of the British Columbia profile and along regional tectonic strike (Fig. 2). The current high heat flow throughout the Cordillera (Lewis et al., 2002) and the great depth of burial of both wedge and underlying rocks, indicate that basement, Proterozoic strata, and Paleozoic rocks within the lower half of the wedge are now all metamorphosed into gneiss and granulites (e.g., Evenchick et al., 1984). Proterozoic sedimentary rocks could retain primary layering and structures during this metamorphism, but bulk physical properties such as seismic velocities and density would become largely indistinguishable from those of typical igneous rocks.

EVIDENCE FOR TECTONIC THICKENING

Numerous basins worldwide have been studied in detail because of their petroleum content. The bands of reflections that characterize the wedge

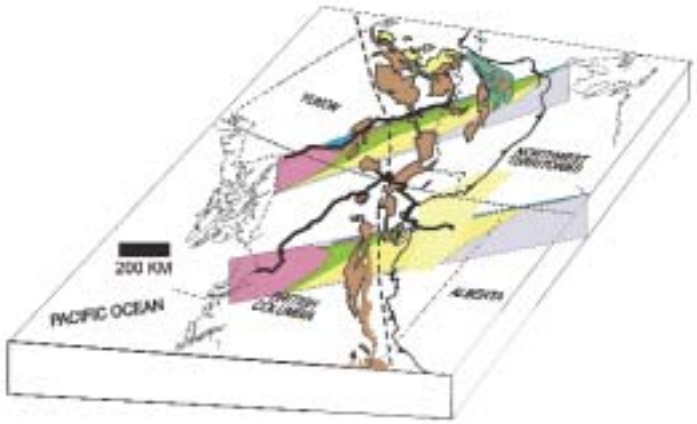


Figure 4. Three-dimensional perspective view of Proterozoic sedimentary rocks exposed in western Canada and crustal cross sections derived from seismic profiles. Outcrop locations are shown with respect to the seismic reflection profiles (heavy black lines) and major tectonic features such as the Tintina fault zone (dashed line), Cordilleran frontal thrust (barbed line) and Pacific coastline. Brown shaded units are Proterozoic Sequence C (Windermere Supergroup), green units are Sequence B (MacKenzie Mountains Supergroup), yellow shaded units are Sequence A (Muskwa assemblage), purple color marks exotic terrane Stikinia in cross section. Yellow area straddling the Northwest Territories and British Columbia border is subcrop of Muskwa assemblage as delimited by drill holes.

described here do not show geometries typical of these sedimentary rocks. For example, a prograding fan cannot be demonstrated directly from seismic sequence stratigraphy analysis of our data from lines 2 and 3. Instead, the bands are observed as gently folded and interleaved, but on scales of up to 10–15 km vertically and many tens of kilometers laterally. This deformation, due to horizontal shortening, occurred around the time of sediment deposition, in the late Proterozoic (Cook, 1988; Cook and MacLean, 1995) and again hundreds of millions of years later, when suspect terranes were accreted to North America and the mountains of the Cordillera formed. Truncations above these folded reflection bands by nearly horizontal reflections demonstrate that in most places the overlying crust moved obliquely toward the foreland over the top of the buried wedge.

The implied continuity of individual reflectors and groups of reflectors from surface outcrop to lower crustal depths leads us to conclude that most of the layered reflective wedge is sedimentary strata, metamorphosed to various grades according to their depths. We cannot exclude the possibility that some layers within the lower crust also include slivers of older crystalline continental crust, tectonically interleaved with the Proterozoic stratigraphic sequences.

Bands of reflections are generally continuous within the crustal wedge, but do not cross its base (at 11.5 s two-way traveltime). The gently undulating reflection Moho, near or at the crust-mantle boundary (e.g., Welford et al., 2001), does not appear to be locally deformed or offset. At the top of the wedge, gently westward-dipping reflections truncate eastward-dipping layers within it (Fig. 2). In a few locations along the imaged 500–700 km dip length of the prism, such as at the Muskwa anticlinorium (Fig. 3) (Thompson, 1991), the reflection geometries indicate that sedimentary rocks within the prism were thrust to the surface on faults rooted near the Moho.

CONTINUITY AND EXTENT OF THE WEDGE-PRISM

The Tintina–Northern Rocky Mountain trench fault zone is arguably the most striking single feature on geological and topographic maps of this part of the Cordillera (Wheeler and McFeely, 1991). The only location for which a break in the reflective wedge can be convincingly argued is where this fault zone crosses the seismic profiles (Fig. 2). If the minimum amount of the proposed 450–800 km of right-hand strike-slip displacement along this fault (Gabrielse, 1985) is restored, then the western part of the northern seismic profile becomes roughly aligned with the eastern part of the southern profile. The presence of the wedge on three widely separated cross sections after this reconstruction further confirms the large extent (>900 km reconstructed strike length) and uniformity of this reflective wedge along the continental margin. Furthermore, the inferred 1–10 million km^3 volume of layered rock deposited on the North American margin between 1.85 and 0.54 Ga, which now resides within the reflective prism, provides insight into the vast amount of material eroded from the continent during this time period.

The continuity of this reflective wedge, both along strike between the two SNORCLE profiles and across its width, is its most obvious and significant characteristic. One important factor is that this segment of the North American Cordillera has undergone only limited amounts of extension (i.e., <10%) in contrast to the considerable extension associated with the southern Canadian Cordillera (Cook and Varsek, 1994) or the western United States (e.g., Allmendinger et al., 1987). As a result, individual reflection packets observed in the northern Cordillera were not stretched or dismembered beyond recognition. However, due to lack of data we cannot presently assess the full northern or southern extent of the reflective wedge (Figs. 1 and 4).

THIN SUSPECT TERRANES

None of the numerous exotic (suspect) terranes that represent most of the surface rocks along the northwestern margin of North America (Wheeler and McFeely, 1991) are observed to break through this lower crustal reflective wedge. These terranes, some exotic to North America, some perhaps originally marginal to it, apparently grounded or arrested on top of the wedge of Proterozoic and early Paleozoic layers. Some terranes such as Yukon-Tanana, Cache Creek, and Quesnellia were detached from their roots and thrust 200–400 km onto the margin of North America as thin (<5 km) crustal flakes (Fig. 2). Other terranes, such as Stikinia, docked above and outside of the leading edge of the layered wedge and make up most of the crust there today (Fig. 2).

Most previous workers inferred that suspect terranes did not occupy the entire crust (e.g., Gabrielse, 1985) nor fully represent the deeper tectonics of the orogen (e.g., Oldow et al., 1990). The extreme thinness of some terranes and small volume represented collectively by these terranes implied by the seismic reflection data are new. The recognition that most of these terranes, as well as tectonic slices of North American

Precambrian strata, collectively form a hanging-wall block above a detachment surface at the top of the Proterozoic wedge helps to constrain the order and timing of their accretion to the North American continent. For example, if terranes occupy only the uppermost 10 km of crust, it becomes mechanically improbable that the various suspect terranes were stacked on top of one another or overrode one another. The simplest order of accretion is the obvious order in which the terranes appear at the surface today. The interpreted thinness of the terranes also de-emphasizes their volumetric importance in the overall architecture of the Cordillera. As a corollary, the recognition of the thin suspect terranes emphasizes the volumetric importance of lithospheric material, in the form of mantle detached from the suspect terranes, that has been recycled into the mantle.

DISCUSSION AND MORE GENERAL IMPLICATIONS

LITHOPROBE, with its component transects such as SNORCLE, is widely recognized for its interdisciplinary and collaborative studies (Clowes et al., 1999). Each transect is anchored by the subsurface geometries established by deep seismic reflection profiles that provide a complete two-dimensional image of structures well into the uppermost mantle. In most transects, a number of individual two-dimensional profiles provide some three-dimensional control on interpreted features. Supporting geophysical, geochronological, geochemical, and geological studies add multidisciplinary input and provide the broad geoscience context within which comprehensive interpretations and models of tectonic evolution are developed.

In SNORCLE, for example, geochemical analysis of mantle xenoliths entrained in Cretaceous to Recent volcanic eruptions indicates that the North American plate ends somewhere between the Tintina and Teslin zones (Fig. 2) (Creaser et al., 1997; Abraham et al., 2001). This implies that North American mantle underlies the Proterozoic North American sedimentary strata as interpreted from the reflection sections discussed herein. Heat flow studies throughout the Cordillera indicate that the average heat flow in the region of lines 2a and 2b is remarkably high, ~105 mW/m^2, resulting in high calculated crustal temperatures (Lewis et al., 2002). If similar temperatures existed during the orogenic evolution of the Cordillera, the only significant strength would be found in the upper crust, implying some form of middle to lower crustal detachment as proposed from the reflection data. Moreover, the high temperatures imply high-grade metamorphic rocks in the lower crust, again as inferred in our interpretation. In contrast, magnetotelluric results suggest a laterally varied mantle and crust (Ledo et al., 2002), in variance to the horizontally stratified wedge of reflectors described here. These observations are not incompatible; they require further study to determine the nature of the sub-Moho rocks on our SNORCLE sections. Is it highly attenuated North American continental lithosphere or of more primitive, oceanic affinity?

Although suspected from recent stratigraphic studies, the vast volume of Proterozoic sedimentary deposits along the western margin of North America requires rethinking of some long-held ideas. Are these deposits orogenic or rift related? Although the genesis is different, the final structure of a slowly filling rift or coalescing alluvial fans cannot be distinguished if only one margin is preserved (see Ross et al., 2001, and Thorkelson et al., 2001, for further discussion). Existing stratigraphic studies indicate that a long-lived, slowly subsiding rift is most probable. The rift basin was fed by at least four major sedimentation pulses that were widely spaced in time over about 1 b.y. Our Indus analogy would represent just one of these pulses. Potential source regions of these pulses include the Trans-Hudson Orogen of central Canada and most of the Precambrian age orogens recognized in North America.

The relatively shallow décollement between the prism and the overlying suspect terranes revisits concepts of thin-skinned thrusting and the compressive strength of the footwall material. Although much of the wedge of Proterozoic material is likely sedimentary in origin, it is now metamorphosed and deformed into gneiss and therefore acts mechanically as granitic basement. This describes a geometry very similar to those recognized in many locations worldwide as thin-skinned thrust zones, for example the Appalachians, Caledonides, and Urals. Sedimentary prisms of the volume described here are not known in those orogens, but perhaps are just not yet recognized.

ACKNOWLEDGMENTS

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Geology and Public Policy Committee to Develop Position Statement

GSA Council has approved a proposal prepared by the Geology and Public Policy Committee to develop a statement on GSA's position on "The Value of Geologic Mapping." This statement is intended to encourage the teaching of skills required to prepare geology maps, acknowledge advancements in the interpretive and technological skills involved in the development of geology maps, declare the support of the GSA membership for continuing growth in public financial support of geologic mapping, and recognize excellence in field-based research activities published in GSA publications.

The Council's decision to proceed with the development of this important statement on the value of geologic mapping is an achievement of the presidency of Anthony J. Naldrett, who appointed a review panel to consider comments and suggestions of the GSA members and charged panel members according to GSA policy. The final version of this statement will be presented for the Council's approval.

The review panel is now accepting comments from Council and GSA members. The "Proposed Public Policy Statement on the Value of Geologic Mapping" is on GSA's Web site at www.geosociety.org/aboutus/position3.htm. Please submit your comments on this proposal by January 1, 2003, either electronically to Thomas J. Evans, Review Panel Chair, at tevans@facstaff.wisc.edu or by mail to the attention of Karlon Blythe, GSA, P.O. Box 9140, Boulder, CO 80301-9140, USA.

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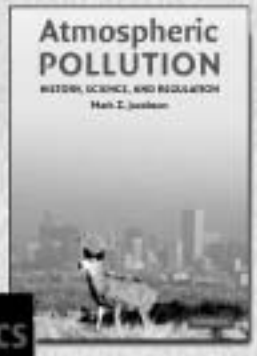

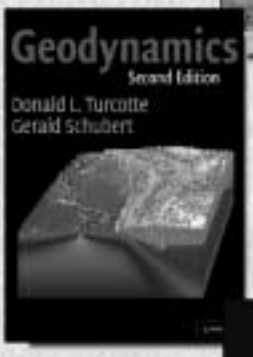

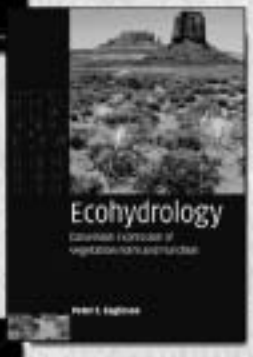

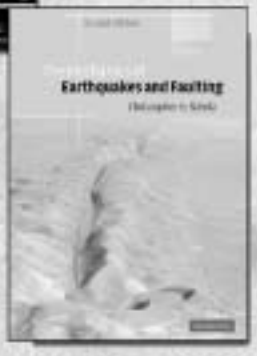

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All sessions will be held in the Colorado Convention Center and are oral unless indicated as poster sessions. Check the GSA Web site—www.geosociety.org—for updates, detailed listings, abstracts, and the titles and authors database.

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
SATURDAY, OCTOBER 26			
1	7:55 a.m.	T11. Society of Economic Geologists Special Session: The Global Tectonic Setting of Ore Deposits—Present Understanding and New Advances I *(Society of Economic Geologists)*	A102/104/106
2	1:15 p.m.	T11. Society of Economic Geologists Special Session: The Global Tectonic Setting of Ore Deposits—Present Understanding and New Advances II *(Society of Economic Geologists)*	A102/104/106
SUNDAY, OCTOBER 27			
3	8 a.m.	Carbonate Stratigraphy-Geochemistry-Diagenesis (Posters)	Exhibit Hall
4	8 a.m.	Coal Geology (Posters)	Exhibit Hall
5	8 a.m.	Geomicrobiology	C108/110/112
6	8 a.m.	Geophysics/Tectonophysics/Seismology	C101/103
7	8 a.m.	Hydrogeology (Posters) I: Physical Hydrogeology	Exhibit Hall
8	8 a.m.	Neotectonics/Paleoseismology (Posters)	Exhibit Hall
9	8 a.m.	Paleoclimatology/Paleoceanography (Posters) I	Exhibit Hall

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
10	8 a.m.	Paleontology/Paleobotany I: Quantifying Morphology and Morphological Trends	A108/110
11	8 a.m.	Paleontology/Paleobotany II: Paleoecology and Preservational Bias	A112
12	8 a.m.	Planetary Geology (Posters)	Exhibit Hall
13	8 a.m.	Structural Geology: Faults, Folds, and Fabrics	C109
14	8 a.m.	Tectonics (Posters) I	Exhibit Hall
15	8 a.m.	K4. Geologic and Ecologic Responses to Landscape Disturbances *(GSA Quaternary Geology and Geomorphology Division)*	Ballroom 2 & 3
16	8 a.m.	T13. Case Studies in Landslide Problem Solving, Landslide Monitoring, and Alarm Methodology: In Honor of David J. Varnes *(GSA Engineering Geology Division, Association of Engineering Geologists)*	A101/103
17	8 a.m.	T19. Groundwater and Hardrock Mining *(GSA Hydrogeology Division, International Association of Hydrogeologists)*	A209
18	8 a.m.	T34. The Anisotropy of Magnetic Susceptibility of Granitic Rocks: New Methodological Developments, Interpretations, and Challenges *(GSA Structural Geology and Tectonics Division)*	A201
19	8 a.m.	T52. Denver Basin Bedrock Aquifers—Past, Present, and Future *(GSA Hydrogeology Division, Colorado Ground-Water Association)*	Ballroom 4
20	8 a.m.	T63. The Terrestrial-Aqueous Interface: Multidisciplinary Research and Opportunities *(GSA Hydrogeology Division)*	A205
21	8 a.m.	T68. Yucca Mountain Update: Recent Advances from Scientific Investigations of the Unsaturated Zone I *(U.S. Department of Energy—Yucca Mountain Project)*	A207
22	8 a.m.	T72. Rocky Mountains I: Geologic Records of Paleoelevation	C102/104/106
23	8 a.m.	T75. Paleosols and Phanerozoic Climate: Geochemistry to Trace Fossils	C105/107
24	8 a.m.	T76. Three Billion Years of Reef Evolution I *(Paleontological Society)*	A105/107
25	8 a.m.	T85. Microprobe Monazite Geochronology: New Developments and Applications *(Mineralogical Society of America)*	C201
26	8 a.m.	T88. Early Mars *(GSA Planetary Geology Division)*	A102/104/106
27	8 a.m.	T92. Effective Communication and/or Partnership Among Geoscientists, the Public, and Policy Makers: Case Studies *(National Association of Geoscience Teachers, GSA Geology and Public Policy Committee, Critical Issues Caucus)*	A111/109
28	8 a.m.	T99. Geology, Biogeochemistry, and Ecology: A New Synthesis for Arid Landscape Processes *(GSA Quaternary Geology and Geomorphology Division, GSA Geobiology and Geomicrobiology Division)*	C209
29	8 a.m.	T119. Nonconventional Fold-Thrust Belts: Assessing the Spectrum of Variation in a Structural Style *(GSA Structural Geology and Tectonics Division, Ocean Energy, Inc.)*	Exhibit Hall
30	8 a.m.	T120. Structure and Tectonics of the Midcontinent, North America *(GSA Structural Geology and Tectonics Division)*	C207
31	1 p.m.	Paleontology/Paleobotany III: Early Life	A108/110
32	1 p.m.	Planetary Geology	C101/103
33	1 p.m.	Tectonics I: Extensional Tectonics	C102
34	1 p.m.	T2. Nature, Effects, and Control of Groundwater at Archaeological Sites *(GSA Archaeological Geology Division, GSA Hydrogeology Division)*	A112
35	1 p.m.	T3. Obsidian Sources and the Distribution of Archaeological Sites from These Sources *(GSA Archaeological Geology Division)*	A101/103
36	1 p.m.	T10. Role of Mafic Magmas in the Generation of Porphyry Copper Deposits *(Society of Economic Geologists)*	C109
37	1 p.m.	T15. Decay and Conservation of Stone Buildings and Monuments *(GSA Engineering Geology Division, Stone Weathering and Atmospheric Network)*	C201
38	1 p.m.	T18. Geohazards and Transportation Routes *(GSA Engineering Geology Division)*	A111/109

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
39	1 p.m.	T37. Educational Issues in Teaching and Research at Two-Year Colleges *(National Association of Geoscience Teachers*)	C105/107
40	1 p.m.	T43. Urbanizing Geoscience Education *(Center for the Advancement of Science and Technology Education, Middle Tennessee State University)*	A105/107
41	1 p.m.	T46. Contributions of American Geologists to Theoretical Tectonics on the Basis of Research Done West of the 100th W Meridian in the Latter Half of the 19th Century *(GSA History of Geology Division, History of Earth Sciences Society)*	C108/110/112
42	1 p.m.	T54. Flow and Transport in Fractured Aquifers—From Field Characterization to Model Construction *(GSA Hydrogeology Division)*	A205
43	1 p.m.	T58. Hydrogeology and Water Resources of the High Plains Aquifer: Issues for Public Policy Over the Next 50 Years *(GSA Hydrogeology Division, High Plains Aquifer Coalition of State Geological Surveys)*	A207
44	1 p.m.	T62. The Role of Analytic Elements in Groundwater Modeling *(GSA Hydrogeology Division)*	A201
45	1 p.m.	T64. The What, When, Why, and How Much of Chemical (Nutrient) Supplements for Bioremediation *(GSA Hydrogeology Division, GSA Geobiology and Geomicrobiology Division)*	A209
46	1 p.m.	T77. Advances in the Fossil Record of Insects and Terrestrial Arthropods *(Paleontological Society, GSA Geobiology and Geomicrobiology Division)*	A102/104/106
47	1 p.m.	T94. Injecting Geoscience Into Public Policy: Strategies That Work	Ballroom 4
48	1 p.m.	T101. Interdisciplinary Approaches to Understanding Soil and Vadose Zone Hydrology of Saprolite: Integration of Hydrogeology, Sedimentology, Geomorphology, Pedology, and Biology *(GSA Hydrogeology Division, GSA Sedimentary Geology Division; SEPM—Society for Sedimentary Geology; GSA Quaternary Geology and Geomorphology Division)*	C209
49	1 p.m.	T123. Tectonic Modeling Applied to the Characterization and Evaluation of Yucca Mountain as a National Nuclear Waste Repository Site: Concepts, Methods, and Hazard Analyses at Local and Regional Scales	C207
50	1 p.m.	T124. Thermal and Mechanical Significance of Gneiss Domes in the Evolution of Orogens *(GSA Structural Geology and Tectonics Division, Mineralogical Society of America)*	C205

MONDAY, OCTOBER 28

51	8 a.m.	Archaeological Geology (Posters)	Exhibit Hall
52	8 a.m.	Economic Geology I: Magmatic PGE-Cr-Cu-Ni, VMS, Sed-hosted Pb-Zn-Cu, and Alaska Au Deposits	C201
53	8 a.m.	Environmental Geoscience	A201
54	8 a.m.	Geochemistry, Aqueous	C205
55	8 a.m.	Geoscience Education	C109
56	8 a.m.	History of Geology	A207
57	8 a.m.	New Geologic Research Along the Plate's Edge: The USGS Southern California Areal Mapping Project (SCAMP) (Posters)	Exhibit Hall
58	8 a.m.	Quaternary Geology/Geomorphology (Posters) I	Exhibit Hall
59	8 a.m.	Quaternary Geology/Geomorphology I	C209
60	8 a.m.	Sediments, Clastic (Posters) I: Methods, Processes, and Petrology	Exhibit Hall
61	8 a.m.	Stratigraphy (Posters) I	Exhibit Hall
62	8 a.m.	K1. Earth Sciences Challenges in the National Problem of High-Level Radioactive Waste Disposal	Ballroom 2 & 3
63	8 a.m.	T7. Diverse Origins of Sedimentary Rock-Hosted Disseminated Gold Deposits: A Global Perspective *(Society of Economic Geologists, U.S. Geological Survey)*	A101/103
64	8 a.m.	T14. Integrated Studies of the Effects of Abandoned Mines on the Environment *(GSA Engineering Geology Division, GSA Hydrogeology Division, Association of Exploration Geochemists)*	A111/109

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
65	8 a.m.	T24. Human Health Sciences and Geosciences: Bridging the Gap	C102/104/106
66	8 a.m.	T26. Sigma Gamma Epsilon Student Research (Posters) *(Sigma Gamma Epsilon)*	Exhibit Hall
67	8 a.m.	T27. From Geochemistry of the Geosphere, Atmosphere, and Cosmos to Forensic Environmental Geochemistry I: A Tribute to Ian Kaplan *(Geochemical Society, Organic Geochemistry Division of the Geochemical Society)*	C101/103
68	8 a.m.	T44. New Heights in Geoscience Information: Access and Technology *(Geoscience Information Society)*	A112
69	8 a.m.	T48. Application of Biological and Hydrochemical Tracers in Groundwater Quality Investigations *(GSA Hydrogeology Division, GSA Geobiology and Geomicrobiology Division*)	Ballroom 4
70	8 a.m.	T56. Groundwater Depletion and Overexploitation I: A Global Problem (*GSA Hydrogeology Division, International Association of Hydrogeologists)*	A209
71	8 a.m.	T60. Rivers in Karst: Processes and Applications *(GSA Hydrogeology Division, Karst Waters Institute, GSA Sedimentary Geology Division, GSA Quaternary Geology and Geomorphology Division)*	A205
72	8 a.m.	T63. The Terrestrial-Aqueous Interface (Posters): Multidisciplinary Research and Opportunities *(GSA Hydrogeology Division)*	Exhibit Hall
73	8 a.m.	T70. Antarctica During the Neogene *(GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	C105/107
74	8 a.m.	T76. Three Billion Years of Reef Evolution II: Onshore-Offshore Paleoenvironmental Reconstructions *(Paleontological Society)*	A105/107
75	8 a.m.	T78. Developing Perspectives on the Ecological Context of Biological Evolution Across the Neoproterozoic-Cambrian Transition *(Paleontological Society, GSA Geobiology and Geomicrobiology Division)*	A102/104/106
76	8 a.m.	T85. Microprobe Monazite Geochronology: New Developments and Applications (Posters) *(Mineralogical Society of America)*	Exhibit Hall
77	8 a.m.	T90. Terrestrial Approaches to Extraterrestrial Problems and Vice Versa *(GSA Planetary Geology Division)*	A108/110
78	8 a.m.	T98. Geological and Ecological Responses to Landscape Disturbances (Posters) *(GSA Quaternary Geology and Geomorphology Division)*	Exhibit Hall
79	8 a.m.	T113. Extensional Tectonics in the Southern Basins and Ranges, United States, and in Western Turkey *(GSA Structural Geology and Tectonics Division)*	C207
80	8 a.m.	T117. Rocky Mountains II: Lithospheric Structure and Evolution of Rocky Mountain Region, from Deep Mantle to Mountain Tops I *(GSA Structural Geology and Tectonics Division)*	C108/110/112
81	1:30 p.m.	Archaeological Geology	A205
82	1:30 p.m.	Economic Geology II: Carlin Au, Low and High Sulfidation Au-Ag-Cu, Porphyry Cu-Mo-Au, and W-Skarn Deposits	A105/107
83	1:30 p.m.	Environmental Geoscience (Posters) I	Exhibit Hall
84	1:30 p.m.	Geochemistry, Aqueous (Posters)	Exhibit Hall
85	1:30 p.m.	Geoscience Education (Posters) I	Exhibit Hall
86	1:30 p.m.	Paleoclimatology/Paleoceanography (Posters) II	Exhibit Hall
87	1:30 p.m.	Quaternary Geology/Geomorphology II	C201
88	1:30 p.m.	Remote Sensing/Geographic Info System (Posters)	Exhibit Hall
89	1:30 p.m.	Sediments, Clastic: Processes, Petrology, and Provenance	A108/110
90	1:30 p.m.	K5. The Role of the Earth Sciences in Fostering Global Equity and Stability *(GSA International Division, U.S. National Committee for the Geological Sciences, U.S. National Committee for Geodesy and Geophysics)*	Ballroom 2 & 3
91	1:30 p.m.	T5. Wetlands Paleoecology Through Time *(GSA Coal Geology Division, Paleontological Society, GSA Geobiology and Geomicrobiology Division)*	A101/103

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NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
92	1:30 p.m.	T14. Integrated Studies of the Effects of Abandoned Mines on the Environment (Posters) *(GSA Engineering Geology Division, GSA Hydrogeology Division, Association of Exploration Geochemists)*	Exhibit Hall
93	1:30 p.m.	T16. Evaporite Karst and Engineering and Environmental Problems in the United States *(GSA Engineering Geology Division, GSA Hydrogeology Division; GSA Quaternary Geology and Geomorphology Division)*	A111/109
94	1:30 p.m.	T25. Modern and Ancient Tidal Flats Reflecting Environmental and Climate Changes for Past and Future *(GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	C105/107
95	1:30 p.m.	T27. From Geochemistry of the Geosphere, Atmosphere, and Cosmos to Forensic Environmental Geochemistry II: A Tribute to Ian Kaplan *(Geochemical Society, Organic Geochemistry Division of the Geochemical Society)*	C101/103
96	1:30 p.m.	T30. Microbial Sulfur Transformations Throughout Earth's History: Development, Changes, and Future of the Biogeochemical Sulfur Cycle *(GSA Geobiology and Geomicrobiology Division)*	C109
97	1:30 p.m.	T45. Implementing Geoinformatics for Knowledge Integration and Decision Management	A112
98	1:30 p.m.	T47. Advances in Karst Modeling (Posters) *(GSA Hydrogeology Division)*	Exhibit Hall
99	1:30 p.m.	T55. Geophysical Evaluation of Aquifer Properties *(GSA Hydrogeology Division, GSA Sedimentology Geology Division, GSA Geophysics Division)*	A209
100	1:30 p.m.	T56. Groundwater Depletion and Overexploitation II: A Global Problem *(GSA Hydrogeology Division, International Association of Hydrogeologists)*	A201
101	1:30 p.m.	T60. Rivers in Karst: Processes and Applications (Posters) *(GSA Hydrogeology Division, Karst Waters Institute, GSA Sedimentary Geology Division, GSA Quaternary Geology and Geomorphology Division)*	Exhibit Hall
102	1:30 p.m.	T61. The Platte River Basin of Colorado, Nebraska, and Wyoming: Where Geology, Hydrology, Endangered Species, People, and Politics Attempt to Coexist *(GSA Hydrogeology Division)*	A102/104/106
103	1:30 p.m.	T68. Yucca Mountain Update: Recent Advances from Scientific Investigations of the Unsaturated Zone II *(U.S. Department of Energy—Yucca Mountain Project)*	A207
104	1:30 p.m.	T70. Antarctica During the Neogene (Posters) *(GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	Exhibit Hall
105	1:30 p.m.	T71. Feedback in Earth Systems: Determining System Response to Perturbation Through Observations and Modeling	C209
106	1:30 p.m.	T91. A-Type Plutons and Convergent Margins: Orogenic Links to Anorogenic Magmatism? *(International Geologic Correlation Program Project 426: Granite Systems and Proterozoic Lithospheric Processes)*	C205
107	1:30 p.m.	T91. A-Type Plutons and Convergent Margins: Orogenic Links to Anorogenic Magmatism? (Posters) *(International Geologic Correlation Program Project 426: Granite Systems and Proterozoic Lithospheric Processes)*	Exhibit Hall
108	1:30 p.m.	T93. Hydrogeology in Developing Countries: Opportunities and Challenges (Posters) *(GSA Hydrogeology Division)*	Exhibit Hall
109	1:30 p.m.	T105. Response of Dryland Geomorphic Systems to Climate Change and Variability *(GSA Quaternary Geology and Geomorphology Division)*	Ballroom 4
110	1:30 p.m.	T112. EarthScope Town Hall Meeting *(GSA Structural Geology and Tectonics Division, GSA Geophysics Division, Mineralogical Society of America, Geochemical Society)*	C102/104/106
111	1:30 p.m.	T113. Extensional Tectonics in the Southern Basins and Ranges, United States, and in Western Turkey (Posters) *(GSA Structural Geology and Tectonics Division)*	Exhibit Hall
112	1:30 p.m.	T114. Forward Modeling in Tectonics and Structural Geology *(GSA Structural Geology and Tectonics Division, GSA Sedimentary Geology Division)*	C207
113	1:30 p.m.	T117. Rocky Mountains II: Lithospheric Structure and Evolution of Rocky Mountain Region, from Deep Mantle to Mountain Tops II *(GSA Structural Geology and Tectonics Division)*	C108/110/112

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
TUESDAY, OCTOBER 29			
114	10:15 a.m.	Engineering Geology	C109
115	8 a.m.	Engineering Geology (Posters)	Exhibit Hall
116	8 a.m.	Environmental Geoscience (Posters) II	Exhibit Hall
117	8 a.m.	Geochemistry (Posters) I	Exhibit Hall
118	8 a.m.	Geophysics/Tectonophysics/Seismology (Posters)	Exhibit Hall
119	8 a.m.	Marine/Coastal Science	C109
120	8 a.m.	Paleontology/Paleobotany IV: Phylogeny and Ontogeny	A207
121	8 a.m.	Petrology, Igneous and Experimental	C205
122	8 a.m.	Precambrian Geology (Posters)	Exhibit Hall
123	8 a.m.	Quaternary Geology/Geomorphology (Posters) II	Exhibit Hall
124	8 a.m.	Stratigraphy (Posters) II	Exhibit Hall
125	8 a.m.	K2. Evolution of the Early Atmosphere, Hydrosphere, and Biosphere: Constraints from Ore Deposits *(Society of Economic Geologists, Geochemical Society, NASA Astrobiology Division)*	Ballroom 2 & 3
126	8 a.m.	T4. Coal Resource and Utilization Issues (GSA Coal Geology Division, The Society for Organic Petrology [TSOP])	A101/103
127	8 a.m.	T9. Mining in the Twenty-First Century: Meeting the Environmental Challenges *(Society of Economic Geologists)*	Ballroom 4
128	8 a.m.	T16. Evaporite Karst and Engineering and Environmental Problems in the United States (Posters) *(GSA Engineering Geology Division, GSA Hydrogeology Division; GSA Quaternary Geology and Geomorphology Division)*	Exhibit Hall
129	8 a.m.	T27. From Geochemistry of the Geosphere, Atmosphere, and Cosmos to Forensic Environmental Geochemistry (Posters): A Tribute to Ian Kaplan *(Geochemical Society, Organic Geochemistry Division of the Geochemical Society)*	Exhibit Hall
130	8 a.m.	T28. Geochemical and Mineralogical Records from Ancient Lake Sediments *(GSA Sedimentary Geology Division, GSA Limnogeology Division)*	C101/103
131	8 a.m.	T29. Sources, Transport, Fate, and Toxicology of Trace Elements in the Environment I: A Tribute to Gunter Faure *(International Association of Geochemistry and Cosmochemistry)*	A108/110
132	8 a.m.	T35. Design and Assessment of Computer-Based Instructional Materials for the Geosciences *(GSA Geoscience Education Division, National Association of Geoscience Teachers, National Earth Science Teachers Association)*	A111/109
133	8 a.m.	T40. Special Session I in Honor of John C. Butler: Water Where the Grass Is Greener—Emerging Uses of Technology in Geoscience Education *(National Association of Geoscience Teachers)*	A112
134	8 a.m.	T42. Undergraduate Research in the Geosciences: Faculty and Student Perspectives (Posters) *(Council of Undergraduate Research: Geosciences Division)*	Exhibit Hall
135	8 a.m.	T53. Experimental, Field, and Modeling Studies of Geological Carbon Sequestration I *(GSA Hydrogeology Division, Geochemical Society)*	A205
136	8 a.m.	T65. Characterization, Attenuation, and Remediation of Subsurface Contaminants in Heterogeneous Chemical or Physical Settings I *(GSA Hydrogeology Division, Geochemical Society)*	A201
137	8 a.m.	T68. Yucca Mountain Update: Recent Advances from Scientific Investigations of the Unsaturated Zone (Posters) *(U.S. Department of Energy—Yucca Mountain Project)*	Exhibit Hall
138	8 a.m.	T69. Phosphates: Geochemical, Geobiological, and Materials Importance I *(Mineralogical Society of America, Geochemical Society, GSA Geobiology and Geomicrobiology Division)*	A209
139	8 a.m.	T71. Feedback in Earth Systems? Determining System Response to Perturbation Through Observations and Modeling (Posters)	Exhibit Hall

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
140	8 a.m.	T74. Isotopic and Elemental Tracers of Late Quaternary Climate Change *(Geochemical Society)*	C105/107
141	8 a.m.	T81. Paleobiogeography: Integrating Plate Tectonics and Evolution *(Paleontological Society, GSA Geobiology and Geomicrobiology Division)*	A102/104/106
142	8 a.m.	T87. Drilling into Impact Structures: Petrology, Geochemistry, and Geophysics *(GSA Planetary Geology Division, Geological Society of South Africa, European Science Foundation IMPACT Program)*	A105/107
143	8 a.m.	T100. Geomorphic Impacts of Wildfire I *(GSA Quaternary Geology and Geomorphology Division, GSA Engineering Geology Division, International Association of Wildland Fire)*	C209
144	8 a.m.	T102. Rocky Mountains III: Post-Laramide Uplift and Erosion of the Rocky Mountains and Colorado Plateau *(GSA Sedimentary Geology Division)*	C108/110/112
145	8 a.m.	T103. Quaternary Sciences from Land to Sea I: In Honor of John T. Andrews *(GSA Quaternary Geology and Geomorphology Division)*	C102/104/106
146	8 a.m.	T114. Forward Modeling in Tectonics and Structural Geology (Posters) *(GSA Structural Geology and Tectonics Division, GSA Sedimentary Geology Division)*	Exhibit Hall
147	8 a.m.	T115. Geometry, Kinematics, and Vorticity of High-Strain Zones *(GSA Structural Geology and Tectonics Division)*	C207
148	8 a.m.	T119. Nonconventional Fold-Thrust Belts: Assessing the Spectrum of Variation in a Structural Style (Posters) *(GSA Structural Geology and Tectonics Division, Ocean Energy, Inc.)*	Exhibit Hall
149	8 a.m.	T122. Tectonic Evolution of the Middle East and Adjacent Regions: The Confluence of the Alpine and Himalayan Orogenic Systems and a Window into Processes of Continental Dynamics *(GSA Structural Geology and Tectonics Division)*	C201
150	8 a.m.	T124. Thermal and Mechanical Significance of Gneiss Domes in the Evolution of Orogens (Posters) *(GSA Structural Geology and Tectonics Division, Mineralogical Society of America)*	Exhibit Hall
151	1:30 p.m.	Carbonate Stratigraphy, Diagenesis, and Geochemistry	A209
152	1:30 p.m.	Economic Geology (Posters)	Exhibit Hall
153	1:30 p.m.	Geochemistry (Posters) II	Exhibit Hall
154	1:30 p.m.	Geoscience Education (Posters) II	Exhibit Hall
155	1:30 p.m.	Hydrogeology I: Physical Hydrogeology	A201
156	1:30 p.m.	Marine/Coastal Science (Posters)	Exhibit Hall
157	4 p.m.	Mineralogical Society of America Presidential Address	C101/103
158	1:30 p.m.	Mineralogy/Crystallography (Posters)	Exhibit Hall
159	1:30 p.m.	Paleoclimatology/Paleoceanography I: Quaternary Paleoclimate	C201
160	1:30 p.m.	Paleontology/Paleobotany (Posters) I	Exhibit Hall
161	1:30 p.m.	Paleontology/Paleobotany V: Diversity Dynamics and Extinctions	C105/107
162	1:30 p.m.	Petrology, Igneous and Experimental (Posters)	Exhibit Hall
163	1:30 p.m.	Precambrian Geology	C101/103
164	1:30 p.m.	Quaternary Geology/Geomorphology III	C207
165	1:30 p.m.	Structural Geology (Posters)	Exhibit Hall
166	1:30 p.m.	Structural Geology: Deformation, Intrusion, and Volcanism	C109
167	1:30 p.m.	K7. Toward a Better Understanding of the Complicated Earth: Insights from Geologic Research, Education, and Cognitive Science *(National Association of Geoscience Teachers)*	Ballroom 2 & 3
168	1:30 p.m.	T1. Application of GIS and Remote Sensing to Archaeological Geology *(GSA Archaeological Geology Division)*	A105/107
169	1:30 p.m.	T8. Evolution of the Early Atmosphere, Hydrosphere, and Biosphere I: Constraints from Ore Deposits *(Society of Economic Geologists, Geochemical Society, NASA Astrobiology Division, GSA Geobiology and Geomicrobiology Division)*	Ballroom 4
170	1:30 p.m.	T28. Geochemical and Mineralogical Records from Ancient Lake Sediments (Posters) *(GSA Sedimentary Geology Division, GSA Limnogeology Division)*	Exhibit Hall

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
171	1:30 p.m.	T31. Micropaleontological Applications to Problems of Urbanization *(Cushman Foundation)*	A111/109
172	1:30 p.m.	T32. Magnetic Mapping of North American Geology (Posters)	Exhibit Hall
173	1:30 p.m.	T41. Special Session II in Honor of John C. Butler: Multimedia in Earth Science Education—Creation, Use, and Limitations *(National Association of Geoscience Teachers)*	A112
174	1:30 p.m.	T53. Experimental, Field, and Modeling Studies of Geological Carbon Sequestration II *(GSA Hydrogeology Division, Geochemical Society)*	A205
175	1:30 p.m.	T57. Hydrogeologic Framework and Basin Hydrology of the Desert Southwestern United States *(U.S. Geological Survey)*	A101/103
176	1:30 p.m.	T74. Isotopic and Elemental Tracers of Late Quaternary Climate Change (Posters) *(Geochemical Society)*	Exhibit Hall
177	1:30 p.m.	T83. Phenotypic Variation: Discriminating Between Evolution and Environment (*Paleontological Society)*	A108/110
178	1:30 p.m.	T89. Impact Stratigraphy *(GSA Planetary Geology Division, GSA Sedimentary Geology Division)*	A102/104/106
179	1:30 p.m.	T100. Geomorphic Impacts of Wildfire II *(GSA Quaternary Geology and Geomorphology Division, GSA Engineering Geology Division, International Association of Wildland Fire)*	C209
180	1:30 p.m.	T103. Quaternary Sciences from Land to Sea II: In Honor of John T. Andrews *(GSA Quaternary Geology and Geomorphology Division)*	C102/104/106
181	1:30 p.m.	T110. Rocky Mountains IV: Tectonics, Climate Change, and the Late Cenozoic Evolution of the Rocky Mountains, Colorado Plateau, and Western Great Plains *(GSA Sedimentary Geology Division)*	C108/110/112
182	1:30 p.m.	T116. Kinematics of the Himalayan-Tibetan Orogen—Comparing the Present with the Past *(GSA Structural Geology and Tectonics Division)*	C205
183	1:30 p.m.	T122. Tectonic Evolution of the Middle East and Adjacent Regions (Posters): The Confluence of the Alpine and Himalayan Orogenic Systems and a Window into Processes of Continental Dynamics *(GSA Structural Geology and Tectonics Division)*	Exhibit Hall
184	1:30 p.m.	T126. Reconstructing the Cambrian World: Temporal and Spatial Changes in Physical and Biotic Environments *(GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	A207

WEDNESDAY, OCTOBER 30

185	8 a.m.	Environmental Geoscience (Posters) III	Exhibit Hall
186	8 a.m.	Hydrogeology II: Chemical Hydrogeology	A205
187	8 a.m.	Paleontology/Paleobotany (Posters) II	Exhibit Hall
188	8 a.m.	Paleontology/Paleobotany VI: Terrestrial Paleoenvironments and Biostratigraphy	A105/107
189	8 a.m.	Petrology, Metamorphic (Posters)	Exhibit Hall
190	8 a.m.	Sediments, Clastic (Posters) II: Petrology and Provenance	Exhibit Hall
191	8 a.m.	Tectonics (Posters) II	Exhibit Hall
192	8 a.m.	K6. There and Back Again: Terrestrial Approaches to Extraterrestrial Problems *(GSA Planetary Geology Division)*	Ballroom 2 & 3
193	8 a.m.	T6. Chemostratigraphy: An Emphasis on Metal-Rich Black Shale Deposits *(GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	C201
194	8 a.m.	T12. The Changing Vision of Marine Minerals *(Society of Economic Geologists)*	A112
195	8 a.m.	T20. Humans as a Geologic Agent: In Honor of George Kiersch *(GSA Engineering Geology Division)*	A111/109
196	8 a.m.	T21. Remote Sensing and Geographic Information Systems in the New Millennium: Their Use in Environmental and Engineering Geology *(GSA Engineering Geology Division)*	A108/110
197	8 a.m.	T29. Sources, Transport, Fate, and Toxicology of Trace Elements in the Environment II: A Tribute to Gunter Faure *(International Association of Geochemistry and Cosmochemistry)*	A207

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
198	8 a.m.	T33. New Views of Extensional Basins and Related Volcanic Fields Using Geophysics and Remote Sensing (Posters) *(GSA Geophysics Division)*	Exhibit Hall
199	8:15 a.m.	T36. Digital Libraries as Vehicles for Systemic Educational Change *(National Association of Geoscience Teachers)*	A101/103
200	8 a.m.	T38. Geology in the National Parks I: Research, Mapping, Education, and Interpretation *(Association for Women Geoscientists)*	C102/104/106
201	8 a.m.	T50. Characterizing Geochemical Processes: When Is There Sufficient Information? *(GSA Hydrogeology Division)*	A201
202	8 a.m.	T73. Global Biogeochemical Change During PETM Events *(GSA Geobiology and Geomicrobiology Division, GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	C105/107
203	8 a.m.	T84. Seafood Through Time—The Ecologic Context of the History of Life I: In Honor of Richard K. Bambach *(Paleontological Society, GSA Geobiology and Geomicrobiology Division)*	A102/104/106
204	8 a.m.	T86. Chesapeake Bay Impact Structure: Geology, Geophysics, and Geohydrology of America's Largest Crater *(GSA Planetary Geology Division)*	Ballroom 4
205	8 a.m.	T96. Workforce and Education: Exploring the Industry-Academia Connection Toward Developing a Capable and Sufficient Science and Technology Labor Pool *(GSA Geology and Public Policy Committee; GSA Professional Development Committee)*	A209
206	8 a.m.	T100. Geomorphic Impacts of Wildfire (Posters) *(GSA Quaternary Geology and Geomorphology Division, GSA Engineering Geology Division, International Association of Wildland Fire)*	Exhibit Hall
207	8 a.m.	T102. Rocky Mountains III: Post-Laramide Uplift and Erosion of the Rocky Mountains and Colorado Plateau (Posters) *(GSA Sedimentary Geology Division)*	Exhibit Hall
208	8 a.m.	T104. Quaternary Stratigraphy and the Glacial Environment: In Honor of Ernest H. Muller *(GSA Quaternary Geology and Geomorphology Division)*	C209
209	8 a.m.	T106. Remotely Sensed Data for Geologic and Environmental Studies (Posters) *(GSA Geophysics Division)*	Exhibit Hall
210	8 a.m.	T108. The Green River Formation Revisited: Crucible for New Concepts and Advances in Paleoclimatology, Tectonics, Chronostratigraphy, Sequence Stratigraphy, Isotope Geochemistry, and Paleontology *(International Association of Limnogeologists, GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	C101/103
211	8 a.m.	T109. Deltas—Old and New *(GSA Sedimentary Geology Division)*	C207
212	8 a.m.	T111. Detrital Thermochronology—Dating of Exhumation and Landscape Evolution in Mountain Belts *(GSA Structural Geology and Tectonics Division)*	C109
213	8 a.m.	T116. Kinematics of the Himalayan-Tibetan Orogen—Comparing the Present with the Past (Posters) *(GSA Structural Geology and Tectonics Division)*	Exhibit Hall
214	8 a.m.	T121. Tackling Transpression and Transtension in Orogenesis: Tools of Structural Geology from Microfabric to Tectonic Reconstruction *(GSA Structural Geology and Tectonics Division)*	C108/110/112
215	8 a.m.	T125. Thrust Belt Curvature: Integrating Paleomagnetic and Structural Analyses *(GSA Structural Geology and Tectonics Division)*	C205
216	1:30 p.m.	Geomicrobiology (Posters)	Exhibit Hall
217	1:30 p.m.	Geoscience Information/Communication (Posters)	Exhibit Hall
218	1:30 p.m.	Hydrogeology (Posters) II: Chemical Hydrogeology	Exhibit Hall
219	1:30 p.m.	Paleoclimatology/Paleoceanography II	A108/110
220	1:30 p.m.	Petrology, Metamorphic	C201
221	1:30 p.m.	Quaternary Geology/Geomorphology (Posters) III	Exhibit Hall
222	1:30 p.m.	Stratigraphy	A112
223	1:30 p.m.	Tectonics II: Convergent Margins	C207
224	1:30 p.m.	Volcanology (Posters)	Exhibit Hall
225	1:30 p.m.	K3. Flood Hazard on Dynamic Rivers: Human Modification, Climate Change, and the Challenge of Non-Stationary Hydrology *(GSA Quaternary Geology and Geomorphology Division, American Geological Institute)*	Ballroom 2 & 3

NO.	TIME	DESCRIPTION *(SPONSORS)*	LOCATION
226	1:30 p.m.	T8. Evolution of the Early Atmosphere, Hydrosphere, and Biosphere II: Constraints from Ore Deposits *(Society of Economic Geologists, Geochemical Society, NASA Astrobiology Division)*	Ballroom 4
227	1:30 p.m.	T22. Rumbling in Below the Radar: Earthquake Hazards in Areas Where Seismic Potential Is Underrecognized *(GSA Engineering Geology Division)*	A207
228	1:30 p.m.	T38. Geology in the National Parks II: Research, Mapping, Education, and Interpretation *(Association for Women Geoscientists)*	C102/104/106
229	1:30 p.m.	T39. Geoscience Research Partnerships as a Strategy for Engaging K–16 Students and Teachers in Inquiry-Based Learning *(National Association of Geoscience Teachers)*	A105/107
230	1:30 p.m.	T51. Delineation of Contributing Areas for Wells in Challenging Hydrogeologic Settings: Methods, Uncertainty, and Verification *(GSA Hydrogeology Division)*	A201
231	1:30 p.m.	T59. Mass and Energy Transport in Groundwater: In Memory of Patrick Domenico *(GSA Hydrogeology Division)*	A205
232	1:30 p.m.	T65. Characterization, Attenuation, and Remediation of Subsurface Contaminants in Heterogeneous Chemical or Physical Settings II *(GSA Hydrogeology Division, Geochemical Society)*	C109
233	1:30 p.m.	T67. Watershed Processes Within Tropical Montane Catchments	A209
234	1:30 p.m.	T69. Phosphates: Geochemical, Geobiological, and Materials Importance II *(Mineralogical Society of America, Geochemical Society, GSA Geobiology and Geomicrobiology Division)*	C108/110/112
235	1:30 p.m.	T73. Global Biogeochemical Change During PETM Events (Posters) *(GSA Geobiology and Geomicrobiology Division, GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	Exhibit Hall
236	1:30 p.m.	T79. Evolutionary Paleobiology and Paleoecology of the Bivalvia *(Paleontological Society, GSA Geobiology and Geomicrobiology Division)*	A111/109
237	1:30 p.m.	T82. Paleontology in National Parks: Sharing the Fossil Record with Managers and the Public *(National Park Service, Association for Women Geoscientists)*	A101/103
238	1:30 p.m.	T84. Seafood Through Time—The Ecologic Context of the History of Life II: In Honor of Richard K. Bambach *(Paleontological Society, GSA Geobiology and Geomicrobiology Division)*	A102/104/106
239	1:30 p.m.	T89. Impact Stratigraphy (Posters) *(GSA Planetary Geology Division, GSA Sedimentary Geology Division)*	Exhibit Hall
240	1:30 p.m.	T97. Geoecology—The Emergence of an Old Concept to Solve Problems in the 21st Century *(GSA Quaternary Geology and Geomorphology Division)*	C209
241	1:30 p.m.	T103. Quaternary Sciences from Land to Sea (Posters): In Honor of John T. Andrews *(GSA Quaternary Geology and Geomorphology Division)*	Exhibit Hall
242	1:30 p.m.	T106. Remotely Sensed Data for Geologic and Environmental Studies *(GSA Geophysics Division)*	C105/107
243	1:30 p.m.	T107. New Perspectives on Chert, Its Origin, Diagenesis, and Economic Significance *(GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	C101/103
244	1:30 p.m.	T108. The Green River Formation Revisited: Crucible for New Concepts and Advances in Paleoclimatology, Tectonics, Chronostratigraphy, Sequence Stratigraphy, Isotope Geochemistry, and Paleontology (Posters) *(International Association of Limnogeologists, GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	Exhibit Hall
245	1:30 p.m.	T118. New Constraints on Mesoproterozoic–Early Neoproterozoic Supercontinent Assembly and Dispersal *(GSA Structural Geology and Tectonics Division, GSA Sedimentary Geology Division, SEPM—Society for Sedimentary Geology)*	C205
246	1:30 p.m.	T121. Tackling Transpression and Transtension in Orogenesis: Tools of Structural Geology from Microfabric to Tectonic Reconstruction (Posters) *(GSA Structural Geology and Tectonics Division)*	Exhibit Hall

SCHOOL

Graduate School Information Forum

Colorado Convention Center Exhibit Hall • Mon., Oct. 28–Wed., Oct. 30 • 9 a.m.–5:30 p.m.

Searching for the right graduate school? Meet with university representatives from across the nation. The schools participating (as of press time) are listed below. For a complete list of schools, including those not participating in the forum but exhibiting in the Exhibit Hall, visit the 2002 GSA Annual Meeting home page at www.geosociety.org/meetings/2002/. Go to "Exhibits," then to "2002 Exhibitor Products & Services Guide."

Institution	Mon.	Tues.	Wed.
Clemson University	◎		
Colorado School of Mines	◎	◎	
Duke University	◎	◎	◎
East Carolina University	◎	◎	
Eastern Kentucky University	◎	◎	
Graduate Center of the City University of New York	◎		
Idaho State University	◎	◎	
Illinois State University	◎		
Indiana University	◎	◎	◎
Iowa State University	◎		
Kent State University	◎	◎	
Miami University	◎	◎	
Michigan Tech University	◎		
New Mexico Institute of Mining & Technology	◎		
New Mexico State University		◎	
Northern Illinois University	◎	◎	
Northwestern University	◎		
Oklahoma State University	◎	◎	
Oregon State University	◎	◎	◎
Purdue University	◎	◎	
State University of New York	◎		
Syracuse University	◎	◎	
Texas A&M University	◎	◎	
Texas Tech University	◎	◎	

Institution	Mon.	Tues.	Wed.
University of Alaska Fairbanks	◎	◎	
University of California, Davis	◎	◎	◎
University of California, Riverside	◎	◎	◎
University of Chicago	◎	◎	
University of Colorado at Boulder	◎	◎	◎
University of Delaware	◎		
University of Florida	◎	◎	
University of Heidelberg, Germany	◎	◎	
University of Idaho	◎	◎	
University of Kansas	◎		
University of Massachusetts	◎	◎	
University of Missouri—Rolla		◎	
University of North Carolina at Chapel Hill	◎		
University of Oklahoma	◎	◎	
University of South Carolina	◎	◎	◎
University of Texas at Dallas	◎	◎	
University of Texas at El Paso	◎	◎	◎
University of Vermont	◎	◎	◎
Utah State University		◎	◎
Vanderbilt University	◎		
Virginia Tech	◎	◎	
Washington State University	◎		
Western Washington University	◎		
Yale University	◎	◎	

Registration

You can still register online, by mail, or by fax until October 9; on-site rates apply. (Preregistration ended September 20.)

Online: www.geosociety.org

By mail: GSA
P.O. Box 9140
Boulder, CO 80301-9140

By fax: 303-357-1071

After October 9: Do not mail or fax registrations. You must register on-site at the Registration desk in the Colorado Convention Center, Lobby A.

Did you preregister before September 20?

Your badge will be sent to you by mail. Pick up your badge holder and program on-site at the Registration desk in the Colorado Convention Center, at the Marriott City Center Hotel, or the Hyatt Regency Hotel.

If you registered after September 20, you will need to pick your badge up at the Registration desk in the Colorado Convention Center.

GSA Annual Meeting & Exposition

Science at the Highest Level ◎ Denver 2002

October 27–30 ◎ Colorado Convention Center

Transportation

GSA will not be providing Shuttle Service from the hotels to the Colorado Convention Center; however, Denver has the following inexpensive—or free!—options. GSA will provide alternative arrangements to and from GSA hotels and the Colorado Convention Center for the elderly or disabled. To make these arrangements, contact Tamela White in the Annual Meeting Office, Colorado Convention Center, Room A214, (303) 228-8555.

City Transportation

RTD Transit—There are several modes of public transportation in downtown Denver. RTD provides complete bus transportation throughout Denver and the region. RTD operates a FREE shuttle up and down the 16th Street Pedestrian Mall, the core of downtown Denver just two blocks from the Convention Center. Buses run every 1 to 2 minutes from 6 a.m.–10:30 p.m. and every half-hour until 12:55 a.m. It's a perfect way to get from the hotels to the restaurants and entertainment in "LoDo," Lower Downtown Denver. For more information, call (303) 299-6000 or visit www.rtd-denver.com.

Light Rail—Denver's Light Rail runs from some downtown hotels to the Convention Center, Invesco Field, Pepsi Center, and to the suburbs. You must have a validated ticket before you board the Light Rail. To purchase a ticket, use the stainless-steel ticket vending machines (TVMs) located at each station. For more information, call (303) 628-9000 or visit www.rtd-denver.com.

Taxicabs—Taxi service throughout the Denver metro area is available. To arrange a taxi, hail a cab outside of the Colorado Convention Center or any hotel, or have your hotel doorman make these arrangements for you.

Airport Transportation

SuperShuttle—(303) 370-1300, (800) BLUE-VAN (258-3826) or (800) 525-3177, www.supershuttle.com. Operates daily from 4:30 a.m. to midnight serving all downtown hotels to and from Denver International Airport for $18 one-way or $28 round-trip (special round-trip rate for the GSA meeting: please bring coupon printed below (also appears in Annual Meeting Program). Travel time is 45 minutes to one hour depending on the hotel and number of stops. To arrange passage, stop at the SuperShuttle counter on the 5th level at the airport or order from a hotel doorman.

RTD Skyride—Convenient, daily public bus transportation to and from Denver International Airport. The fare is $6 one way. For more information, contact RTD at (303) 299-6000 or www.rtd-denver.com.

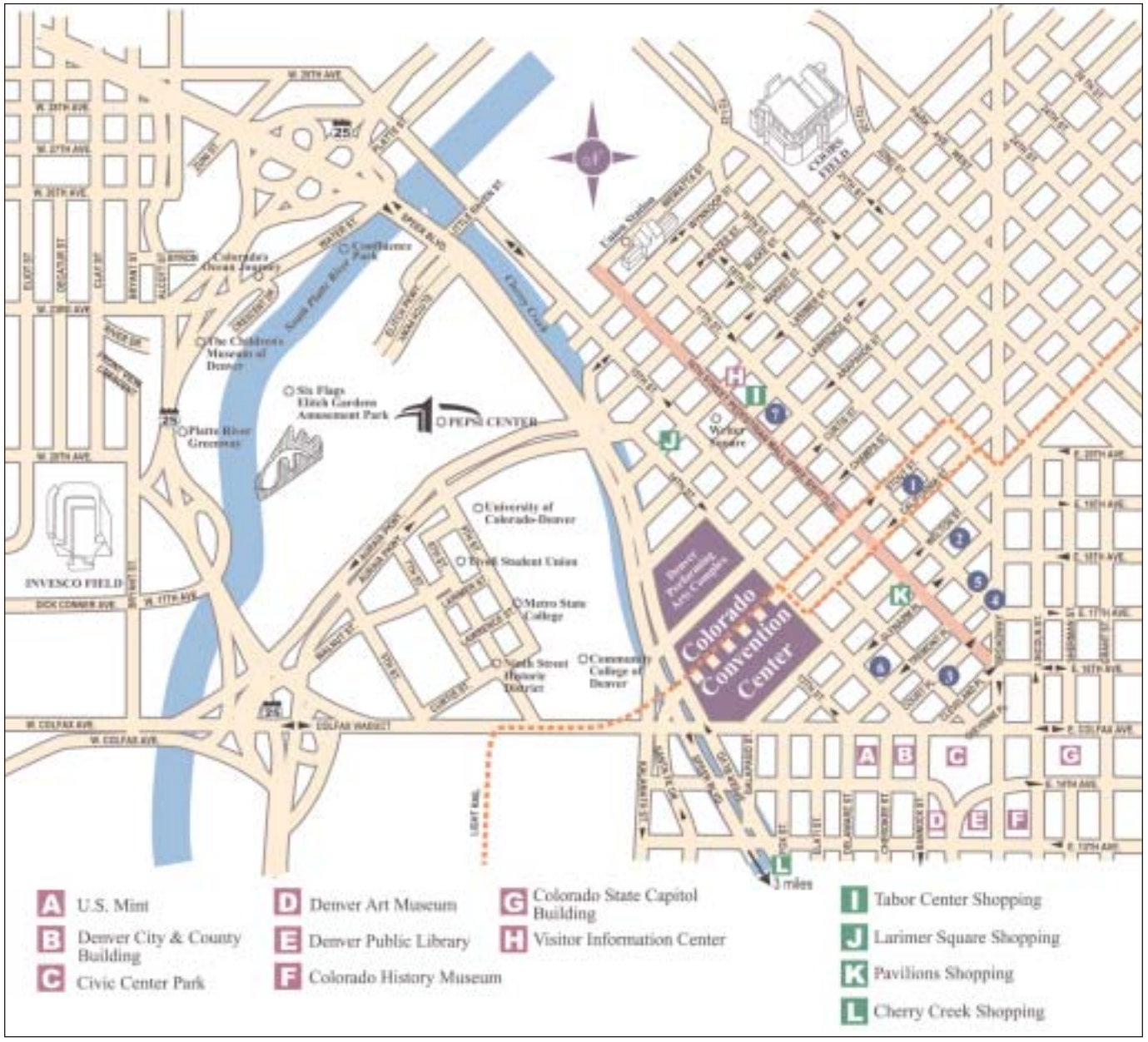
Taxicabs—Approximate cost to the airport from downtown Denver is $40–$50 for one person.

Car Rental

Alamo is the official car rental agency for the GSA Annual Meeting in Denver. Alamo will provide convention rates from $30/day to $109/week and up, with unlimited mileage and no charge for one additional driver. To receive Alamo's special group rates, call 1-800-732-3232 and request Group ID #699477, Plan Code GR.

MAP OF DENVER

Denver Street Map and Hotel Locations



DENVER HOTELS	RATES (SINGLE/DOUBLE)	NO. ON MAP	DISTANCE TO COLORADO CONVENTION CENTER
Marriott City Center*	$155/$174	❶	4 blocks
Hyatt Regency Hotel*	$140/$157	❷	4 blocks
Adam's Mark Hotel	$155/$170	❸	4 blocks
Brown Palace Hotel	$156/$178	❹	5 blocks
Comfort Inn Downtown	$106/$116	❺	5 blocks
Holiday Inn	$105/$115	❻	1.5 blocks
Westin Tabor Center	$137/$137	❼	4 blocks

*co-headquarters hotel

Attention Annual Meeting and Exposition Attendee!

Be sure to schedule some time in the Exhibit Hall, and come prepared to take advantage of some great deals on field gear, GIS equipment and software, microscopes, maps, books, and a whole array of products that support your work and your interest as members in the scientific community!

We're looking forward to a dynamic meeting and we know that you deserve top-notch choices at the Annual Meeting. Let's make it hard for vendors to get booth space next year in SEATTLE!

October 27–30, 2002

Exhibit Hall Hours:

Sunday 6–8 p.m.

Monday–Wednesday 9 a.m.–5:30 p.m.

Do you have a product or service you would like to see on the exhibit floor? Does your organization want to be represented on the exhibit floor? To view a current Exhibitor Prospectus with a live floor plan and a list of all vendors, go to www.geosociety.org/meetings/2002/xPro1.htm.

For information, suggestions, or to reserve a booth contact:

Brenda Martinez, Exhibit Sales
303.357.1038 or bmartinez@geosociety.org

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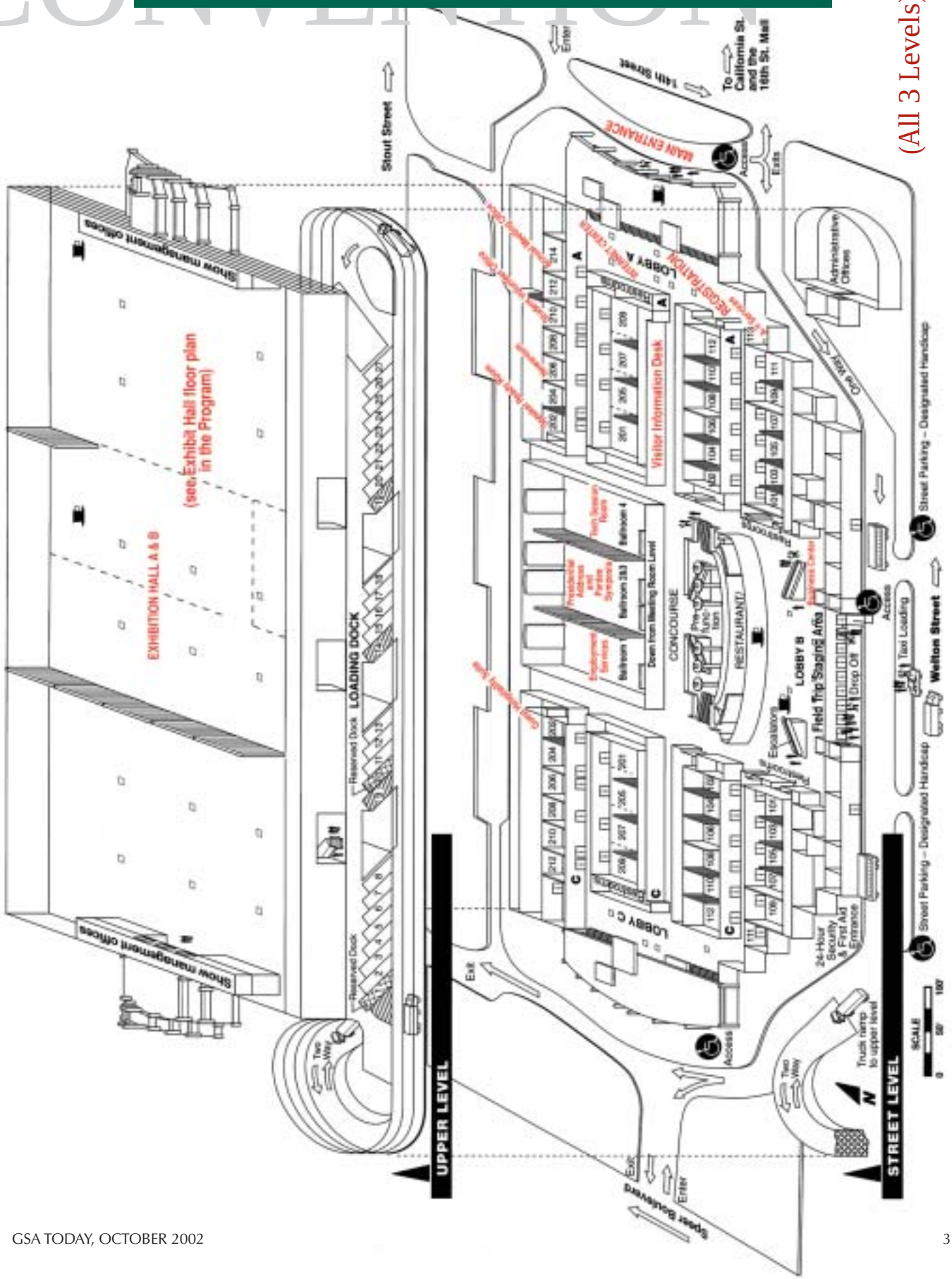

Call for Geological Papers: 2003 GSA Section Meetings

South-Central–Southeastern Sections Joint Meeting
March 12–14, 2003
University of Memphis, Memphis, Tennessee
Abstract deadline: December 10, 2002
Information: Dan Larsen, Dept. of Earth Sciences, University of Memphis, 421 J.M. Smith Bldg., Memphis, TN 38152, (901) 678-4358, dlarsen@memphis.edu.

North-Central Section
March 24–25, 2003
Kansas City Airport Hilton, Kansas City, Missouri
Abstract deadline: December 10, 2002
Information: Raymond M. Coveney Jr., Dept. of Geosciences, 420 Flarsheim Hall, University of Missouri, 5110 Rockhill Rd., Kansas City, MO 64110-2499, (816) 235-2980, coveneyr@umkc.edu.

Northeastern Section
March 27–29, 2003
Westin Hotel, Halifax, Nova Scotia
Abstract deadline: December 18, 2002
Information: Jane Barrett, Dept. of Earth Sciences, Dalhousie University, Halifax, NS B3H 3J5, Canada, (902) 494-1473, jmbarret@is.dal.ca.

Cordilleran Section
April 1–3, 2003
Hotel NH Krystal, Puerto Vallarta, Mexico
Abstract deadline: December 16, 2002
Information: Elena Centeno-García, Instituto de Geología, Universidad Nacional Autónoma de México, (National Autonomous University of Mexico), Ciudad Universitaria, México, D.F. 04510, México, centeno@servidor.unam.mx.

Rocky Mountain Section
May 7–9, 2003
Fort Lewis College, Durango, Colorado
Abstract deadline: January 30, 2003
Information: James Collier, Dept. of Geosciences, Fort Lewis College, 1000 Rim Dr., Durango, CO 81301-3999, (970) 247-7129, collier_j@fortlewis.edu.

1. Cordilleran Section
2. Rocky Mountain Section
3. North-Central Section
4. South-Central Section
5. Northeastern Section
6. Southeastern Section

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Preliminary Announcement and Call for Papers

1st Joint Meeting, Northeastern Section, GSA, and Atlantic Geoscience Society

38th Annual Meeting, Northeastern Section, GSA • 29th Annual Meeting, Atlantic Geoscience Society
Westin Hotel, Halifax, Nova Scotia, Canada • March 27–29, 2003

REGISTRATION

Preregistration deadline: February 14, 2003
Cancellation deadline: February 21, 2003

GSA Headquarters will handle preregistration. Registration details will be in the December 2002 issue of *GSA Today* and at www.geosociety.org. Preregister online at www.geosociety.org beginning in the first part of December.

CALL FOR PAPERS

Papers are invited from students and professionals for presentation in oral and poster general sessions and for presentations that may fit into the symposia and theme sessions listed below. Additional general discipline sessions will be scheduled on the basis of submitted abstracts.

Oral technical sessions and symposia provide 15 minutes for presentation and five minutes for questions and discussion. One PowerPoint data projector and two slide projectors will be provided in each of the technical sessions. All PowerPoint presentations must be provided on CD: Presenters will not be able to use their own laptops. All slides must fit a standard 35 mm carousel tray. Speakers are encouraged to bring their own loaded trays to the meeting. Poster sessions will allow at least three hours of display time. Posters must fit on a single 8 foot by 4 foot display board.

ABSTRACTS

Abstract deadline: December 18, 2002

Abstracts for all sessions must be submitted online at the GSA Web site, www.geosociety.org. If you have questions, contact technical program committee chairs, Sandra Barr, sandra.barr@acadiau.ca, and David Piper, piper@agc.bio.ns.ca. 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.

SYMPOSIA

Symposia will include invited papers and selected submitted papers. Prospective authors are encouraged to contact individual conveners directly. Address requests for general information regarding symposia to Sandra Barr, sandra.barr@acadiau.ca, and David Piper, piper@agc.bio.ns.ca.

1. **Regional Hydrogeological Studies in Northeastern America.** Yves Michaud, ymichaud@nrcan.gc.ca; Roger Morin, rhmorin@usgs.gov.
2. **Eastern North America Mesozoic-Cenozoic Margins and Their Hydrocarbon Potential.** *Cosponsored by Eastern Section, AAPG.* Paul Olsen, polsen@ldeo.columbia.edu; John Hogg, john.hogg@encana.ca.
3. **Evolution of the East Laurentia Continental Margin, Eastern United States–Canada: From Late Proterozoic Rifting to Devonian Collisions.** Denis Lavoie, delavoie@nrcan.gc.ca; Ed Landing, elanding@mail.nysed.gov; A. Tremblay, tremblaya@uqam.ca; S. Castonguay, scastong@nrcan.gc.ca.
4. **New Developments in Understanding of the Avalon Terrane from Southern New England to Newfoundland.** *Cosponsored by IGCP 453—Modern and ancient orogens.* Margaret D. Thompson, mthompson@wellesley.edu; J. Brendan Murphy, bmurphy@stfx.ca.
5. **Metals in the environment.** Don Fox, don.fox@gnb.ca; Terry Goodwin, goodwita@gov.ns.ca.

THEME SESSIONS

Theme sessions will include only volunteered papers. Prospective authors are encouraged to contact individual conveners directly. Address requests for general information regarding symposia to Sandra Barr, sandra.barr@acadiau.ca, and David Piper, piper@agc.bio.ns.ca.

1. **Communicating the Critical Relevance of Earth Science.** Jennifer Bates, bates@agc.bio.ns.ca.
2. **History of Geology: Links Between Northeastern United States and Atlantic Canada.** John Calder, jhcalder@gov.ns.ca.
3. **Metallogeny of the Northern Appalachian Orogen.** *Cosponsored by SEG.* Dave Lentz, dlentz@unb.ca; Dan J. Kontak, kontakdj@gov.ns.ca.
4. **Paleozoic Arcs in the Northern Appalachian Orogen and Their Accretionary History.** *(Second Annual NETectonics session.)* Leslie R. Fyffe, les.fyffe@gnb.ca; Cees R. van Staal, cvanstaa@NRCan.gc.ca.
5. **Mesozoic Basalts, Sills, and Feeder Dikes.** J. Gregory McHone, gregmchone@snet.net; John H. Puffer, jpuffer@andromeda.rutgers.edu.
6. **Processes in Felsic Magma Chambers—From Crystallization and Evolution to Emplacement.** David Gibson, dgibson@maine.edu; Dan Lux, dlux@maine.edu.
7. **Acadian Metamorphism in the Northern Appalachian Orogen—Styles, Timing, and Tectonic Significance.** Rebecca A. Jamieson, beckyj@is.dal.ca; Robert J. Tracy, rtracy@vt.edu.
8. **Crustal Structure of the Atlantic Margin and Northern Appalachian Orogen.** Sonya Dehler, dehler@agc.bio.ns.ca.
9. **Energy Resources of the Paleozoic.** *Cosponsored by Eastern Section, AAPG.* T. Martel, tmartel@corridor.ns.ca; Skip Hobbs, 73162.1256@compuserve.com.
10. **Ichnology and Biofacies: Innovations and Applications.** Murray Gingras, mgingras@unb.ca; Andy Pulham, andy.pulham@mun.ca.
11. **Late Glacial–Early Holocene Climate and High-resolution Records of Climate Change from Lakes.** Ian S. Spooner, ian.spooner@acadiau.ca; Ray Spear, spear@geneseo.edu.
12. **Geological Impacts of Extreme Events on Land and Sea (Storms, Floods, Climate Variability, Tsunamis).** Don Forbes, forbes@agc.bio.ns.ca; Brian G. McAdoo, brmcadoo@vassar.edu.
13. **Undergraduate Research in the Geological Sciences.** (Poster Session.) Graham Williams, gwilliam@agc.bio.ns.ca; David Bailey, dbailey@hamilton.edu.

GENERAL SESSIONS

In addition to Symposia (invited papers) and Theme Sessions (volunteered papers), General Sessions for both oral presentations and posters will be organized to accommodate other volunteered papers.

SHORT COURSES

For more information on short courses, contact the short course organizer, Djordje Grujic, Dalhousie University, Halifax, Nova Scotia, Canada, djordje.grujic@dal.ca.

1. **Use of Benthic Foraminifera for Environmental Applications.** David B. Scott, david.scott@dal.ca, and others.
2. **From Lithosphere to Basin: Numerical and Analogue Modeling of Basin Evolution.** Djordje Grujic, djordje.grujic@dal.ca, and others.
3. **Testing Dynamical Models of Earth Processes Using Nonlinear Spatial Analysis.** Lawrence Plug, lplug@dal.ca, and others.

FIELD TRIPS

Trips planned at this time are listed below and are contingent on the weather. For more information, contact the field trip committee chair, Peter Wallace, peter.wallace@dal.ca.

1. **Macrotidal Environments of the Minas Basin and Bay of Fundy: Morphology, Sedimentology, and Natural History.** Wed., March 26. Ian Spooner, Acadia University, Wolfville, Nova Scotia, ian.spooner@acadiau.ca.
2. **Tour of Geological Survey of Canada, Atlantic, Bedford Institute of Oceanography, Dartmouth, Nova Scotia.** Wed., March 26 (afternoon). Leader TBA.
3. **Physical and Chemical Features of the Halifax Pluton, South Mountain Batholith.** Wed., March 26. Barrie Clarke, Dalhousie University, Halifax, Nova Scotia, barrie.clarke@dal.ca.
4. **Tour of Geology and Paleontology Collections, Nova Scotia Museum of Natural History.** Time and date TBA. Deborah Skilliter, Curator of Geology, skillidm@gov.ns.ca.
5. **Hidden Cretaceous Basins in Nova Scotia.** Sun., March 30. Ralph Stea, Nova Scotia Department of Natural Resources, rrstea@gov.ns.ca.

WORKSHOPS

Drillcore display. A show-and-tell workshop to display representative drillcore from offshore oil and gas exploration wells will be organized by Grant Wach, Dalhousie University, grant.wach@dal.ca, and David Brown, Canada Nova Scotia Offshore Petroleum Board, dbrown@cnsopb.ns.ca. (Time TBA.)

Roy J. Shlemon Mentor Program in Applied Geology. *Sponsored by GSA Foundation.* Thurs. and Fri., March 27 and 28, 11:30 a.m.–1 p.m. Karlon Blythe, GSA, (303) 357-1036, kblythe@geosociety.org. Cost: free (includes lunch). These workshops for undergraduate and graduate students will be led by practicing geoscientists. Plan to attend both free luncheons to hear different presenters each day. These interactive and informal workshops will cover real-life issues such as the professional opportunities and challenges that await students after graduation. Preregistration is encouraged to secure a seat; however, meeting registration is not required to attend only these workshops.

STUDENT TRAVEL AND RESEARCH GRANTS

Travel grants are available from the Northeastern Section and the GSA Foundation for students who are presenting papers at the Halifax meeting. The awards are open to both graduate and undergraduate students. To apply, please contact Stephen Pollock, Secretary-Treasurer, GSA Northeastern Section, pollock@usm.maine.edu. The Northeastern Section also announces the availability of undergraduate research grants. Students in the Northeastern Section who are juniors in the 2002–2003 academic year are eligible to apply for a research grant. For an application, e-mail Stephen Pollock, pollock@usm.maine.edu. The deadline for completed applications is January 25, 2003.

EXHIBITS

Exhibits will be located in the Westin Hotel, Halifax, Nova Scotia. Snacks and refreshments will be available for exhibitor visitors. For information on exhibit rates and space reservations, contact Patrick Ryall, Treasurer, NEGSA-AGS 2003, patrick.ryall@dal.ca, (902) 494-3465, fax: 902-494-6889.

SPONSORSHIP

The committee is actively seeking sponsorship for this conference from industry and government agencies. If you are interested in sponsoring an event, audiovisual equipment rentals, coffee breaks, or donations to the general sponsorship of the conference, please contact John Hogg, john.hogg@encana.com, EnCana Corporation, 150 9th Ave. SW., Calgary, Alberta, Canada T2P 2S5, (403) 645-2533, fax: 403-645-2926.

DETAILED INFORMATION

For further information, see www.geosociety.org/sectdiv/northe/03nemtg.htm, contact General Co-Chairs Marcos Zentilli, marcos.zentilli@dal.ca, and David B. Scott, david.scott@dal.ca, or Administrative Assistant Jane Barrett, jane.barrett@dal.ca, all at the Department of Earth Sciences, Dalhousie University, Halifax, Nova Scotia, Canada, B3H 3J5, (902) 494-2358, fax 902-494-6889.

GSA is committed to making all events at the 2003 meeting accessible to all people interested in attending. You can indicate special requirements (wheelchair accessibility, dietary concerns, etc.) on the registration forms.

Preliminary Announcement and Call for Papers

99th Annual Meeting of the Cordilleran Section, GSA

Puerto Vallarta, Jalisco, Mexico • April 1–3, 2003

THE CORDILLERA BEYOND BORDERS

The 99th Cordilleran Section Annual Meeting of GSA is sponsored by Institute of Geology UNAM (Universidad Nacional Autónoma de México), Center of Geosciences UNAM, Institute of Geophysics UNAM, and by Department of Geology CICESE. Participating organizations include the Mexican Geological Society (SGM), the Mexican Geophysical Union (UGM), and the Institute of Geochemistry (INAGEQ).

The meeting will take place in the Hotel NH Krystal, in Puerto Vallarta, Jalisco, Mexico, a beautiful setting to discuss a broad variety of topics. The meeting chairs are Elena Centeno-García, +52 (55) 5622-4309, centeno@servidor.unam.mx, and Dante Morán-Zenteno, + 52 (55) 622-4328, dantez@servidor.unam.mx. The meeting will run April 1–3. The hotel is accessible to people with disabilities.

CALL FOR PAPERS

Abstracts deadline: December 16, 2002

Papers are invited for theme and general sessions in both oral and poster format. Volunteered abstracts will be considered for any general discipline listed on the GSA abstract form. The technical chair is Luca Ferrari, +52 (55) 5623-4104, ext. 118, luca@geociencias.unam.mx. You may submit only one volunteered abstract as first author or presenter. Abstracts must be submitted using the electronic submissions form at the GSA Web site, www.geosociety.org. If you have any problems, contact Nancy Carlson at ncarlson@geosociety.org.

TECHNICAL PROGRAM

The following symposia and theme sessions are planned for the Puerto Vallarta meeting. Anyone interested in proposing additional symposia or session topics should contact Luca Ferrari, +52 (55) 5623-4104, ext. 118, luca@geociencias.unam.mx.

SYMPOSIA

1. **Tectonics, Structure, and Geophysics of the Gulf of California–Salton Trough Region.** *Sponsored by MARGINS initiative.* Arturo Martín Barajas, amartin@cicese.mx; Gary Axen gaxen@ess.ucla.edu.
2. **Stratigraphy, Sedimentation, and Volcanism in the Gulf of California–Salton Trough Region.** *Sponsored by MARGINS initiative.* Ana Luisa Carreño, anacar@servidor.unam.mx; Rebecca Dorsey, rdorsey@darkwing.uoregon.edu.
3. **Modern and Ancient Orogens.** *Sponsored by IGCP project 453.* Duncan Keppie, duncan@servidor.unam.mx; Brendan Murphy, bmurphy@stfx.ca.
4. **Mexican Terranes, 20 Years After: In Honor of Peter Coney.** Fernando Ortega-Gutíerrez, fortega@geologia.unam.mx.
5. **Symposium on Geological Hazards.** Hugo Delgado, hugo@tonatiuh.igeofcu.unam.mx; Carlos Martínez.

THEME SESSIONS

1. **Cretaceous and Cenozoic Tectonic Evolution of Baja California.** Harald Böhnel, harald@geociencias.unam.mx; Luis Delgado, ldelgado@cicese.mx; Dave Kimbrough, david.kimbrough@geology.sdsu.edu.
2. **Mesozoic Invertebrate Paleontology.** Ricardo Barragán Manzo, ricardor@geologia.unam.mx; Ana Bertha Villaseñor, anab@servidor.unam.mx.
3. **Groundwater Resources Management in the Cordillera: Quality and Conservation.** Adrián Ortega, maog@servidor.unam.mx.
4. **Subduction of Young Plates, Arc Magmatism, and Tectonics: The TransMexican Volcanic Belt and the Cascades.** Luca Ferrari, luca@geociencias.unam.mx.
5. **Cordilleran Tectonics: Contribution from Low Temperature Thermochronology.** Thierry Calmus, tcalmus@servidor.unam.mx.
6. **The Caribbean and Central American Realms of the Southernmost Cordillera.** Robert Rogers, rrogers@utig.ig.utexas.edu.
7. **Basin Analysis for Determining Timing of Collisional Events.** Sarah Roeske, roeske@geology.ucdavis.edu.
8. **Sedimentation in Ancient and Recent Volcanic Arcs.** Elena Centeno-García, centeno@servidor.unam.mx.
9. **New Insights from Paleontology, Stratigraphy, and Sedimentology on Accreted Terranes of Western North America.** Robert B. Blodgett, blodgetr@science.oregonstate.edu; George D. Stanley, fossil@selway.umt.edu.
10. **Multidisciplinary Studies of Land Subsidence and Regional Fracturing in Fluvio-lacustrine Basins.** Dora Carreón Freyre, freyre@geociencias.unam.mx.
11. **The Present as a Key to the Past: Modern Marine Biotas as Analogues for Fossil Assemblages.** Ralph Hitz, rhitz@tcc.ctc.edu.
12. **Sediment Provenance: Constraints on Terrane Paleogeography.** Brian Mahoney, mahonej@uwec.edu.
13. **Geophysics of Batholiths and Volcanic Sequences.** Jaime Urrutia Fucugauchi, juf@tonatiuh.igeofcu.unam.mx.
14. **Latitudinal Displacements of Cordilleran Terranes.** Sandra Wyld, swyld@gly.uga.edu.

FIELD TRIPS

For details about particular field trips, contact main field trip leaders listed below, the general coordinator, Dante J. Morán Zenteno, +52 (55) 5622-4238, dantez@servidor.unam.mx, or field trips chairs Arturo Martin Barajas, amartin@cicese.mx, and Hugo Delgado Granados, hugo@tonatiuh.igeofcu.unam.mx. Field trips begin and end in different parts of Mexico. For detailed information see the meeting Web site, www.geosociety.org/sectdiv/cord/03cdmtg.htm.

Premeeting

1. **Cenozoic Volcanism and Tectonics in Northwestern Mexico.** 5 days. Jorge Aranda-Gómez, jjag@servidor.unam.mx.
2. **IGCP 453 Field Trip: The Grenvillian Oaxacan Complex and the Eastern Part of the Acatlan Complex.** 6 days. J.D. Keppie, duncan@servidor.unam.mx.
3. **Recent Basaltic Volcanism and Submarine Hydrothermal Activity in the Punta Mita Area, Near Puerto Vallarta.** 2 days. Rosa María Prol Ledezma, prol@servidor.unam.mx.
4. **The Puerto Vallarta Batholith and the Manzanillo Intrusive: High Diversity Parenthood of Continental Arc Magmas.** 2 days. Peter Schaaf, pschaaf@tonatiuh.igeofcu.unam.mx.

5. **Ridge-trench Interactions and the Ongoing Capture of the Baja California Microplate: Insights from the Southern Gulf Extensional Province.** 3 days. John Fletcher, jfletche@cicese.mx.
6. **Pliocene Sedimentary Units and Tectonic Evolution at the Santa Rosalia–Loreto Region, Gulf of California.** 3 days. Jorge Ledesma-Vazquez, ledesma@uabc.mx.
7. **Geology of Joshua Tree National Park, East of the Salton Sea, California.** To be confirmed. Andy Barth, ibsz100@iupui.edu.

Postmeeting

1. **Geology and Tectonic Evolution of Western Guerrero Terrane: A Transect from Puerto Vallarta to Zihuatanejo.** 3 days. Elena Centeno-García, centeno@servidor.unam.mx.
2. **Tertiary Arc Magmatism and Deformation in Southern Mexico.** 3 days. Dante J. Morán Zenteno, dantez@servidor.unam.mx.
3. **Geology of the Northern Sierra Madre Occidental, Eastern Sonora and Western Chihuahua, Mexico.** 3 days. Jaime Roldán Quitana, jaimer@servidor.unam.mx.
4. **Three Superimposed Volcanic Arcs in the Southern Cordillera. A Record of Tectonomagmatic Activity from the Early Cretaceous to Middle Miocene in Central Mexico.** 4 days. Gerardo de Jesús Aguirre Díaz, ger@geociencias.unam.mx.
5. **Geological Features and Biostratigraphy of the Cretaceous Sequences in Southwestern Mexico (Guerrero terrane).** 4 days. Jerjes Pantoja Alor, jerjes@servidor.unam.mx.
6. **Activity of the Popocatéptl Volcano and the Sierra de Chichinautzin Volcanic Field.** To be confirmed. Claus Siebe, csiebe@tonatiuh.igeofcu.unam.mx.
7. **Magmatism and Tectonics of the Western Trans-Mexican Volcanic Belt.** 3 days. Luca Ferrari, luca@geociencias.unam.mx.

SHORT COURSE

Additional short courses are invited. Chair: Victor Dávila, +52(55) 5622-4264, davilal@servidor.unam.mx.

1. **Construction of Balanced Cross-sections by Computer Simulation.** Juan Contreras, juanc@cicese.mx.

WORKSHOP

Roy J. Shlemon Mentor Program in Applied Geology. *Sponsored by GSA Foundation.* Programs for undergraduate and graduate students will be led by practicing geoscientists. Free, includes lunch. Preregistration is encouraged. Contact Karlon Blythe, GSA, (303) 357-1036, kblythe@geosociety.org. These workshops for undergraduate and graduate students will be led by practicing geoscientists. These interactive and informal workshops will cover real-life issues such as the professional opportunities and challenges that await students after graduation. Preregistration is encouraged to secure a seat; however, meeting registration is not required to attend only these workshops.

STUDENT AWARDS AND SUPPORT

Travel grants are available from the Cordilleran Section and the GSA Foundation for partial support of Student Members or Associates who are presenting papers or posters. Apply to Joan Fryxell, (909) 880-5311, jfryxell@csusb.edu. The section will present cash awards for best and honorable-mention undergraduate and graduate papers, both oral and poster.

EXHIBITS

Any exhibitors interested should contact Alex Iriondo, iriondo@usgs.gov in the United States, and Gerardo Zenteno, gzenteno@geol-sun.igeolcu.unam.mx in Mexico.

REGISTRATION

Preregistration deadline: February 21, 2003
Cancellation deadline: February 28, 2003

GSA Headquarters will handle preregistration. Registration details will be in the December 2002 issue of *GSA Today* and at www.geosociety.org. You will be able to preregister online at www.geosociety.org beginning in the first part of December. Onsite registration will be available at the NH Krystal Hotel.

ACCOMMODATIONS

A block of rooms have been reserved at the Hotel NH Krystal. For reservations, call toll free in the United States 1-800-903-3300, and in Mexico +52 (322) 224-0202, nhkrystalvallarta@nh-hoteles.com.mx. For more information on other hotels in Puerto Vallarta and social events, contact Lourdes Godinez, lgodinez@servidor.unam.mx.

ADDITIONAL DETAILS

Information about other events and business meetings will be published in the December issue of *GSA Today*. See also the meeting Web site, www.geosociety.org/sectdiv/cord/03cdmtg.htm, or http://geoinf.igeolcu.unam.mx/cordilleran2003.

GSA is committed to making all events at the 2003 meeting accessible to all people interested in attending. You can indicate special requirements (wheelchair accessibility, dietary concerns, etc.) on the registration forms.

ANNOUNCEMENTS

NASA Astrobiology Institute "Draft" Cooperative Agreement Notice

The National Aeronautics and Space Administration (NASA) Office of Space Science has released a Draft Cooperative Agreement Notice (CAN 02-OSS-XX) for community consideration interested in participation in the NASA Astrobiology Institute as an innovative way of conducting basic interdisciplinary research in the area of astrobiology, the study of life in the universe. The final release is expected this month with a planned proposal due date in December 2002.

Participation is open to all categories of organizations, foreign and domestic, including industry, educational institutions, nonprofit organizations, NASA centers, and other government agencies. The Cooperative Agreement Notice is available at: http://research.hq.nasa.gov/code_s/open.cfm.

For more information on the NASA Astrobiology Institute, visit http://nai.arc.nasa.gov. Programmatic information: Rosalind Grymes, Deputy Director, NASA Astrobiology Institute, Mail Stop 240-1, Ames Research Center, National Aeronautics and Space Administration, Moffett Field, CA 94035-1000, (650) 604-0809, CAN3@mail.arc.nasa.gov.

This solicitation leading to the award of Cooperative Agreement is issued pursuant to title 14 CFR Part 1260 for educational and nonprofit institutions and 14 CFR part 1274 for commercial organizations

You Are Invited: Golden Celebration of Geologic Excellence

In honor of GSA Fellows Lauren Wright and Bennie Troxel, friends and colleagues have organized a "Golden Celebration of Cooperative Geologic Research," to be held Saturday, November 9, 2002, in Shoshone, California (Death Valley).

More information on this event appeared in the September issue of *GSA Today*, also posted at www.geosociety.org/pubs/gsatoday/. Questions about the event? Please contact Jim Calzia, (650) 329-5538, jcalzia@usgs.gov.

In Memoriam

David L. Amsbury
Kerrville, Texas
August 18, 2002

C. Anders Bengtson
Walnut Creek, California
August 16, 2002

Jerome W. Boettcher
Boulder City, Nevada
June 11, 2002

Francis D. Hole
Madison, Wisconsin

J. David Love
Laramie, Wyoming
August 24, 2002

K. Douglas Nelson
Syracuse, New York
August 18, 2002

George Phair
Potomac, Maryland
August 5, 2002

Mary C. Rabbitt
Washington, DC
August 8, 2002

August H. Simonsen
Hertford, North Carolina
August 5, 2002

William A. S. Sarjeant
Saskatoon, Saskatchewan
July 8, 2002

Lawson M. Smith
Clinton, Mississippi
June 5, 2002

Gerald T. Sweeney
Milton, Washington
February 2002

Woodville J. Walker
Tucson, Arizona
June 22, 2002

Call for GSA Committee Service

Stimulate Growth and *Change!*

Serve on a GSA Committee

Terms begin July 1, 2003

GSA is seeking candidates to serve on Society committees and as GSA representatives to other organizations. Contribute to our science 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 specified 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/commtees. Upon accessing the site, click on the **2003–2004 Nomination Form** link to access the form. For questions pertaining to nominations, please contact Ruth Harrison at (303) 357-1000, ext. 0, 1-800-472-1988, or rharrison@geosociety.org.

Nominations received at GSA headquarters by January 15, 2003, 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 2003 committee vacancies. Please use one form per candidate. If additional space is needed, you may attach a separate page. 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 2003 COMMITTEE VACANCIES

KEY

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

Annual Program Committee* (AM, B/E)
1 member-at-large vacancy

Develops a long-range plan for increasing the quality of the annual and other Society-sponsored meetings 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.

Arthur L. Day Medal Award (T/E)
2 member-at-large vacancies

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 student member; 1 graduate-level 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 earth science education objectives and initiatives.

Geology and Public Policy (AM, B/E, T/E)
2 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/E)
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 (B/E, T/E) (term begins January 1, 2004)
4 vacancies: 2 Environmental Geoscience representatives; 1 Marine Geology representative; 1 Public Policy 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. **Qualifications:** should be specialists in computers, Precambrian geology, or paleoceanography-paleoclimatology, and must be able to attend a meeting in late summer.

Membership (B/E, T/E)
1 member-at-large vacancy (government employment category)

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, T/E)
2 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)
4 member-at-large vacancies (one to be a Councilor or former Councilor)

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

Penrose Conferences and Field Forums (T/E)
2 member-at-large vacancies

Reviews and approves Penrose Conference proposals and recommends and implements guidelines for the success of the conferences. **Qualifications:** past convener of a Penrose Conference or a Field Forum, or shall have attended two or more Penrose conferences and/or Field Forums.

Penrose Medal Award (T/E)
2 member-at-large vacancies

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 (AM, T/E)
2 vacancies: 1 member-at-large; 1 student representative

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.

Research Grants* (B/E)
5 vacancies: 4 member-at-large vacancies; 1 National Science Foundation delegate (serving as conferee)

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 (Donath Medal) (T/E)
2 member-at-large vacancies

Committee members investigate the achievements of young scientists who should be considered for this award and submit recommendations to Council. **Qualifications:** should have knowledge of young scientists with "outstanding achievement(s) in contributing to geologic knowledge through original research which marks a major advance in the earth sciences."

Representative to the North American Commission on Stratigraphic Nomenclature
1 vacancy

Must be familiar with and have expertise in stratigraphic nomenclature.

THE GEOLOGICAL SOCIETY OF AMERICA

SCIENCE STEWARDSHIP SERVICE

Committee, Section, and Division Volunteers:

Council Thanks You!

The GSA Council acknowledges the many member-volunteers who, over the years, have contributed to the Society and to our science through involvement in the affairs of the GSA.

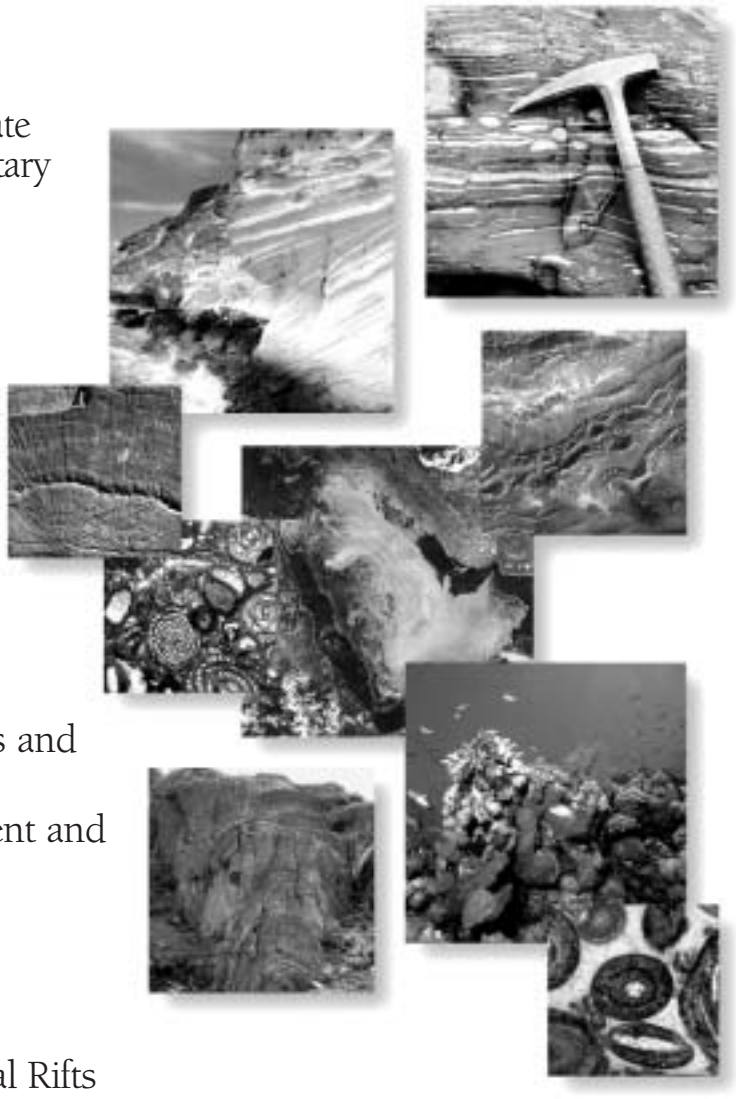
Each year, GSA asks for volunteers to serve on committees, and many highly qualified candidates express their willingness to serve. Not everyone can be appointed to the limited number of vacancies; however, members are reminded that there are also opportunities to serve in the activities and initiatives 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.

Join SEPM!

Society for Sedimentary Geology

Mission:

The society's mission is to disseminate scientific information about sedimentary geology to the global community to further its understanding and use. Because sedimentary geology is a basic building block of geology, our members range from the academic, research, energy and environmental areas.



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SC30–Reservoir Quality Assessment and Prediction in Clastic Rocks

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SP71–Carbonate Eolianites
SP72–Phanerozoic Reef Patterns
SP73–Sedimentation in Continental Rifts
SC51–Continental Trace Fossils

Want to learn more about SEPM? Check out our website:

www.sepm.org

Call for Nominations

GSA Awards and Medals

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 for 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 61 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 less) 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 at www.geosociety.org under Grants, Awards & Medals. A nomination form may also be obtained from the Program Officer, Grants, Awards, and Medals, (303) 357-1037, lcarter@geosociety.org. **The deadline for receipt of nominations is February 1, 2003.**

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. Managed by the GSA Foundation, 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 2003, only those candidates born on or after January 1, 1968, are eligible for consideration. In choosing candidates for the Young Scientist Award, scientific achievement and age will be the sole criteria. Nominations for the 2003 award must include:

- biographical information;
- a summary of the candidate's scientific contributions to geology (200 words or less);
- a selected bibliography (no more than 10 titles); and
- supporting letters from five scientists in addition to the person making the nomination.

The nomination form and instructions are available at www.geosociety.org under Grants, Awards & Medals. A nomination form may also be obtained from the Program Officer, Grants, Awards, and Medals, (303) 357-1037, lcarter@geosociety.org. **The deadline for receipt of nominations is February 1, 2003.**

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 make a nomination for the award. 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 less) 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, or visit www.geosociety.org under Grants, Awards & Medals for more information and for a nomination form. **Deadline for nominations is February 1, 2003.**

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

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Call for Nominations

continued from p. 43

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, funded by the GSA Foundation, will normally 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 less) 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. Visit www.geosociety.org under Grants, Awards & Medals for more information or for a nomination form. **The deadline for receipt of nominations is February 1, 2003.**

National Awards for 2005

Deadline: April 30, 2003

Nominations for the national awards described below are being solicited for 2005. Each year GSA members are invited to participate by recommending possible candidates.

Those who wish to make nominations are urged to do so by sending background information and vitae, and specifying the award for which the candidate is being submitted by April 30, 2003, to Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140, (303) 357-1037, fax 303-357-1070. The American Geological Institute (AGI) on behalf of its member societies coordinates the nomination process, and the AGI Member Society Council will finalize a roster of candidates at its spring 2004 meeting for nomination to the respective offices sponsoring the national awards.

The **William T. Pecora Award**, sponsored jointly by NASA and the 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."

There are now many younger American scientists and engineers who may 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 **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 National Science Foundation (NSF) and National Science Board to an outstanding young researcher in any field of science or engineering supported by NSF.

Candidates must be U.S. citizens or permanent residents and must be 35 years of age or younger, OR not more than five years beyond receipt of the Ph.D. degree by December 31 of the year in which they are nominated.

Candidates should have completed sufficient scientific or engineering research to have demonstrated, through personal accomplishments, outstanding capability, and exceptional promise for significant future achievement.

Note: Background information and vitae of nominated candidates should be sent by **April 30, 2003**, to the Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140.

2003 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

Nominations can be made by anyone on the basis of 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, (3) nomination must include a paragraph stating the pertinence of the paper, (4) nominations must be sent to Program Officer, Grants, Awards, and Medals, GSA, P.O. Box 9140, Boulder, CO 80301-9140. **Deadline: March 31, 2003.**

Basis for Selection

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

2002 Award Recipient Named

The 2002 award will be presented at the GSA Annual Meeting in Denver, Colorado, to **Peggy S. Johnson** for editing *Water, Watersheds, and Land Use in New Mexico*, published by the New Mexico Bureau of Mines and Mineral Resources.


GSA 2003 Annual Meeting!
Seattle
GSA Annual Meeting & Exposition
Washington State Convention
& Trade Center
November 2–5, 2003
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meetings@geosociety.org
www.geosociety.org
SUBARU
Title Sponsor of the 2003 GSA Annual Meeting.
Photo by Brenda Martinez

GSA Foundation Update

Donna Russell, *Director of Operations*

Subaru of America—A GSA Strategic Sponsor Once Again

The GSA Foundation is pleased to announce that Subaru of America, Inc., has renewed its sponsorship to GSA for the next two years.

The sponsorship will provide support for the Annual Meetings and enhance member services, and will also ensure critical funding for several GSA priority programs. GSA's strategic partnership with Subaru will make possible support for the following.

- Subaru of America is the Title Sponsor of the GSA Annual Meeting and the lead sponsor of the Welcoming Party at the meeting.
- The use of two Subarus at GSA Headquarters in Boulder for two years.
- Underwrite three key programs within GSA's Education and Outreach Department:

  The Subaru Distinguished Earth Science Educator will be underwritten by this partnership. Christine McLelland, a teacher from the Englewood School District in Denver will work full time for one academic year on this program, meeting a critical need in the K–12 education program for GSA.

  The Doris Curtis Women in Science Fund, will be enhanced by the Subaru of America–GSA partnership. An award will be given this year at the GSA Annual Meeting in Denver to an outstanding woman in the geosciences, and additional dollars will be added to the endowment of this fund.

  GeoCorps America sponsorship. GeoCorps America is a partnership with GSA, the National Park Service, the USDA Forest Service, and other governmental and corporate sponsors, placing interns in selected public lands.
- Members can benefit from the Subaru of America–GSA relationship with the VIP Partners Program. The VIP Partners Program allows GSA members the ability to purchase or lease a new Subaru vehicle through a dealership at a no-haggle price of dealer invoice cost. For details, visit www.geosociety.org/members/subaru.htm, see p. 23 of the July *GSA Today*, or contact Nancy Williams, nwilliams@geosociety.org, 1-800-472-1988, ext. 1017.

GSA Foundation and GSA are most appreciative of the benefits to the geosciences that this partnership with Subaru of America brings.

Our Sincere Appreciation for your Support

As the Foundation closed out its fiscal period ending June 30, 2002, we had recorded almost 4,500 gifts from our members and corporate supporters. In addition, more than 2,000 gifts were from new donors.

On behalf of the Foundation's Board of Trustees, I would like to express our deepest thanks to the GSA members for their continued support of the Foundation and GSA programs. Your gifts really do make a difference. We hope you will remember to give again when renewing your 2003 membership with GSA.

Most memorable early geologic experience

I had the thrill of finding a shark's tooth on my first field trip—9th grade science class.

—Robert Lee Wilsen

GSA Foundation

3300 Penrose Place, P.O. Box 9140
Boulder, CO 80301-9140 • (303) 357-1054
drussell@geosociety.org

Enclosed is my contribution in the amount of $_____.

Please credit my contribution for the:

☐ Greatest need ☐ Other: _____ Fund

☐ I have named GSA Foundation in my will.

PLEASE PRINT

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Address _____

City/State/ZIP _____

Phone _____

2002–2003 Subaru Distinguished Earth Science Educator Appointed

Christine McLelland, a teacher at Englewood High School in Englewood, Colorado, has been chosen as the Subaru Distinguished Earth Science Educator at GSA for the 2002–2003 school year.

The Subaru Distinguished Earth Science Educator is a master teacher selected by GSA to act as a full-time educator in residence. McLelland will work with GSA Education and Outreach staff, the Committee on Education, and other GSA members to serve the K–12 geoscience education community. She has several goals to make this third year of the program successful.

"I want to use this opportunity to help teachers with lesson plans for earth science topics," McLelland said. "I want to make the GSA Web site a place where earth science teachers commonly turn for ideas and support. The earth science teachers I have discussed this idea with have been excited about finding original ideas and sharing some of their own."

Christine McLelland

McLelland holds a B.A. in geology from Wellesley College in Wellesley, Massachusetts, and an M.S. in geology from the University of Vermont. After graduating, she went to work for an environmental firm before returning to the University of Vermont to earn a teaching certificate. She took her first teaching position at Englewood High School, where she teaches ninth grade earth systems and resources classes and tenth and eleventh grade earth, energy, and environment classes. A native of Vermont, she now lives in Englewood, Colorado, with her husband, a math teacher at Eaglecrest High School in Aurora, and their two young children.

"I am extremely excited about the position," she said. "I love to teach geology, and I hope to increase awareness of geology among K–12 students and their teachers. I will also help to create a new junior membership at GSA, and start a Web page where students can get answers to their earth science questions."

2003 Doris M. Curtis Memorial Fund for Women in Science Award

SUBARU

(Sponsored in part by Subaru of America, Inc.)

In partnership with Subaru of America, GSA is proud to announce the Doris M. Curtis Memorial Fund for Women in Science Award.

Managed by the GSA Foundation, the Women in Science Award will be awarded to a woman/women who have impacted the field of the geosciences in a major way based on their Ph.D. research. Women are eligible for the first 3 years following their degrees. The 2003 award will be $2,500, and it will be presented at the Seattle Annual Meeting. This award is named in honor of a pioneer in the field, Doris Curtis.

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

GSA seeks nominations for the Doris M. Curtis Memorial Fund for Women in Science Award for 2003.

Nominations

Nominations should include a nominating letter that clearly states how the Ph.D. research has impacted geosciences in a major way, a short summary of the research, a short resume with a list of publications and a copy of the dissertation abstract, published abstracts and/or reprints as available.

Please send nominations and supporting material to:
GSA
Attn: Grants, Awards, and Medals
P.O. Box 9140
Boulder, CO 80301-9140

Nominations must be received by February 1, 2003.

New at the GSA Bookstore

Special Papers

Variscan-Appalachian Dynamics:
The Building of the Late Paleozoic Basement
SPE364 (in press; go online for price)

Volcanic Rifted Margins
SPE362 (in press; go online for price)

The Hell Creek Formation and the Cretaceous-Tertiary Boundary in the Northern Great Plains: An Integrated Continental Record of the End of the Cretaceous
SPE361 (in press; go online for price)

Tectonic Evolution of the Bering Shelf–Chukchi Sea–Arctic Margin and Adjacent Landmasses
SPE360, 373 p. plus index, includes 6 plates on 3 sheets and CD-ROM
$145.00, member price $116.00

Ancient Seismites
SPE359, 190 p.
$72.00, member price $57.60

Geology and Geophysics of an Arc-Continent Collision, Taiwan
SPE358, 211 p.
$80.00, member price $64.00

Nearshore Marine Paleoclimatic Regions, Increasing Zoogeographic Provinciality, Molluscan Extinctions, and Paleoshorelines, California: Late Oligocene (27 Ma) to
Late Pliocene (2.5 Ma)
SPE357, 490 p., includes 19 maps
$145.00, member price: $116.00

Catastrophic Events and Mass Extinctions: Impacts and Beyond
SPE356, 729 p. plus index
$170.00, member price $136.00

Memoirs

Geologic Evolution of the Mojave Desert and Southwestern Basin and Range
MWR195, 299 p. plus index, includes 4 plates on 3 sheets and CD-ROM
$120.00, member price $96.00

Reviews in Engineering Geology

Catastrophic Landslides: Effects, Occurrence, and Mechanisms
REG015 (in press; go online for price)

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THE GEOLOGICAL SOCIETY OF AMERICA

Visit the GSA Bookstore at the Annual Meeting in Denver.

GSA 2003 Research Grants 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 details 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 80301-9140, USA, lcarter@geosociety.org. Please use only the current 2003 application and appraisal forms.

Confidential evaluations from two faculty members are required from candidates and must accompany applications submitted. PLEASE USE THE "APPRAISAL OF APPLICANT" FORMS THAT ACCOMPANY THE 2003 APPLICATION FORMS. Application forms will not be accepted by facsimile or E-mail. ONLY COMPLETE APPLICATIONS WILL BE ACCEPTED.

The Geological Society of America awarded $450,000 in grants in 2002. The grants went to 243 students doing research for advanced degrees. The average amount awarded was $1,852. Grants supported 44 % 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 that have been 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, all applicants for grants will be informed of the committee's actions by GSA's executive director.

- Applicants must be members of GSA to apply.
- All applications must be submitted on the 2003 forms and postmarked by February 1, 2003.
- Only complete applications will be accepted.

Geology and Geophysics of an Arc-Continent Collision, Taiwan

SPE358, ISBN 0-8137-2358-2
211 p., soft cover
$80.00, member price $64.00

The Taiwan orogenic belt, which straddles the plate boundary between the Eurasia and Philippine Sea plates, represents one of Earth's only active arc-continent collisions; as such, it provides a unique natural laboratory for understanding orogenic processes. The 14 papers that constitute this volume are organized around five research themes, followed by a synthetic interpretation of the subduction-collision transition in southern Taiwan.

The five themes are: the role of extensional structures before and during thrusting in the fold and thrust; the relation between tectonically driven uplift, river terraces, fold-and-thrust development, and global positioning system data; deformation patterns and strain compatibility in the exposed, internal parts of the orogen; the geothermal structure and the role of synorogenic extension in the internal parts of the orogen; and the integration of geologic and geophysical data sets with finite element models to understand the three-dimensional evolution of the orogen, including the subduction-collision transition. A common theme of the papers is the authors' desire to document the three-dimensional architecture of the orogen and to understand its spatial and temporal evolution using a variety of techniques. As a result, the papers provide new insights on the evolution of the orogenic belt and lay the groundwork for future studies.

Timothy B. Byrne and Char-Shine Liu, Editors

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THE GEOLOGICAL SOCIETY OF AMERICA

Field Forum Scheduled

Structural Controls on Magma Transport and Vertical Coupling in the Continental Lithosphere

Fiordland, New Zealand
April 26–May 6, 2003

Leaders: ***Keith Klepeis****, University of Vermont,* ***Geoffrey Clarke****, University of Sydney,* ***Tracy Rushmer****, University of Vermont, and* ***Andrew Tulloch****, Institute of Geological and Nuclear Sciences.*

The mechanisms by which magma is generated, segregated, and transported through continental crust and how these processes affect the mechanical evolution of orogens are two of the least understood issues of continental dynamics. Few field sites allow us to directly examine structural and magmatic features that evolved simultaneously within large sections of the lower crust. The Early Cretaceous granulite belt of Fiordland, New Zealand, provides an unusual opportunity to examine feedbacks among magmatic, metamorphic, and deformation processes at very deep levels of an ancient orogen (25–50 km paleodepths). This belt contains one of the world's best examples of high-pressure (14–16 kbar) migmatites, granulite facies mineral assemblages, and lower crustal structural features that enable us to observe the effects of lower crustal magmatism, sources of partial melting, the mechanisms and pathways of melt generation and escape, and how migrating magma interacted with deformation on a crustal scale. We plan to use these spectacular exposures to address the following issues:

- The effects of changing thermal and structural regimes in the lower crust on the tectonic evolution of an orogen.
- Evidence of melt sources and mechanisms of magma segregation and transport through the lower crust.
- The effects of lower crustal melting and magmatism on vertical coupling/decoupling within the lithosphere.
- Feedbacks among crustal melting, melt migration, granulite facies metamorphism, and deformation.
- Changing kinematic patterns in lower crustal shear zones and their relationship to magma transport.

Itinerary

April 26: Arrive in Dunedin, New Zealand, by 5 p.m. for dinner and orientation.

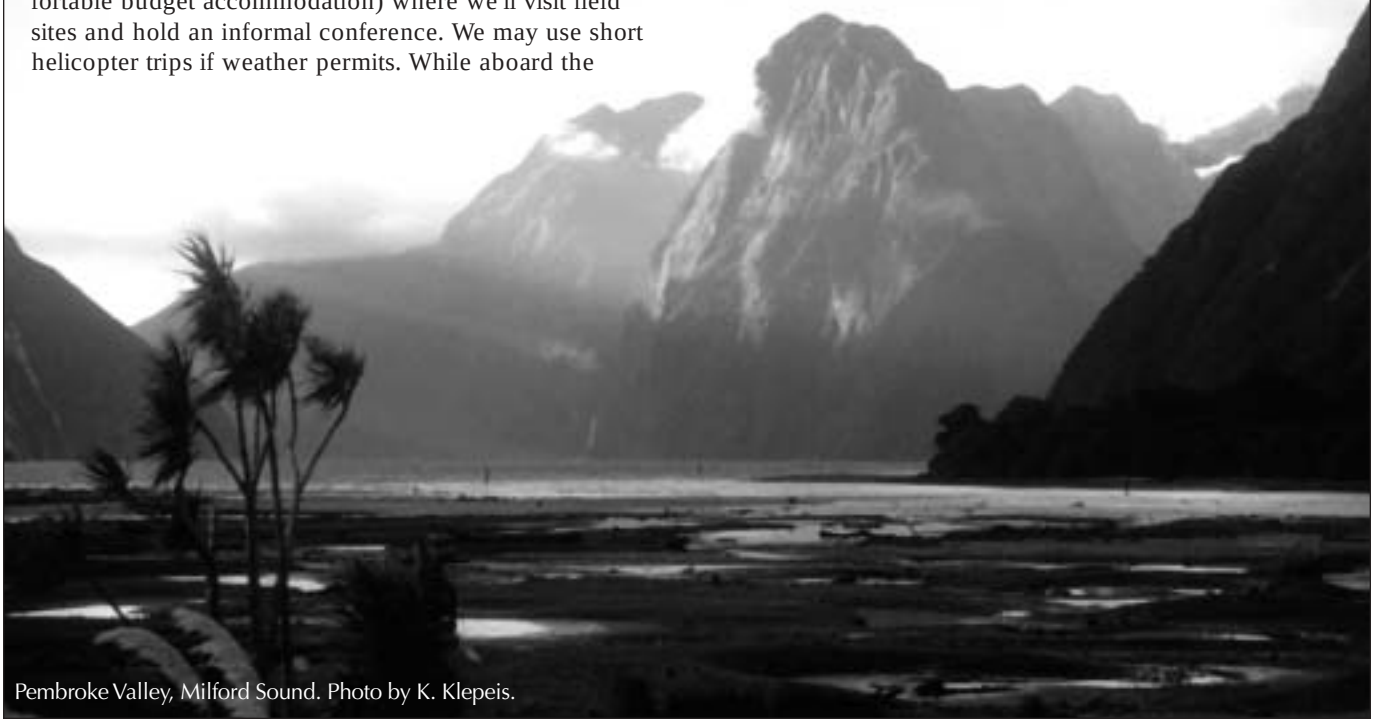
April 27: Chartered bus to Milford Sound, stopping to examine magma mingling textures and mafic intrusions in the upper crust of an early Mesozoic island arc.
April 28–30: Orientation; short in-house conference where participants present and discuss relevant work; outcrop examination of lower crustal granulites, high-*P* migmatites, granulite facies mineral assemblages, and lower crustal shear zones; access by helicopter if weather permits.
May 1: Examine coastal exposures of Milford Sound aboard *Milford Wanderer*. Includes boundaries of the granulite belt and early Mesozoic arc and lower crustal shear zones showing variable styles of strain partitioning.
May 2: George Sound. Examine migmatite textures, metamorphic assemblages, and intrusive contacts inside a mafic-intermediate lower crustal batholith. Relationships here contrast with those found below the batholith.
May 3: Caswell Sound. Examine a mid-crustal fold-thrust belt and its relationship to magmatism at and above the uppermost contact of the batholith.
May 4: Crooked Arm. Examine sheeted ultramafic, gabbroic and dioritic intrusions, evidence of the partial melting of mafic lower crust and extensional shear zones that evolved at garnet granulite facies conditions.
May 5: Continued examination of Crooked Arm leaving boat by noon. Bus and ferry to the town of Te Anau for dinner and overnight.
May 6: Travel to Dunedin (5 hours). Flights out after 1 p.m.

Logistics, Participants, and Costs: For five days, we'll live aboard the *Milford Wanderer* (a fully enclosed, comfortable boat with three decks, 35 berths, tendercraft, and a crew of five) to access remote sites along the waterways of Fiordland National Park. After the first night in a motel in Dunedin, we'll stay three nights at the Milford Lodge (comfortable budget accommodation) where we'll visit field sites and hold an informal conference. We may use short helicopter trips if weather permits. While aboard the *Milford Wanderer*, we'll visit outcrops using small boats and anchor in protected areas for the evening. Dinners (6–7 p.m.) will be followed by informal discussions. Participants should be physically fit and comfortable walking on steep, rocky terrain. Limited roadside access will involve short walks (<0.5 km). Elsewhere we will be in mountain valleys (<1500 m) or landing on coastal outcrops. Participants should be prepared for wind, rain, and cool (5–10 °C, 40–50 °F) temperatures. A list of recommended clothing will be provided.

This forum is limited to 30 people; minimum is 20. We encourage all geoscientists, and especially graduate students, with an interest in deformation, metamorphism, and magmatism in the deep crust to apply. We aim to attract geologists, geophysicists, modelers, and experimentalists. Participants should make their own travel arrangements to and from Dunedin, New Zealand. A registration fee of US$960 covers guidebook, transportation, and meals and lodging within New Zealand. Fee does NOT include airfare to Dunedin, New Zealand.

Registration, Applications, and Information: Please send a letter of application, including a statement of interests, recent work relevant to the meeting's themes, the subject of any proposed presentation (verbal or poster), and contact information (e-mail address) to Keith Klepeis, Dept. of Geology, University of Vermont, Burlington, VT 05405, USA. (802) 656-0246, fax 802-656-0045, kklepeis@zoo.uvm.edu. **Registration fee is due by February 17, 2003.** For more information please contact Klepeis or visit www.uvm.edu/~kklepeis/fieldforum/.

Registrants with Special Needs: GSA is committed to making Field Forums accessible to all. If you require special arrangements or have special dietary concerns, please contact Keith Klepeis at the above address.



Pembroke Valley, Milford Sound. Photo by K. Klepeis.

Ads (or cancellations) must reach the GSA Advertising office one month prior. Contact Advertising Department, (303) 357-1053, 1-800-472-1988, ext. 1053, fax 303-357-1073, acrawford@geosociety.org. Please include address, phone number, and e-mail address with all correspondence.

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Ph.D. in geology/paleontology w/ 5+ years exper in science research, oil industry, grad & undergrad teaching. Field experience in W. America, Europe, Greenland. Bilingual, published. Want to again be a geologist in USA. Willing to relocate. Contact @ (352) 278-3481.

Positions Open

GEODYNAMICS AND EARTH SURFACE PROCESSES

The Department of Geological Sciences at Case Western Reserve University seeks a broadly trained geoscientist for a tenure-track faculty position specializing in dynamic earth surface processes. We seek candidates who will help bridge existing strengths in geochemistry, planetary materials, and surficial processes. Areas of expertise may include, but are not limited to geodynamics, kinematics, tectonics, numerical modeling of deformation, evolution and exhumation of landscapes and continental-scale structures, basin evolution, geodetics, neotectonics, and fluids and rock mechanics. Application of a variety of tools such as geochemistry, isotopic and cosmogenic nuclides, and numerical models is an asset. The ideal candidate will be expected to develop a vigorous field-based research program that involves both undergraduate and graduate students, have the ability to teach related coursework such as structural geology and geophysics, and is committed to exceptional undergraduate instruction of both majors and non-majors as well as graduate education. It is anticipated that the position will be filled at the Assistant Professor level. Apply by November 15 by sending an application letter, curriculum vitae, a statement of research and teaching interests, and the names, addresses, telephone numbers, and email addresses of three references to Prof. Gerald Matisoff, Chair, Department of Geological Sciences, Case Western Reserve University, Cleveland, OH 44106-7216. Case Western Reserve University is an Affirmative Action/Equal Opportunity Employer. Minority and women candidates are strongly encouraged to apply.

TENURE-TRACK POSITION IN ENVIRONMENTAL EARTH SCIENCE UNIVERSITY OF PITTSBURGH

The Department of Geology and Planetary Science at the University of Pittsburgh invites applications for a full time, Assistant Professor level, tenure-track faculty position beginning in September 2003, pending budgetary approval. The successful candidate will develop a vigorous, externally funded research program in addition to teaching at the undergraduate and graduate level and supervising masters and Ph.D. student research. Qualifications include a Ph.D. at time of appointment and demonstrated excellence in teaching, research, and intellectual leadership.

We seek an integrative geoscientist who is creatively quantifying the physical, chemical, and/or biological processes that occur at or near the Earth's surface. The time frame of interest is open, ranging from Precambrian to Holocene. The successful candidate should combine an active field-based research program with expertise that could include but is not limited to stable isotope geochemistry, micropaleontology, environmental geochemistry, biogeochemistry, and environmental geophysics. We seek a candidate who will integrate with and strengthen the department's focused research efforts in paleoclimatology, low temperature geochemistry, remote sensing, tectonics and paleomagnetism.

Applicants should send a curriculum vitae (including past and current grant support and relevant publications), statements of research and teaching interests, and the names, addresses, phone numbers and email of at least four references to: Faculty Search Committee, Department of Geology and Planetary Science, 200 SRCC Building, University of Pittsburgh, Pittsburgh, PA 15260, USA. Evaluation of applications will begin December 1, 2002, and continue until the position is filled. For additional information about the Department please see http://www.geology.pitt.edu/.

The University of Pittsburgh is an Affirmative Action, Equal Opportunity Employer. Women and members of minority groups under-represented in academia are especially encouraged to apply.

STRUCTURAL GEOLOGIST UNIVERSITY OF WISCONSIN—MILWAUKEE

The Department of Geosciences at the University of Wisconsin—Milwaukee seeks to hire a structural geologist the tenure-track Assistant Professor level, pending budgetary approval. Applicants must hold a Ph.D. in geology or related field, and have demonstrated field and research experience in structural geology. Post-doctoral experience is desirable. The successful candidate is expected to conduct an active research program, and teach undergraduate and graduate courses in structural geology, introductory level geology and related subject areas. Information is available on-line regarding the Department at www.uwm.edu/Dept/Geosciences/.

Candidates must mail a curriculum vita with a research plan, a statement of teaching philosophy and three letters of reference from appropriate individuals to Norman P. Lasca, Chair, Department of Geosciences, University of Wisconsin—Milwaukee, P.O. Box 413, Milwaukee, WI 53201 (FAX: 414-229-5452; e-mail: nplasca@uwm.edu). Review of candidates will begin on November 4, 2002 and will continue until the position is filled. The University of Wisconsin is an Equal Opportunity/Affirmative Action Employer.

ASSISTANT PROFESSOR OF ENVIRONMENTAL SCIENCE

Hardin-Simmons University, an institution affiliated with the General Baptist Convention of Texas, is seeking applications for the position of Assistant Professor Environmental Science in the Geology Department. Earned doctorate in chemistry, environmental studies, or geological sciences is required (ABD considered). Applications with academic and professional credentials that are field oriented with thorough knowledge and experience of GIS/GPS are encouraged. Candidates must support the department's expansion into environmental science and management and actively participate in the Environmental Management Graduate Program. The successful applicant will have a strong commitment to university teaching, student advising, church service, and community service. HSU employs faculty members who are Christians and who support the mission of the university in the Baptist tradition. Send letter of application (including teaching philosophy), three letters of reference, and vita to Dr. Mark A. Ouimette, Head of Geological Sciences, Holland School of Sciences and Mathematics, Box 16164, Hardin-Simmons University, Abilene, TX 79698-6164; (915) 670-1383; Email: ouimette@hsutx.edu. Under state and federal law, the University may discriminate on the basis of religion in order to fulfill its purpose. Preference for this position will be given to applicants who are professing Baptists. Minorities and women are encouraged to apply.

NORTHERN KENTUCKY UNIVERSITY

The Department of Physics and Geology invites applications for a tenure-track position in geology beginning August 2003. Applicants with any specialty complimenting our current faculty will be considered although preference will be given to candidates with strong backgrounds in structural geology, stratigraphy and natural resource development. The position requires a PhD and a strong commitment to teaching at the undergraduate level. Rank and salary will be commensurate with qualifications and experience. Course responsibilities will include an introductory course in physical geology as well as upper division courses in the applicants' area of expertise, offered on a rotating basis. Candidates also will be expected to develop a strong research program and to supervise undergraduate research projects. The ability to collaborate with the NKU Environmental Science program, the Environmental Resource Management Center and the Center for Integrative Natural Science and Mathematics

will offer the successful candidate additional professional opportunities. Interested applicants should send a letter of application, curriculum vitae, separate statements of teaching philosophy and research interests, the names, addresses, phone numbers and e-mail addresses of three references to: Chair, Geology Search Committee, Department of Physics and Geology, Northern Kentucky University, Highland Heights, KY 41099-1900. The search committee will begin reviewing applications on November 1, 2002, although the search will remain open until the position is filled. Candidates may be asked to submit additional documentation. For additional information on Northern Kentucky University visit http:www.nku.edu. Northern Kentucky is an Equal Opportunity Employer.

TENURE-TRACK FACULTY POSITION
IN HYDROGEOLOGY AND WATER RESOURCES
UNIVERSITY OF WISCONSIN—EAU CLAIRE

Beginning August 2003. Instructional responsibilities will include water resources, physical hydrogeology, chemical hydrogeology, computer modeling in hydrogeology, and introductory geology courses as needed by the department. Applicant must also involve students in high-quality collaborative research projects. A Ph.D in geology or a closely related discipline is required at the time of appointment. The department has modern facilities in hydrogeology, geophysics, geochemistry, and sedimentology.

To apply, please send a letter of application, curriculum vita, copies of college transcripts, and arrange to have three letters of recommendation sent to the department. Reply to Dr. Robert Hooper, Chair, Department of Geology, University of Wisconsin—Eau Claire, Eau Claire, WI, 54702-4004. To be considered for priority screening all application materials must be received by December 15, 2002; however, screening may continue until position is filled.

For a complete position description, call 715/836-3732 or visit http://www.uwec.edu/acadaff/jobs/. UW-Eau Claire is an AA/EEO employer and encourages applications from women and minorities.

PROFESSORSHIP IN PETROLOGY
DEPARTMENT OF EARTH AND
ENVIRONMENTAL SCIENCES
KOREA UNIVERSITY, KOREA

The Department of Earth and Environmental Sciences (EES), Korea University, invites application for a tenure-track faculty position in igneous or metamorphic petrology. Appointment will be at the Assistant, Associate or Full Professor level depending on the candidate's experience and research record. There are currently seven full-time faculty members, one research professor, six part-time lecturers, and about 30 graduate students in the department. We have excellent research equipment for petrology including newest models of microprobe, XRD, XRF, ICP (AES & MS) and Gas-isotope mass spectrometer in EES. The starting salary will vary depending on the qualification of the candidate, and ranges from approximately U.S.$37,000 to 60,000 per year. Income tax will be exempted for the first two years of the appointment for foreigners and after the two years the tax rate (including income and social security taxes) will be about 10% of the salary.

The successful candidate is expected to maintain a vigorous research on igneous or metamorphic petrology, possibly in collaboration with faculty members in EES, and teach one undergraduate and one graduate courses per semester in English. This appointment will start from as early as March 1, 2003. Initial appointment will be for three years.

Applicants should send a curriculum vitae, a publication list, reprints of papers published from 1998, three letters of reference, and a statement of research and teaching interest by October 26, 2002 to: Dean of the Office of Academic Affairs, Korea University, Seoul 136-701, Korea. A detailed information on our department may be obtained from http://ees.korea.ac.kr. For any inquiry about this position, contact Prof. Jin-Han Ree (reejh@korea.ac.kr).

GEOLOGY INSTRUCTOR
FOR DISTANCE LEARNING PROGRAM
MISSISSIPPI STATE UNIVERSITY

The Department of Geosciences at Mississippi State University invites applications for a new full-time, non-tenure track instructor (9-month appointment with additional summer teaching and salary available and expected) position. An M.S. degree in geology or related discipline is required. This position is with the Geoscience Distance Learning Programs and will begin 1 January 2003. The Instructor will be teaching a wide variety of geology courses in our Teachers In Geosciences distance learning program. Courses to be taught may include Geology of North America, geomorphology, rocks and minerals, earthquakes and volcanoes, and historical geology. Interest in distance learning techniques is essential. Extensive computer knowledge and an interest in leading summer field courses for teachers in various locations across the country are highly desirable. Instructional technology experience is also desirable.

The Geoscience Distance Learning Programs offer B.S. and M.S. degrees in Geoscience. The distance learning programs have enrollments of over 400 undergraduate and over 200 graduate students. The department presently offers seventeen undergraduate courses and twenty-two graduate courses by distance learning. Enrollments are expected to continue to increase and new courses are being added. More information on the distance learning programs can be found at http://www.msstate.edu/dept/geosciences/distance.html.

The Geoscience Distance Learning Programs presently consist of six instructors and four professional/support staff members. The Department of Geosciences is growing rapidly and currently has twenty-eight faculty and staff. In addition, the department and the Distance Learning Programs have just moved into completely renovated and expanded facilities.

Candidates should submit a letter of application, curriculum vitae, copies of transcripts, and the names of three people who may be contacted for letters of recommendation. Screening of applicants will begin November 1 and continue until the positions are filled. Preliminary interviews may be scheduled at the GSA annual meetings in October. Women and minorities are encouraged to apply. Mississippi State University is an Affirmative Action/Equal Opportunity Employer. Apply: Dr. Mark S. Binkley, Head, Department of Geosciences, P. O. Box 5448, Mississippi State, MS, 39762. Voice (662) 325-3915. E-mail: binkley@geosci.msstate.edu.

ASSISTANT PROFESSOR, GEOCHEMISTRY
GEOLOGY DEPT., UNIVERSITY OF VERMONT

Full time, tenure track position to begin September 2003. Preferred candidates will approach geochemical problems using both field and analytical methods comple-

menting departmental interests in crustal evolution, mountain systems, petrology, and surface processes. Expertise should include quantitative geochemical analysis of natural systems including fluid-rock interactions under a wide range of P/T conditions. Candidate should integrate, at the undergraduate and MS level, high-quality research and teaching that utilizes Vermont's unique and highly varied geologic setting. Responsibilities include developing a strong research program, advising MS and undergraduate research, teaching core 2nd year Earth Materials course, 3rd year general geochemistry course, and graduate courses of the candidate's choosing. Ph.D. required. Questions and applications (only by PDF, <3 MB) to geochem@zoo.uvm.edu including only CV, research and teaching interests, and contact information for three references by December 31, 2002. The University is an affirmative action, equal opportunity employer.

STRATIGRAPHY/SEDIMENTOLOGY
CALIFORNIA STATE UNIVERSITY, FULLERTON

The Department of Geological Sciences, California State University, Fullerton, invites applications for a tenure-track position starting August 2003. We anticipate filling this position at the rank of Assistant Professor; however, candidates with exceptional qualifications may be considered for appointment at a higher rank. The successful applicant will have the following credentials and capabilities:

A Ph.D. in Geology or a related discipline at the time of appointment;

A primary interest in teaching and achieving excellence in teaching;

A vigorous, field-based research program in stratigraphy/sedimentology that would allow involvement of undergraduate and graduate students.

A research emphasis in clastic sedimentology and/or sequence stratigraphy and an ability to interact with faculty in neotectonics, geomorphology, paleoclimatology and/or hydrology would be considered favorably.

Teaching responsibilities are sedimentation and stratigraphy, paleontology, and graduate-level basin analysis. Additional teaching responsibilities may include physical geology, historical geology, field geology, as well as graduate courses in the new faculty member's area of expertise. Research activities must result in publications in refereed journals.

CSU Fullerton is a large urban university dedicated to the preeminence of learning. Located 22 miles southeast of metropolitan Los Angeles, Fullerton is a full-service city renowned for its unique mix of residential, commercial and industrial, educational, and cultural environments that provide residents with an outstanding quality of life. The Department has ten full-time faculty with expertise in traditional and applied areas of geology. The nearby geological provinces provide abundant opportunities for field-based research, which the department emphasizes in its curriculum. We have about 50 undergraduate majors and a small but growing MS graduate program. Other information is available from our web page at http://geology.fullerton.edu/.

To apply, please send 1) a detailed curriculum vita, 2) a letter of application that explains how you meet the qualifications outlined above, 3) a statement about teaching that includes a discussion of relevant course work and/or experience in preparation for teaching, a list of courses you would feel comfortable teaching, and a statement of your teaching philosophy, 4) a statement of your future research plans and goals, and 5) letters of recommendation from at least three references familiar with your teaching and research potential — referees should send their letters directly to the address below.

Send application to: Dr Diane Clemens-Knott, Chair, Search Committee, Department of Geological Sciences, California State University, PO Box 6850, Fullerton, California 92834-6850. Applications will be accepted until the position is filled. To receive serious consideration applications should be received by November 30, 2002.

California State University, Fullerton is an Affirmative Action/Equal Opportunity Employer. All personnel policies conform to the requirements of Executive Order 11246, the Americans with Disabilities Act (ADA) of 1990, Title IX of the Higher Education Amendments of 1972 and other federal regulations regarding nondiscrimination.

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

The Geological Sciences Dept. invites applications for a tenure track faculty position at the Associate Professor level beginning September 2003. Applicants must have an earned doctorate in Geology with a specialty in one of the above mentioned fields and teaching expertise in two or more of the following areas: Optical Mineralogy, Geotectonics, Geohydrology and Engineering Geology, a minimum of five years of full-time, documented, effective, high quality college-level undergraduate teaching experience and a grant and publication record commensurate with an associate professor-level appointment. Applicants must be actively involved in the field study of the southwest U.S. and should have experience directing undergraduate research projects. Preference will be given to applicants who possess knowledge of GIS software and GIS/GPS applications to Geology and who can teach a broad range of general education and service courses. Successful candidates must be committed to working with a diverse student body. Responsibilities broadly include teaching and developing core courses in the above-mentioned fields as well as general education and service courses, directing undergraduates in field-oriented research in the southwest U.S., integrating GIS into the geoscience curriculum, advising students and carrying out committee assignments. Applicants must submit a resume, a statement of teaching and research interests, three recent letters of reference as well as names and contact information for two additional references, transcripts (unofficial OK), and a completed application form (supplied by the Dept.). Official transcripts are required of all finalists. Mail requests and materials to: Dr. John A. Klasik, Chair, Geological Sciences Department, Cal Poly Pomona, Pomona, CA, 91768. Initial screening: January 6, 2003, position open until filled or terminated. EO/AA employer.

MARINE, EARTH, AND ATMOSPHERIC SCIENCES
NORTH CAROLINA STATE UNIVERSITY

5 Tenure Track Positions. The Dept. of Marine, Earth and Atmospheric Sciences (MEAS) at North Carolina State University (NCSU) invites applications for 5 tenure track faculty positions at the level of Assistant Professor in the fields of Air Quality, Geodynamics, Geological Oceanography, Coastal Physical Oceanography, and Terrestrial Mesozoic Studies. The successful candidates are expected to establish vigorous programs of scholarship and sponsored professional activity that should include, but are not limited to, active research involving high-quality graduate students, teaching at undergraduate and graduate levels, and involvement in various outreach programs. A PhD. degree in an appropriately related field is required for each position.

MEAS at NCSU is one of the largest interdisciplinary earth science departments in the nation with 32 full-time faculty. MEAS is a charter member of the Consortium for Oceanographic Research and Education (CORE) and part of the Duke/University of North Carolina Oceanographic Consortium, which operates the R/V CAPE HATTERAS, a 135-foot oceanographic research vessel. The department encompasses a rich variety of research opportunities, including the Center for Marine Science and Technology (CMAST is a coastal research, teaching, and outreach facility located at Morehead City, NC), the Program for Air Quality, and the Program for the Exploration of the Dinosaurian World. In addition, we house the State Climate Office and share space with the National Weather Service. The department has extensive computational resources, including access to the NC Supercomputer Center. North Carolina State University is located in Raleigh, which forms the eastern apex of the Research Triangle Park made up of many colleges, universities, government laboratories, research institutes, and a thriving private sector. Further details concerning the department and the university can be found at our websites http://www.meas.nscu.edu, http://www.ncsu.edu/.

AIR QUALITY: Applicants should have expertise in one or more of the following areas: chemistry and physics of air pollution: urban/regional/global air quality modeling/forecasting; photochemical transformations; nucleation and growth of atmospheric aerosols; air pollution meteorology; and impact of air quality on climate. The potential for building upon existing research programs in the department and the University is highly desirable. A special opportunity exists for collaboration with the U.S. EPA (National Exposure Research Lab) and NOAA (Air Resources Lab) that are located nearby in Research Triangle Park. Exceptionally qualified candidates could be considered for higher rank. Search committee chair: Dr. V. Saxena.

GEODYNAMICS: We seek applicants who have a fundamental understanding of geological processes,

continued on p. 58

Statement of Ownership, Management, and Circulation

(Required by Title 39 U.S.C. 4369)

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a.	Total No. Copies (Net press run)	18,500	18,500
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	(1) Sales through dealers and carriers, street vendors, and counter sales (not mailed)	0	0
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c.	Total Paid and/or Requested Circulation (Sum of b (1) and b (2))	17,936	17,669
d.	Distribution by Mail (Samples, complimentary, and other free)	0	0
e.	Free Distribution Outside the Mail (Carriers or other means)	0	0
f.	Total Free Distribution (Sum of d and e)	0	0
g.	Total Distribution (Sum of c and f)	17,936	17,669
h.	Copies Not Distributed		
	(1) Office use, leftovers, spoiled	564	831
	(2) Returned from news agents	0	0
i.	Total (Sum of g, h (1), and h (2))	18,500	18,500
Percent Paid and/or Requested Circulation (c/g x 100)		100%	100%

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continued from p. 57

possess the ability to build a potent research and teaching program that emphasizes quantitative approaches to these processes, and can develop linkages between crustal studies and other research programs in the department. Examples of interest include, but are not restricted to, the interaction of surface processes-tectonics-climate, sea level changes related to crustal motion, geologic hazards, and sedimentary basin evolution. Search committee chair: Dr. J. Hibbard.

GEOLOGICAL OCEANOGRAPHY: We seek a candidate with field interests and a strong background in areas such as continental margin processes, ocean basin evolution, or paleoceanography. Interactions between the successful candidate's research program and existing MEAS research programs (e.g., geochemistry, surface-earth processes and hydrogeology, as well as biophysical oceanography) are encouraged and highly desirable. Department resources include CMAST, the Oceanographic Remote Sensing Facility, on-campus sample storage and staging areas, as well as a machine shop. Search committee chair: Dr. D. DeMaster.

COASTAL PHYSICAL OCEANOGRAPHY: We are particularly looking for candidates with strong backgrounds in field-based estuarine and coastal ocean processes. This position will be located on main campus and will have access to extensive marine science facilities both on campus and on the coast. Facilities available on main campus include the Oceanographic Remote Sensing Facility, the Ocean Science Technology and Engineering Facility (for equipment preparation, development and maintenance supporting field and laboratory activities), and a machine shop. Comparable facilities are available off-campus at CMAST for coordination and execution of coastal field activities of relevance to North Carolina. This is the first of three positions dedicated to developing coastal activities through/at CMAST. MEAS anticipates an exciting period of growth over the next few years at CMAST comes. Candidates must have a Ph.D. in physical oceanography or a closely related field. Post-doctoral experience is preferred. Search committee chair: Dr. John M. Morrison.

TERRESTRIAL MESOZOIC STUDIES: This position will be supported jointly by MEAS and the North Carolina Museum of Natural Sciences (http://www.naturalsciences.org). Individuals with specialties in paleo-climatology, -biology, -ecology and/or -surficial processes are encouraged to apply. The successful applicant is expected to participate in the Program for the Exploration of the Dinosaurian World (http://www.dinoheart.org/center.html). The Program is a consortium of scientists from the University and the Museum, as well as in other organizations in the US and abroad, which has as its objective the study of the evolution of terrestrial ecosystems through Mesozoic time.

Outreach responsibilities for this position will be directed towards activities with the Museum. Founded in 1879, the Museum is the largest natural sciences museum in the Southeast. In April 2000, the Museum moved into a new 7-story, 200,000-square-foot state-of-the-art facility. The mission of the Museum is to enhance the public's understanding and appreciation of the natural environment in ways that emphasize the diversity of North Carolina and the southeastern United States and relate the region to the natural world as a whole. Search committee chair: Dr. N. Blair.

Applicants should provide full curriculum vitae, a selection of reprints, separate statements of research and teaching goals that demonstrate commitment to interdisciplinary interests, and the names and contact information of at least three references. Forward applications to Chair, (position title) Search Committee, Dept. of Marine, Earth and Atmospheric Sciences, Box 8208, North Carolina State University, Raleigh, NC, 27695-8208. Direct questions to MEASsearch@ncsu.edu (subject = search chair). Review of applications will begin September 15, 2002 and will continue until the various positions are filled. NC State is an equal opportunity, affirmative action employer and especially solicits applications from women, underrepresented minorities, and persons who are physically challenged. Proper documentation of identity and employability will be required.

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 $42,000 plus a research expense fund of $2,000 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 2003-2004 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 interdisciplinary 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 email to: mmedley@gps.caltech.edu, or forms can be downloaded from www.gps.caltech.edu/positions/positions.html.

COMPLETED APPLICATIONS WITH REFERENCES SHOULD ARRIVE AT CALTECH BY Friday, December 20, 2002.

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.

FACULTY POSITION IN STRUCTURAL GEOLOGY UNIVERSITY OF WISCONSIN—MADISON

The Department of Geology and Geophysics at the University of Wisconsin—Madison seeks a Structural Geologist for an assistant professor, tenure-track position. Distinguished candidates at the associate and full professor level are also encouraged to apply. A starting date of August, 2003 is anticipated. We are seeking an individual in the broad area of structural geology. This includes, but is not limited to, geomechanics, tectonics, tectonophysics, continental dynamics, geodynamics, rock deformation, physical glaciology, and quantitative geomorphology. We anticipate that this person will interact with existing groups in Geology and Geophysics; opportunities also exist for interaction with the Geological Engineering program. A field component of research is desirable.

A Ph.D. is required at the time of the appointment. The successful candidate is expected to develop an active research program, including supervision of graduate students. Teaching responsibilities include courses at the undergraduate and graduate levels.

Applicants should submit a resume, statement of research and teaching interests, and the names and addresses of at least three references to Dr. Basil Tikoff, Structural Geology—Search Chair, Dept. of Geology & Geophysics, University of Wisconsin—Madison, 1215 W. Dayton St., Madison WI 53706-1692. The application deadline is November 15, 2002.

For additional information, please visit: www.geology.wisc.edu. UW-Madison is an equal opportunity/affirmative action employer and encourages applications from women and minorities. Unless confidentiality is requested in writing, information regarding applicants must be released upon request. Finalists cannot be guaranteed confidentiality.

GEOSCIENCE EDUCATION, OHIO UNIVERSITY

The Department of Geological Sciences at Ohio University invites applications for a tenure-track appointment at the assistant professor level in Geoscience Education to begin in September 2003, contingent on budgetary conditions. We are seeking an individual who is committed to teaching and pedagogical research, and who will enhance the active learning environment of the department's general education courses, coordinate the introductory laboratories, and develop the department's contribution to teacher education in collaboration with the College of Education. Preference will be given to those candidates with public school or junior college teaching experience, experience teaching geoscience courses designed for students preparing to be teachers, facility teaching with technology, and research interests in the teaching and learning of lower level college geoscience. The successful candidate will be expected to teach a variety of under-

graduate geoscience courses including those designed for teacher education students, plan/conduct professional development for area public school teachers, and work with faculty in the College of Education. Excellence in undergraduate teaching and student advisement must be complemented by the development of a strong personal pedagogical research program supported by external funds. The successful applicant will possess a Ph.D. in geoscience and must show demonstrated potential for teaching and research in some aspect of geoscience education.

Applicants should send a vita, a description of teaching philosophy and experience, research interests, and the names and addresses of three referees to: Search Committee Chair, Department of Geological Sciences, 316 Clippinger Laboratories, Ohio University, Athens, Ohio 45701-2979. For further information concerning the department and its faculty, visit the Ohio University web site at www.ohiou.edu. Applications should be received before December 1, 2002, but will be considered until the position is filled. Women and minorities are especially encouraged to apply. Ohio University is an affirmative action/equal opportunity employer.

U.S. GEOLOGICAL SURVEY
PROGRAM COORDINATOR
ENERGY RESOURCES PROGRAM

The U.S. Geological Survey (USGS) invites applications for the position of Program Coordinator, Energy Resources Program, in Reston, VA. The Energy Resources Program provides scientific information and comprehensive analyses of oil, natural gas, and coal resources of the Nation and the world. The Program conducts basic and applied research on geologic energy resources and on the environmental and economic impacts of their extraction and use. It also conducts research on frontier energy resources such as geothermal, coal-bed methane, and gas hydrates. The Program Coordinator plans, develops, and implements all energy resources activities and provides scientific leadership and funding guidance for these activities. This position requires strong coordination and negotiation skills combined with demonstrated scientific stature and communications skills.

Applicant must have a strong record of publications in refereed scientific literature and a state-of-the-art knowledge of the scientific concepts, principles, and practices of geology, geophysics, and related geoscience disciplines as they apply to solid and liquid fuels, energy resource assessment, and environmental quality. The incumbent will serve as a leader for planning and coordinating major National energy resource programs and must have extensive experience in one or more of the above listed disciplines to develop and coordinate major energy resources programs. The Energy Resources Program works closely with U.S. Departments of Energy, Defense, and State, Federal land management agencies, and the International community to assess the availability of oil and natural gas resources. The Program also cooperates with many local and State agencies and coal and electric power producers to assess the availability and quality of coal resources.

This is an interdisciplinary position that may be filled as either Geologist, GS-1350-15; Geophysicist, GS 1313-15; or Physical Scientist, GS-1301-15. It is a full-time, permanent position with the U.S. Geological Survey and has a salary range of $92,060 to $119,682 commensurate with experience. This is a permanent appointment, however, the successful candidate will serve a time-limited rotational assignment not to exceed 5 years. Upon completion of this rotational assignment the incumbent will be reassigned to a permanent position within the Geologic Discipline. The position is located in Reston, VA. There are six vacancy announcements for this position but only one position will be filled amongst the six announcements. The following announcements are open to all U.S. Citizens: HQ-2002-53, HQ-2002-55, and HQ-2002-57. The following announcements are open to all U.S. Citizens that are current or former Federal employees: HQ-2002-52, HQ-2002-54, and HQ-2002-56. The announcements are open from October 1, 2002 to October 29, 2002. For detailed vacancy announcement, including specific qualification requirements and application go to http://www.usgs.gov/ohr/oars/. U.S. Citizenship is required. Contact: Office of Personnel (703) 648-4484. The U.S. Geological Survey is an equal opportunity employer.

SEDIMENTARY GEOLOGY/PALEONTOLOGY
DENISON UNIVERSITY

The Department of Geology and Geography invites applications for a tenure-track appointment, at the Assistant Professor level, to begin fall 2003. A Ph.D. is required. Primary teaching responsibilities include historical geology, sedimentology/stratigraphy, introductory physical geology, and an upper-level course in the candidate's area of expertise. Our department stresses a balance of classroom, field and laboratory experiences for our majors, and we seek a colleague who will contribute to all these components of our undergraduate curriculum. Denison is a selective liberal arts college strongly committed to and supportive of excellence in teaching and active faculty research that involves undergraduate students.

Please submit a letter of application, including a discussion of your approach to teaching and research in a liberal arts setting, along with a vita, academic transcripts and contact information for three references to: Dr. Tod A. Frolking, Department of Geology and Geography, Denison University, Granville, OH 43023; (740) 587-6217; frolking@denison.edu. Please visit our website at http://www.denison.edu/geology. Application materials must arrive by November 15, 2002 for full consideration; interviews will be held on campus in January. Early applications are strongly encouraged as we hope to meet with candidates at the GSA meeting in Denver. Denison is an affirmative action/equal opportunity employer. Women and minorities are encouraged to apply.

ENVIRONMENTAL GEOLOGIST
EASTERN WASHINGTON UNIVERSITY

The Department of Geology, Eastern Washington University, invites applications for a tenure-track position at the assistant professor level in environmental geology, to begin fall 2003. The successful candidate is expected to be a dynamic lecturer dedicated to excellence in

Department of Geosciences
PRINCETON UNIVERSITY

HARRY HESS FELLOWS PROGRAM

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

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

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

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

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

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

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

undergraduate teaching and student mentoring. He/she will be expected to contribute to Eastern's new environmental science degree program by teaching introductory courses in geology and environmental science, an upper-division course in soil mechanics, and to develop and teach courses in their field of specialization. Demonstrable experience in GIS is required. Preference will be given to candidates with specialization in the following areas: soil mechanics and/or geotechnical engineering, geomorphology, and practical applications of GIS. The successful candidate is expected to develop a research program in environmental geology that involves undergraduates, relates to the Inland Northwest, and integrates with existing faculty in geochemistry, hydrogeology, biology and chemistry. The candidate will also be expected to develop collaborative relationships with the local geologic community. A Ph.D. is required, and the applicant must obtain registration and licensing as a professional geologist in the state of Washington for successful tenure evaluation.

Applicants should send a curriculum vita and a cover letter with a statement of teaching philosophy and courses that could be taught and a statement of future research plans, and have three letters of reference sent to: Chair, Search Committee, Department of Geology, 130 Science Building, Eastern Washington University, Cheney, WA 99004. Screening will begin December 1, 2002, and the position will remain open until filled. Early applicants will be interviewed at the national GSA meeting in Denver. Applicants should arrange for their referees to send letters to the above address. Departmental information is available on our home page at www.geology.ewu.edu.

EWU is an equal opportunity/affirmative action employer, and applications from members of historically underrepresented groups are especially encouraged. The successful candidate will be required to pass a background check and to show proof of eligibility to work in the U.S. pursuant to U.S. immigration laws.

FACULTY POSITION/QUATERNARY GEOLOGY
UNIVERSITY OF COLORADO, BOULDER

The Department of Geological Sciences, University of Colorado at Boulder, invites applications for a tenure-track position in terrestrial Quaternary Geology. We seek applicants with established research in the fields of glacial geology or paleoclimatology, and whose research provides quantitative measures of paleoenvironmental variables at global to regional scales. Preference will be given to applicants whose research complements established strengths within INSTAAR, our partnering unit, in terrestrial paleoecology, Quaternary geochronology, ice-core paleochemistry, paleoceanography , or biogeochemistry, and that focuses on processes and mechanisms on timescales relevant to society. Postdoctoral experience is desirable. The successful applicant will have a strong commitment to teaching at the undergraduate level, and participation in the graduate program in Quaternary studies. Additional information about the Department may be found at www.Colorado.EDU/GeolSci/. We expect to fill the position at the Assistant or Associate Professor level.

Applicants should submit a brief description of research and teaching interests, including a discussion of how they plan to obtain resources necessary for their research, a summary of experience in guiding graduate students, curriculum vitae, and names of four referees to Gifford Miller, Search Committee Chair, (Quaternary@colorado.edu) Geological Sciences, University of Colorado, Boulder, CO 80309-0399. We will start to review applications after October 15, 2002, but will continue to accept applications until the position is filled. The University of Colorado is an equal opportunity/nondiscrimination institution.

EARTH SCIENCE TEACHER EDUCATION
EASTERN MICHIGAN UNIVERSITY

The Department of Geography and Geology at Eastern Michigan University invites applications for a tenure-track faculty position at the assistant professor level in the field of earth science teacher education, effective August 2003. A Ph.D. is required at the time of appointment. Teaching experience at the K–12 level is a plus, but not required.

We seek a creative candidate to oversee the earth science for elementary teachers course, develop upper-level courses in earth science specifically geared for elementary teachers, teach methods courses for secondary teachers, and to act as a liaison between the Department and the College of Education, and the local K–12 community. Research in the field of science education is expected.

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 #F0310, Eastern Michigan University, 202 Boone Hall, Ypsilanti, MI 48197.

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

ASST. PROFESSOR—ASTROBIOLOGY
UNIVERSITY OF NORTH DAKOTA.

The Department of Space Studies is seeking a tenure-track Assistant Professor (entry-level) position in the broad area of astrobiology. A Ph.D. in a relevant discipline is required at the time of hire. Areas of potential focus include the origin or modification of prebiotic compounds in the early solar system and solar nebula, the inventory of potential solar system or solar nebula sources of such materials, the delivery of such materials to the early Earth, and/or the effects of inorganic extra-terrestrial materials on the origin of life. The successful candidate will be one that will develop an active, externally funded, research program and contribute to the interdisciplinary teaching focus of the Space Studies Department. Ongoing contact with the space community and broad teaching experience is desirable. Please see http://www.space.edu/ for more details.

Send a letter of application, CV, teaching, research, and service statements, and names and contact information for three references to: Chair of Astrobiology Search Committee, Dept. of Space Studies, University of North Dakota, PO Box 9008, Grand Forks, ND 58202-9008 USA, or by email to search@space.edu. Review of applications will begin November 1, 2002, although the position will remain open until filled. UND is an equal opportunity, affirmative action employer.

SONOMA STATE UNIVERSITY, CALIFORNIA
DEPARTMENT CHAIR/FACULTY MEMBER

The department of Geology at Sonoma State University, Rohnert Park, California, anticipates announcing soon a national search for a tenure track position. Full details will come in a mailing in late September. We seek a person to fulfill two roles: the first, as department chair for a decade or more; the second, as instructor in a major specialty, perhaps with a paired field course, and at least one upper division elective. The department chair position is one-third of a full load of 12 units/semester. The new person will have the responsibility of leading the department through a transition period caused by the retirements of four of the five tenured faculty and will oversee new curricular developments.

The department has an average of about 50 majors in a traditional BA/BS program emphasizing field studies and mineralogy/petrology. All faculty teach major lecture, lab and field major classes and general education classes. Sonoma State is an equal opportunity employer. Contact Dr. Rolfe Erickson (www.sonoma.edu/geology) for more details.

FACULTY POSITION IN GEOPHYSICS
UNIVERSITY OF MISSOURI—ROLLA

The Department of Geology & Geophysics, University of Missouri—Rolla invites applications for a tenure track position in geophysics at the assistant/associate professor level. We seek an outstanding scientist with expertise in applied and/or exploration geophysics who can foster interdisciplinary study incorporating tectonics and/or environmental geosciences. A strong publication record and demonstrated success in obtaining, or the potential to obtain, external research support is essential. Research interests in any of the following areas are desirable: earthquake seismology, seismic hazards monitoring, seismic reflection, or electrical and electromagnetic geophysical methods. Applicants should have a Ph.D. in geophysics or a closely related field in hand, ability to teach graduate and undergraduate courses in geophysics, including fieldwork, and prepare students for work in the petroleum and/or environmental industries. A letter stating teaching interests, curriculum vitae, and names and addresses of three professional references should be sent to: Human Resource Services, Reference #R50143, University of Missouri—Rolla, 1870 Miner Circle, 1202 North Bishop, Rolla, MO 65409-1050. Screening of applications will begin Nov. 1, 2002, however applications are welcome until the position is filled. More information about the Department of Geology & Geophysics at UMR can be found at http://web.umr.edu/~geo-geop/. UMR is an equal opportunity employer. Women and minorities are strongly encouraged to apply.

LECTURER POSITIONS
INDIANA UNIVERSITY
PURDUE UNIVERSITY INDIANAPOLIS

The Department of Geology at Indiana University Purdue University Indianapolis (IUPUI) has an opening for a full-time, non tenure-track, lecturer position. This appointment is renewable yearly subject to performance and funding and includes promotion opportunities.

The Department seeks a highly qualified candidate who has a strong commitment to excellence in teaching geology and to undergraduate education. Candidates should have a Ph.D. in geology, a record of high quality teaching at the introductory/undergraduate levels, and have the ability and interest to work with a diverse student population. Responsibilities include teaching 4 sections each semester and service to the Department. Salary level will be commensurate with degree and prior teaching experience.

Application materials must include the following: a letter of application, curriculum vitae, at least three letters of recommendation addressing the candidates teaching qualifications, a statement on teaching philosophy, graduate transcripts where appropriate, and any other materials that document teaching experience and effectiveness, including recent teaching evaluations. We will begin to review applications on November 1, 2002, but will continue to accept applications until the position has been filled. All applications should be mailed to: Lecturer Search Committee, Department of Geology, UPUI, 723 W Michigan St. SL 118, Indianapolis, IN 46202-5132.

IUPUI is an Equal Opportunity/Affirmative Action Employer and strongly encourages applications from women and underrepresented minorities. Additional information about the university and the Geology Department is available at www.iupui.edu and www.geology.iupui.edu, respectively.

GEOCHEMISTRY POSITION
FACULTY OPENING
UNIVERSITY OF OREGON/GEOCHEMISTRY

The Department of Geological Sciences invites applications for a faculty position to begin in Fall 2003. While it is likely that the position will be filled at the assistant professor level, exceptional applicants may be considered at the associate professor level. We seek an individual who applies light stable isotopic, trace element, or other inorganic geochemical techniques to the study of chemical processes on the Earth's surface or within the Earth's crust or hydrosphere.

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

Completion of the Ph.D. is required and postdoctoral research experience is desirable. Applicants should send a curriculum vitae, statements of teaching and research interests, and the names, postal and email addresses, and telephone numbers of three referees to Geochemistry Search Committee, Department of Geological Sciences, 1272 University of Oregon, Eugene,

OR 97403-1272. We will begin reviewing completed applications November 15, 2002 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.

FACULTY POSITION
ENVIRONMENTAL GEOCHEMISTRY
UNIVERSITY AT BUFFALO
THE STATE UNIVERSITY OF NEW YORK

The Department of Geology invites applications for a tenure-track faculty position in environmental geochemistry starting in September 2003 at the Assistant Professor level. The successful candidate will demonstrate a potential for research and teaching, which will both complement and integrate with our existing program in environmental geology. We seek a person with primary interest in geochemical modeling of engineered or natural subsurface aqueous systems. Expertise in designing and conducting relevant field and laboratory testing experiments and/or familiarity with the applications of geochemical and isotopic (stable/radiogenic) techniques in assessment and remediation of aquatic systems is a plus. Preference will be given to candidates who use spatial data to infer geochemical evolution of pristine or contaminated subsurface aqueous environments. We encourage collaboration with departmental researchers in hydrogeology and environmental geophysics (see www.geology.buffalo.edu), and with engineering faculty in the areas of ground-water remediation, water quality, and groundwater modeling (see www.groundwater.buffalo.edu). The successful candidate is expected to develop an active, externally funded research program, and to teach undergraduate and graduate level courses. A Ph.D. degree is required 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, State University of New York at Buffalo, 876 Natural Sciences Complex, Buffalo, NY 14260-3050. We will begin evaluating applicants on December 1, 2002. The University at Buffalo is an Equal Opportunity Employer/Recruiter.

WELLESLEY COLLEGE
ASSISTANT OR ASSOCIATE PROFESSOR

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

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

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

THE UNIVERSITY OF TEXAS AT AUSTIN
PETROLOGY/GEOCHEMISTRY

The Department of Geological Sciences of the John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin seeks to fill two faculty positions in the general areas of igneous petrology, metamorphic petrology, and high-temperature geochemistry. These searches will be focused at the level of tenure-track Assistant Professor, but full consideration will be given to outstanding scientists at more senior levels. The successful candidates will conduct vigorous externally funded research programs that integrate field-based investigations with modern analytical/experimental methods to attack fundamental geologic problems. We seek enthusiastic teachers to participate in undergraduate courses in earth materials, igneous and metamorphic petrology, and introductory physical geology, and to offer graduate courses and direct the research of M.S. and Ph.D. students. The persons filling these positions will join a large, diverse and active geoscience department with superb analytical facilities and research support. See http://www.geo.utexas.edu for complete information. The anticipated starting date for these positions is August 2003; a Ph.D. is required at the time of appointment. To apply, please send a curriculum vitae, statements of research and teaching interests, and the names and contact information for five references to: Chair, Petrology/Geochemistry Search Committee, Department of Geological Sciences, The University of Texas at Austin, Austin TX 78712. Review of applications will begin on October 15, 2002, and will continue until the positions are filled. The University of Texas at Austin is an Equal Opportunity/Affirmative Action employer.

THE UNIVERSITY OF TEXAS AT AUSTIN
APPLIED CLASTIC SEDIMENTOLOGY

The Department of Geological Sciences of the John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin seeks to fill a faculty position in the area of applied clastic sedimentology and stratigraphy. The position is open at all levels, including the chair level. We seek applicants with a strong background in depositional systems, stratigraphy, and basin analysis. Experience in application of subsurface well and seismic data bases to research and interpretation projects is highly desirable. The successful applicant will teach a graduate level course in terrigenous clastic depositional systems, as well as related undergraduate courses, actively supervise graduate research of M. S. and Ph. D. students, interact with colleagues within the Jackson School, and develop an active, funded research program. The person filling this position will join a large, diverse and active geoscience department and geoscience school. See http://www.geo.utexas.edu for complete information. The anticipated starting date is August 2003; a Ph.D. is required at the time of appointment. To apply, please send a curriculum vitae, statements of research and teaching interests, and the names and contact information for five references to: Chair, Applied Clastic Sedimentology Search Committee, Department of Geological Sciences, The University of Texas at Austin, Austin TX 78712. Review of applications will begin on October 15, 2002, and will continue until the position is filled. The University of Texas at Austin is an Equal Opportunity/Affirmative Action employer.

TULANE UNIVERSITY—SEDIMENT TRANSPORT

The Department of Geology at Tulane University invites applications for a tenure track Assistant Professor position to begin in the Fall, 2003 in the field of sediment transport. Applicants will be expected to develop an externally funded research program that builds upon the expertise of a growing, interdisciplinary department (http://tulane.edu/~geology) and the Institute for Earth and Ecosystem Sciences (http://tulane.edu/~iees) conducting basic and applied research in fluvial, deltaic, and/or coastal environments. In particular, we seek applicants who utilize field observations in concert with numerical or laboratory modeling in one or more of the following areas: (1) suspended sediment transport, (2) bedform migration, (3) surface water hydrology, or (4) fluvial geomorphology. Candidates will have completed their Ph.D. by the start date, and will be expected to teach undergraduate and graduate courses in their field of expertise, and to mentor graduate students. Applicants should send a letter of application, statement of research and teaching interests, current curriculum vitae and the names, addresses, and telephone numbers of 3 references to Dr. George C. Flowers, Chair, Department of Geology, Tulane University, New Orleans, Louisiana 70118, e-mail flowers@tulane.edu. The closing date for applications is November 15, 2003, although the search will remain open until the position is filled. Tulane University is an affirmative action/equal opportunity employer. Women and minorities are encouraged to apply.

BELOIT COLLEGE

Beloit College invites applications for a full-time, tenure-track position (beginning mid-August 2003) at the assistant professor rank in geology, with expertise in tectonics/igneous and metamorphic petrology. Course responsibilities include an introductory course in physical geology, mineralogy, petrology, structural geology (on a rotating basis), and selected advanced courses (e.g., tectonics, geochemistry, isotope geology). The successful candidate will also be expected to teach a six-week summer field-geology course on a rotating basis, participate in the departmental field-trip program, and supervise undergraduate research projects. Finally, the successful candidate will contribute to all-college programs (e.g., first-year seminars, interdisciplinary courses, writing program, and international education).

Beloit College is a selective undergraduate liberal-arts college with an enrollment of 1,100 students. The college emphasizes excellence in teaching, breadth and versatility in its faculty, and collaborative research between students and faculty. The city of Beloit is located in southern Wisconsin, close to Madison, Milwaukee, and Chicago.

Applicants should have a Ph.D. by the time of appointment. Send a letter of application, a statement of teaching and research interests, a vita, college-level transcripts, and three letters of reference by 15 October 2002 to Carl Mendelson, Geology Search Committee, Beloit College, 700 College St., Beloit, WI 53511. Inquiries may be directed to Prof. Mendelson (608-363-2223 or mendelson@beloit.edu). Preliminary interviews for this position will be conducted at the GSA annual meeting in Denver (October 2002). For more information, see http://geology.beloit.edu/.

Beloit College is committed to cultural and ethnic diversity, and urges all interested individuals to apply. AA/EEO Employer.

GEOARCHAEOLOGY AND QUATERNARY GEOLOGY
UNIVERSITY OF KANSAS

The Kansas Geological Survey (KGS) and the Department of Anthropology invite applications for a permanent full-time (12 month) joint appointment (80% KGS, 20% Dept.), in geoarchaeology and Quaternary research. The position will begin July 2003 or sooner based in KGS. The program is supported with a substantial endowment in the Odyssey Archaeological Research Fund at the University of Kansas. The position is expected to be filled at the Associate/Senior Scientist (KGS)–Associate Professor (Dept) level. A full description of duties and qualification requirements can be reviewed at http://www.kgs.ku.edu/General/jobs.html.

Application procedure: Send letter of application, curriculum vitae with publication record, and the names, addresses, telephone numbers, and email addresses of three professional references to: A. Delaney, Human Resources, Kansas Geological Survey, The University of Kansas, 1930 Constant Avenue, Lawrence, KS 66047; PH: (785) 864-2152, FAX: (785) 864-5317, EMAIL: hr@kgs.ku.edu. First consideration given to applications postmarked by November 30, 2002. For further technical information contact Dr. William E. Harrison: PH: (785) 864-2070, EMAIL: harrison@kgs.ukans.edu. The University of Kansas is an AA/EOE.

ASSISTANT PROFESSOR
SEDIMENTOLOGY/FIELD GEOLOGY

The Department of Geology at Hofstra University invites applications for a tenure-track position at the assistant professor level beginning fall 2003. We seek a candidate with a background in sedimentology and field geology who is strongly committed to excellence in undergraduate teaching and research. The successful candidate will have a teaching load of nine contact hours per semester and will be expected to teach one introductory level and one advanced undergraduate course per semester. The ideal candidate will teach physical geology and should be prepared to offer advanced laboratory courses in sedimentology and field methods, as well as one additional advanced course in a topic of interest to the candidate. We are looking for a dynamic individual who combines excellence in teaching with breadth and versatility in professional productivity, and who shares our commitment to close student-faculty interaction, including a vigorous program of field trips and student involvement in faculty research and professional activities.

Hofstra University is located in suburban Long Island, New York, 25 miles from Manhattan. The University occupies a beautiful 240-acre campus that is also a registered arboretum and enrolls 8,000 full-time undergraduates and 4,000 graduate and part-time students. The Geology Department consists of four full-time and seven adjunct faculty and offers undergraduate degrees in Geology and Environmental Resources.

Applicants should have their Ph.D. completed by September 2003. Send a letter of introduction discussing your teaching and research interests, a curriculum vitae, and three supporting letters to: Dr. Dennis Radcliffe, Chair—Department of Geology, 114 Hofstra University, Hempstead, NY 11549-1140. The deadline for receipt of applications is December 31, 2002.

Hofstra University is an equal opportunity employer and is also dedicated to ethnic and cultural diversity among the faculty and student body.

ASSISTANT OR ASSOCIATE PROFESSOR
(STRUCTURAL GEOLOGY/TENURE-TRACK)
GEOLOGY AND GEOPHYSICS

The Department of Geology and Geophysics at Louisiana State University invites applications for a tenure-track Assistant Professor position to begin fall semester of 2003.The Associate Professor level may be considered for an exceptional candidate. The successful candidate is expected to contribute to our undergraduate and graduate teaching programs and develop courses in his/her area of specialization. Development of a strong research program, including supervision of graduate student

continued on p. 62

Earth Systems Science/Energy Resources Faculty Position

Rice University
Department of Earth Science

The Rice Earth Science Department is expanding in faculty, staff, and facilities. We anticipate filling a tenure track position in Earth Systems Science / Energy Resources. Applications at all levels will be considered.

This position is in the area of physical and/or chemical processes of fluid flow in porous media.

The successful candidate will be expected to establish an externally funded research program, supervise graduate research, and participate in graduate and undergraduate instruction. We are especially interested in a scientist who will bring to our department opportunities for collaboration while allowing us to expand into new and emerging fields of research. Rice is a private university whose administration and faculty are dedicated to outstanding research and education at the undergraduate and graduate levels.

Applications received by November 1, 2002 are assured of receiving fullest attention.

Please send a resume and names of four or more references to:

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

Information about the department can be found at http://terra.rice.edu

Rice is an equal opportunity affirmative action employer.

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research, active publication in highly ranked journals, and the generation of external funding is also expected. Required Qualifications: Ph.D. at the time of appointment; an outstanding, quantitative, field-oriented geoscientist with demonstrated expertise in structural geology. Additional Qualifications Desired: postdoctoral experience.

The Department consists of 19 tenure-track faculty members covering a wide range of expertise. We have well-equipped analytical and computational laboratories. The Department of Geology and Geophysics has been identified as one of the twelve priority departments at LSU that is receiving additional resources to further enhance its national status. For more information, see our web site at http://www.geol.lsu.edu.

The review process will begin November 1, 2002. The search will continue until a suitable candidate is found. Interested persons should send a copy of their vita, a statement of their research and teaching interests, and the names, addresses, and phone numbers of at least three references to: Chair, Structure Search Committee, Department of Geology and Geophysics, Louisiana State University, Log #0278, Baton Rouge, LA 70803.

LSU IS AN EQUAL OPPORTUNITY/EQUAL ACCESS EMPLOYER

ASSISTANT OR ASSOCIATE PROFESSOR (SEDIMENTARY GEOLOGY/TENURE-TRACK) GEOLOGY AND GEOPHYSICS

The Department of Geology and Geophysics at Louisiana State University invites applications for a tenure-track Assistant Professor to begin fall semester of 2003. Appointment at the Associate Professor level may be considered for an exceptional candidate.

The Department of Geology and Geophysics at LSU provides excellence in undergraduate and graduate education, advanced degree preparation, and research. The Department has 19 faculty members with active research in stratigraphy and sedimentary geology, paleontology, mineralogy and petrology, geochemistry, hydrogeology, and geophysics. With this new position, LSU is expanding upon its strengths in sedimentary geology and stratigraphy, which includes two recent NSF Career Awardees.

The Department of Geology and Geophysics has been identified as one of the twelve priority departments at LSU that is receiving additional resources to further enhance its national status. We have well-equipped analytical and computational laboratories. For more information, see the departmental web site at www.geol.lsu.edu.

Required Qualifications: Ph.D. at the time of appointment; process-oriented with field-based sedimentary experience. Additional Qualifications Desired: postdoctoral experience; research in modern and ancient depositional processes. The new faculty member is expected to contribute to our undergraduate and graduate teaching programs, and develop courses in her or his area of specialization. Development of a strong research program, including supervision of graduate student research, active publication in highly ranked journals, and the generation of external funding is also expected. Interaction with other faculty within the Department and across the University is strongly encouraged.

The review process will begin November 1, 2002. The search will continue until a suitable candidate is found. Interested persons should send a copy of their vita, a statement of their research and teaching interests, and the names, postal and email addresses, and phone numbers of at least three references to: Laurie C. Anderson, Chair, Sedimentary Geology Search Committee, Department of Geology and Geophysics, Louisiana State University, Ref: Log 0275, Baton Rouge, LA 70803.

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Opportunities for Students

Attention students! Looking for a job or an internship? Then join us in Houston for the 5th Annual National AAPG/SEG Student Expo on October 20–21, 2002! The Expo is a great opportunity for students to meet with representatives from oil and gas and environmental companies, some of which recruit only at the Expo. Students will have the chance to showcase their research in a poster session and network with potential employers. Successful job searches result from the Expo every year. And use this occasion to explore Houston, a vibrant city, an oil capital, and home to the largest geoscientist population in the world! Contact Kerri Donathan at AAPG for more information (donathan@aapg.org).

Ph.D. Student Assistantships. Oregon State and Portland State Universities are offering fifteen Ph.D. research assistantships to explore all aspects of the Earth's subsurface microbial biosphere. Tuition and stipend are provided by the NSF IGERT program and the two universities. Students will work in interdisciplinary teams of engineers, oceanographers, microbiologists, microbial ecologists, geologists, soil scientists, and chemists to solve environmental problems, to understand global chemical cycles, and to determine the impact of subsurface microorganisms on surface ecosystems. More information can be found at: http://oregonstate.edu/dept/igert/, or Martin R. Fisk, College of Oceanic and Atmospheric Sciences, Oregon State University, mfisk@coas.oregonstate.edu

Students from all scientific backgrounds are encouraged to apply to departments represented by IGERT faculty at either institution. U.S. citizens or permanent residents can be supported by IGERT funds, however students of all nations can participate in the program. Review of applications starts 2/1/03. Oregon State and Portland State Universities are committed to equality in education.

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Web Site. Evolution of the Aleutian Arc: A Dynamic Model Different from Strict Plate Tectonics. The model is presented in 19 documented "snapshots" that might be considered to be an elementary animation of the evolution of the general structures, sedimentary columns, and landforms. The model requires only of the order of 100 km of convergence of the plates during the post-Paleozoic. It argues two parallel tectonic troughs. Best viewed with Internet Explorer V. 4 or later. http://aleutians.home.att.net.

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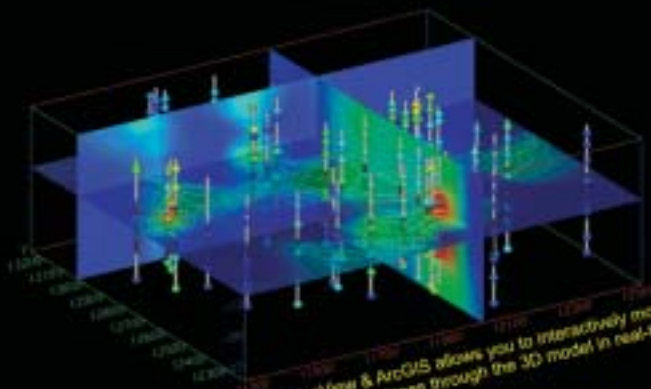

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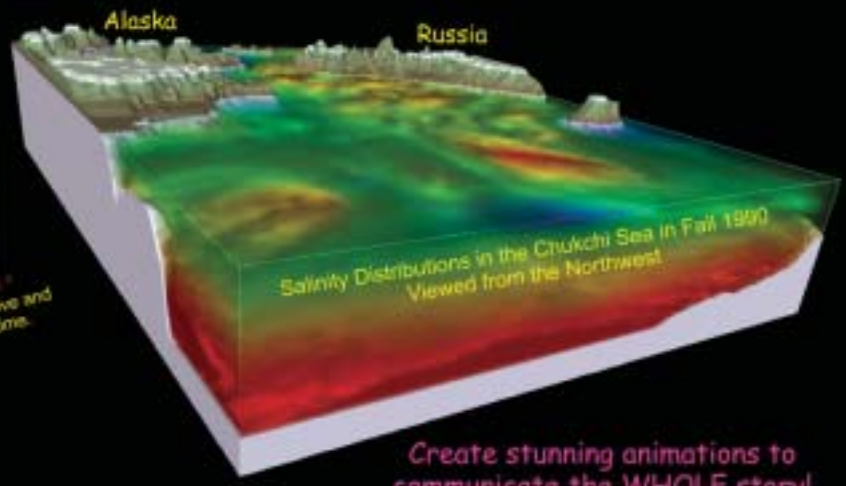

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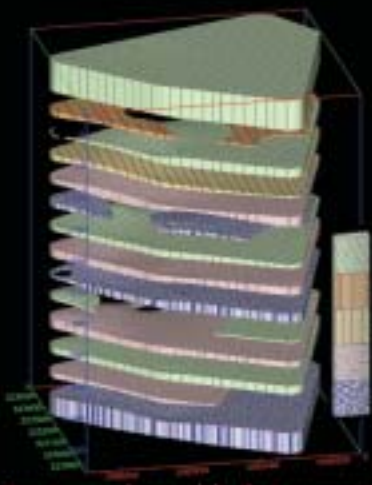

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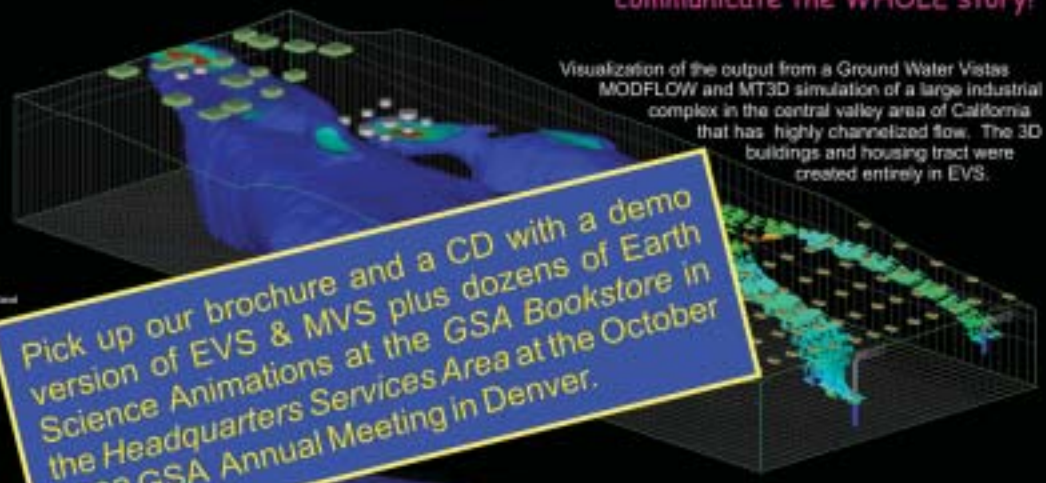

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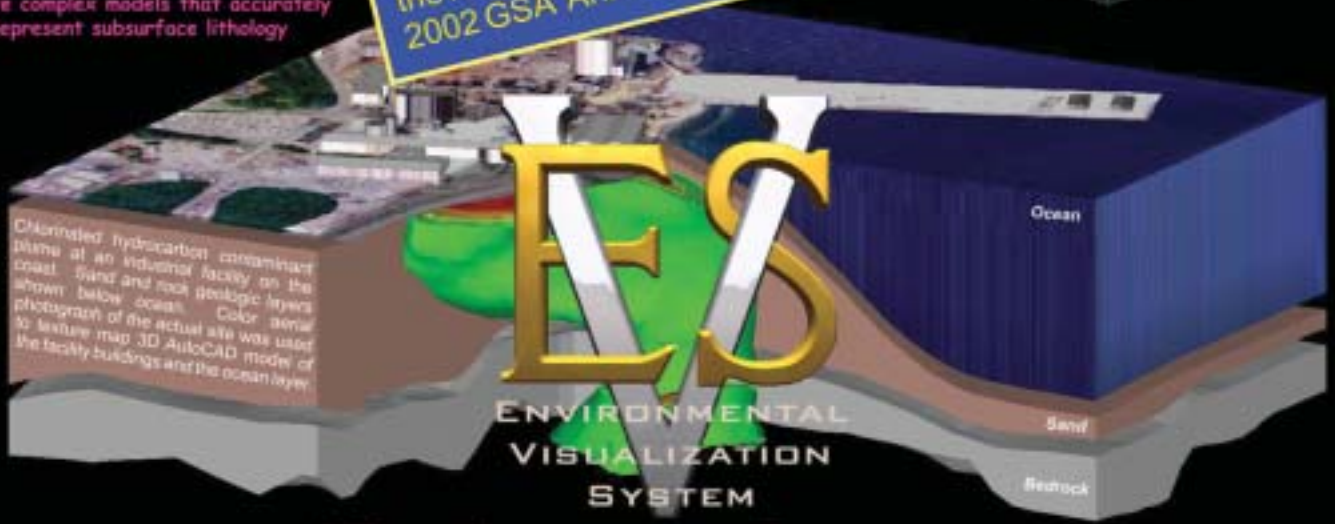

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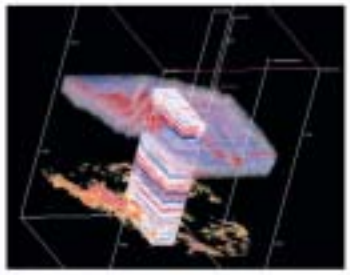

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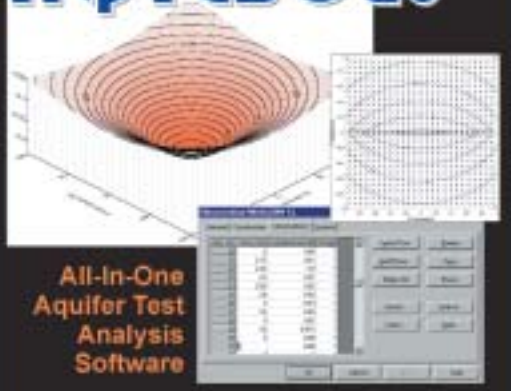

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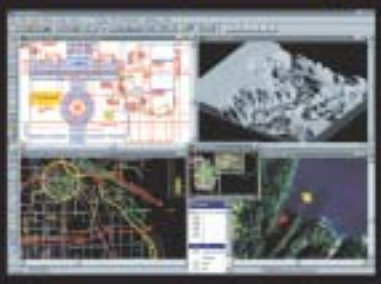

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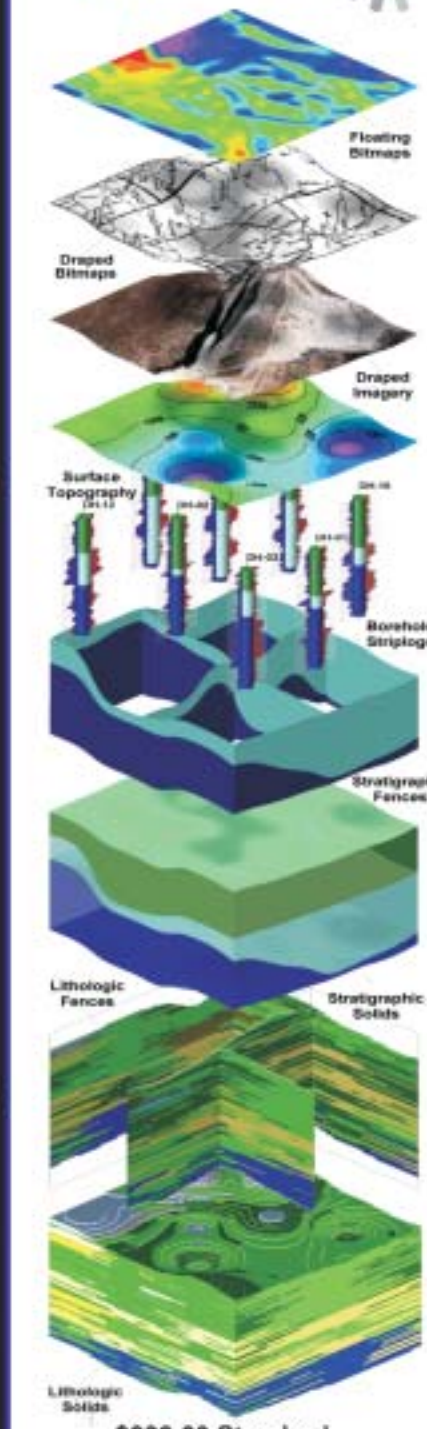

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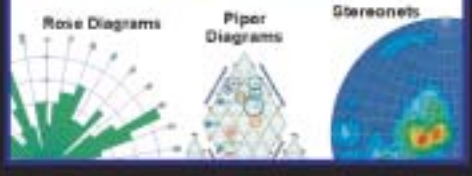

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