

G.S.A. ARCHIVES

GSA
NEWS &
INFORMATION

Monthly Newsletter of
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GSA 1990 ANNUAL MEETING

Dallas, Texas October 29–November 1



DALLAS

CALL FOR PAPERS/FIRST ANNOUNCEMENT—See page 101

ABSTRACTS DUE JULY 11

PREREGISTRATION DUE SEPTEMBER 28

REGISTRATION/FULL DETAILS: August GSA News & Information

Council Approves Two-Nominee Corporate Slate

Responding to a poll of voting members, the GSA Council has approved a two-nominee slate for the positions of vice-president and councilor.

A preference poll was included with the 1989 corporate ballot mailing to all voting members of GSA to ascertain whether they would prefer ballots consisting of more than one nominee for the vice-president and councilor positions. A total of 2740 members responded to the poll; 69% preferred a multi-nominee slate, 29% preferred the present system, and 1% had no preference.

Of those favoring a multi-nominee slate, most did not like the idea of three candidates per position because such a system might

not result in a majority and could require a runoff election. Most preferred two candidates per position.

The Council accepted the results of the poll and approved a multiple slate, to include two candidates for the position of vice-president and two candidates for each councilor position. Beginning this fall, all voting members of the Society will receive a ballot that will list two candidates for each of these elected positions. Accompanying information will include biographical data and a photograph of each nominee.

The Council hopes that this new policy will encourage greater membership participation in the election process. Only you, the voting Members and Fellows of the Society, can make this happen. This fall, exercise your right to vote for GSA councilors and officers.

Report on Fibrous Minerals Available

GSA has published a report by its Committee on Geology and Public Policy, "Fibrous Minerals, Mining, and Disease." The 11-page publication summarizes a forum sponsored by the committee and held at the 1988 Centennial Celebration in Denver, Colorado. Co-conveners for the forum were H. Catherine W. Skinner, Yale University, and Malcolm Ross, U.S. Geological Survey. Panelists were Graham W. Gibbs, Occupational Health Services, Canada; Michael M. Stahl, Toxic Substances Control Act Assistance Office, U.S. Environmental Protection Agency; Hans Weill, Tulane Medical Center; and Ann G. Wylie, Department of Geology, University of Maryland.

Copies of the report are available on request from Geological Society of America, Membership Services, P.O. Box 9140, Boulder, CO 80301; (303) 447-2020.

1991-1992 Advanced Research Fellowships in India

The Indo-U.S. Subcommittee on Education and Culture is offering twelve long-term (6-10 months) and nine short-term (2-3 months) awards for 1991-1992 research in India. These grants will be available in all academic disciplines except clinical medicine. Applicants must be U.S. citizens at the postdoctoral or equivalent professional level. The fellowship program seeks to open new channels of communication between academic and professional groups in the United States and India and to encourage a wider range of research activity between the two countries than now exists. Therefore, scholars and professionals with limited or no prior experience in India are especially encouraged to apply.

Fellowship terms include: \$1500 per month, of which \$350 per month is payable in dollars and the balance in rupees; an allowance for books and study/travel in India; and international travel for the grantee. In addition, long-term fellows receive international travel for dependents; a dependent allowance of \$100-\$250 per month in rupees; and a supplementary research allowance up to 34,000 rupees. This program is sponsored by the Indo-U.S. Subcommittee on Education and Culture and is funded by the United States Information Agency, the National Science Foundation, the Smithsonian Institution, and the Government of India.

The application deadline is *June 15, 1990*. Application forms and further information are available from: Council for International Exchange of Scholars, Attn: Indo-American Fellowship Program, 3400 International Drive, Suite M-500, Washington, D.C. 20008-3097; telephone (202) 686-4013.

PEOPLE

Fellow **Don L. Anderson** has been named the first Eleanor and John R. McMillan Professor of Geophysics at the California Institute of Technology.

The American Association for the Advancement of Science has given Fellow **Robert D. Ballard**, Woods Hole Oceanographic Institution, its Westinghouse Award for Public Understanding of Science and Technology.

Fellow **Robert W. Decker** has been appointed Distinguished Visiting Professor of Geophysics for 1990 at the newly established Center for the Study of Active Volcanoes, University of Hawaii at Hilo.

Member **James E. Furr** has been appointed a Geraghty and Miller, Inc., Associate; he is manager of the firm's Baton Rouge, Louisiana, office.

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DNAG NEWS

by Allison R. (Pete) Palmer

First Canadian DNAG Volume Now Available

Quaternary Geology of Canada and Greenland (Volume K-1 of the DNAG set), edited by Bob Fulton, has just been received from the Geological Survey of Canada. This 839-page volume and the accompanying slipcase with five major four-color maps is a real bargain for those individuals with prepaid DNAG orders. The volume is also

the first of nine projected volumes that will serve as the 1990s set of *The Geology of Canada*; it was published simultaneously in French in Canada. The 61 contributors listed below made this volume possible. Thanks to them for their contributions and for their patience while the French translation was being prepared.

D. F. Acton	L. A. Dredge	J. A. Heginbottom	R. W. Mathewes	N. W. Rutter
T. W. Anderson	A. S. Dyke	K. Hewitt	W. H. Mathews	J. M. Ryder
J. T. Andrews	W.A.D. Edwards	D. A. Hodgson	J. V. Matthews, Jr.	C. E. Schweger
J. Bednarski	P. A. Egginton	O. L. Hughes	J. H. McAndrews	J. S. Scott
M. J. Bovis	J. England	L. E. Jackson, Jr.	S. R. Morison	H. O. Slaymaker
M. Boyko-Diakonow	S. G. Evans	P. F. Karrow	R. J. Mott	M. W. Smith
M. A. Carson	D. C. Ford	R. A. Klassen	S. Occhietti	C. Tarnocai
J-Y. Chagnon	B. Fredskild	R. W. Klassen	W. R. Peltier	K.W.G. Valentine
J. J. Clague	H. M. French	R. M. Koerner	E. W. Presant	J-S. Vincent
W. R. Cowan	R. J. Fulton	H. C. Larsen	N. Reeh	K. Webb
P. P. David	S. Funder	J. Locat	P.J.H. Richard	O. L. White
T. J. Day	J. S. Gardner	G. M. MacDonald	J. C. Ritchie	
R.N.W. DiLabio	D. R. Grant			

More Kudos

With the receipt of the final chapter for *Surface Water Hydrology*, we can now list the 35 patient contributors to this volume as well. These and the Canadian contributors

listed above bring the total number of participants in finished DNAG volumes to 1423.

E. D. Andrews	M. Frenette	H. F. Lins	H. C. Riggs	J. F. Walker
J. T. Armbruster	F. K. Hare	T. E. Lisle	J. D. Rogers	D. D. Williams
J. P. Buchanan	K. D. Harvey	H. F. Matthai	K. E. Saxton	B. R. Winkley
M. Church	J. D. Hem	R. H. Meade	S. Schumm	T. C. Winter
J. C. Day	R. M. Hirsch	M. F. Meier	S. Y. Shiau	M. G. Wolman
T. J. Day	R. Kallio	R. Newbury	K. P. Singh	M-K. Woo
A. Demayo	M. Lapointe	R. Patrick	R. A. Smith	T. R. Yuzyk

Book Wrap-up Continuing

Final paging is underway for three volumes that are now all in our hands: *Archaeological Geology of North America*, *Surface Water Hydrology*, and *The Arctic Ocean Region*. These will probably appear, in that order, in late May or early June.

The final proofs for the final color plates for both the Appalachian/Ouachita and Caribbean volumes have now been checked by their respective authors. If there are no further problems, this will probably liberate the Appalachian/Ouachita volume by the time you read this; the text has already been printed, and the volume is awaiting only completion of the plates.

The Caribbean volume will move into the final production process as soon as the Shagam chapter (being revised by Case) is in our hands. All major plates for this volume are now under control.

Other Progress

The final revision of the Stewart and Crowell chapter on strike-slip faulting in the U.S. Cordillera is now in production. Otherwise, nothing has changed from the March listing of things needed.

Half of the volume *Economic Geology of Mexico* is now through translation, and these chapters are now in production.

For the volume *Economic Geology: U.S.*, drop Tim Cross from the list of authors from whom we expect manuscripts. We have received no indication that the chapter he was to prepare on the geography of North American coal has even been started, and Tim is now in Europe until June, long past the time when we need the final chapters for this volume in hand.

A Pound of Cure: Earthquakes Are Simple, Oil Spills Are Not

by Daniel R. Sarewitz

1989–1990 GSA Congressional Science Fellow

Shortly before Christmas, I received my first gift from a lobbyist. I was willing to interpret this as a rite of passage: someone actually thought that my opinion was important enough to be worth influencing with an attractively packaged and tasty sampling of various fruit preserves. The accompanying note thanked me for remaining “proactive” on a certain issue of interest to the lobbyist and the group that he was representing.

“Proactive” was not a part of my working vocabulary prior to arriving in Washington, D.C., but I have now reluctantly incorporated it into my repertoire. Although it cannot be found in the 1933 compact edition of the Oxford English Dictionary (4116 pages), “proactive” turns up in American dictionaries published after about 1970. For example, the 1976 Webster’s New Collegiate Dictionary offers the following helpful definition: “involving modification by a factor which precedes that which is modified.” In other words: closing the barn door while the horse is still inside.

As a rule, the Congress of the United States is not proactive. There is often political risk involved in trying to anticipate future events, and the voting public tends to be unappreciative of expenditure or compromise associated with long-term goals. On the other hand, rapid response to a crisis can be an effective way for politicians to show sensitivity to the needs of the people. Crisis is the key word here, and crisis management is a specialty of the House (and Senate). What’s on the legislative agenda these days? The budget crisis, the savings and loan crisis, the health-care crisis, the education crisis, the housing crisis, the ozone crisis, the carbon dioxide crisis.

The government finds it more expedient to pay (in both the political and fiscal sense of the word) for cure than to pay for prevention. For example: as Congress struggled divisively last autumn to cut \$14 billion out of the federal budget in order to comply with the Gramm-Rudman-Hollings deficit-reduction law, they were momentarily distracted by the magnitude 7.1 Loma Prieta earthquake. Within a week, Congress approved \$3.4 billion in disaster assistance, with very little opposition. (This is what is known as an “off-budget” expenditure, which apparently means that even though the government spends it and the taxpayers pay for it, Congress and the President agree to pretend that it never existed.) The magnitude of this expenditure is particularly conspicuous in light of Congressional unwillingness to provide adequate funds for earthquake hazard mitigation. Last year’s appropriation of \$67 million for mitigation programs was 50 times less than the federal cost of responding to the Loma Prieta event, and 150 times less than total estimated damages of about \$10 billion resulting from the earthquake. Congress, they say, is “reactive.”

Earthquakes, however, are politically simple. Few would criticize Congress for providing aid to a region that has experienced a natural disaster, even if there has not been an adequate federal commitment to disaster preparedness. But some events may force Congress to make choices that are politically painful. An important example of this has been the 15-year struggle to develop federal legislation regarding oil spills.

From 1975 to 1989, legislators tried repeatedly but without success to pass a comprehensive bill governing liability and cleanup



after oil spills. At present, there are at least eight federal statutes pertaining directly or indirectly to oil spills, as well as 24 individual state laws, many of which are in direct conflict with federal regulations. This rather formidable assemblage of laws has charitably been referred to as a “patchwork,” which is meant to imply that all of the separate laws somehow work together to form a coherent whole. “Hodgepodge” is probably a more precise term; indeed, most interested parties—the federal government, the states, the petroleum industry, and environmental groups—have long agreed that a single federal law is necessary to clear up the confusion. Such a law would mandate liability levels, increase preparedness and response capability, provide an immediate source of funds so that cleanup efforts are not delayed, and internalize the costs of the cleanup within the industry.

Prior to 1989, all attempts to forge comprehensive legislation foundered on a principle that is as old as the nation itself: states’ rights. Should federally mandated liability levels for oil spills supplant the levels set by individual states? On the one hand, the petroleum industry strongly supported federal preemption, because some state liability regulations were—and remain—much more stringent than national laws. They argued that state provisions establishing unlimited liability for some spills would make it impossible for oil carriers to get insurance. Environmental groups supported the opposite position, maintaining that individual states bore individual risks, so that each should be free to establish its own laws.

This was not a dispute that could be resolved on the basis of the merits of the arguments themselves. Neither was it a strictly partisan issue. The House of Representatives and the Senate found themselves in a difficult philosophical position. In resource disputes, the House often leans toward stronger environmental protection measures, while the Senate tends to support more aggressive programs of development. But the controversy about oil spill liability turned this trend upside down. Beneath the specific issue was a more fundamental question of the distribution of political power. The Constitution established the House and Senate as countervailing forces in order to prevent the outright dominance of one force over the other. As the seat of popular representation, the House is the natural advocate of federalism, whereas the Senate is

(continued on p. 93)

Report from Washington (continued from p. 92)

the historical champion of states' rights. Thus, from the beginning, the House supported federal preemption of state laws in the case of oil spill liability, while the Senate supported the rights of states to do whatever they wanted. For 14 years there was no incentive to break the stalemate; the "hodgepodge" remained in effect.

When the 101st Congress convened in January of 1989, oil spills were not a legislative priority. Without a crisis, there was not much likelihood of achieving the Congressional compromise that would be required for passing legislation. Had OPEC nations managed to reassert their control over oil supplies and prices last year, oil spill legislation might have been pushed through Congress with federal preemption language intact, in order to safeguard the industry's ability to transport petroleum with the fewest possible restrictions. Instead, on March 24, 1989, the *Exxon Valdez* struck rocks off Bligh Island in Alaska's Prince William Sound, spilling more than 10 million gallons of crude oil. Since that time, both the House and Senate have passed oil spill legislation that preserves the rights of states to set their own liability limits, and it is likely that a final compromise version of these bills will be sent to the President for his signature by mid-1990.

The *Exxon Valdez* spill graphically demonstrated the weaknesses of existing legislation—weaknesses that were well understood beforehand. Cleanup and liability in this case were mostly covered under the jurisdiction of the 1973 Trans-Alaska Pipeline Authorization Act (TAPAA), although six other laws (including the Limitation on Liability Act, which was passed in 1851) were also relevant to some aspects of the spill. In all, 14 Federal agencies have been involved in the cleanup effort, including the Environmental Protection Agency (EPA) and agencies within the departments of Commerce, Justice, Transportation, and Interior.

A major provision of TAPAA was the creation of the Trans-Alaska Pipeline Liability Fund, which was initially financed by a five-cent-per-barrel fee on all oil that passed through the pipeline between 1977 and 1981 and is currently worth about \$250 million. TAPAA established a liability limit of \$100 million per spill; the first \$14 million in costs were to be borne by the owner or operator of the vessel and the remaining costs—up to \$86 million—were to be paid from the fund. In the event that costs exceeded the \$100 million limit, the federal treasury would be forced to foot the remainder of the cleanup bill, and private damage claims would have to be recovered through the state courts.

Recent estimates suggest that the total cost of cleanup and damages from the *Exxon Valdez* spill may exceed \$2 billion. Exxon waived legal technicalities and has shouldered most of these costs, but the magnitude of the problem shows that the liability levels established for TAPAA are completely inadequate. In addition, according to a "Report to the President" from the Secretary of Transportation and the head of EPA, "Government and industry plans, individually and collectively, proved to be wholly insufficient. . . . The various contingency plans did not refer to each other or establish a workable response command hierarchy. This resulted in confusion and delayed the cleanup."

Congress responded—reacted—like sharks to blood. In 1989, between early April and October, 27 separate hearings were conducted before five committees of the Senate and seven committees of the House. Nineteen bills were introduced in the Senate, and 46 bills in the House. The Senate passed the comprehensive Oil Pollution Liability and Compensation Act of 1989 on August 4, by a vote of 99 to 0. The state preemption debate was not resolved until November 8, when the House voted 279 to 143 to adopt amendments to their comprehensive bill that would leave individual states free to

enforce their own liability limits. The next day, the bill itself passed in the House by a vote of 375 to 5.

Although there are some differences between the legislation passed by the Senate and House, the resolution of the state preemption dispute will probably allow a mutually agreeable law to emerge from House-Senate conference in 1990. The new law would establish a \$1 billion oil spill compensation fund—financed by a 5-cent-per-barrel tax on oil—to pay for cleanup and damages from future spills and to support improved prevention and response capabilities. The law would also significantly increase liability levels for non-negligent spills, and it would establish full liability for "willful misconduct or gross negligence."

Congress reacts, but not in a vacuum. The *Exxon Valdez* spill broke a 15-year legislative deadlock, but the character of the Congressional response was dictated as much by the prevailing political climate as by the spill itself. Although the United States is more dependent than ever on foreign oil, fuel prices remain low, whereas Congressional and public concern over the environment has grown stronger. In this context, last year's oil spill resulted in legislation that favored environmental, rather than industrial, interests. The spill also widened the debate over oil production in the United States, stiffening Congressional resistance to proposed exploration and development in environmentally sensitive areas such as the Alaska National Wildlife Refuge, offshore California, and offshore Florida.

Several petroleum geologists have told me that, by allowing the oil spill to influence its position on exploration, Congress has confused the problem of oil transit with unrelated issues of oil exploration and development. While this may be correct in a very literal sense, it is also a good example of why Congress and scientists have trouble communicating with one another. At the moment, environmental considerations carry substantial weight in Congress. If resource development arguments are not framed within this broader political reality, they are unlikely to find an enthusiastic audience on Capitol Hill. This will probably be the case at least until the next oil crisis.

Daniel R. Sarewitz, GSA Congressional Science Fellow for 1989-1990, is working in the office of Congressman George E. Brown, Jr., 36th District of California, 2188 Rayburn House Office Building, Washington, DC 20515; (202) 225-6161. The fellowship, which is for a one-year term, is jointly sponsored by funds from GSA and a grant from the U.S. Geological Survey.

Memorial Preprints

The following memorial preprints are now available, free of charge, by writing to GSA, P.O. Box 9140, Boulder, CO 80301.

Edwin B. Eckel, by Ernest Dobrovolny, Wallace Hansen, G. D. Robinson, W. S. Twenhofel, Ogden Tweto, David Varnes, and Robert Yates
Ralph Early Grim, by Haydn H. Murray
Hollis Dow Hedberg, by Timothy A. Anderson
Richard W. Smith, by Watson H. Monroe

In Memoriam

Charles A. Anderson
Pomona, California
January 9, 1990

Ronald T. Russell
Victoria, Australia
November 3, 1989

Guillermo Zuloaga
Caracas, Venezuela

GSA in Education

by Allison R. (Pete) Palmer

Preparing for Partnering

Partnering in science education at the precollege level is catching on in many forms across the nation. Our effort, focused on the geoscience component of science education, will be another entry in the field. The problem is logistically immense—nearly every school in the country can use some partnering help. In order to make this project manageable and effective, we will have to do pilot runs to get some experience in the process of powerful partnering. Setting up pilots will be one of the goals of this spring's activities for the Education Committee, and seeds for these will be planted at the spring section meetings.

One of our important targets should be elementary school science education. If we don't get things started right at this level, the power of our efforts at the secondary school level may be diminished. In preparation for partnering at the elementary school level, I strongly recommend the recent report "Science and Technology Education for the Elementary Years: Frameworks for Curriculum and Instruction." This report was prepared by the National Center for Improving Science Education, a partnership of The Network, Inc., and the Biological Sciences Curriculum Study Project (BSCS). One of its co-authors is Ed Buchwald, who was featured in this column earlier this year. This is a strong and sensible document and should be the basis for thinking about the way to present essential geoscience ideas at the elementary school level. It can be ordered from The Network, Inc., 290 South Main Street, Andover, MA 01810 as publication 301. The price is \$12 plus \$2.50 for postage and handling.

Another Way To Help

There is a need for volunteers to review published precollege science texts and also to serve as prepublication reviewers for publishers of precollege texts. The National Center for Science Education, Inc. (NCSE) at Berkeley, California is serving as a coordinator for publishers looking for reviewers; it also publishes a newsletter called Bookwatch Reviews, which is the only periodical dedicated to reviewing precollege science texts. NCSE needs to add to its pool of reviewers either before or after the fact. If you are interested in assisting as either a prepublication reviewer or a book reviewer for Bookwatch Reviews, please send me your name, address, fields of special knowledge, and current professional position, so that I can prepare a list of potential reviewers in either mode for NCSE. AGU has already received a good response from its members to a similar solicitation.

USGS Creates an Educational Tool

If you want to take advantage of the recent publicity caused by the Loma Prieta earthquake, Tau Rho Alpha, John C. Lahr, and Linda F. Wagner have created a simple paper model to illustrate the motion that occurred on the San Andreas fault during the earthquake. It is available as U.S. Geological Survey Open-File Report 89-640A. To learn more, contact one of the authors, at USGS, 345 Middlefield Rd., Menlo Park, CA 94025.



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In the mid-1980s, GSA launched a new representative program, targeting companies, agencies, and consultants throughout the country. The purpose was to broaden GSA's representation to include all employment sectors. The program was modeled on the successful campus representative program that was begun in 1979 and now includes 523 representatives at colleges and universities throughout North America.

We now have 137 company, 79 agency, and 48 consultant GSA representatives. However, we need more volunteers. Our goal is to designate a representative at all major company offices and governmental agencies throughout the country. For example, we hope to have a GSA representative for the South Carolina Geological Survey in Columbia, for the Geological Survey of Canada in Vancouver, for the U.S. Geological Survey in Tucson, etc. We want to develop a similar liaison with GSA members who are self-employed and serve as consultants. They would also represent major cities and geographic regions.

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We need your help to continue this communications link between GSA headquarters and the membership of the Society. If you are a Member or Fellow (not Student Associate) and are interested in serving GSA as a representative for your company, agency, or group of the employment sector, please complete and return the form on p. 99. Play an active role in the affairs of your Society and be the first in your area to represent GSA!

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ABSTRACTS DEADLINE FOR INVITED AND VOLUNTEERED PAPERS WEDNESDAY, JULY 11, 1990

Technical sessions consist of both invited and volunteered papers organized in one of three presentation formats: symposia, theme sessions, and discipline sessions. All abstracts are due for review by July 11.

The Joint Technical Program Committee (JTPC) will select abstracts and determine the final session schedule. The JTPC consists of approximately 30 geoscientists representing each of the associated societies and GSA divisions participating in the technical program. The JTPC chairmen, nominated by the Dallas Local Committee and approved by the GSA Council, also serve a four-year term

on GSA's ongoing Program Committee, which oversees all technical program activities.

The JTPC meets August 10-11 in Boulder. Speakers will be notified within 14 days following the meeting.

The final session schedule will appear in the September issue of *GSA News & Information*.

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Although papers for discipline sessions may be submitted in either oral or poster mode, symposia and theme sessions will be presented in oral mode only. The exceptions are theme sessions T20 and T32 (poster mode only) and T31 (both oral and poster).

Abstract Forms

All abstracts must be submitted on the 1990 Abstract Form, available from the Abstracts Coordinator at GSA headquarters, from the conveners of symposia, from the geoscience departments of most colleges and universities, and from the main survey offices. The abstract form will be used as camera-ready copy for publication of *Abstracts with Programs*.

Speaker/Author Limits

You may be designated speaker (presenter) for only one invited abstract and only one volunteered abstract, regardless of format or mode.

INVITED PAPERS (SYMPOSIA)

This format includes only abstracts that have been invited by the convener of a symposium. Abstracts are sent directly to the convener by July 11. The convener is responsible for obtaining two independent reviews of each abstract, and for sending the reviews and the abstracts to GSA headquarters prior to the JTPC meeting.

The list of 1990 symposia appears below. A preliminary schedule will be available by May 15. Please call the GSA Meetings Department for information.

- S1. **Seafloor Hydrothermal Mineralization: New Developments.** *Society of Economic Geologists.* Peter Rona, NOAA, Miami; Steven D. Scott, University of Toronto.
- S2. **Geologic Setting and Generation of Very Large Volcanic-Hosted Massive Sulfide Deposits.** *Society of Economic Geologists.* Frederick J. Sawkins, University of Minnesota.
- S3. **The Origin of Animals.** *Paleontological Society.* Philip W. Signor, University of California—Davis; Stanley M. Awramik, University of California—Santa Barbara.
- S4. **Active Tectonics in the Mid-Continent.** *Engineering Geology Division.* Norman R. Tilford, Texas A&M University.
- S5. **Extinction and Recovery of Plankton from the K/T Boundary Event.** *Cushman Foundation for Foraminiferal Research and North American Micropaleontological Section of SEPM.* Richard K. Olsson, Rutgers University; William A. Berggren, Woods Hole Oceanographic Institution.
- S6. **Thermodynamic Mixing Properties of Petrologically Important Minerals.** *Mineralogical Society of America.* Mark S. Ghiorso, University of Washington; Robert C. Newton, University of Chicago.
- S7. **Geoscience Organizations: Their Efforts and Impact on Geoscience Education.** *National Association of Geology Teachers.* Dorothy L. Stout, Cypress College, California.
- S8. **Geochemistry of Metalliferous Black Shales.** *Organic Geochemistry Division—Geochemical Society and IGCP Working Group 254.* Philip A. Meyers, University of Michigan; Lisa M. Pratt, Indiana University.
- S9. **Transient Responses to Global Change: The Geomorphic and Hydrologic Record.** *Hydrogeology and Quaternary Geology and Geomorphology Divisions.* Steven Wells, University of New Mexico; Jack Hess, Desert Research Institute; Richard Craig, Kent State University.
- S10. **Oxygen and Carbon Isotopes in Paleozoic and Early Mesozoic Marine Sediments: Toward a Global Isotope Stratigraphy.** *Geochemical Society.* Ethan L. Grossman, Texas A&M University.
- S11. **Geology of Venus.** *Planetary Geology Division.* Ted A. Maxwell, NASA, Washington; Baerbel K. Lucchitta, USGS, Flagstaff.
- S12. **The Effects of Scale on Archaeological and Geological Perspectives.** *Archaeological Geology Division.* Julie K. Stein and Angela R. Linse, University of Washington.
- S13. **Geological Societies and Information Transfer in the Electronic Age.** *Geoscience Information Society.* Marie Dvorzak, University of Wisconsin—Madison.
- S14. **Salt Tectonics.** *Structural Geology and Tectonics Division.* Mark Cloos and Martin Jackson, University of Texas, Austin.
- S15. **The Effects of Past Global Change on Life.** *1990 Annual Meeting Committee and National Academy of Sciences/National Research Council.* Thomas M. Usselman, National Academy of Science/National Research Council.
- S16. **Eustasy: The Ups and Downs of a Major Concept.** *History of Geology Division.* Robert H. Dott, Jr., University of Wisconsin—Madison.
- S17. **Practical Applications of Coal Geology.** *Coal Geology Division.* Robert B. Finkelman, USGS, Reston; Douglas Peters, U.S. Bureau of Mines, Denver.
- S18. **Structure, Tectonics, and Geophysics of the Southern Margin of North America.** *Geophysics Division.* G. Randy Keller, University of Texas at El Paso; Richard T. Buffler, University of Texas, Austin.

VOLUNTEERED PAPERS

This format includes all abstracts that are not specifically invited for a symposium. Each paper will have a minimum of three reviews. Two types of sessions are available:

1. Discipline Sessions

Papers are submitted to one scientific category (discipline). The JTPC representatives select and schedule the papers in sessions focused on this one discipline, e.g., hydrogeology, geochemistry.

2. Theme Sessions

Papers are submitted to a specific pre-announced title AND to ONE scientific category. Theme sessions are interdisciplinary; each theme may have as many as three categories from which authors may choose. After each theme description below, the categories are identified by name and number as they appear on the 1990 Abstract Form. Theme submissions must include the theme number (T1, T4, T20 . . .), the first five key words of the theme title, and ONE discipline.

Each theme session has been proposed by an advocate. Advocates may not invite speakers. Advocates may encourage colleagues to submit abstracts, however, with

the understanding that there is no guarantee of acceptance. Each theme advocate evaluates abstracts initially only on the basis of topical relevance.

All abstracts then will be evaluated by three appropriate JTPC reviewers in the discipline for which they are submitted; a fourth review will be provided by the theme advocate.

If an abstract is submitted to, but not accepted for, a theme session, it will continue through the evaluation process to be considered for the appropriate discipline session.

During the August 10–11 meeting, the designated JTPC representative (in consultation with the theme advocate), will organize theme sessions from the abstracts approved for presentation.

Schedules for theme sessions will be available immediately after the JTPC meeting and will appear in the September issue of *GSA News & Information*.

THEME TOPICS

- T1. **Strontium Isotopes and Sedimentary Geology.** Richard Koepnick, Mobil Research & Development Corp.
Strontium isotope analysis is recognized as a powerful tool in sedimentary geologic studies and in basin analysis. Applications are many and include dating of sedimentary sequences, especially evaporitic, marginal marine, and high-latitude deposits; providing insights into paleoceanographic, paleoclimatic, and tectonic processes; and characterizing depositional environments, provenance, diagenetic reactions, and rock-water interactions. Contributions are solicited from all fields of geosciences that further the appreciation of this technique in sedimentary geology.
Geochemistry (7), Global Geoscience (12), Paleooceanography/Paleoclimatology (18)
- T2. **Mesozoic Tectonic Evolution of Mexico and the Gulf of Mexico.** Jose Longoria, University of Texas at Dallas; Richard Buffler, University of Texas, Austin.
Although Mesozoic paleogeographic reconstructions of the Gulf of Mexico incorporate Mexico as an integral component in the tectonic development of the region, conflicts exist between data obtained inland and data from the Gulf. Aspects of circum-Gulf regional Mesozoic geology that need to be addressed include paleogeography, pre-Laramide tectonic events, stratigraphic hiatuses, metamorphic rocks and metamorphic histories of western Mexico, juxtaposition of petrotectonic assemblages, and existence of tectono-stratigraphic terranes. Contributions are solicited from all fields of geosciences that will shed light on these problems.
Geophysics (10), Stratigraphy (30), Tectonics (32)

- T3. Problems and Solutions to Monitoring Ground Water in Karst Terranes.** *Hydrogeology Division.* Ralph O. Ewers, Eastern Kentucky University.
Ground-water flow in carbonate rocks is radically different from flow in porous media. This theme session, which has the formal endorsement of the Hydrogeology Division, will address both real-world and conceptual problems in environmental monitoring in karst terranes. Contributors are invited to share practical, experience-based insights into solving these problems.
Environmental Geology (6), Hydrogeology (14), Petrology, Sedimentary (24)
- T4. Cretaceous/Tertiary Boundary Sections in the Southern United States.** Gerta Keller, Princeton University; Stefan Gartner, Texas A&M University.
This theme session will focus on all aspects of the Cretaceous/Tertiary boundary in the southern United States in order to illuminate the events that imprinted the physical, geochemical and biological signatures on the geologic record; to identify evidence of geologically instantaneous or catastrophic events and long-term environmental changes at and across the K/T boundary; and to investigate the proximity of the southern United States to a possible impact location. Contributions are solicited on all aspects of the K/T boundary including geochemistry, isotopic and trace element geochemistry, melt rock and shock features, paleontology, stratigraphy, sedimentology, climate, and sea-level changes.
Geochemistry (7), Global Geoscience (12), Paleontology (19)
- T5. Hydrogeology of Arid Regions.** *Hydrogeology Division.* Bridget Scanlon, University of Texas, Austin.
A detailed understanding of the mechanisms and rates of ground-water recharge in arid regions is necessary for predicting potential contaminant migration from radioactive waste disposal sites and for estimating future water supplies. Because long-term predictions are required, information on paleoclimatic and paleogeomorphic variations and their effect on ground-water recharge are needed. Contributions are solicited for this theme, which has the formal endorsement of the Hydrogeology Division, to address these problems.
Hydrogeology (14)
- T6. Erosional Landscapes of the South-Central United States.** David L. Amsbury, NASA; O.T. Hayward, Baylor University.
Evidence exists for and against broad-scale, episodic erosional events and processes that formed the landscapes of the United States south of the glacial limits, west of the Mississippi Embayment, and east of the Rocky Mountains. Because this region has not been glaciated or affected by wide-spread volcanism or severe tectonic activity, extensive preserved surfaces and their distinctive paleosols allow the erosional record to be unraveled more easily than in areas where relatively violent processes have been active. Contributions are solicited that utilize space imagery, modern dating techniques, stream processes, soil formation, and climatic history to understand episodic erosional events in this region.
Geomorphology (9), Paleoclimatology (18), Remote Sensing (28)
- T7. Oxygen and Carbon Isotopes in Paleozoic and Early Mesozoic Marine Sediments: Toward a Global Isotope Stratigraphy.** *Geochemical Society.* Ethan L. Grossman, Texas A&M University.
Stable isotope stratigraphies provide a foundation for understanding Earth's history and systems. Excellent progress has been made in the last five years to develop a Paleozoic and early Mesozoic isotope stratigraphy, but the resolution and level of verification do not equal that for the Cretaceous and Tertiary. Contributions are solicited for this theme, which has the formal endorsement of the Geochemical Society and is intended to complement the Society's symposium on this topic, to establish a level of communication and understanding that will insure rapid development of an accurate isotope stratigraphy for this important period in the history of Earth and its biota.
Geochemistry (7), Global Geoscience (12), Stratigraphy (30)
- T8. Geologic Effects of Hurricane Hugo.** Nicholas K. Coch, Queens College; Paul Gayes, Coastal Carolina College.
Hurricane Hugo's path from the U.S. Virgin Islands, across Puerto Rico, and into the Carolinas, provides an unprecedented opportunity to study and describe the varied geologic effects of a powerful storm under different climatic and geologic conditions. Contributions are solicited that address geologic aspects of this event as well as environmental damage and recovery, including reef damage, mass movements, wind shear effects, sediment dispersal, and remobilization of pollutants by flood scour.
Environmental Geology (6), Remote Sensing (28), Sedimentology (29)
- T9. Environmental and Engineering Studies for Radioactive Waste Isolation: Experience Based on the Waste Isolation Pilot Plant (WIPP) Project, SE New Mexico.** *Engineering Geology Division.* William M. Roggenthen, South Dakota School of Mines & Technology; Dwight Deal, International Technology Corp., Carlsbad, New Mexico; A. L. Lappin, Sandia National Laboratories.
Safe, long-term underground storage of radioactive wastes poses a major problem that is rapidly approaching a crisis. Detailed geological knowledge of possible repositories is crucial. Contributions are solicited for this theme session, which has the formal endorsement of the Engineering Geology Division, that are pertinent to waste isolation, including rock mechanics, hydrology of permeable and very impermeable materials, environmental aspects, depositional systems, and engineering geophysical aspects.
Engineering Geology (5), Environmental Geology (6), Hydrogeology (14)
- T10. Effects of the Loma Prieta Earthquake.** *Engineering Geology Division.* Perry Rahn, South Dakota School of Mines and Technology.
This session, which has the formal endorsement of the Engineering Geology Division, will focus on predictions of damage and effects from an earthquake in the San Francisco Bay area, and how these predictions differed from the damage done by the Loma Prieta earthquake of October 17, 1989. Contributions are solicited that will relate damage and effects to site-specific or local geologic conditions as well as contributions that demonstrate no obvious relation between damage and subsurface factors.
Engineering Geology (5), Environmental Geology (6), Geophysics (10)
- T11. Amino Acid Geochemistry: Applications in Stratigraphy and Geochronology.** John F. Wehmiller, University of Delaware.
The amino acid racemization method has become a widely applied technique in the study of Quaternary stratigraphic sequences. Contributions are solicited that provide insights into kinetic modeling of diagenetic racemization; developing analytical and geological criteria for evaluating integrity of fossilized amino acid mixtures; establishing local and regional aminostratigraphic data sets; and integrating amino acid racemization data with independent stratigraphic and geochronological information.
Geochemistry (7), Quaternary Geology (27), Stratigraphy (30)

- T12. Metageology: Expanding Geologic Awareness.** Raymond Pestrong, San Francisco State University; Garry McKenzie, Ohio State University.
The geosciences have played an increasingly integral role in many aspects of society, of which the arts are but one. The concept of "metageology" is introduced to provide a forum for those seeking to express ideas that fall outside one or more of the traditional disciplinary areas or that cross disciplinary boundaries to include geosciences and the arts, environmental issues, or social, political, or psychological concerns as well as those of the humanities. Contributions are solicited that will address the important impact of the geosciences on all aspects of society.
Environmental Geology (6), Geology Education (8), Other (34)
- T13. The Late Proterozoic Evolution of Organisms and Environments.** Andrew H. Knoll, Harvard University; David DesMarais, NASA; Robert J. Stern, University of Texas at Dallas.
Paleontological, geological, and geochemical data indicate that the Late Proterozoic (ca. 850–550 Ma) was an interval of marked biological, tectonic, and environmental change. This theme session will focus on data illuminating Late Proterozoic history, advances in stratigraphy that can improve our ability to correlate different events, and ideas about how different processes may have interacted to produce the unique record of the Late Proterozoic and, in the end, usher in the Phanerozoic world. Contributions are solicited in all aspects of late Precambrian geology including paleontology, tectonics, magmatism, climatology, and isotopic geochemistry that offer a global perspective on this part of earth history.
Global Geoscience (12), Paleontology (19), Precambrian Geology (26)
- T14. Regulatory Geology: Site and Performance Evaluations in the Face of Geological Uncertainty.** Philip S. Justus, U.S. Nuclear Regulatory Commission.
Geologists concerned with regulating or licensing solid and liquid waste disposal systems and facilities of all types (e.g., deep geologic, shallow burial) frequently encounter geological uncertainties. The emphasis of this theme session will be on cases or examples of evaluating waste disposal or storage sites, designs, and performance to specified standards in the face of geological uncertainty. Contributions are solicited from presenters who can share lessons from successes and failures of regulatory geologists responsible for developing, implementing, or complying with laws and regulations that rely on assessments of geological behavior of a site.
Engineering Geology (5), Environmental Geology (6), Hydrogeology (14)
- T15. Salt Domes: Geotechnology, Energy, and Economic Significance.** James T. Neal, Sandia National Laboratories; Martin Jackson, University of Texas, Austin.
Salt domes have a high level of economic interest both as storage repositories and as features associated with energy and mineral resources. Contributions are solicited on the economic aspects of salt domes, including their use for cavern storage of oil and gas, compressed air, and chemical waste, and on topics related to sulfur, salt, and brine extraction.
Economic Geology (4), Engineering Geology (5), Environmental Geology (6)
- T16. Paleosols and Subaerial Exposure Surfaces in Carbonate Sequences.** Annabelle Foos, University of Akron.
Paleosols and subaerial exposure surfaces yield significant paleoenvironmental and stratigraphic information in carbonate sequences. Exposure surfaces at major unconformities are often associated with paleokarst and petroleum reservoirs; paleosols also cap cycles within carbonate sequences and can be related to the depositional processes and meteoric diagenesis of the underlying sediments. Contributions are solicited that consider petrography, sedimentology, pedogenesis, stratigraphy, geochemistry, and petroleum geology of paleosols and exposure surfaces from a variety of carbonate environments and time scales.
Geochemistry (7), Petrology, Sedimentary (24), Stratigraphy (30)
- T17. Upper Cretaceous Stratigraphy and Paleontology, U.S. Gulf Coastal Plain and Adjacent Regions.** David T. King, Jr., Auburn University.
The Gulf Coastal Plain is a key region for study of relative sea-level changes and passive margin sequence stratigraphy. Contributions are solicited that focus on all aspects of the Upper Cretaceous of this region including facies analysis, sequence stratigraphy, sea-level analysis, biostratigraphy, invertebrate and vertebrate paleontology, paleoclimatology, and depositional environments. Presentations are also solicited on similar topics from adjacent regions (i.e., Mississippi Embayment, eastern margin of Western Interior Seaway, and Atlantic Coastal Plain) especially relevant to Upper Cretaceous geology of the Gulf Coast.
Paleontology/Paleobotany (19), Sedimentology (29), Stratigraphy (30)
- T18. Isotope Fractionations in Organic Matter: Biosynthetic and Diagenetic Processes.** Stephen A. Macko, Memorial University.
Fractionations of the stable isotopes of H, C, N, and S in organic matter in geologic settings provide information about paleoenvironments, depositional conditions, and thermal histories. Contributions are solicited on aspects of stable isotope fractionation of these elements in organic matter that reflect the biosynthetic sources of these components and the diagenetic processes altering them.
Geochemistry (7), Paleoceanography (18), Sedimentology (29)
- T19. Calibration of Controls on Stratigraphic Sequences.** *Sedimentary Geology Division.* John P. Grotzinger, Massachusetts Institute of Technology.
The application of concepts of sequence stratigraphy has become widespread. Contributions are solicited for this theme, which has the formal endorsement of the Sedimentary Geology Division, that quantitatively examine which factors control sequences (and parasequences), including sea level, subsidence, and sedimentation. Emphases might include application of numerical models to understanding facies development, unconformities, and stratigraphic geometry; documentation of relevant field or subsurface examples; and techniques for reduction of stratigraphic data (e.g., backstripping, time series analysis, and error analysis).
Global Geoscience (12), Sedimentology (29), Stratigraphy (30)
- T20. Geoscience Transects (POSTER MODE ONLY).** *Geophysics Division.* W. R. Van Schmus, University of Kansas; Walter Mooney, USGS, Menlo Park.
The Global Geoscience Transects (GGT) Project of the International Lithosphere Program (ILP) actively promotes preparation of geologic and geophysical strip maps and crustal cross sections, with tectonic interpretations, for key lithospheric transects throughout continental regions of the world. Contributions are solicited for a poster session, formally endorsed by the Geophysics Division, from teams with significant progress in North American transects as well as from any other groups that have constructed geoscience transects as part of their research.
Geophysics (10), Structural Geology (31), Tectonics (32)

- T21. Applications of Organic Matter Biomarkers in Sedimentary Geology.** Michael A. Kruge, Southern Illinois University.
The suite of organic matter biomarker compounds in sedimentary rocks and oils provides information about the nature of the source organisms and about the diagenetic conditions that affected chemical modifications of the compounds. These results are important in understanding the processes of oil generation and sedimentary ore formation and in interpreting paleo-environments. Contributions are solicited that will emphasize the application of biomarker geochemistry in these examples.
Geochemistry (7), Paleooceanography (18), Sedimentology (29)
- T22. Salt Tectonics. Structural Geology and Tectonics Division.** Mark Cloos and Martin Jackson, University of Texas, Austin.
Salt has played an important role in the development of structures in the Gulf Coast region and elsewhere. Contributions are solicited that will advance our understanding of salt tectonics in these regions or that will describe results of experimental and numerical studies; the scale of these contributions on salt behavior may range from microscopic to crustal. This theme session, which is formally endorsed by the Structural Geology and Tectonics Division, complements the division's symposium of the same title.
Structural Geology (31), Tectonics (32)
- T23. Tectonostratigraphic Correlation of Late Cretaceous–Early Tertiary Island-Arc Rocks in the Caribbean Region.** *International Division.* Paul Mann, University of Texas, Austin; Burke Burkart, University of Texas, Arlington.
A number of conflicting hypotheses exist for the origin of the island arc rocks fringing the Caribbean. One set of reconstructions calls for one or more arcs that were swept in from the Pacific and were accreted to North and South America; another set proposes that one or more arcs formed in situ. Contributions are solicited for this session, which is formally endorsed by the International Division, that will enable these hypotheses to be tested by integration of stratigraphic, geochemical, and structural data from different geographic regions.
Geochemistry (7), Structural Geology (31), Tectonics (32)
- T24. Geological Resources, Hazards and Population.** Garry D. McKenzie, Ohio State University.
Geoscientists have major roles in efforts to improve hazard warning systems and mitigation and to increase resource availability in an environmentally responsible manner. Both tasks become increasingly difficult as population increases. Contributions are solicited that will explore the present and future relations between resources, hazards, and population; that will address the research needs in this area; and that will offer suggestions for actions and policies needed to mitigate these problems.
Engineering Geology (5), Environmental Geology (6), Geomorphology (9)
- T25. Friction Melting Processes and Products in Geologic Materials.** Jerry F. Magloughlin, University of Minnesota; John G. Spray, University of New Brunswick.
Friction melts of several varieties have been described from numerous geologic settings, and recently artificially generated melts have been studied. While friction melts, especially pseudotachylites, have been investigated, few studies have addressed either the source material or the actual mechanisms of melting. Contributions are solicited that address the nature of the source material (what actually melted?) and the mechanisms of melting (how did melting occur?), and that seek to provide quantitative constraints on the conditions (pressure, temperature, strain rate, finite strain, etc.) accompanying melting, in either natural or artificially generated friction melts.
Engineering Geology (5), Petrology, Igneous (22), Structural Geology (31)
- T26. Writing Assignments: A Tool for Teaching and Learning Geology.** *National Association of Geology Teachers.* R. Heather Macdonald, College of William and Mary; Susan H. Conrad, Vassar College.
Writing assignments in both lower- and upper-level geoscience classes enhance learning, as demonstrated by Writing Across the Curriculum programs. Contributions are solicited for this theme session, which has the formal endorsement of the National Association of Geology Teachers, on any aspect of writing assignments in geoscience classes ranging from specific assignment descriptions to pedagogical implications of writing, teaching, and learning.
Geology Education (8)
- T27. Geochemistry and Global Change.** Keith A. Kvenvolden, USGS, Menlo Park.
Global changes result from perturbations in the dynamic interaction of the biosphere, atmosphere, hydrosphere, and lithosphere, all of which are linked
- by Earth's carbon cycle. An understanding of the geological and environmental implications of these perturbations is crucial in modeling potential global changes. Contributions are solicited that address geochemical aspects of global change, including climate; atmospheric/oceanic interactions, especially concerning the carbon cycle gases methane and carbon dioxide; acid rain; volcanic gases; and other geochemical factors relating to past, present, and future global changes.
Geochemistry (7), Global Geoscience (12), Paleooceanography/Paleoclimatology (18)
- T28. Microcomputer Management of Databases in Petrology and Geochemistry.** Joseph Frizado, Bowling Green State University.
Databases in petrology and geochemistry have traditionally been stored in large computers, but recent advances in microcomputer technology have made available a variety of database management systems appropriate for handling such data. Different software and hardware combinations have been used to address similar problems. Contributions are solicited that will evaluate particular hardware/software combinations as applied to efficient management of this type of geological information.
Computers (3), Geochemistry (7), Petrology, Igneous (22)
- T29. Practical Applications of Coal Geology.** *Coal Geology Division.* Robert B. Finkelman, USGS, Reston; Douglas C. Peters, U.S. Bureau of Mines, Denver.
Coal geology has made important practical contributions to the energy industry. Geologic concepts and research have been used to make coal utilization more economical, efficient, and environmentally acceptable. Contributions are solicited for this theme session, which is formally endorsed by the Coal Geology Division and designed to complement the division's symposium on this topic, to highlight the practical applications of coal geology research.
Coal Geology (2), Environmental Geology (6), Hydrogeology (14)
- T30. Granites/Rhyolites: Interrelations, Processes, Geometries, Geochemistries.** M. Charles Gilbert, Texas A&M University.
Silicic magmas reaching the upper crust (near-surface and surface) undergo a myriad of rapid changes during final stages of ascent, emplacement, and crystallization. Contributions are solicited that document any aspect of the physical or chemical conditions under which the plutons, dikes, flows, and tuffs formed or that document any properties of these

bodies that constrain their formative processes.

Geochemistry (7), Petrology, Experimental (21), Petrology, Igneous (22)

T31. Water and Volcanoes (BOTH POSTER AND ORAL MODE). Grant Heiken, Los Alamos National Laboratory.

On Earth, nearly all aspects of volcanism, throughout the history of a volcanic field, are affected by meteoric water. A volcano is the focus for elevated rainfall, has a unique hydrologic system, is the focus for magma/water interaction, and serves as a framework for hydrothermal systems. Contributions are solicited for both poster and oral sessions from contributors in hydrology, volcanology, sedimentology, and hydrothermal geochemistry relating to all aspects of interaction of water with volcanoes.

Geochemistry (7), Hydrogeology (4), Volcanology (33)

T32. Transient Responses to Global Change: The Geomorphic and Hydrologic Record (POSTER MODE ONLY). *Quaternary Geology and Geomorphology Division.*

Steven Wells, University of New Mexico; Jack Hess, Desert Research Institute; Richard Craig, Kent State University.

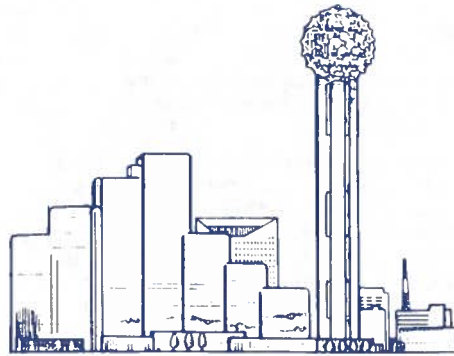
While the topic of global change and the concomitant responses at the regional and local levels are important today, it is generally recognized that many of these changes will be transient. Earth systems do not always adjust immediately and completely to external forcings. Contributions are solicited for this poster session, which is formally endorsed by the Quaternary Geology and Geomorphology Division and complements the Division's symposium of the same title.

Environmental Geology (6), Geomorphology (9), Hydrogeology (14)

T33. Opportunities for Scientific Drilling in the Continental Crust: Shallow- to Intermediate-Depth Projects. Earl Hoskins, Texas A&M University; James J. Papike, South Dakota School of Mines and Technology.

There are many opportunities to further the understanding of geologic processes in the continental crust by careful sampling through core drilling at relatively shallow depths, i.e., 100 m to 1 km. Examples include, but are not limited to, mass wasting problems, extended outcrop penetration for unweathered samples for paleomagnetic and geochemical studies, detailed stratigraphy of critical zones such as the K/T boundary, and hydrological and environmental problems. Contributions are solicited in all aspects of these problems or others that could benefit from relatively simple and cost-effective drilling.

Geochemistry (7), Geophysics (10), Sedimentology (29)



FIELD TRIPS

Big "D" has been a crossroads for travel in North America for many years. The field trips planned for the 1990 Annual Meeting in Dallas do likewise and use the city as a hub from which to venture forth and visit geologic outcrops in Texas, adjoining states, Mexico, and Guatemala. GSA hopes that this listing of proposed trips for the 1990 meeting will pique your interest and that you will make plans to attend one or more of them.

Trips begin and end in Dallas unless otherwise noted. Further details will be given when registration for the trips begins in August 1990. Costs are preliminary estimates.

For further information contact either of the 1990 Field Trip Chairmen, Robert T. Clarke, Mobil Research and Development Corp.—DRL, P.O. Box 819047, Dallas, TX 75381-9047, (214) 851-8481, fax 214-851-8185, or Kent C. Nielsen, Dept. of Geosciences, MS FO2.1, University of Texas at Dallas, P.O. Box 830688, Richardson, TX 75083-0688, (214) 690-2448, fax 214-690-2537.

PREMEETING

Sedimentation and Diagenesis of Middle Cretaceous Platform Margins, East-Central Mexico. Paul Enos, Dept. of Geology, University of Kansas, Lawrence, KS 66045, (913) 864-4974, Charles J. Minero, and J. Eduardo Aguayo Camargo. Sponsored by the *Sedimentary Geology Division*. October 24-28. Cost: \$650.

Hydrogeology of Trans-Pecos Texas. John M. Sharp, Jr., Dept. of Geological Sciences, University of Texas, Austin, TX 78712, (512) 471-3317, and C. W. Kreitler. Sponsored by the *Hydrogeology Division*. October 25-28. Trip begins in El Paso, Texas. Cost: \$260.

Petrologic Evolution of the Southeast San Juan Volcanic Field: Oligocene Intra-Continental Arc Magmatism. Michael Dungan, Dept. of Geology, Southern Methodist University, Dallas, TX 75275, (214) 692-2752, Michael Colucci, Kurt Ferguson, Steve Balsley, and Peter Lipman. October 25-28. Trip begins in Albuquerque, New Mexico. Cost: \$250.

Remote Sensing Techniques Applied to Structural Geology and Oil Exploration in South-Central Oklahoma. Mike Crawford, ARCO Oil and Gas Co., PRC-D3607, 2300 W. Plano Pkwy., Plano, TX 75075, (214) 754-3877, Ken Morgan, Nowell Donovan, and Bill Brown. October 25-28. Cost: \$250.

Geology, Geochemistry, and Structure of Low-Pressure Sheet Granites, Wichita Mountains, Oklahoma. M. Charles Gilbert, Dept. of Geology, Texas A&M University, College Station, TX 77843-2451, (409) 845-2464. October 25-28. Cost: \$195.

Coal Geology of the Western Region of the Interior Coal Province in Parts of Kansas, Missouri, and Oklahoma. Samuel A. Friedman, Oklahoma Geological Survey, N-131 Energy Center, 100 E. Boyd St., Norman, OK 73019-0628, (405) 325-3031, Lawrence L. Brady, and Joy L. Bostic. Sponsored by the *Coal Geology Division*. October 25-28. Trip begins in Tulsa, Oklahoma. Cost: \$245.

Carbonate and Siliciclastic Sedimentation in Late Pennsylvanian Cycles, North-Central Texas. Thomas E. Yancey, Dept. of Geology, Texas A&M University, College Station, TX 77843-3115, (409) 845-2451, Arthur Cleaves, and Merlynd Nestell. Sponsored by the *Sedimentary Geology Division*. October 27-28. Cost: \$125.

Nearshore Clastic-Carbonate Facies and Dinosaur Trackways in the Glen Rose Formation (Lower Cretaceous) of Central Texas. Gail R. Bergan, Reservoirs, Inc., 1151-C Britmore Rd., Houston, TX 77043, (713) 932-7183, and Jeffrey G. Pittman. October 27. Cost: \$35.

Dinosaur Tracks in the Cretaceous Glen Rose Formation of Central Texas. Ronnie J. Hastings, 114 San Jacinto St., Waxahachie, TX 75165, (214) 937-3861. Sponsored by the *History of Geology Division*. October 28. Cost: \$35.

Geology, Hydrogeology, and Engineering Aspects of the Superconducting Super Collider Site, Ellis County, Texas. Donald F. Reaser, Dept. of Geology, University of Texas, Arlington, TX 76019, (817) 273-2984, Priscilla P. Nelson, and Joe C. Yelderman. October 28. Cost: \$40. (Note: GSA Short Course, "Site Selection for Critical Facilities—The Earth Science Perspective" is being offered on Saturday, October 27.)

Archaeological Geology of the Upper Trinity River Drainage Basin, Texas. C. Reid Ferring, Institute of Applied Sciences, University of North Texas, P.O. Box 13078, Denton, TX 76203, (817) 565-2694. Sponsored by the *Archaeological Geology Division*. October 28. Cost: \$40.

Clastic and Carbonate Shelf Deposition, Late Albian-Early Cenomanian, North Texas. Alton Brown, ARCO Oil and Gas Co., PRC-D3231A, 2300 W. Plano Pkwy., Plano, TX 75075, (214) 754-6217, and Joe McGowen. October 28. Cost: \$40.

POSTMEETING

Structure and Stratigraphy of the Marathon Basin, Big Bend Park and Vicinity, Trans-Pecos Texas. William R. Muehlberger, Dept. of Geological Sciences, University of Texas, Austin, TX 78713-7909, (512) 471-4885, and Patricia W. Dickerson. November 1 (evening)-4. Cost: \$395.

Geological and Hydrological Studies of Evaporites in the Northern Delaware Basin for the Waste Isolation Pilot Plant (WIPP). Dennis W. Powers, Consulting Geologist, Star Route Box 87, Anthony, TX 79821, (915) 747-5969, Norbert Rempe, Robert Holt, and Richard Beauheim. November 1 (evening)-4. Cost: \$300.

Hydrogeology of the Blaine Gypsum-Dolomite Karst Aquifer, Southwestern Oklahoma. Kenneth S. Johnson, Oklahoma Geological Survey, University of Oklahoma, Norman, OK 73019-0628, (405) 325-3031, and Donna L. Runkle. November 1 (evening)-3. Cost: \$130.

Structure and Stratigraphy of the Arbuckle Mountains, Southern Oklahoma. Rodger E. Denison, Mobil Research and Development Corp.—DRL, P.O. Box 819047, Dallas, TX 75381-9047, (214) 851-8172, and Nowell Donovan. November 1 (evening)-3. Cost: \$125.

NOAM-CARIB Plate Boundary in Guatemala. Richard C. Finch, Dept. of Earth Sciences, Tennessee Technological University, P.O. Box 5062, Cookeville, TN 38505, (615) 372-3121, and Gabriel Dengo. November 2-8. Trip ends in Houston, Texas. Cost: \$775.

Reefal Development in a Terrigenous Province—The Reefs of Veracruz, Mexico and Eocene-Miocene Analogues of the Tampico-Misantla Basin, Mexico. Paul R. Krutak, Basin Research Institute, Louisiana State University, Baton Rouge, LA 70803-4101, (504) 388-8328, Raul Gio-Argaez, and Clif F. Jordan. November 2-6. Cost: \$625.

The Lampasas Cut Plain—Evidence for the Cyclic Evolution of a Regional Landscape, Central Texas. O. T. Hayward, Dept. of Geology, Baylor University, Waco, TX 76798-7354, (817) 755-2361, Peter Allen, and David Amsbury. November 2-3. Cost: \$150.

Carboniferous Geology and Tectonic History of the Southern Fort Worth (Foreland) Basin and Concho Platform. Robert C. Grayson, Jr., Dept. of Geology, Baylor University, Waco, TX 76798, (817) 755-2361, Matthew J. Pranter, Lance L. Lambert, and Glen K. Merrill. November 2-3. Cost: \$135.

Engineering and Urban Geology of the Dallas-Fort Worth Metroplex. Christopher C. Mathewson, Dept. of Geology, Texas A&M University, College Station, TX 77843-3115, (409) 845-2488, and Aubrey D. Henley. Sponsored by the *Engineering Geology Division*. November 2. Cost: \$40.

Hydrogeology of the Jewett Lignite Mine, East Texas. W. R. Kaiser, Bureau of Economic Geology, University of Texas, University

Station, Box X, Austin, TX 78713, (512) 471-7721, Marc J. Norris, and W. Douglas Hall. Sponsored by the *Hydrogeology Division*. November 2. Cost: \$40.

Lower Cretaceous Vertebrates in Central Texas. Louis Jacobs, Dept. of Geological Sciences, Southern Methodist University, Dallas, TX 75275, (214) 692-2773, Dale Winkler, Phillip Murry, and Jeffrey Pittman. Sponsored by the *Society of Vertebrate Paleontologists*. November 2. Cost: \$40.

SEG-SPONSORED FIELD TRIP

Non-Metallic Mineral Resources of the Delaware Basin, Texas and New Mexico. Richard Kyle, Dept. of Geological Sciences, University of Texas, Austin, TX 78712, (512) 471-4351. October 25-27. Trip begins in El Paso, Texas. Cost: \$300. For further information, contact Sam Sawkins, Dept. of Geology & Geophysics, University of Minnesota, Minneapolis, MN 55455, (612) 624-6302.



PROFESSIONAL HORIZONS GSA-SPONSORED SHORT COURSES/FORUM

Advanced registration for GSA Short Courses begins in May with the publication of the 1990 Short Course Brochure. To receive a copy of the brochure or for more information on any of the courses listed below, contact Edna Collis, Course Registrar, GSA headquarters.

Fees will be approximately \$75-\$100 for the first day, \$50-\$75 for the second day, and \$25-\$50 for the third day. Actual fees, course details, and registration information will be published in the May issue of *GSA News & Information*. A "GSA Certificate of Completion" will be given to each registrant.

Site Selection for Critical Facilities—The Earth Science Perspective. October 27. Cosponsored by the *Engineering Geology Division*. Norman R. Tilford, Texas A&M University. (Note: GSA Field Trip, "Geology, Hydrogeology, and Engineering Aspects of the Superconducting Super Collider Site, Ellis County, Texas" is being offered on Sunday, October 28.)

Coastal Land Loss. October 27-28. Joseph T. Kelley, Maine Geological Survey; Robert A. Morton, Bureau of Economic Geology; Shea Penland, Louisiana Geological Survey; Orrin H. Pilkey, Jr., Duke University.

Contaminant Hydrogeology: Practical Monitoring, Protection and Cleanup. October 27-28. Cosponsored by the *Hydrogeology Division*. Christopher M. Palmer and Jeffrey L. Peterson, GeoStrategies, Inc.

Creating Geological Applications with Macintosh HyperCard. October 27-28. Cosponsored by the *National Association of Geology Teachers*. H. Robert Burger, Smith College; John R. Boyd, University of Wyoming.

Metamorphic Pressure-Temperature-Time Paths. October 27-28. Cosponsored by the *Mineralogical Society of America*. Frank S. Spear, Rensselaer Polytechnic Institute; Simon M. Peacock, Arizona State University.

Phanerozoic Plate Tectonic Reconstructions. October 27-28. Christopher R. Scotese, Shell Development Co.

Quantitative Sedimentary Basin Modeling. October 27-28. Cosponsored by the *Sedimentary Geology Division*. Paul L. Heller and Charles L. Angevine, University of Wyoming; Christopher Paola, University of Minnesota.

Seismic Expression of Structural Styles. October 27-28. Cosponsored by the *Structural Geology and Tectonics Division*. Albert W. Bally, Rice University; Martha Oliver Withjack, Mobil Research and Development Corp.; Kristian E. Meisling and David A. Fisher, ARCO Oil and Gas Co.

Computer Modeling of Cyclic Carbonate Sequences. October 28. J. Fred Read, Maya Elrick, and David A. Osleger, Virginia Polytechnic Institute and State University.

Practical Tracing of Ground Water, with Emphasis on Karst Terranes. October 28. Cosponsored by the *Hydrogeology Division*. James F. Quinlan, ATEC Environmental Consultants; E. Calvin Alexander, Jr., University of Minnesota.

Recent Sediments of the Northwest Gulf Coast Region. October 28. Rufus J. LeBlanc, Sr., Rufe LeBlanc School of Clastic Sediments.

FORUM

Geology and Public Policy Forum: The Future for Fossil Fuels. October 30, 5:30 to 7 p.m. For information, contact the Meetings Department, GSA headquarters.

NON-GSA-SPONSORED SHORT COURSES/WORKSHOPS/FORUM

Mineral-Water Interface Geochemistry. October 26–28. Precourse reception the evening of October 25. Sponsored by the *Mineralogical Society of America*. For information: MSA Business Office, 1625 I St., N.W., Suite 414, Washington, DC 20036, (202) 775-4344.

Marine and Terrestrial Radiations of the Arthropods. October 28, 8:15 a.m. to 5:30 p.m. Sponsored by the *Paleontological Society*. For information: Don Mikulic, Illinois Geological Survey, Natural Resources Bldg., 615 E. Peabody Dr., Champaign, IL 61820, (217) 244-2518.

GeoRef Beginners Workshop. October 30, 8 to 11 a.m. Sponsored by the *Geoscience Information Society* and *GeoRef*. For information: Barbara DeFelice, Dartmouth College, Kresge Physical Sciences Library, Hanover, NH 03755, (603) 646-3845.

GeoRef Advanced Workshop. October 31, 1:30 to 4:30 p.m. Sponsored by the *Geoscience Information Society* and *GeoRef*. For information: Barbara DeFelice, Dartmouth College, Kresge Physical Sciences Library, Hanover, NH 03755, (603) 646-3845.

GIS Database Forum. November 1, 9 to 11 a.m. Sponsored by the *Geoscience Information Society*. For information: Claren M. Kidd, Geology Library, University of Oklahoma, 830 Van Vleet Oval, Room 103, Norman, OK 73019, (405) 325-6217.



EXHIBITS

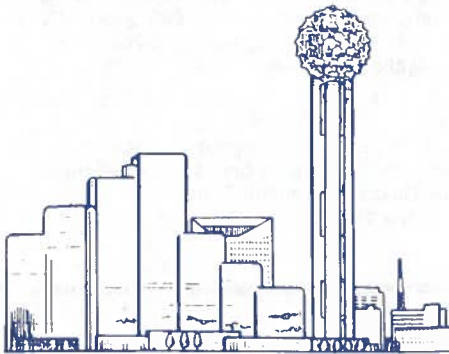
"The exhibit hall gets bigger and better, and provides us with more high-tech

exhibitors each year!" This endorsement is repeated on hundreds of comment cards and letters that are sent to GSA. Come see for yourself in the Dallas Convention Center's West Hall, October 28 through 31.

The 1990 Exhibits kick off with the Welcoming Party Sunday evening, an exclusive opportunity that's popular with exhibitors and attendees. "We do a lot of business on Sunday at the Welcoming Party," say key exhibitors. The 4000 geologists who attend the opening party enjoy this first chance to visit the exhibits. The show remains open daily through Wednesday.

Exhibitors display and demonstrate computer hardware and software, X-ray diffraction and measurement equipment, powder diffraction equipment, camera equipment, isotope ratio mass spectrometers, microanalysis equipment, publications, maps, gems and jewelry, mineral and fossil specimens, field supplies, and camping equipment. Many universities and educational organizations have booths as well.

GSA welcomes repeat exhibitors who return to the exhibit hall each year. Their combined efforts have made the exhibits what they are today—a growing success! GSA also encourages participation by new, innovative companies, organizations, and universities with products and services that appeal to geologists. If you are interested in participating or if you would like to see a particular exhibitor in Dallas, please contact Kathy Ohmie Lynch, Exhibits Manager, GSA headquarters.



EMPLOYMENT SERVICE

Once again, GSA will be offering its Employment Interview Service. The popularity of this program continues to rise—at last year's meeting in St. Louis, 49 employers conducted 650 interviews with more than 300 applicants seeking employment.

As in the past, booths will be provided for employers to interview applicants registered with the Employment Service, and GSA staff will be available to assist in scheduling interviews.

See the February issue of *GSA News & Information* for forms and further information, or contact T. Michael Moreland, Employment Service Manager, GSA headquarters.



GUEST PROGRAM

Come see "Big D" . . . diverse, dynamic Dallas! The Guest Committee is making plans to entertain, enlighten, and even exercise you while you're in Dallas. Come discover the Dallas of yesterday and today—from the trolleys and antiques of McKinney Avenue to the new cityscape of Las Colinas; from the autumn blooms of the Arboretum to I. M. Pei's Morton Meyerson Symphony Center. You can work out at Dr. Cooper's Aerobics Center, or discover the "Metroplex" through tours of Waxahachie, with its Gingerbread Trail, and Fort Worth, "where the West begins." Seminars will include tall tales of Texas, tastes of Texas wine, and tricks to increase your memory power. You can see and feel the spirit that makes Dallas special, and the guest committee is looking forward to welcoming you in October. More details and registration information for tours will be published in the August issue of *GSA News & Information*.



HIGHLIGHTS

Sunday, October 28

Tennis buffs unite! Warm up for the week at the Sunday morning **Tennis Tournament**. Courts have been reserved for round-robin doubles at Samuell Grand Park near beautiful White Rock Lake. Come with a partner, or we'll pair you with one on Sunday. Entry will be limited; first-come, first-served.

Sunday, October 28

The Dallas **Welcoming Party** will be on Sunday evening, 6 to 9 p.m. at the Dallas

ABSTRACT FORMS & INFORMATION: (303) 447-2020 or 1-800-472-1988

Convention Center in conjunction with the opening of the 250-booth scientific and technical exhibits. Showing the city's multifaceted character, both jazz and country-western bands will entertain.

Monday, October 29

The Effects of Past Global Change on Life, a symposium on Monday morning, will be cosponsored by the *1990 Annual Meeting Committee* and the *National Academy of Sciences/National Research Council*.

"Major transitions from one set of environmental conditions to another have had important impacts on the biosphere. These changes have entailed not only extinction but also shifts in the distribution and abundance of species and origins of new species in response to opening of new environmental opportunities. Topics will range from the build-up of atmospheric oxygen and biotic diversity in the latest Precambrian to the impact of the last Ice Age on human evolution."—Thomas M. Usselman, NAS/NRC, Convener.

Monday, October 29

The well-known **Alumni Receptions** reunite friends and colleagues. More than 60 universities and colleges will hold alumni reunions at the Hyatt Regency Dallas from 7 to 9:30 p.m. If you would like to schedule an alumni function, have your department chairman contact Vanessa George, GSA headquarters.

Wednesday, October 31

Train now for the popular **5K/10K Fun Run** to be held on Wednesday morning. Breathe hard. Break into a sweat. Enjoy the colorful sunrise along the pathways encircling peaceful Bachman Lake in the heart of Dallas.

Wednesday, October 31

Come for some true Texas hospitality at the Wednesday evening **Wild West Barbecue and Dance** at the Texas-sized Longhorn Ballroom, close to downtown Dallas. This low-cost, informal event will feature a lip-smacking beef and chicken barbecue served chuckwagon style in a saloon setting, a country-western band for dancing and listening pleasure, and a variety of entertainers guaranteed to bring back the Old West.

Thursday, November 1

The Dallas meeting starts *and ends* with a party. Speakers giving papers after 3:00 p.m. on Thursday will be invited to a **T.A.C. (Thursday Afternoon Club)** free beer and music celebration. Each speaker will receive the highly prized "I Survived" button. Supporters of survivors will be encouraged to join the fun.



TRAVEL AND LODGING

AIRFARES SAVE 40% OR MORE!

GSA's official travel agent, Cain Travel Group, has negotiated discounted rates of 40% or more with the major Dallas carriers: Delta, American, and United. In addition, Cain will meet or beat any fare offered by another travel agency.

As with all airline reservations, please use caution regarding change and cancellation penalties that accompany low-fare tickets. This especially applies to field-trip participants, whose trips may be canceled after the September 28 preregistration deadline.

Advance bookings with Saturday night stayovers are the best route to lowest fares. Call Cain Travel Group at 1-800-346-4747, or in Colorado call (303) 443-2246. No obligation, of course.

GSA SHUTTLE

The technical program, registration, exhibits, and employment service will be at the Dallas Convention Center. GSA will provide a convenient, day-time, free shuttle

servicing the seven GSA-selected downtown hotels and the Convention Center. The shuttle will also serve official GSA evening events.

LODGING

GSA has selected seven downtown hotels, which will offer special convention rates ranging from \$49 to \$110 single, and \$61 to \$125 double. A block of 650 rooms is reserved at the Hyatt Regency Dallas, which, as headquarters, will host most social and business events. Other participating hotels include Adolphus, Aristocrat, Dallas Park Plaza, Days, Holiday Inn—Downtown, and Sheraton Dallas.

STUDENT HOUSING. In addition to the downtown hotels, GSA will be offering special rates at several motels about 3 to 5 miles from downtown. These motels will be in the lower price range, and will NOT be on the GSA shuttle route. Registrants will be responsible for their own transportation.

Hotel information and reservation forms will be available in the August issue of *GSA News & Information*. All housing will be processed by the Dallas Housing Bureau.

TEXAS INFORMATION

Abundant information and friendly service are available at the following contact numbers:

Texas Department of Commerce
Tourism Division
P.O. Box 12008
Austin, TX 78711
(512) 320-9419

Dallas Convention & Visitors Bureau
1201 Elm Street, Suite 2000
Dallas, TX 75270
(214) 746-6677

GSA 1990 ANNUAL MEETING

Dallas, Texas October 29–November 1

DALLAS

ABSTRACT FORMS & INFORMATION: (303) 447-2020 or 1-800-472-1988

GSA Goes Kiwi

New Zealand: North and South Islands



Dates: March 3 to March 23, 1991; 21 days

Itinerary: Our trip starts on March 3 in Auckland, from which we will travel south, through Rotorua toward Wellington. The primary geological focus will be volcanological and geothermal features, including the Wairakei geothermal area, Lake Taupo, and the mighty volcanic trio of Mounts Tongariro, Ngauruhoe, and Ruapehu. The insight of interpretive specialists will help us to explore the unique cultural and biological story of New Zealand.

We will cross to South Island to visit the spectacular Banks Peninsula volcanics, Fiordland National Park, Milford Sound, Fox Glacier, Te Anau, Mount Cook, and the "Scottish" city of Dunedin. In addition to glacial areas, the trip focuses on metamorphic facies, gold mineralization, alpine faulting, and the features of the mountain high country. This fascinating trip will end in Christchurch on March 8 for the return trip home.

Leader: Douglas S. Coombs, University of Otago, Dunedin, South Island, will coordinate the scientific leaders. He is a GSA Honorary Fellow and was elected Foreign and Commonwealth Member of the Geological Society of London "in recognition of . . . outstanding contributions in the fields of mineralogy, and igneous and metamorphic petrology." He has led an impressive number of field trips in New Zealand, and has been known to play a mean game of cricket.

Lodging: A range of accommodations, including hotels, inns, bed and breakfast establishments, and occasionally field stations.

Transportation: Bus and van; ferry between North and South Islands.

Land cost: \$2525 for 21 days; \$125 special discount for GSA members. There is also an advance registration discount. Airfare to and from New Zealand is additional.

Included: Island transportation by bus, van, and ferry; lodging (double occupancy); most meals (except those enjoyed during free time); entrance fees and applicable taxes; transfers and tours; luggage handling; and educational materials. There will be a small additional charge for those wanting single accommodations. If they wish, solo travelers may be paired to share accommodations.

Not included: Airfare to and from New Zealand; meals during free time; optional activities such as overflights of glaciers or to White Island, raft trips, or visits to sheep farms (to name a few of the possibilities); personal items such as laundry, liquor, gifts, excess baggage fees, or other items not specifically listed in the final brochure; side trips to places such as Tahiti, Samoa, or Australia.

Limit: 36 persons plus leaders. The trip will fill quickly, so register as soon as you can. Your \$200 deposit will be refunded through November 14, 1990 (less \$25), so you can secure a place on the trip early with almost no risk.

Registration: Registration is open to everyone, but GSA members will be given preference during the advance registration period up to June 30, 1990. Registrants should be in good health. Although there will be no mountaineering or first ascents, this trip will include moderate activity, especially because tramping (hiking) is a national pastime in New Zealand.

Airfares: The current 1990 roundtrip airfare on United Airlines from Los Angeles is \$1101 (plus tax). Air reservations are *not* included in the GSA trip price. We are making arrangements for a group fare, and we will keep Kiwi-trippers posted. A GSA travel agent will be designated to help with questions and concerns about travel to New Zealand and to other areas of the South Pacific.

If you would like to discuss the trip, call Sue Beggs, GSA Meetings Manager, or Delores Jones, Registration Coordinator.



New Zealand: 1991

Note: This trip has already filled!

If you wish to be put on the waiting list, call Sue Beggs, GSA Meetings Manager, (303) 447-2020 or write to GSA Meetings Dept. P.O. Box 9140, Boulder, CO 80301

1989 GSA Short Course Notes For Sale

A limited supply of short course notes is available from some of the courses presented at the St. Louis Annual Meeting. For information, please call:

Edna A. Collis
Meetings Department
1-800-472-1988.

FOUNDATION NEWS

by Robert L. Fuchs

Small Funds Get Larger (in more than one way)

During 1989 and early 1990 there has been steady (in some cases spectacular) growth in several of the Foundation's special-purpose funds, as indicated in the following table.

Fund	January 1989	January 1990	Increase
A. V. Cox Student Research	\$ 4,794	\$ 6,514	36%
J. T. Dillon Alaska Research	\$ 8,244	\$13,409	63%
A. Lierman Medlin Award	\$17,838	\$23,912	34%
Minority	\$ 5,553	\$ 9,381	69%
Women in Science	\$ 104	\$ 1,032	892%

These increases are net of distributions for grants and scholarships during the year; if that money were added back in, the performance would have been even better!

Several of GSA's larger designated funds also showed very significant growth during the year. Fred and Mavis Donath made an additional gift to the Young Scientist Award Fund which they initiated with a gift of \$100,000 in 1988. In January 1990 the balance stood at \$217,000, a 117% increase. The Gladys W. Cole Memorial Research Award Fund received a bequest of \$40,000 from the W. Storrs Cole estate, increasing that fund 58%, to \$117,000.

While the size of these funds may appear small in comparison to massive federal and industry grants or large university endowments, their importance to individual scientists and specific sectors of the science is not insignificant. In fact, the amount of leverage that can occur from effective use by the recipient of the income from these funds is startling at times.

Richard A. Young, a professor with the Department of Geological Sciences, SUNY, College at Geneseo, New York, received the 1988 Gladys W. Cole Award of \$3,000 for geomorphic work in the Colorado Plateau/Grand Canyon area. Among the general accomplishments were six weeks in the field; support of a field assistant, a SUNY undergrad; a 239-page guidebook (co-

editor); participation in two IGC symposia; invitations to present three graduate seminars; and new scientific contacts leading to NSF and Penrose Conference proposals.

Richard Young also listed seven specific accomplishments ranging from locating a previously undescribed series of Tertiary outcrops to the siting of two water wells for the Havasupai Indians. In expressing his appreciation for the award, he stated, "... a relatively modest amount of funding can have a significant impact on research or problems of interest to a variety of individuals or organizations. It has become obvious that such modest funding for field projects is becoming . . . difficult to obtain. Yet I believe it can often be more important than some of the large amounts of money that seem to vanish into overhead, fringe benefits, supplies, and miscellaneous expenses associated with a research project. The fallout and professional interactions generated by such relatively small projects can be considerable, especially if individuals are willing to find ways of cooperating with colleagues and making the most of related opportunities."

The ripple effect of a small amount of research money, carefully spent, is far reaching. Whether the source of the money is a special-purpose, named fund or GSA's unrestricted endowment, a modest award in the hands of a dedicated geologist can generate results well beyond normal expectations. Scientific leverage is giving us more bang for the buck.

Donors to the Foundation, January 1990

DNAG

Texaco Services, Inc.

Century Challenge

William A. Bassett
Raymond Burke
Margaret J. Guccione
Frank R. Luther
Richard C. Nolen-Hoeksema

Bernard Wallace Pipkin
Donald B. Potter
Richard Rezak
Jeff L. Ward

GEOSTAR FUNDS

Antoinette Lierman Medlin Scholarship
Penn Virginia Corporation

Allan V. Cox Student Research Award

James N. Gundersen John P. Lockwood

GEOSTAR

Bari S. Brown
John Huner, Jr.*
Richard F. Madole

John L. Rosenfeld*
David A. Stephenson*
Anthony K. Yeo

Minority

Frederic H. Wilson

Research

John T. Andrews
Sterling S. Cook
John Thad Dubernas, Jr.
Kenneth D. Ehman*

Donald G. Hadley
Stephen F. Lintner
Paul C. Manega

(continued on p. 113)

GSA Foundation
3300 Penrose Place, P.O. Box 9140
Boulder, CO 80301
(303) 447-2020

GEO STAR
Supporting The Advancement of Research

_____ Please send me information about establishing a named, designated fund.

_____ Enclosed please find my contribution to the GSA Foundation.

Please print:

Name _____

Address _____

City/State/ZIP _____

Phone _____

*Second Century Club (gifts of \$100 or more)

1990 GSA Committees and Representatives

Committees are the key to GSA's accomplishments in promoting the science of geology. Committee members and representatives contribute their expertise and experience to all areas of GSA endeavor. Listed here are those currently serving the Society and the science as committee members and as GSA representatives to other scientific groups.

Executive Committee

Raymond A. Price—President and Chairman; Doris M. Curtis—Vice-President; Randolph W. Bromery—Past President; Robert L. Fuchs—Treasurer; Priscilla C. Grew—Council Member-at-Large

Audit Committee

Priscilla C. Grew—Chairman, 1988-1990; Eldridge M. Moores, 1989-1991; William L. Fisher, 1990-1992; Ex Officio: Robert L. Fuchs

Committee on Committees

Haydn H. Murray—Chairman; Kevin Burke; Richard A. Davis, Jr.; James D. Lowell; Anthony J. Naldrett; Leigh H. Royden

Committee on the Arthur L. Day Medal Award

Priscilla C. Grew—Chairman, 1990; Russell S. Harmon, 1988-1990; Samuel M. Savin, 1988-1990; Bruce D. Marsh, 1989-1991; Denis M. Shaw, 1989-1991; Don L. Anderson, 1990-1992; Donald L. Turcotte, 1990-1992

Committee on Education

David A. Stephenson—Chairman, 1989-1991; John R. Carpenter, 1989-1990; Betty Wade Jones, 1989-1990; Sharon Stroud, 1989-1991; Ross Iverson, 1989-1991; Shirley M. Brown, 1990-1992; E-an Zen, 1990-1992; Section Representatives: Dorothy L. Stout (Cordilleran); Monte D. Wilson (Rocky Mountain); John S. Klasner (North-Central); George R. Clark II (South-Central); Arthur M. Hussey II (Northeastern); Stephen H. Stow (Southeastern); A. R. (Pete) Palmer, Conferee, GSA Coordinator of Education Programs; Doris M. Curtis, Ex Officio, Vice-President

Donors to the Foundation (continued from p. 112)

Research (continued)

Burdette A. Ogle
Lisa M. Pratt
Leon T. Silver*

David P. Stewart
Brian P. Wernicke
William E. Wertz

Unrestricted

Ygnacio Bonillas
David S. Bowling
Dennis A. Clark, Jr.
H. Grady Collier, Jr.
Lindreth Cordell
Bruce Ehleringer
Nicholas B. Harris
E. Dean Laudeman
Harley C. Lee
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Camille I. Mancuso
Elizabeth Johnston Oliver
Thomas L. Patton
Lee R. Russell
Nathaniel McLean Sage, Jr.
R. Shagam
Julian Soren
Lee J. Suttner
Matt S. Walton
James A. Woodhead

Women in Science

Valerie-Ann K. Eagen

Holly L.O. Huyck

Committee on Geology & Public Policy

Steven Schamel—Chairman, 1989-1991; Bruce B. Hanshaw, 1990; Marcus E. Milling, 1988-1990; Clement F. Shearer, 1988-1990; Patricia A. Jacobberger, 1989-1991; Thomas E. O'Connor, 1989-1991; William L. Fisher, 1990-1992; Philip Oxley, 1990-1992; Brian E. Tucker, 1990-1992; Past Congressional Science Fellows: Jennifer Hess, 1989-1990; James E. Evans, 1989-1991; Ex Officio: Elizabeth M. Robinson, 1990-1992

Committee on Honorary Fellows

Robert S. Yeats—Chairman, 1988-1990; Samuel S. Adams, 1988-1990; Clifford A. Hopson, 1989-1991; Nicholas Rast, 1989-1991; Carl Kisslinger, 1990-1992; Anthony J. Naldrett, 1990-1992

Committee on Investments

Anthony Reso—Chairman, 1990-1992; Robert E. Folinsbee, 1989-1991; William B. Heroy, Jr., 1989-1991; Brian J. Skinner, 1989-1991; Carel Otte, 1990-1992; Ex Officio: Robert L. Fuchs, Treasurer

Committee on Long-Range Planning

Raymond A. Price—President and Chairman; Doris M. Curtis—Vice-President; Randolph W. Bromery—Past President; Samuel S. Adams, 1990-1991; Don L. Anderson, 1990-1991; R. Allan Freeze, 1990-1992; James W.H. Monger, 1990-1992

Committee on Membership

Marie E. Morisawa—Chairman, 1989-1991; James O. Jones, 1988-1990; Robert M. West, 1988-1990; Henri Gaudette, 1989-1991; Fred J. Menzer, 1990-1992; Juergen Reinhardt, 1990-1992

Committee on Nominations

James F. Hays—Chairman; Richard J. Bottjer; Robert J. Fulton; Fernando Ortega-Gutierrez; Thomas L. Holzer; Leigh H. Royden

Committee on Penrose Conferences

Sigmund Snelson—Chairman, 1989-1990; Eric J. Barron, 1989-1991; John E. Repetski, 1989-1991; Arthur W. Snoko, 1990-1992; Henry Spall, 1990-1992

Committee on the Penrose Medal Award

Elaine R. Padovani—Chairman, 1990; Kevin Burke, 1988-1990; Thomas Dunne, 1988-1990; Scott B. Smithson, 1988-1990; George H. Brimhall, 1990-1991; Amos Salvador, 1989-1991; Brian J. Skinner, 1989-1991; John O. Wheeler, 1990-1992

Program Committee

Robert F. Dymek—Chairman and 1989 JTPC Chairman; Richard M. Mitterer—1990 JTPC Chairman; Richard W. Berry—1991 JTPC Chairman; Nicholas Rast—1992 JTPC Chairman (term begins at summer 1990 JTPC meeting); Councilor-members: Priscilla C. Grew, 1989-1990; James F. Tull, 1989-1991; Eldridge M. Moores, 1990-1991; Ex Officio: F. Michael Wahl, GSA Executive Director; Sue S. Beggs, GSA Meetings Manager; A. R. (Pete) Palmer, GSA Coordinator for Education Programs

*Second Century Club (gifts of \$100 or more)

(continued on p. 114)

GSA Committees and Representatives

(continued from p. 113)

Committee on Publications

Donald C. Haney—Chairman, 1988–1990; Arden L. Albee, 1990–1992; Joanne Bourgeois, 1990–1992; Robert M. Easton, 1990–1992; John E. Costa, Editor, *Bulletin*; Arthur G. Sylvester, Editor, *Bulletin*; Raymond E. Arvidson, Editor, *Geology*; Henry T. Mullins, Editor, *Geology*; Richard A. Hoppin, Editor, *Memoirs and Special Papers*; David Schleicher, Editor, *Maps and Charts*; Conferee: F. Michael Wahl, GSA Executive Director

Committee on Research Grants

Richard H. Groshong, Jr.—Chairman, 1988–1990; John A. Breyer (acting for Howard W. Day, who is unable to attend the 1990 committee meeting), 1990; Edwin H. Brown (acting for Patricia Jacobberger, who is unable to attend the 1990 committee meeting), 1990; Mitchell W. Lyle, 1988–1990; Patricia H. Cashman, 1989–1991; Patricia A. Jacobberger, 1989–1991; Richard A. Davis, Jr., 1990–1992; Howard W. Day, 1990–1992; NSF Conferee: Thomas O. Wright

Committee on Short Courses

Doris M. Curtis—Chairman, 1988–1990; Robert J. Weimer, 1990–1991; Kevin Burke, 1990–1992; James M. Coleman, 1990–1992

Treatise on Invertebrate Paleontology Advisory Committee

Charles W. Pitrat—Chairman, 1987–1990; Richard Arnold Davis, 1989–1992; F. Michael Wahl, Continuing

Committee on the Young Scientist Award (Donath Medal)

M. Gordon Wolman—Chairman, 1989–1990; Robert S. Yeats, 1989–1990; W. Gary Ernst, 1989–1991; Wallace S. Broecker, 1990–1991; Donald J. DePaolo, 1990–1992; James W.H. Monger, 1990–1992

Ad Hoc Committee on Minorities in the Geosciences

A. Wesley Ward, Jr.—Chairman, 1990–1992; Charles A. Baskerville; Louis A. Fernandez; David A. Lopez; Elisabeth C. Schwarzman; Ravindra P. Sinha

GSA Member of the AGI Member Society Council

Doris M. Curtis, GSA Vice-President, 1990

GSA Representative to the AGI Education Advisory Committee

Albert W. Bally (October 28, 1987–1990)

GSA Representatives to American Association for the Advancement of Science (AAAS)

Section E—Geology & Geography

J. Thomas Dutro, Jr. (February 16, 1988–February 15, 1991)

Section W—Atmospheric & Hydrospheric Sciences

John G. Weihaupt (July 1988–February 15, 1991)

GSA Delegate to Circum-Pacific Council

Robert L. Fuchs (May 2, 1984—)

GSA Representatives to North American Commission on Stratigraphic Nomenclature (NACSN)

Donald E. Hattin, 1987–1990; Donald L. Baars, 1988–1991; Paul R. Seaber, 1989–1992; Peter R. Vail, 1990–1993 (representative-elect; term begins during NACSN meeting in Dallas)

GSA Designees to Joint ASCE-GSA-AEG Committee on Engineering Geology (American Society of Civil Engineers)

Lokesh Chaturvedi, July 1, 1984–June 30, 1990; Robert T. Pack, July 1, 1985–June 30, 1991

GSA Representative to U.S. National Committee on Tunneling Technology

Richard E. Gray, July 1, 1989–June 30, 1992

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MEETINGS

(Asterisk indicates new or changed information)

1990

Symposium on Geology and Ore Deposits of the Great Basin, April 1-5, 1990, Reno, Nevada. Information: Geological Society of Nevada, P.O. Box 12021, Reno, Nevada 89510.

Engineering Geology and Geotechnical Engineering 26th Symposium, April 4-6, 1990, Pocatello, Idaho. Information: Lee Robinson, Engineering Geology Symposium, Box 8371, Idaho State University, Pocatello, ID 83209; (208) 236-3273.

GSA Southeastern Section, April 5-6, Tuscaloosa, Alabama. Information: William A. Thomas or C. Michael Leshner, SE-GSA, Dept. of Geology, University of Alabama, Tuscaloosa, AL 35487.

Ninth Symposium on Coastal Sedimentology, April 5-6, 1990, Tuscaloosa, Alabama. Information: Richard Hummell, Energy and Coastal Geology Division, P.O. Box 0, Tuscaloosa, AL 35486.

International Conference on High-Level Radioactive Waste Management, April 8-12, 1990, Las Vegas, Nevada. Information: American Society of Civil Engineers, 345 East 47th St., New York, NY 10017; (212) 705-7543; fax 212-421-1826; telex 422847 ASCE UI.

8th Petroleum Congress of Turkey, April 16-20, 1990, Ankara, Turkey. Information: Aytac Eren, Mudafaa Cad. 22, 06420 Bakanliklar, Ankara, Turkey; phone 90-4-117-91-60/288-285; telex 42-426 TPAO-TR.

Conference on Subsurface Contamination by Immiscible Fluids, April 18-20, 1990, Calgary, Alberta. Information: K. Udo Weyer, Weyer Corp., Inc., 4827 Vienna Dr. N.W., Calgary, Alberta T3A 0W7, Canada; (403) 286-3777; fax 403-247-6074.

International Conference on Mechanics of Jointed and Faulted Rock, April 18-20, 1990, Vienna University of Technology, Vienna, Austria. Information: H. P. Rossmann, Wiedner, Jaupstrasse 8-10/325, A-1040 Wien, Austria; phone 0222-588-01.

Orogenesis in Action: Tectonics and Processes in the West Equatorial Pacific Margin, April 18-20, 1990, London, England. Information: Robert Hall, Department of Geological Sciences, University College, Gower St., London, WC1E 6BT, England.

9th Annual Princeton-Conoco Symposium in Geoscience: Computation and Data Analysis in the Earth Sciences, April 20-21, 1990, Princeton, New Jersey. Information: Tracey McGrath, Dept. Geological and Geophysical Sciences, Guyot Hall, Princeton, NJ 08544; (609) 258-4128; internet e-mail tracey@weasel.princeton.edu.

European Geophysical Society XV General Assembly, April 23-27, 1990, Copenhagen, Denmark. Information: EGS Office, Postfach 49, D-3411 Katlenburg-Lindau, Federal Republic of Germany; phone 49-5556-1140; fax 49-5556-4709; telex 965564 zil d.

GSA North-Central Section, April 26-27, 1990, Macomb, Illinois. Information: John Klasner, Dept. of Geology, Western Illinois University, Macomb, IL 61455.

V. M. Goldschmidt Conference (international conference for the advancement of geochemistry), May 2-4, 1990, Baltimore, Maryland. Information: Donna Ricketts, 409 Keller Conference Center, Pennsylvania State University, University Park, PA 16802.

Pacific Rim Congress, May 6-12, 1990, Gold Coast, Queensland, Australia. Information: AusIMM PACRIM 90, P.O. Box 731, Toowong, Queensland 4066, Australia; 61-7-371-7900.

SIAM Conference on Applications of Dynamical Systems, May 7-10, 1990, Orlando, Florida. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999.

West Texas Geological Society and Permian Basin Section of SEPM Field Seminar to the Marathon Area, Brewster County, Texas, May 10-12, 1990. Information: WTGS/PBS-SEPM, P.O. Box 1595, Midland, TX 79702; (915) 683-1573.

Midwest Friends of the Pleistocene Field Trip, May 11-13, 1990, Council Bluffs, Iowa. Information: Art Bettis, Iowa Dept. of Natural Resources-Geological Survey Bureau, 123 N. Capitol St., Iowa City, IA 52242; (319) 335-1578.

13th Annual Spring Systematics Symposium: Evolutionary Ethics, May 12, 1990, Chicago, Illinois. Information: Symposium Coordinator, Dept. of Geology, Field Museum of Natural History, Roosevelt Rd. at Lakeshore Dr., Chicago, IL 60605-2496; (312) 922-9410, ext. 298.

***Fourth National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring and Geophysical Methods**, May 14-17, 1990, Las Vegas, Nevada. Information: Outdoor Action/National Water Well Association, P.O. Box 182039, Dept. 017, Columbus, OH 43218, (614) 761-1711.

Andean Geodynamics Symposium, May 15-17, 1990, Grenoble, France. Information: R. A. Oliver, Inst. Laue-Langevin, 156X, Centre de Tri, 38042 Grenoble Cedex, France.

Geological Association of Canada-Mineralogical Association of Canada Joint Annual Meeting, May 16-18, 1990, Vancouver, British Columbia. Information: R. I. Thompson, c/o GAC-MAC '90 Secretariat, 801-750 Jervis St., Vancouver, B.C. V6E 2A9, Canada; (604) 681-5226; fax 604-681-2503; telex 04-352848 VCR.

GSA Rocky Mountain Section, May 21-23, 1990, Jackson, Wyoming. Information: Ronald W. Marrs, Dept. of Geology & Geophysics, University of Wyoming, Laramie, WY 82071; (307) 766-3386.

Geological Association of Canada Nuna-SEG Field Research Conference on Greenstone Gold and Crustal Evolution, May 24-27, 1990, Val d'Or, Quebec. Information: Francois Robert, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario K1A 0E8, Canada; fax 613-996-9990.

***American Geophysical Union-Mineralogical Society of America Spring Meeting**, May 29-June 1, 1990, Baltimore, Maryland. Information: 1990 Spring Meeting, American Geophysical Union, 2000 Florida Ave. N.W., Washington, DC 20009; (202) 462-6900; fax 202-328-0566.

Symposium on Naturally Occurring Radionuclides in Agricultural Products, May 29-June 1, 1990, Orlando, Florida. Information: IFAS Office of Conferences, University of Florida, 551 IFAS, Gainesville, FL 32611; (904) 392-5930.

American Association of Petroleum Geologists Annual Convention, June 3-6, 1990, San Francisco, California. Information: Jim Baroffio, Chevron Canada Resources Ltd., 500 5th Ave., SW, Calgary, Alberta T2P 0L7, Canada.

(continued on p. 116)

MEETINGS (continued from p. 115)

1st Joint Meeting of the Canadian Quaternary Association and American Quaternary Association, June 4-6, 1990, Waterloo, Ontario, Canada. Information: Alan V. Morgan, Quaternary Sciences Institute, Dept. of Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada.

5th Symposium on the Geology of the Bahamas, June 15-19, 1990. Information: R. J. Bain, Dept. of Geology, University of Akron, Akron, OH 44325-4101; (216) 375-7659.

USA/USSR Joint Conference on Global Environmental Hydrology and Hydrogeology, June 18-21, 1990, Leningrad, USSR. Information: Helen Klose, American Institute of Hydrology, 3416 University Ave., S.E., Minneapolis, MN 55414; (612) 379-1030.

***International Symposium on Mapping and Geographic Information Systems**, June 21-22, 1990, San Francisco, California. Information: Ivan Johnson, A. Ivan Johnson, Inc., 7474 Upham Ct., Arvada, CO 80003; (303) 425-5610.

***National Environmental Health Association Education Conference**, June 23-28, 1990, Charlotte, North Carolina. Information: NEHA, 720 S. Colorado Blvd., South Tower, #970, Denver, CO 80222; (303) 756-9090.

4th International Conference on Geoscience Information (GeoInfo IV), June 24-29, 1990, Ottawa, Ontario. Information: David Reade, Conference Secretary-Treasurer, GEOSCAN Centre, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario K1A 0E8, Canada; (613) 992-9550; fax 613-996-9990; telex 0533117 EMAR-OTT.

9th International Conference on Basement Tectonics, July 2-6, 1990, Canberra, Australia. Information: IBT9 ACTS, GPO Box 2200, Canberra, A.C.T. 2601, Australia; phone 062-49-8015; fax 062-573256.

1990 Watershed Management Symposium, July 9-11, 1990, Durango, Colorado. Information: Robert Riggins, USACERL, P.O. Box 4005, Champaign, IL 61824-4005.

International Association on the Genesis of Ore Deposits 8th Symposium, August 12-18, 1990, Ottawa, Ontario. Information: L. M. Cumming, 8th IAGOD Symposium, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario K1A 0E8, Canada.

Wyoming Geological Association 41st Annual Field Conference, August 17-23, 1990, Casper, Sheridan, Cody, Jackson, and Riverton, Wyoming. Information: Kent A. Sundell, P.O. Box 1543, Casper, WY 82602; (307) 266-4760.

Cretaceous Resources, Events and Rhythms, SEPM Research Conference, August 20-24, 1990, Denver, Colorado. Information: Michael A. Arthur, Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882-1197; fax 401-792-6160.

***International Symposium on Geothermal Energy**, August 20-24, 1990, Kailua-Kona, Hawaii. Information: Geothermal Resources Council, P.O. Box 1350, Davis, CA 95617-1350; (916) 758-2360; fax 916-758-2839.

***Western Pacific Geophysics Meeting**, August 21-25, 1990, Kanazawa, Japan. Information: Western Pacific Geophysics Meeting, American Geophysical Union, 2000 Florida Ave N.W., Washington, DC 20009; (202) 462-6900; fax 202-328-0566.

International Sedimentological Congress, August 26-31, 1990, Nottingham, England. Information: C. P. Summerhayes, Institute of

Oceanographic Sciences Deacon Lab., Brook Rd., Wormley, Godalming, Surrey GU8 5UB, England.

International Conference on Water Resources in Mountainous Regions, August 27-September 1, 1990, Lausanne, Switzerland. Information: Aurèle Parriaux, Laboratory of Geology EPFL, 1015 Lausanne, Switzerland; phone 021-47-23-55; telex 454478 EPFV CH.

AEG General Meeting and 14th International Geochemical Exploration Symposium, August 29-31, 1990, Prague, Czechoslovakia. Information: Frantisek Mrna, Geological Survey of Prague, 118 21 Praha 1, Malostranske nam. 19, Czechoslovakia.

Conference on Evolution of Upwelling Systems since the Early Miocene, September 3-4, 1990, London, England. Information: C. P. Summerhayes, IOS Deacon Lab., Wormley, Godalming, Surrey GU8 5UB, England; 042-879-4141; fax 042-879-3066.

Geological Association of Canada Nuna Research Conference, Late Proterozoic Rifting, Glaciation and Eustasy, as Illustrated by the Windermere Supergroup, September 8-14, 1990, Windermere and Valemount, British Columbia. Information: J. D. Aitken, Geological Survey of Canada, 3303 33rd St. NW, Calgary, Alberta T2L 2A7, Canada.

***Society for Organic Petrology Annual Meeting**, September 9-14, 1990, Calgary, Alberta, Canada. Information: Wolfgang Kalkreuth, Institute of Petroleum and Sedimentary Geology, 3303-33 St., N.W., Calgary, Alberta T2L 2A7, Canada; (403) 292-7119; fax 403-292-5377.

GOLDTech 4, September 10-12, 1990, Reno, Nevada. Information: Meetings Department, Society for Mining, Metallurgy, and Exploration, P.O. Box 625002, Littleton, CO 80162-5002; (303) 973-9550; fax 303-973-3845; telex 881988.

AAPG-SEPM-EMD Rocky Mountain Section Meeting, September 16-19, 1990, Denver, Colorado. Information: Matt Silverman, Gustavson Associates, Inc., 5757 Central Ave., Suite D, Boulder, CO 80301.

3rd International Archaeological Symposium, September 17-21, 1990, Perth, Western Australia. Information: Susan E. Ho, P.O. Box 435, Nedlands, Western Australia 6009, Australia.

7th International Conference on Geochronology, Cosmochronology and Isotope Geology, September 24-29, 1990, Canberra, Australia. Information: Organizing Committee, ICOG 7, Research School of Earth Sciences, Australian National University, G.P.O. Box 4, Canberra, A.C.T. 2601, Australia; phone 062-49-3406; fax 61-62-490 738; telex 62693.

European Geological Societies, September 29-October 7, 1990, Lisbon, Portugal. Information: MEGS 6, Sociedade Geológica de Portugal, Apto. 2361, P1109 Lisboa Codex, Portugal.

Association of Engineering Geologists 33rd Annual Meeting, October 1-5, 1990, Pittsburgh, Pennsylvania. Information: 33rd AEG Meeting, MEMS, One Northgate Sq., Suite 211, P.O. Box 270, Greensburg, PA 15601; (412) 836-6813; fax 412-836-6817.

International Earth Sciences Congress on Aegean Regions, October 1-7, 1990, Izmir, Turkey. Information: IESCA-1990, D.E. University Dept. of Geology, P.K.74 (E.U.-PTT) Bornova, Izmir, Turkey; phone 51-182919 or 180680 or 181088; telex 52407 dbte tr; fax 51-220978.

***Soils and Landscape Evolution, Binghamton Symposium in Geomorphology**, October 6-7, 1990, Binghamton, New York.

(continued on p. 118)

CALL FOR APPLICATIONS & NOMINATIONS

FOR **GEOLOGY** CO-EDITOR

GSA solicits applications and nominations for the position of co-editor of **Geology**, to serve with current Editor H. T. Mullins for a three-year term, beginning in December 1990, as one of a two-editor team. Desirable characteristics for the successful candidate include:

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THE GEOLOGICAL SOCIETY OF AMERICA

MEETINGS (continued from p. 116)

Information: Peter L.K. Knuepfer, Dept. of Geological Sciences, SUNY, Binghamton, NY 13901; (607) 777-2389; Leslie D. McFadden, Dept. of Geology, University of New Mexico, Albuquerque, NM 87131; (505) 277-2307. (Abstracts deadline: August 1, 1990.)

Clay Minerals Society 27th Annual Meeting, October 6-11, 1990, Columbia, Missouri. Information: W. D. Johns, Dept. of Geology, University of Missouri, Columbia, MO 65211; (314) 882-3785.

Federation of Analytical Chemistry and Spectroscopy Societies 17th Annual Meeting, October 7-12, 1990, Cleveland, Ohio. Information: Charles J. Belle, Lucas Aerospace, PEC, 4259 W. 192 St., Fairview Park, OH 44126.

5th Australasian Remote Sensing Conference, October 8-12, 1990, Perth, Western Australia. Information: Golden West Conventions, P.O. Box 411, West Perth, W.A. 6005, Australia; phone 619-3227922; telex AA 95380; fax 619-4814029.

American Institute of Professional Geologists Annual Meeting, October 9-12, 1990, Long Beach, California. Information: Stephen M. Testa, 6695 E. Pacific Coast Highway, Long Beach, CA 90803; (213) 430-6500.

Geodynamics of the Arabian Plate, October 20-25, 1990, Kuwait. Information: Waris E.K. Warsi, Dept. of Geology, University of Kuwait, P.O. Box 5969, Safat 13060, Kuwait; or Muawia Barazangi, INSTOC, Snee Hall, Cornell University, Ithaca, NY 14853-1504. (Abstracts deadline: April 1, 1990.)

Geological Society of America Annual Meeting, October 29-November 1, 1990, Dallas, Texas. Information: GSA, Meetings Department, P.O. Box 9140, Boulder, CO 80301; (303) 447-2020. (Abstracts deadline: July 11, 1990.)

Supercomputing '90, November 12-16, 1990, New York, New York. Information: Joanne L. Martin, IBM T. J. Watson Research Center, P.O. Box 218, Rte. 134, Yorktown Heights, NY 10598; (914) 945-3285.

Penrose Conferences 1990

Correlation of Nonmarine Cretaceous Strata, May 9-14, 1990, Breckenridge, Colorado. Information: Niall J. Mateer, Nonmarine Cretaceous Correlations, 1467 N. 17th, Laramie, WY 82070; (307) 721-4946.

Transpressional Tectonics of Convergent Plate Margins, August 25-30, 1990, Bellingham, Washington. Information: Vicki L. Hansen, Dept. of Geological Sciences, Southern Methodist University, Dallas, TX 75275-0395; (214) 692-4179.

Large Lakes and Their Stratigraphic Record, September 9-13, 1990, Lake Tahoe, California. Information: Andrew S. Cohen, Dept. of Geosciences, University of Arizona, Tucson, AZ 85721; (602) 621-4691 (direct), (602) 621-6024 (dept.).

New Methods for Dating of Geomorphic Surfaces, October 12-17, 1990, Mammoth Lakes, California. Information: Fred M. Phillips, Dept. of Geoscience, New Mexico Tech, Socorro, NM 87801; (505) 835-5540 (direct), (505) 835-5634 (dept.).

1991

***International Symposium on Geophysical Hazards in Developing Countries and Their Environmental Impacts**, April 21-27, 1991, Cairo, Egypt. Information: T. S. Murty, Hazards-91, c/o

Institute of Ocean Sciences, P.O. Box 6000, Sidney, B.C. V8L 4B2, Canada; (604) 356-6311; telex 04-97281; fax 604-356-6390; Mohammed I. El-Sabh, Hazards-91, Dept. Océanographie, Université du Québec, 300, Allée des Ursulines, Rimouski, Québec G5L 3A1, Canada; (418) 724-1707; telex 051-31623; fax 418-723-7234.

European Geophysical Society XVI General Assembly, April 22-26, 1991, Wiesbaden, Federal Republic of Germany. Information: EGS Office, Postfach 49, 3411 Katlenburg-Lindau, Federal Republic of Germany; phone 49-5556-1440; fax 49-5556-4709; Telex 965564 zil d.

***International Symposium on Land Subsidence**, May 12-18, 1991, Houston, Texas. Information: Ivan Johnson, A. Ivan Johnson, Inc., 7474 Upham Ct., Arvada, CO 80003; (303) 425-5610.

***SEPM Midyear Meeting—Continental Margins, Tectonics, Eustasy and Climate Change**, August 15-18, 1991, Portland, Oregon. Information: Sam Boggs, Jr., Dept. of Geology, University of Oregon, Eugene, OR 97403; (503) 686-4573.

Third U.S. Conference on Lifeline Earthquake Engineering, August 22-23, 1991, Los Angeles, California. Information: American Society of Civil Engineers, Specialty Conference Dept., 345 East 47th St., New York, NY 10017; (212) 705-7139.

International Symposium on Fossil Cnidaria including Archaeocyatha and Porifera, September 9-14, 1991, Münster, Federal Republic of Germany. Information: Fossil VI. Cnidaria, Pferdegasse 3, D-4400 Münster, Federal Republic of Germany.

American Institute of Professional Geologists Annual Meeting, October 16-19, 1991, Gatlinburg, Tennessee. Information: Lawrence I. Benson, ERC/EDGE, P.O. Box 22879, Knoxville, TN 37933-0879; (615) 966-9761; fax 615-966-4155.

Geological Society of America Annual Meeting, October 21-24, 1991, San Diego, California. Information: GSA, Meetings Department, P.O. Box 9140, Boulder, CO 80301; (303) 447-2020.

Mining Indonesia '91, December 4-7, 1991, Jakarta, Indonesia. Information: Eileen M. Lavine, Information Services, Inc., 4733 Bethesda Ave., #735, Bethesda, MD 20814; (301) 656-2942; fax 301-656-3179.

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