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# GSA NEWS & INFORMATION

Monthly Newsletter of  
The Geological Society of America

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## Schiffries Named GSA Congressional Science Fellow for 1990–1991

Craig M. Schiffries has been selected as the fifth GSA Congressional Science Fellow. He will work as a special legislative assistant on the staff of a committee or member of the U.S. Congress from September 1990 through August 1991.



Schiffries believes that recent scientific and political developments have created an unprecedented need for scientific input in governmental decisions.

His goal as Congressional Science Fellow is, he says, "to communicate to policy makers the views of scientists, and to communicate to scientists the nature of the policy making process." In his role as Congressional Science Fellow, Schiffries will advise members of Congress on the implications of geology and other science-related legislative matters. He plans to focus on several issues, including global change and human stewardship of Earth; the role of natural resources, science, and technology in maintaining a competitive advantage for the United States in the international economy; technology transfer, scientific exchange, and resource development in the emerging democracies of Eastern Europe and the Third World; and improving scientific literacy among nonscientists.

Schiffries received his Ph.D. in geology from Harvard and is currently a Carnegie Fellow at the Geophysical Laboratory of the Carnegie Institution in Washington. He completed his undergraduate work at Yale, where he graduated summa cum laude with a double major in geology and geophysics, and economics and political science. He also earned a master's degree in geology and geophysics at Yale, and then an honors B.A. in philosophy, politics, and economics at Oxford University. He has received numerous fellowships and awards, including: Hertz Foundation Graduate Fellowship, Marshall Scholarship to Oxford University, Yale's Belknap Prize, Burton P. Twichell Memorial Scholarship at Yale,

and Bank of America Scholarship for Science and Mathematics. Schiffries has also done field work in North America, India, South Africa, and the USSR.

### The Fellowship

The GSA Congressional Science Fellowship is intended as a way to obtain first-hand experience in the public policy process and to educate the earth science community about the need for informed involvement; to demonstrate the value of such science-government interaction; and to make practical contributions to the more effective use of scientific and technical knowledge in government. Requirements for the fellowship include exceptional competence in some area of the earth sciences, cognizance of a broad range of matters outside the fellow's particular area, and a strong interest in working on a range of public policy problems.

The fellowship is funded by GSA and the U.S. Geological Survey, which supports 47% of the program with a \$21,000 grant. Guided by the American Association for the Advancement of Science, the program places highly qualified, accomplished scientists with the offices of individual members of Congress and committees for a one-year assignment. Fellows perform in much the same way as regular staff members; they have the opportunity to be involved in varied legislative, oversight, and investigative activities. They offer their special knowledge, skills, and competence for the opportunity to acquire experience and the chance to contribute to the formulation of national policy. The GSA Congressional Fellow reports periodically to the GSA membership and to the USGS during the one-year period.

### Selection Committee

On the selection committee for the fellowship this year were Chairman Steven Schamel, University of South Carolina; William R. Greenwood, USGS; Marcus E. Milling, University of Texas; and Elizabeth R. Robinson, Office of Technology Assessment.

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## Three Little Words

Daniel R. Sarewitz

1989–1990 GSA Congressional Science Fellow

Laws, they say, are like sausages: it's best not to watch while they are being made. During each two-year session of Congress, on the order of 10,000 bills and resolutions are introduced for consideration by the House and Senate. Of this original 10,000—which range from the sublime (H.R. 2593—Baseball Viewers Protection Act of 1989) to the ridiculous (H.J. Res. 166—National Dairy Goat Awareness Week)—perhaps 500 survive the unfathomably complex legislative process and are enacted into law.

As bills progress through the House and Senate, they may be changed so profoundly as to bear little resemblance to their original state. Consider recent action in the House of Representatives on the National Earthquake Hazards Reduction Act of 1977. This modest law, which includes expenditures that amounted to 0.007% of the federal budget in 1990, must go through what is known as a reauthorization process every two or three years. During this process, Congress may decide to authorize new budget levels, or amend the wording of the law to reflect new concerns or priorities. Most of this work is done in the committees that have jurisdiction over the legislation (House Science Committee, House Interior Committee, and Senate Commerce Committee), but ultimately the reauthorization must be voted on by the entire House and Senate, and signed by the President. (I may as well mention that the reauthorization process has nothing at all to do with the amount of federal dollars that really get spent—it merely provides legal authority for a certain maximum level of expenditure. The actual allocation of money is done by the Appropriations committees of the House and Senate—but that's another story.)

The National Earthquake Hazards Reduction Program (NEHRP) was created by Congress in the wake of the 1971 San Fernando earthquake. No major U.S. earthquakes occurred in the next 17 years. Not coincidentally, federal support for NEHRP, which began in 1978, declined by about 35% in the subsequent decade. Despite repeated warnings from a few legislators and a lot of earth scientists that NEHRP was being dangerously compromised, Congress was unwilling to increase expenditures. This attitude began to change when the government was forced to spend \$3.5 billion on disaster relief after the October 1989 Loma Prieta earthquake. Suddenly, the wisdom of earthquake preparedness became self-evident.

Self-evident and politically viable are two separate issues, however. The ongoing budget crisis makes it very difficult to increase spending on any program, even if that program promises a huge return on the initial investment. In the months immediately following Loma Prieta, it seemed that there was little possibility of significantly increasing the authorization level for NEHRP, because the program did not have a broad base of political support outside of California. Ultimately, however, several fiscally conservative Republicans on the Interior Committee came to understand the extent of seismic risk that existed in their own states. In light of this realization, they decided to support substantial increases in NEHRP authorization levels. As a condition of their support for additional funds, new language was added to the reauthorization bill which would make it easier for their states to get federal grants for seismic hazard assessment. On April 4, 1990, the House Interior Committee unanimously approved a NEHRP bill that would triple program authorization levels over a period of four years.

The next step was for the House Science Committee to consider the NEHRP legislation. Although the majority of Congress members on the House Science Committee supported the funding increases approved by the Interior Committee, the ranking Republican, Robert Walker of Pennsylvania, did not, and it seemed likely that he would oppose the bill at the Committee level, and on the floor of the House if necessary. In order to avoid a divisive fight on the increases, a compromise was negotiated between Congressman Walker and Democrat George E. Brown, Jr., of California, which included somewhat smaller spending increases, and a shorter reauthorization period (three years, rather than four) than specified in the Interior Committee bill. On June 13, 1990, the House Science Committee met for what is known as a "markup," to consider the compromise version of the NEHRP reauthorization bill.

On the day before the markup, members of the House Science Committee received a letter from Erich Bloch, the Director of the National Science Foundation (NSF). Included in the letter was the following: "The Foundation must oppose the version of H.R. 3533 [the reauthorization bill]... in its current form, H.R. 3533 would authorize \$12.25 million more than requested [in the Administration's

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proposed budget] for earthquake-related research in FY 1991. In addition, the authorization floors within the bill would adversely impact other high-priority programs within the relevant directorates and would impose unnecessary constraints on the Foundation's support for earthquake-related research."

Mr. Bloch, as director of a federal agency, and a Presidential appointee, was not just presenting his own point of view; he was speaking for the Bush Administration. Although the Science Committee and the entire House were free to pass whatever legislation they liked, the letter was a warning that the Administration would oppose it. The ultimate threat of a Presidential veto could not be ruled out. Furthermore, the compromise within the Science Committee dissolved, because Congressman Walker decided to endorse the Administration's position.

Mr. Bloch's letter appears to say that NSF did not want any additional money for earthquake research. In fact, the dispute was jurisdictional, not fiscal. The root of the problem was three words that appeared in the reauthorization bill: "Of the amounts authorized for Engineering under section 101(d)(1)(B) of the National Science Foundation Authorization Act of 1988, **not less than \$24,000,000** shall be obligated for carrying out this Act for the fiscal year ending September 30, 1991, and... for Geosciences... **not less than \$13,000,000.**" Had those three words—deeply buried in the 22 pages of stupefying legislative prose of H.R. 3533—not been present, then the Administration would not have formally objected to the bill.

The essential point here is that authorizing committees such as the Science Committee usually have little or no control over how much money actually gets allocated. They can authorize a billion dollars for a given program, but unless the money gets appropriated by the Appropriations Committee, nothing gets spent. In the case of NSF's participation in NEHRP, this problem is particularly obscure. The Science Committee authorizes a specific amount of money which they feel NSF should devote to earthquake research. The House Appropriations Committee, however, does not appropriate a specific sum for this purpose; it allocates a lump sum for all NSF research programs, and allows NSF itself, in cooperation with the Administration, to prioritize its own spending for most smaller scale programs. This means that the NEHRP authorization can be treated by NSF as a recommendation, rather than a binding amount. It also means that NSF will never spend more than the authorized sum for NEHRP, but they may spend less. By including the words "not less than" in the NEHRP authorization, however, the Committee was adding an explicit requirement—known as an authorization floor—that would legally bind NSF to a specific minimum expenditure level. This action made NSF—and the Administration—unhappy.

Just in case that wasn't entirely clear, let me present it in the Congress Members' own words, from the transcript of the Committee markup. The context of the discussion is the debate over an amendment, offered by Congressman Walker during the markup, which would remove "not less than" wherever it appeared in association with the NSF authorization figures.

Mr. Hall (Democrat of Texas): "Would you [Mr. Walker] just very briefly discuss for my benefit, and for others here, the differences in the amounts of money you are talking about [if your amendment is adopted]?"

Mr. Walker: "We are talking about no differences in amounts of money."

Mr. Hall: "We are talking about a floor. But what would that relegate and what would that leave left for this bill

that we would not have under this bill as a threat before being made?"

Mr. Walker: "The amounts of money would be exactly the same as the amounts of money now in the bill. I am not changing one dollar. All I am saying is that we would have authorized ceilings in the bill rather than making all this funding which is in the bill a floor.

"I would not change one dollar. I heard a couple of people on my side [i.e., fellow Republicans] indicate that I was trying to cut the spending. I am not cutting one dollar. All I am suggesting is that the figures that are in the bill ought to be as they have been in all other bills that we have passed in NSF, they ought to be the authorized ceiling for the programs rather than representing absolute floors below which no money could be spent."

[Mr. Walker apparently meant that he "would not change one dollar" of the authorization amount. The "amounts of money now in the bill" would indeed remain the same if the three words were removed, but the amounts of money in real life—dollars spent by NSF for NEHRP—would almost certainly decline.]

Mr. Roe [Democrat of New Jersey; Committee Chairman]: "What [NSF] wants to do, for the benefit of the Members as I understand it, [NSF] wants to have the option to determine what [it] wants to expend and allocate to this program. That is exactly what this is about. But [NSF] is coming back and saying it wants the total flexibility to determine what resources will be allocated to this particular program, or for that matter any other program.

"Now I don't know what experience you have had, I don't know what experiences all our Members have had, but there have been times when I have seen this Committee and the Public Works Committee and other committees right along mandating that something be done in desperation from the Congressional point of view, and somebody came back and said 'Too bad. We want the flexibility to determine whether we think that is important enough,' even after Congress has mandated the issue.

"We are saying to the good Administrator [at NSF], 'Hey fellow, we happen to think that where the earthquake issue is involved, we should have that share of funds allocated for that purpose.' The Committee is really directing, in effect, the Administrator."

The question is this: if Congress feels that NSF has not devoted enough funding to earthquake-related research, should it be able to mandate a minimum level of expenditure? The specific argument in favor is that NSF's research budget has more or less kept pace with inflation over the past decade, whereas NSF's expenditures on NEHRP have declined by about 40%. A strong Congressional mandate would make certain that NSF devoted additional resources to the earthquake program.

The argument against such a mandate is that NSF, not Congress, should decide on the appropriate level of expenditures for a given program, because only NSF has the expertise to do so wisely.

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**Three Words** continued from p. 231

Further, if the NEHRP budget increases within NSF, then the budget for other programs must suffer a corresponding decrease (although in this case the decrease would be small, because NEHRP obligations make up only about 2% of NSF's research budget). More to the point, NSF and the Administration (as well as researchers who do not study earthquakes) argue that Congress should not meddle in the specifics of science policy, and they should not "micromanage" the research budget. In other words, the underlying issue is one of power, and who gets to exercise it.

The amendment to remove the three words was easily defeated by a bipartisan majority, and the bill was approved by the Science Committee with the authorization floor intact. Before the

entire House can vote on the NEHRP bill, however, the House Science and Interior committees must compromise between themselves on the final form of the legislation, because each approved its own distinct version. Then, when the bill does come before the House for a final vote, opponents of the authorization floor may try to add an amendment to have the floor removed. Furthermore, the NEHRP authorization bill under consideration by the Senate does not include spending floors for NSF; this difference, and several others, will be ironed out in a House-Senate conference after both bills have passed. Then, if the floors are included in the final bill, the President will have to decide if he finds those three little words so offensive as to merit a veto. And that's how they make sausage in Washington, D.C.

### Meet the GSA Congressional Science Fellow

Dan Sarewitz will be available at an informal lunch-hour session on Wednesday, October 31, during the GSA 1990 Annual Meeting in Dallas. This open forum is sponsored by the GSA Geology and Public Policy Committee. The meeting location will be announced in the Annual Meeting program.

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.

## GSA in Education

by Allison R. (Pete) Palmer

### The SAGE Program Is Now Official!

This May the GSA Council formally committed the Society to a powerful presence in the ongoing process of improving the quality of public understanding of those areas of the geosciences that impact our lives. The Council also approved a long-range plan for GSA's education activities. This includes a full-time staff position, Coordinator for Educational Programs, for which a national search is under way.

The Coordinator for Educational Programs will serve the needs of three standing GSA Committees: The Education Committee, the Committee on Minorities and Women in the Geosciences, and the Committee on Geology and Public Policy. Many of the activities of these committees are included within the SAGE Program (Science Awareness through Geoscience Education) that will be gradually gearing up during the remainder of this year. There will be a SAGE booth across the aisle from the GSA Bookstore, and alongside the NAGT and NESTA booths, at the Annual Meeting. Registration forms for the Partners for Excellence Project, the principal 1990 action project of the SAGE Program, will be available, and members of the Education Committee or the SAGE Steering Committee will be there to discuss this and other planned SAGE activities.

You can support the SAGE Program by contributing to the SAGE Program Fund in the GSA Foundation. We need to build an endowment of \$2 to \$3 million in order to make the kind of quality impact that must be made in both formal and informal education of the public (which includes legislators and the judiciary) about those areas of the geosciences that affect life aboard Spaceship Earth during the next several decades. Think big!

I will continue to hold the education fort until I retire from GSA at the end of the year or the new staff person is identified, whichever comes first.

### Welcome to Chip Groat

Charles G. (Chip) Groat took over as Executive Director of AGI in mid-July. Chip has a strong interest in the educational activities of the profession and participated in our GSA Education Committee meeting in June. A number of important issues of mutual interest were discussed, and we look forward to working with Chip to achieve our common goal of a geologically literate American public.

### More on Creation

I have received several very thoughtful responses to my paragraphs suggesting that there is value in recognizing the distinction between "young Earth" and "old Earth" creationists and merit in establishing constructive dialogue on this very emotional issue. The responses constitute a part of that dialogue. As I reread the column in the light of the responses, I can see where a bit of theology crept into the final paragraph. Because the issues raised by the respondents are more theological than geological, I will respond through correspondence rather than expanding the scope of this column. The responses, however, were greatly appreciated and the dialogue is important.

## The Geological Society of America

# Congressional Science Fellowship 1991-1992



**T**he Geological Society of America invites applications for the 1991-1992 Congressional Science Fellowship. The Fellow selected will spend a year (September 1991-August 1992) in the office of an individual member of Congress or a congressional committee advising on a wide range of scientific issues as they pertain to public questions. Guided by the American Association for the Advancement of Science, the Fellow selects a congressional staff position in which he or she can work on major legislative issues.

### Criteria

The program is aimed at highly qualified earth scientists in early or mid-career. Candidates should have exceptional competence in some area of the earth sciences, cognizance of a broad range of matters outside the Fellow's particular area, and a strong interest in working on a range of public policy problems.

### Award

The GSA Congressional Science Fellowship carries with it a \$35,000 stipend, and limited health insurance, relocation, and travel allowances. The fellowship is funded by GSA and the U.S. Geological Survey which supports 47% of the program with a \$21,000 grant. (Employees of the USGS are ineligible to apply for this fellowship.)

### To Apply

Procedures for application and detailed requirements are available in the geology departments of most colleges and universities in the United States or upon request from:

Executive Director  
Geological Society of America  
P.O. Box 9140  
Boulder, Colorado 80301



**Deadline for receipt of all application materials is February 15, 1991**

# LETTERS

## Proactive

In his Report from Washington "A Pound of Cure: Earthquakes Are Simple, Oil Spills Are Not," [GSA News & Information, April 1990] Daniel Sarewitz, Geological Society of America Congressional Science Fellow, 1989-1990, cites an incident in which a lobbyist has thanked him for "remaining proactive on a certain issue."

To the benefit of the reader, Sarewitz has cited the definition of proactive coming from Webster's 1976 New Collegiate Dictionary as "involving modification of a factor which precedes that which is being modified." As this definition is a bit more than I can comprehend, I decided to seek for myself truth, as revealed in my dictionary, the 1983 Webster's Ninth New Collegiate Dictionary. My dictionary has defined the word as: "Relating to, caused by, or being interference between previous learning and the recall or performance of later learning." On the reading of this I perceived that my comprehension was attenuating. I called the English Department of Emory University and was referred to the Writer's department, staffed by Ph.D. candidates who are on call to help the likes of me with my native tongue. A young woman, a possible Ph.D. candidate, friendly and erudite, heard my question and, with competence, guided me through the rationale necessary to determine the meaning of "proactive."

As best as I can determine, a reactionary is one who opposes change; reaction is resistance to a force, influence or movement, especially a tendency toward a former or usually outmoded political or social order or policy. I think most would agree that a reactionary would be one who wishes to restore the House of Bourbon to France or the National Socialist Party to Germany. A reactionary wants to leave things as they are unless it is possible to turn the clock back to a time when things were even better. A proponent of the status quo is one who wishes and seeks to preserve the existing state of affairs.

I am unable to find a word for one who advocates "change for change's sake." But certainly this is the one who believes that "the grass is greener on the other side of the fence," the one who is the legendary Ulysses and says "come, my friends, 'tis not too late to seek a new world," and the one who has made repeated trips to the "quickie divorce states."

I can understand, by mathematical definition, "modification of a factor which precedes that which is being modified"—at least I think I can. If we have the quantity  $X$  we may factor  $X$  into 2 and  $X/2$ , for  $X = (2)(X/2)$ . If we are to modify  $X$  then we must change the 2 or the  $1/2$ . Then the light dawned. Of course, the understanding was mathematical.

Let  $x = 1$ ,  $y = 1$ .

Then  $x = y$ .

Multiply each side by  $x$  and you have  $x^2 = xy$ .

Subtract  $Y^2$  from each side of the equation and you have

$x^2 - x^2 = xy - y^2$ .

Factor the equation and you have  $(x-y)(x+y) = y(x-y)$ .

Now cancel like factors from each side of the equation and you have  $x+y = y$ .

If we substitute the values of  $x$  and  $y$ , you will see  $1+1 = 1$ .

Finally truth has arrived—now I know the definition of PROACTIVE.

Benjamin S. Persons  
Atlanta, Georgia

## Praise for Sarewitz

Mail service to and from Seoul is extremely slow. Yesterday, I finally received the April GSA newsletter. It was worth the wait. The brief article by Mr. Sarewitz was a gem. I try to keep up on a broad range of commentary/editorial/analyses/opinion type articles. His contained more insight and was better written than any other that I have read in quite some time. My congratulations to him for work well done. And, as well, to whomever had the good sense to select him for the fellowship.

J. T. Schulenberg  
Korea Petroleum Development Corporation  
Seoul, Korea

## Dual Slate for GSA Elections

This year for the first time, GSA will issue ballots that contain two names for each Council position, including Vice-President. This change responds to a recent questionnaire that was distributed to GSA members asking their views on a ballot with only one name per position (plus a line for write-ins) vs. a ballot with multiple names (plus write-in). The Society is to be commended for seeking the views of its members on an issue as important as this and for being responsible to the membership's desire for change. While I am pleased with the position that GSA has taken in initiating change, I must express strong concern as to the eventual ramifications of the dual slate, and I write to support the previous procedure of having a ballot with only one name per position.

My view on this matter comes from having watched the Council election process and participating in it annually since 1980. Until 1986, I served as Secretary-Treasurer for the Southeastern Section of GSA and annually submitted names of potential Councilors from the Section Management Board. From 1987 through 1989, I served on Council and participated in the selection of the candidates whose names would go on the ballots. I must admit that for the first few years I was a strong advocate of the dual slate; after learning more about the desired criteria needed to serve on Council (prior GSA service, varying professional/employment affiliations and disciplinary alignments, geographic considerations, etc.), seeing the culling process that occurred in order to eventually end up with a highly qualified candidate for each position, and realizing that there is not an infinite pool from which candidates can come, I became an advocate of the single-name slate. A primary reason for this position is that, very simply put: the person who loses on a dual slate stands a high likelihood of not allowing his/her name to be used again and the Society loses a highly qualified candidate. While I suspect this is generally true for the four new Council positions elected each year, it is even more true for the Vice-President position.

The single-name election process has served the Society well. Certainly in past years (stretching into the early 1980s), the GSA Council was viewed by many as an "old boys' club," and only those who were in that tight circle were elected; the perception was magnified by the single-name slate distributed each year. During the early 1980s, the membership and activities of the Council opened up and became much more reflective of the Society membership as a whole. Each section was represented at all Council meetings, which became open to the Society membership; section finances were extricated from Headquarters and handled by the sections; the

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views of members were carefully considered as Council reached important decisions (remember the rescision of the abstract fee and microfiche?), and so on. As part of this "revolution," those members who were elected to Council became more reflective of the Society, in general, and many of them came from recommendations arising from the sections. Indeed, three section secretaries, plus women and minorities (certainly not part of any "old boys' club"!) have been elected to Council in the 1980s for the first time. I participated in the process that led to the selection of those names on the single-slate ballot, and you can rest assured that input from the GSA membership on potential Councilors was factored into this decision process.

The single-name ballot may seem like a "wired" election, and, indeed, it is when examined on the surface. However, when one realizes the steps that lead to those names—including the multiple input from members and sections—it becomes evident that there has been a constructive selection process and that, in general, a highly qualified and representative candidate has been selected for each position. Behind the closed doors where these decisions are made, there are, of course, "winners and losers," but those whose names do not go on a ballot one year often end up on a subsequent ballot. This all occurs without the candidates' knowledge and without loss of face.

My position is that the single-name ballot, while not a perfect system, is better for GSA than the dual-name ballot and that it serves the membership well. There are at least three supporting reasons: (1) the recent demographics of the Council reflect the Society membership and suggest that the "old boy" days (if they indeed existed) are gone; (2) candidates on the one-name ballot have in reality undergone a thorough review and selection that is responsive to the needs of the Society and the interests of the membership; and (3) there is only a limited number of members that fulfill the multiple criteria for Council, and we can ill afford to lose those who are highly qualified by having them come in second-best in an election.

Time will tell if these concerns are real and we shall have to see what develops over a course of some years unless, of course, the Society—through urging from its members—returns soon to a one-name ballot. If not, perhaps comments such as mine will encourage those who do not get elected one year to allow their names to be placed on a subsequent ballot. Overall, the new system seems to provide GSA with few benefits and the potential for great loss.

Stephen H. Stow  
Oak Ridge, Tennessee

## Books and Journals Needed

Last fall I visited the Institute of Geology of the Estonian Academy of Sciences in Tallinn and also the Latvian University in Riga. At the Faculty of Geography in Riga, the granting of a degree in geology has been renewed after a 40-year interruption, and a geological research division established. I noticed a striking shortage of Western scientific journals and books, because of difficulties in exchanging rubles to foreign currency for payments. A similar situation exists in Vilnius, Lithuania, and at other Baltic scientific institutions.

If anybody is willing to donate sets of geology or geography journals, or scientific books, published during the last 10–12 years for the scientific institutions in Estonia, Latvia, and Lithuania, please let me know by listing the journals/books that you are considering donating and to which institutions you would like them sent. In the meantime, I will work out logistics where and how the books/journals are to be sent for inclusion in bulk shipment of books to the Baltic countries, and will provide the details to those interested in this cause.

Aleksis Dreimanis  
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London, Ontario, Canada N6A 5B7

## GeoRef Database To Be Available on CD-ROM

The American Geological Institute (AGI) and SilverPlatter Information Inc. have signed an agreement to publish the GeoRef (Geological References) database on CD-ROM. SilverPlatter plans to issue the 1.5-million citation database in August 1990. Subscribers will receive quarterly updates to the database. An annual CD subscription will be \$2600. For current subscribers to the *Bibliography and Index of Geology*, an annual CD subscription costs \$1950. Prices are effective in the United States and Canada. Subscribers outside the United States and Canada should add 10 percent.

The GeoRef database and the *Bibliography and Index of Geology*, its printed counterpart, are comprehensive reference tools. They cover the geology of North America from 1785 and the geology of the rest of the world from 1933. To produce them, geoscience indexers scan more than 3,000 journals in 40 languages as well as books, maps, and reports. U.S. Geological Survey publications and U.S. and Canadian master's theses and doctoral dissertations are also covered.

Many citations include abstracts. This year AGI will add 80,000 citations to GeoRef.

For more information on the GeoRef CD and a lease/license agreement, contact SilverPlatter:

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fax: 44-1-995-5159



## DNAG NEWS

by Allison R. (Pete) Palmer

### DNAG Progress

Four years ago, when the authors promised to have their DNAG contributions done by 1989, I anticipated that the DNAG Project would be about wrapped up by now, and I committed to participate in the III International Symposium on the Cambrian System in the USSR, and related Cambrian field excursions there and in China, from mid-July to mid-September. At the time of this writing (early summer), we're still not done. The end is in sight, however, as summarized below. Because of my participation in the symposium, my next update will appear in the December column, which will permit a review of any world-class laggards whose commitments remain unfulfilled by early October.

**The Geology of North America:** The last of the plates for the Appalachian/Ouachita volume was printed in mid-June and distributed in July. Bluelines have been checked for both the Arctic Ocean and Surface Water volumes and they should be printed and available by the time you read this. The final paging is just about complete for the volume on the Caribbean Region, which should be printed and available by the GSA meeting. All of the chapters for the *Economic Geology of Mexico* have been translated and the first 43 chapters have been checked by the editor and cleared for copy editing. As soon as we receive editor approval for the final 13 translations this book will be in the final production stages. Two other volumes, *Non-glacial Quaternary* and *Economic Geology of the U.S.*, should have their final chapters through review and revision by the end of the summer. This leaves only four vying for the dubious distinction of being the last to get wrapped up: Precambrian, Gulf of Mexico, Alaska, and the U.S. Cordillera.

**Centennial Special Volumes:** The Archaeological Geology of North America was printed and distributed in mid-June. *The Heritage of Engineering Geology* is all written and the book galleys should be ready for editor review by the end of September. The remaining two volumes, one to accompany the transects and the other to accompany the Neotectonics maps, are also in the race for last place.

**North American Maps:** Final proofs for the Stress map are being prepared, and the color separation work is in progress for the Thermal Aspects map. Compilation of the Geologic Map of North America is about 75% complete.

**Transects:** Proofs for the two sheets that compare transects along the eastern and western margins of North America at a scale of 1:1,000,000 have been checked by Bob Speed. The next-to-last of the set of Pacific Margin transects, across northern Mexico, has also been proofed and checked. Proofs for Transect A-3, along the Alaska pipeline, are being checked by the author. As soon as corrections are made on these sets of proofs, the stacked transects and Transects H-1 and A-3 will be done, completing the Pacific Margin transect set at both the 1:500,000 and 1:1,000,000 scales. All of these transect products should be available before the GSA meeting. One of the U.S. Appalachian transects is also in the proof stage. Four transects across the U.S. Appalachians and two transects across the Gulf of Mexico Basin are still expected.

### DNAG on Compact Disk

Digital data sets for the Gravity and Magnetic Anomaly Maps, and the Seismicity, Stress, and Thermal Anomaly Maps of the DNAG series, along with other companion continent-scale data sets, including topography/bathymetry and satellite imagery, are now available from the National Geophysical Data Center in Boulder, Colorado. They are all on a CD-ROM, *The Geophysics of North America*, that is designed to operate on an IBM PC/AT-compatible machine. Software is also available for users to manipulate the data and make scientific maps on their personal computers; coastlines, political boundaries and lat/long grids are included.

For additional information, or a free demonstration diskette, contact National Geophysical Data Center, NOAA, Mail Code E/GC1, 325 Broadway, Dept. 741, Boulder, CO 80303; or call Alan Hittelman at (303) 497-6591.

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### Memorial Preprints

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

*Harry F. Ferguson*, by James V. Hamel and Richard E. Gray

*Esther Aberdeen Holm*, by Frank C. Whitmore, Jr.

*J. A. Jletzky*, by A. C. Riccardi

*Clayton H. Johnson*, by A. G. Unklesbay

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### In Memoriam

Ira S. Allison  
Gresham, Oregon  
May 1990

Ralph A. Bagnold  
London, England  
1990

Donald L. Biggs  
Ames, Iowa  
February 12, 1990

Henry Lepp  
St. Paul, Minnesota  
May 27, 1990



# GSA Bulletin and Geology contents

## September 1990



The Geological Society of America

# BULLETIN

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# FOUNDATION NEWS

by Robert L. Fuchs

Family and friends of the late Donald L. Biggs, a GSA Fellow and member since 1953, are establishing the Donald L. Biggs Memorial Fund through the GSA Foundation. The purpose of this fund will be to support and enhance the geoscience awareness and education of young people. Annual income from this endowment will be used to finance GSA educational activity through the SAGE program.

Donald Biggs died in February 1990 at the age of 69. Born in Texas, he earned bachelor's and master's degrees at the University of Missouri and a Ph.D. at the University of Illinois. Biggs was an instructor at the University of Missouri from 1952 to 1954 and then worked as an assistant geologist for two years for the Illinois Survey. In 1956 he joined the faculty of Iowa State University, where he remained for 34 years. In addition to his membership in GSA, Biggs was a member of the Geochemical Society. His specialties included mineralogy, coal petrology, sedimentary petrology, and geochemistry.

Donald Biggs was a strong supporter and good friend of GSA. In 1987 he served as editor of the Centennial Field Guide Volume 3, North-Central Section, one of the six very popular DNAG Field Guides.

The founders of the Donald L. Biggs Memorial Fund—his widow Carolyn N. Biggs and Lawrence Wu of the Illinois Survey—pointed out that Biggs spent most of his professional career as a teacher, from instructor to full professor. An educational fund, the income from which will be used to bring young people closer to geology, is a very fitting memorial to a GSA member who spent his life doing exactly that.

The establishment of the Biggs Fund is particularly timely because of GSA's new emphasis on public education and geological awareness. The success of SAGE (Scientific Awareness through Geologic Education) will in large part depend upon the funds that can be provided to support the program, and the Biggs Fund is an important step in beginning the funding process.

Contributions to the Donald L. Biggs Memorial Fund may be sent to the Foundation office using the accompanying coupon. Please call the Foundation at (303) 447-2020 for further information.

## Trustees meet in Dallas

The Foundation's Board of Trustees held a spring meeting at the Dallas-Fort Worth Airport in June. The progress of current fund-

raising activities and the Foundation's financial affairs were the initial topics of discussion. The increasing involvement of GSA members in the Foundation, through individual contributions and the establishment of funds for special purposes, was noted with satisfaction. The Trustees offered several suggestions for improving the fund-raising process.

A discussion of DNAG matters centered upon the ongoing costs of this program and the previous policy of writing off all DNAG expenditures. The Trustees agreed to adopt a change in accounting policy that would capitalize DNAG expenditures to the extent that there is an inventory of books and other materials in GSA's possession. Valuation of this inventory would be in accordance with GSA's conservative valuation policy.

In order to generally improve financial controls and oversight, the Trustees will recommend to GSA's Council the appointment of a Trustee to the GSA Audit Committee. The Trustees also agreed that this Committee would review the audit and financial statements of the Foundation as well as those of GSA. Considerable discussion centered upon the various special funds of the Foundation. The Trustees were pleased to note the significant growth in several of these funds, particularly the Medlin, Dillon, Cole, and Young Scientist (Donath) Funds. The recent establishment of the Environmental Geology Award using income from the John C. Frye Memorial Fund (see Foundation News, *GSA News & Information*, July 1990) prompted several Trustees to pledge additional contributions to that fund.

The Board discussed three future projects of GSA that will require major funding efforts by the Foundation. These are the SAGE program, the Institute for Environmental Education, and the expansion of GSA's Boulder headquarters. The Board is supportive of all of these GSA projects, and the Trustees discussed at great length the financial needs and ways in which these needs may be met over the next few years.

The Board created the category of Honorary Trustee, a title it intends to award to members who have provided valuable service to the Society by serving long terms as Foundation Trustees. The first Honorary Trustee appointments will be made at the Board's next meeting, scheduled for Tuesday, October 30, 1990, at GSA's Annual Meeting in Dallas, Texas.

Foundation News continued on p. 240



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

I would like to support GSA's Program in Education and Public Awareness. Enclosed please find my contribution to the Donald L. Biggs Memorial Fund in the amount of \_\_\_\_\_.

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### A. L. Medlin Scholarship

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Allison R. Palmer\* (SAGE)  
Jay A. Raney  
Monte D. Wilson (SAGE)  
E-an Zen\* (SAGE)

### Women in Science

Paula Muir Watt

\*Gifts of \$100 or more

# GSA Research Grants Awarded for 1990

by June Forstrom  
Research Grants Administrator

The GSA Committee on Research Grants awarded 244 research grants with its 1990 budget of \$190,900. Grants went to 51% of the 485 applicants. The committee—Chairman Richard H. Groshong, Jr.; Members John A. Breyer, Edwin H. Brown, Patricia H. Cashman, Richard A. Davis, Jr., Mitchell W. Lyle; and National Science Foundation conferee Thomas O. Wright—met in Boulder, Colorado, in April.

The Committee's budget included \$150,000 from the Penrose Endowment, and \$3500 income from the Harold T. Stearns Fund. It also included \$30,000 from the GSA Foundation, as follows: \$500 from the Cox Fund (Geophysics Division Award), \$1000 from the Dillon Fund for Alaska Research, \$2000 from the Minority Fund, over \$13,000 from the GSA Foundation Research Fund (which includes \$4700 from oil companies), and \$13,500 from Unrestricted Funds.

Of the 244 proposals recommended for support, 81 were master's proposals and 163 were doctoral proposals. The size of the average award decreased from \$859 in 1989 to \$787 this year. Proposal requests totaled \$539,210.

## AWARDS

*John T. Dillon Alaska Research Award.* This award was established in memory of John Dillon, who was particularly noted for his radiometric age-dating work in the Brooks Range. His research had a major impact on the geologic understanding of this mountain range. The 1990 recipient is Kimberly A. Hannula of Stanford University, for "Placing Structural and Temporal Constraints on the Uplift History of the Nome Group Blueschists, Seward Peninsula, Alaska."

*Robert K. Fahnestock Award.* This grant is awarded to the applicant with the best proposal in sediment transport or related aspects of fluvial geomorphology. The 1990 recipient is Brian W. McArdell of The Johns Hopkins University, for "A Study of the Down-stream Change in Grain Size in the Post-1980 Deposits, Toutle River, near Mount St. Helens, Washington."

*Harold T. Stearns Fellowship Award.* The three recipients of this award, for research on aspects of the geology of the Pacific Islands and the circum-Pacific region, are Peter Haeussler, University of California, Santa Cruz, "A Paleomagnetic Study of the Mt. Sumdum Pluton: Constraints on Tilting or Transport of the Coast Ranges Batholith"; Thomas J. Mulder, Princeton University, "Uses of Oxygen-isotope Stratigraphy as a Correlation Tool and Paleo-sea-level Indicator: Latest Pliocene-Early Pleistocene Continental Margin Sequence, Taiwan"; Nicholas Pinter, University of California, Santa Barbara, "Quaternary History and Tectonic Evolution of Northern Owens Valley, California."

*Outstanding Mention.* The committee on Research Grants specially recognized five of the proposals as being of exceptionally high merit in conception and presentation: Elizabeth A. Lynch, University of Minnesota, for "Holocene Vegetation History of Montane Parks in the Central Rocky Mountains"; Brian W. McArdell, Johns Hopkins University, for "A Study of the Downstream Change in Grain Size in the Post-1980 Deposits, Toutle River, near Mount St. Helens, Washington"; Thomas J. Mulder, Princeton University, for "Uses of Oxygen-isotope Stratigraphy as a Correlation Tool and Paleo-sea-level Indicator: Latest Pliocene-Early Pleistocene Continental Margin Sequence, Taiwan"; Nicholas Pinter, University of

California, Santa Barbara, for "Quaternary History and Tectonic Evolution of Northern Owens Valley, California"; Kelly Ann West, University of Arizona, for "Resolution and Congruence of Paleontological and Biological Data Sets in the Reconstruction of Tanganyikan Gastropod Phylogeny."

*Industrial Donations and Awards.* Donations from Marathon Oil Foundation (\$2500), Mobil Oil Corporation (\$2000) and Amoco Production Company (\$200) are funding grants to the following applicants: Kathleen A. Campbell, University of Southern California, for "Paleoecology of Ancient Cold Seep Biotas Along the Eastern Pacific Convergent Margin"; John Marshall Guthrie, Indiana University, for "Stratigraphic Potential of Isotopic and Geochemical Variation Through the Ordovician Maquoketa Group, Indiana"; Marilyn C. Huff, Louisiana State University, for "Sequence Stratigraphy of the Upper Frontier Formation (Upper Cretaceous)"; Fredrick D. Siewers, University of Illinois, Urbana, for "Early Paleozoic Hardground Formation and Diagenesis: A Possible Response to an Evolving Ocean-atmosphere System"; Katherine A. Soriano, University of Wisconsin, Madison, for "Depositional and Diagenetic Study of Platform Carbonates, Cretaceous, Pyrenees, Spain"; William G. Zempolich, Johns Hopkins University, for "Depositional and Diagenetic Study of the Vajont Limestone (Jurassic), Northeastern Italy."

*Other Successful Applicants.* Other applicants recommended for funding are the following: Lon D. Abbott, Andrew Peter George Abraham, Timothy Allen, Leslie Ames, Michael E. Anderson, Gerilyn Sue Andrews, J. David R. Applegate, Nan Crystal Arens, Thomas R. Armstrong, Ramon Arrowsmith, Julie L. Azar, Nina Lucille Baghai, Ximena Barrientos, Bobby Joe Beaman, Raymond Emil Beiersdorfer, J. Bret Bennington, Gale C. Blackmer, Michael D. Blum, Isaac Boadi, Mark Elliott Brandriss, Hayden L. Bridwell, Nancy Buening, Michele G. Bullock, Roland Burgmann, Beverly A. Burns, Jay P. Busch, John O.D. Byrd, Jinkui Cai, Arthur Robertson Calderwood, Phyllis A. Camilleri, Desiree M. Campbell, Enrique A. Carballido-Sanchez, Tracy Cascadden, Elena Centeno-Garcia, Brooke Philip Clements, David W. Clow, Emily Anne CoBabe, Ronald B. Cole, Katherine A. Conners, Angela J. Coulton, Brent A. Couzens, Timothy K. Cowdery, Christena M. Cox, Gregg A. Crandall, Lisel D. Currie, Christopher Daniel, Benjamin F. Dattilo, Andrew J. Davidoff, Allison Katherine Davis, Ralph L. Dawes, Aram Derewetzky, Charles P. DeWolf, Michael T. Dolan, Lisa A. Doner, Joseph J. Donovan, Joachim Dorsch, Paul K. Doss, Bernard E. Dougan, Kevin F. Downing, Elizabeth A. Eide, John M. Eiler, Douglas D. Ekart, Harold Ekstrom, Lisa L. Ely, Paige Embry, Johan Erikson, Kevin R. Evans, William L. Evans III, Sharon Nancy Feldstein, Jeffrey A. Fillipone, Jim B. Finley, Thomas J. Fitz, T. Kenneth Fowler, Jr., Charles D. Frederick, Daniel L. Frederick, Deborah Freile, Robert B. Genau, Martha Gerdes, A. Mohamad Ghazi, Stuart A. Gilder, Katherine A. Goebel, Mark A. Gonzalez, Jonathan Goodmacher, Martha C. Green, Marty Grove, Michael James Gunderson, Michael John Harris, Henry Clifford Harrison, Nina Harun, Deborah R. Hassler, Jodie L. Hayob, William Heins, Charles T. Herzig, Jason F. Hicks, Brittain E. Hill, Margaret M. Hiza, Thomas E. Hoak, Margaret A. Hodgkins, John Holbrook, James E. Holl, Paul D. Howell, Qiangsheng Huang, Paul F. Hudak, Carter D. Hull, Lewis Edward Hunter, Frederick E. Hutson, Karen Inman,

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Linda Christine Ivany, Brian Iverson, Keith James Jagiello, Andrew I. James, Wen-Ling Jane, Jonathan Lucas Jee, John Jensen, Bradford Jerome Johnson, Calvin R. Johnson, Jr., Kenneth S. Johnson, Anthony T. Jones, Beth A. Jorgenson, Martin Thomas Kammerer, Darrell S. Kaufman, Myra Keep, Paul Kelso, Richard Ketcham, John D. Kingston, David L. Kirschner, Diane Clemens Knott, David Lehmann, Daniel J. Lehrmann, Dennis Lennartz, Huaibao Liu, Ping Liu, Lisa M. Lobe, James D. Loch, Steven P. Lundblad, Allison Margaret Macfarlane, Helen Mango, Curtis R. Manley, Paul Markwick, Christine Ann Massey, Jennifer Ruth Mayhew, Elizabeth A. McClellan, Tracy L. McFarland, Mac McRae, Dan McShane, Joseph G. Meert, Grant A. Meyer, Elizabeth Millner, James Jon Miner, Phillip C. Molzer, Jai-Woon Moon, Michael D. Moore, Michele Elizabeth Morgan, Barbara J. Munn, Allen Bradshaw Murray, John Musgrave, Julie Newman, Lideng Ni, Paula Noble, Matthew W. Nyman, Mary A. Parke, Thomas E. Parsons, Mark E. Patzkowski, Robert T. Pavlowsky, Frank J. Pazzaglia, Nuria Pequera,

Mark T. Peters, Silvio K. Pezzopane, Dave Pivnik, Stephen S. Potts, Scott T. Prinos, Zhaoxia Qiu, Ronald G. Resmini, Pedro A. Restrepo, Robert N. Rhodes, Ian James Richards, Kenneth D. Ridgway, Patricia Roberts, David B. Rogers, Kurt Roggensack, Joseph I. Satterfield, Bennetta L. Schmidt, Mark F. Schult, Richard B. Schultz, John M. Seeley, Michele A. Seidl, Rudolf Serbet, Peng Sha, Cynthia S. Shroba, Cleverson Guizan Silva, Lynn Simmons, Jennifer L. Smith, Kelly Campbell Smith, Yan Song, Barbara J. Souter, Michael J. Spicuzza, John K. Stacy, Libby Stern, Terry W. Swanson, Valerie Tamm, Jeffrey Harrison Templeton, Mary Ann Thomas, Robert Curtiss Thomas, Andrew Michael Thorne, Mark William Thurber, Anthony R. Tingle, Robert L. Tolliver, Raymond Torres, Matthew G. Trainum, Charles H. Trupe, John F. Vietas, Karen Denise Walker, Erchie Wang, Ping Wang, Yifeng Wang, Tina Marie Watne, Michael T. Whalen, Katherine J. Whidden, Richard S. Whitmarsh, Donna L. Whitney, Gregory C. Wiles, Thomas Edward Williamson, Marc A. Willis, Michael B. Wolf, Leslie J. Wood, Charles Wray, Juanjuan Xia, John C. Yarnold, Douglas M. Yates, J. Douglas Yule, Xiaoming Zhai.



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## The Nature and Origin of Cordilleran Magmatism

*edited by J. L. Anderson, 1990*

Research in specific areas of the orogen, emphasizing magma genesis (including the role of multiple source control and changes of magmatic trends caused by fractional crystallization), assimilative fractional crystallization, and mixing are presented. Here is an abundance of new data and exciting interpretations of the Mesozoic and Tertiary igneous suites of the Cordillera from Baja California to Alaska, including work in the Peninsular Ranges batholith, Transverse Ranges, Mojave Desert and Lake Mead regions, Sierra Nevada batholith, Salinian magmatic arc, Great Basin, Klamath Mountains, Idaho batholith, Colville igneous complex, and Coast batholith. MWR174, 440 p., indexed, ISBN 0-8137-1174-6, hardbound, \$65.00

## DNAG

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*edited by Arthur Grantz, L. Johnson, and J. F. Sweeney, 1990*

Summarizes and analyzes our current knowledge of the bathymetry, seismicity, regional geophysics, regional geology, and tectonic development of the Arctic Ocean basin and its margins, including the hydrocarbon, gas hydrate, and mineral resource potential.

GNA-L, 654 p., 3 microfiche cards in pocket, 11 plates in slipcase, indexed, ISBN 0-8137-5211-6, hardbound, \$85.00

### Surface Water Hydrology

*edited by M. G. Wolman and H. C. Riggs, 1990*

Provides reviews of all major facets of hydrology. Accompanying color plates show histograms of river water chemistry, runoff and flow regimes, and the distribution of precipitation minus evaporation for North America.

GNA-O1, 382 p., 3 pocket plates, indexed, ISBN 0-8137-5210-8, hardbound, \$60.00

### Archaeological Geology of North America

*edited by N.P. Lasca and J. Donahue, 1990*

This volume covers the geological aspects of archaeology from both regional and topical perspectives.

CSV004, 543 p., indexed, hardbound, ISBN 0-8137-5304-X, \$62.50

## MEMOIRS

### Geophysical Framework of the Continental United States

*edited by L. C. Pakiser and W. D. Mooney, 1990*

A comprehensive review and evaluation of our knowledge of the structure of the crust and upper mantle of the continental United States, exclusive of Alaska, as determined from geophysical obser-

## SPECIAL PAPERS

### Dawn of the Age of Mammals in the Northern Part of the Rocky Mountain Interior

*edited by T. M. Bown and K. D. Rose, 1990*

This volume presents significant methodologic innovations in vertebrate paleontology and important new discoveries of and about fossil mammals from Late Cretaceous through early Tertiary rocks of the northern Rocky Mountains in the past decade.

SPE243, 260 p., indexed, paperback, ISBN 0-8137-2243-8, \$45.00

### Volcanism and Fossil Biotas

*edited by M. Lockley and A. Rice, 1990*

This is a broad-based survey of the influence of volcanism on the fossil record. This volume examines the relationships between volcanism and fossil plants and animals from Paleozoic through recent times.

SPE244, 136 p., indexed, paperback, ISBN 0-8137-2244-6, \$27.50

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## GSA Division and Section Grants for 1990

The **Coal Geology Division** presented its third annual Antoinette Lierman Medlin Scholarship Award in 1990 to Thomas D. Demchuck, University of Calgary, Alberta, for his proposal titled "Identification and Delineation of Coal Facies for the Ardley Coal Zone, Wabanum, Alberta." The Division considers proposals from any full-time graduate student who is conducting research in coal geology.

The first **Engineering Geology Division** Anniversary Award for outstanding student research was presented this year to Raymond Torres, a master's degree candidate at the University of California, Berkeley. The title of his research project is "Unsaturated Flow on a Steep Hillslope."

The **Geophysics Division** presented its third annual Allan V. Cox Student Research Award in 1990 for an outstanding student research proposal submitted to the GSA Research Grants Program. Paul Kelso, a Ph.D. candidate at the University of Minnesota received the award for his research project titled "A Magnetic and Petrologic Study of Deep Crustal Rocks from the Arunta Block, Australia, and Its Application to Long Wavelength Anomaly Interpretation."

The first awards for outstanding student research from the **Hydrogeology Division** were presented in 1990 to two students: master's degree candidate, Timothy K. Cowdery, University of Minnesota, Minneapolis, for "Glacier-Aquifer Interaction Between the Des Moines Lobe and the Cambro-Ordovician Aquifer System, Northern Midwest, United States," and doctoral candidate, Joseph J. Donovan, Pennsylvania State University, for "Mass Dynamics and Paleohydrology of Holocene Groundwater-dominated Lake Chains, Northern Great Plains."

The **Quaternary Geology and Geomorphology Division** awarded Mackin Grants to four students in 1990. The two master's degree candidates who received the award are: Robert B. Genau, University of Delaware, who will study "A Shallow Land-based Seismic Reflection Approach to Mapping Quaternary Paleochannel(s) of the Susquehanna River System at Taylor's Island, Maryland," and Martin Thomas Kammerer, Arizona State University, for "The Use of Heavy Metal Concentrations and Concentration Ratios to Cross-correlate Alluvial Deposits." Doctoral degree candidates receiving the award are: Grant A. Meyer, University of New Mexico, for "Holocene and Modern Geomorphic Response to Wildfires and Climate Change in Northeastern Yellowstone National Park," and Kelin X. Whipple, University of Washington, for "The Construction of Alluvial-fan Landforms by Debris Flows."

Thirty-three Mackin Grants have been awarded since the Division made its first award in 1974.

The remaining four divisions—Archaeological Geology, History of Geology, International, and Planetary Geology—do not currently offer research grants.

The **Sedimentary Geology Division** presented its fourth annual award for an outstanding student research proposal submitted to the GSA Research Grants Program to John C. Yarnold, a Ph.D. candidate at the University of Arizona. The award was for his research project titled "A Tectono-Sedimentologic Analysis of the Date Creek Basin, West-central Arizona."

The **Structural Geology and Tectonics Division** presented two awards for outstanding research proposals in 1990. The recipients were Thomas E. Hoak, Ph.D. candidate at the University of Texas, Austin, for "Structural Analysis of the Cinque Terre Region, Northern

Apennines, Italy," and Nuria Pequera, Ph.D. candidate at the University of Rochester, Rochester, New York, for "A Study of the Growth History of a Fault Propagation Fold (Canyon Range, Utah) by Using Incremental Paleostress Distribution from Fault Population Analysis to Constrain Finite Element Models."

Seven of the eleven GSA divisions award grants for outstanding student research within the respective division's field of interest.

The remaining four divisions—Archaeological Geology, History of Geology, International, and Planetary Geology—do not currently offer research grants.

The **North-Central Section** of GSA did not award any student research grants in 1990.

The **South-Central Section** of GSA presented its third annual research awards to qualified students in the Section in 1990. Recipients are students who attend a college or university in the South-Central Section geographic area and have submitted applications to the GSA Research Grants Program. The two awards presented this year went to Karen Sullivan Glaser, for "The Effect of Platform Geometry of the Sequence Stratigraphic Signature of Periplatform Carbonates," and Ann Elizabeth Moran for "Trace Element Geochemistry of Subducted Oceanic Crust." Both recipients are doctoral candidates at Rice University in Houston, Texas.

GSA's **Southeastern Section** awarded research grants to 12 qualified students within the section. They were: Jennifer C. Aydelotte, West Virginia University, "A Study in Wetland Reconstruction and Rehabilitation in Tucker County, West Virginia"; Joseph G. Aylor, Florida State University, "Early Paleozoic History of the Western Blue Ridge Belt, Southwestern, North Carolina"; Andrew T. Benoit, Florida State University, "Predicting the Unsaturated Hydraulic Conductivity of Unconsolidated Porous Media"; Kimberley A. D'Arcy, University of Florida, "Chemical and Isotopic Evolution of the Montana Metasedimentary Terrane"; Jonathan K. Filer, University of North Carolina, Chapel Hill, "Cyclic Siliciclastic Sedimentation and the Frasnian-Famennian Boundary in the Upper Devonian of the Appalachian Basin"; James D. Green, College of Charleston, "The Distribution and Significance of Igneous Facies of the Appling Granite, Georgia"; Stanley H. Harts, University of North Carolina, Wilmington, "Sequence Stratigraphic Concepts Applied to the Onshore Oligocene and Lower Miocene Strata on the North Flank of the Cape Fear Arch, North Carolina"; Lisa N. Hu, University of North Carolina, Chapel Hill, "Subsurface Petrologic Transect of the Upper Triassic Cumnock Formation, Sanford Sub-Basin, North Carolina"; Flenner M. Linn, University of North Carolina, Chapel Hill, "Sedimentary Tectonics in the Silurian-Devonian Helderberg Group of West Central Virginia and Adjacent West Virginia"; Michael J. Neton, University of Tennessee, Knoxville, "Sedimentology and Provenance of Conglomerate Deposits of the Grandfather Mountain Formation (Late Proterozoic) North Carolina: Insight into Rifting of the Grenville Continent"; William S. Pendexter, Florida State University, "The Relative Influence of Wetting Front Instabilities and Media Heterogeneities on the Development of Preferred Pathways of Flow in an Unsaturated Sand"; John F. Sinclair, University of North Carolina, Chapel Hill, "A Lithostratigraphic Study of the Upper Devonian of Elliott Knob Syncline, Virginia."

The remaining three sections—Northeastern, Rocky Mountain, and Cordilleran—do not currently offer research grants.

Preliminary Announcement and Call for Papers  
**NORTHEASTERN AND SOUTHEASTERN SECTIONS, GSA, Joint Meeting**  
**Baltimore, Maryland**  
**March 14–16, 1991**

The Northeastern and Southeastern Sections of the Geological Society of America with the Association of Women Geoscientists, the SEPM, the Northeastern and Southeastern Sections of the Paleontological Society, and the Eastern and Southeastern Sections of the National Association of Geology Teachers will meet at the Omni Inner Harbor Hotel in downtown Baltimore. The meeting is cosponsored by the Maryland Geological Survey and the U.S. Geological Survey in cooperation with Johns Hopkins University, University of Maryland, Towson State University, and George Washington University.

### POINTS OF INTEREST

Baltimore is a culturally diverse city of nearly 800,000 people, located along the Fall Line near the head of Chesapeake Bay. A contemporary blend of traditional and modern, Baltimore is a city rich with history, is a vibrant center for the arts and cultural institutions, and has a spectacular waterfront area. Mid-March weather can be unpredictable, with high temperatures in the 70s and lows near freezing, but the mid-50s are normal and the bay has a moderating influence. All meeting functions and sessions will be held in the Omni Hotel, within walking distance of shopping and food pavilions at the Inner Harbor, aquatic adventures at the National Aquarium, hands-on exhibits at the Davis Planetarium and the IMAX Theater in the Maryland Science Center, exciting boat cruises around the harbor area, and diverse activities at the Baltimore Arena. Nearby are numerous art galleries, museums, theaters, and the famous Lexington Market; these and many other attractions will make your visit to Baltimore enjoyable and memorable.

### CALL FOR PAPERS AND SYMPOSIA

Papers are invited for presentation at oral technical sessions, poster sessions, and symposia. Papers of regional interest to geologists in the eastern part of the United States and Canada, as well as those of more general geological interest, will be considered for the technical program. In addition to the symposia listed below, the technical program committee is especially interested in papers for theme sessions involving:

- Extensional tectonics of the Atlantic and proto-Atlantic oceans
- Assessing physical and chemical dynamics of estuarine systems
- Channel change and sediment yield of developed drainage basins
- Application of geologic mapping and geographic information systems to land-use studies
- Applied geology and geologic engineering concerns in the eastern United States
- The role of geologists in understanding global and climatic change
- Interpreting chaos in geologic systems
- The geoscience department of the future: what will it be?
- Timing of Appalachian orogenic events
- Teaching about the coastal environment.

General oral sessions will allow 15 minutes for presentation and five minutes for discussion of each paper. Poster sessions will be set up for four hours; authors will be present to discuss the paper for a minimum of two hours. Conveners of symposia, in conjunction with the program committee, are responsible for determining the format for their sessions.

### ABSTRACTS

Abstracts are limited to about 250 words and must be submitted camera-ready on the official 1991 GSA abstract form, available

from Abstracts Coordinator, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, (303) 447-8850.

### ABSTRACTS DEADLINE: NOVEMBER 1, 1990

An original and five copies of all volunteered abstracts should be sent to the Technical Program Chairman, Robert W. Ridky, Department of Geology, University of Maryland, College Park, MD 20742, (301) 454-3548. An original and five copies of all symposium abstracts should be sent to the Coordinator of Symposia, George W. Fisher, Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, MD 21218, (301) 338-7237. Each abstract will be reviewed for form and content. Authors will be informed of the acceptance or rejection of abstracts by early January 1991.

### PROJECTION EQUIPMENT

All slides must be 2" x 2" and fit standard 35-mm carousel trays. Two projectors and two screens will be available in each meeting room. Please bring your own loaded carousel trays, if possible. Slide preview facilities will be available at the hotel.

### SYMPOSIA

The following symposia are being organized and may contain both invited and volunteered papers. Prospective authors should contact the symposium conveners listed below as soon as possible. Unresolved questions about symposia should be directed to George W. Fisher, (301) 338-7237.

1. **Appalachian Geology, a Symposium Honoring Richard P. Nickelsen.** Richard Groshong, University of Alabama, (205) 348-5095; Terry Engelder, Pennsylvania State University, (814) 865-3620.
2. **Pennsylvanian Marine Zones in the Appalachian Region: Stratigraphy, Biostratigraphy, and Environments.** Jon Inners and Albert Glover, Pennsylvania Geological Survey, (717) 787-6029.
3. **Phosphate Sedimentation Associated with Neogene Depositional Systems: U.S. Atlantic Continental Margin** (Eastern Section SEPM). Stanley Riggs, East Carolina University, (919) 757-6360.
4. **Sequence Stratigraphy of the Eastern Gulf of Mexico** (Eastern Section SEPM). Anthony Randazzo and Jonathan Jee, University of Florida, (904) 392-2231.
5. **Sedimentary-cycle Control—Tectonics Versus Eustacy** (Eastern Section SEPM). John Dennison, University of North Carolina, (919) 966-4516; Frank Etensohn, University of Kentucky, (606) 257-3758.
6. **Terrestrial and Shallow Marine Geology, Bahamas and Bermuda** (Eastern Section SEPM). Allen Curran and Brian White, Smith College, (413) 585-3804.
7. **Geologic Considerations and Amelioration Techniques in Low-level Waste.** Edward O'Donnell, U.S. Nuclear Regulatory

NORTHEASTERN/SOUTHEASTERN *continued on p. 245*



**NORTHEASTERN/SOUTHEASTERN** *continued from p. 244*  
Commission, (301) 492-3859; Robert Ridky, University of Maryland, (301) 454-3548.

8. **Metamorphic Petrology: Implications for Appalachian Tectonics.** Jo Laird, University of New Hampshire, (603) 862-1718.
9. **Magmatism in the Appalachians.** Krishna Sinha, Virginia Polytechnic Institute and State University, (703) 231-5580.
10. **Structural Interaction Between Blue Ridge and Appalachian Cover Rocks.** Thomas Anderson, University of Pittsburgh, (412) 624-8781; Carol Simpson, National Science Foundation, (202) 357-5070.
11. **Computer Applications in Geology.** Lawrence Malinconico, Lafayette College, (215) 250-5193.
12. **Geologic Processes and the Environment: Studies of Natural and Manmade Radionuclides.** Linda Gunderson, U.S. Geological Survey, (303) 326-5760; Alexander Gates, Rutgers University, (201) 648-5100; L. T. Gregg, Atlanta Testing and Engineering, (404) 476-3555.
13. **Nature of Avalon/Carolina Terrane Boundaries in the Appalachians.** Allen Dennis, University of South Carolina at Aiken, (803) 648-6851 ext. 3396; Robert Hooper, University of South Florida, (813) 974-2237.
14. **Terrane Accretion and Related Processes in the Appalachians and Related Crustal Blocks.** Robert Hatcher, Jr., University of Tennessee, (615) 974-6565; Wright Horton, Jr., U.S. Geological Survey, (703) 648-6933.
15. **Coastal Plain Estuaries: A Comparison of Chesapeake and Delaware Bays.** Jeffrey Halka, Maryland Geological Survey, (301) 554-5543; Charles Fletcher, West Chester University, (215) 436-2570.
16. **The Role of Hydrogeology in Ground-water Science and Engineering.** Harry Hansen, Maryland Geological Survey, (301) 554-5554; Francis Chappelle, U.S. Geological Survey, (813) 765-5966.
17. **The Coastal Environment (NAGT).** Mildred Graham, Georgia State University, (404) 651-2518; James O'Connor, University of the District of Columbia, (301) 593-7851.
18. **Earthquakes in the Eastern United States: Causes, Expression, and Implications.** Gilbert Bollinger, Virginia Polytechnic Institute and State University, (703) 231-9190; John Ebel, Weston Observatory of Boston College, (617) 899-0950.
19. **Innovative Approaches to Taphonomy and Trace Fossils** (Southeastern Section Paleontological Society). Michael Gibson, University of Tennessee at Martin, (901) 587-7435; Frank McKinney, Appalachian State University, (704) 262-3049.
20. **Taphonomy and Paleoecology of Sphaerobolus and Exaerobolus Marine Environments** (Northeastern Section Paleontological Society). Gordon Baird, State University of New York, Fredonia, (716) 673-3293; Carlton Brett, University of Rochester, (716) 275-2408.

## POSTER SESSIONS

Six half-day poster sessions are available to authors as part of the technical program. Poster sessions will be located in a central area of the hotel adjacent to other oral technical sessions. Please identify your preference for a poster session on the GSA abstract form if you wish to take advantage of this highly effective means of communicating the results of your research.

## FIELD TRIPS

Both premeeting and postmeeting field trips are planned. For details, contact the respective field trip leaders. General questions may be addressed to the Field Trip Coordinator, Arthur P. Schultz, U.S. Geological Survey, 926 National Center, Reston, VA 22092, (703) 648-6501. Information on field trip fees and preregistration

forms required for field trip participation will be available in the December 1990 issue of *GSA News & Information*. At this time all field trips are tentative; the final program will be determined by the number of preregistrants for each trip.

## Premeeting

1. **Terranes and Tectonics of the Northern Maryland Piedmont.** Alec Gates, Dept. of Geology, Rutgers University (201) 648-5034, and Peter Muller, Department of Earth Sciences, SUNY, College at Oneonta, (607) 431-3707; two days.
2. **Stratigraphy and Structure of the Great Valley and Valley and Ridge, West Virginia.** Peter Lessing, Stuart Dean, and Byron Kulanter, West Virginia Geological Survey, (304) 594-2331; two days.
3. **Tectonic History of the Blue Ridge Basement and Its Cover—Central Virginia.** Jerry Bartholomew, K. Sinha, S. Lewis, R. Badger, and S. Hughes, Montana Bureau of Mines and Geology, (406) 496-4177; three days.
4. **Taconic Collisions: Delaware-Pennsylvania Piedmont.** Mary Emma Wagner, L. Srogi, G. Wiswall, and J. Alcock, Department of Geology, University of Pennsylvania, (215) 898-7446; three days.
5. **Stratigraphy of Late Precambrian and Early Cambrian Clastics, Southwestern Virginia and Northeastern Tennessee.** Ed Simpson and Dan Walker, Kutztown University, (215) 683-4010; two days; begins in Knoxville, Tennessee.
6. **Tertiary Lithology, Paleontology, and Sequence Stratigraphy, Chesapeake Bay Region.** L. W. Ward, Virginia Museum, and David Powars, U.S. Geological Survey, (703) 648-6936; two days.
7. **Bottom Sediments of the Chesapeake Bay: Physical and Geochemical Characteristics.** Jeff Halka and Jim Hill, Maryland Geological Survey, (301) 554-5543; one-day boat trip.

## Postmeeting

8. **Sedimentology and Sequence Stratigraphic Framework of the Middle Devonian Mahantango Formation in Central Pennsylvania.** Tony Prave and W. Duke, Department of Earth and Planetary Sciences, City College of New York, (212) 690-8441; two days.
9. **Geology of the Robertson River Suite, Blue Ridge Anticlinorium, Virginia.** Richard Tollo, S. Arav, and Karen Gray, Department of Geology, George Washington University, (202) 994-6960; one day.
10. **Late Proterozoic Sedimentation and Tectonics in Northern Virginia.** Peter Lyttle, S. Schindler, and S. Kline, U.S. Geological Survey, (703) 648-6943; one day.
11. **Sideling Hill Road Cut and Visitor's Center—An Educational Opportunity Combining Outcrop and Classroom.** Kenneth Schwarz, Maryland Geological Survey, (301) 554-5525; one day.

## SHORT COURSES

Two premeeting short courses and one postmeeting short course are planned. For details, contact the short course conveners listed below. General questions about the short course offerings may be directed to Declan De Paor, Coordinator of Short Courses, Department of Earth and Planetary Sciences, Johns Hopkins University, (301) 338-7049. Costs for the short courses and a description of the subject matter will be included in the final announcement. Preregistration will be required for the short courses.

## Premeeting

1. **Geostatistics in the Search for Energy.** Michael E. Hohn, West Virginia Geological Survey, (314) 594-2331; two days.

**NORTHEASTERN/SOUTHEASTERN** *continued on p. 246*

**NORTHEASTERN/SOUTHEASTERN** *continued from p. 245*

2. **Radon in the Air and Water.** Douglas Mose and George Mushrush, George Mason University, (703) 323-4318 or 4327; one day.

#### Postmeeting

3. **Comparative Sedimentology of Clastic Coastal Deposits: Bridges to Ancient Shorelines** (SEPM). H. Edward Clifton, U.S. Geological Survey, (415) 359-3112; one day.

#### EXHIBITS

A limited number of exhibit booths will be available at a central location in the Omni Hotel. The exhibit hall will be open during the welcoming party on Wednesday evening, all day Thursday and Friday and until early afternoon on Saturday. The cost of a standard booth (8' x 8') will be \$500 for commercial exhibitors and \$250 for educational and nonprofit organizations. For further information and space reservations, contact Jeff Williams, U.S. Geological Survey, 914 National Center, Reston, VA 22092, (703) 648-6511, fax (703) 648-5464.

#### STUDENT ASSISTANCE

Support for travel expenses is available for GSA Student Associates from the Southeastern Section who are presenting papers at the meeting. GSA student members should contact the Secretary-Treasurer, Michael J. Neilson, Department of Geology, University of Alabama at Birmingham, Birmingham, AL 35294, (205) 934-5102.

The Northeastern Section provides travel support for the national GSA meeting, but not the Section meeting.

#### SPECIAL EVENTS

A **welcoming reception** will be held on the evening of Wednesday, March 13, 1991. Events on the following evening will include a reception and banquet; M. Gordon Wolman will be the featured speaker. **Timed 5- and 10-km runs** will be held on Saturday morning prior to the start of the technical program. Detailed information about a **photo salon-exhibit** during the entire meeting and a Friday evening **public forum** will appear in the Final Announcement in *GSA News & Information*.

#### GUEST AND SPOUSE ACTIVITIES

A hospitality room at the Omni Hotel will be the gathering point for information on local attractions, including Harbor Place, the National Aquarium, the Edgar Allan Poe House, the Maryland Science Center, Antique Row, the Baltimore Museum of Art, and the Walters Art Gallery. A complementary hotel shuttle can transport you and your friends to these and other local attractions. Walking tours of the Baltimore redeveloped district will also be organized for geologists, their spouses, or guests.

#### TRAVEL TO BALTIMORE

By car, Baltimore is conveniently located at the junction of Interstate Highways 95, 83, and 70. Baltimore-Washington International Airport is served by most major airlines and is located approximately eight miles south of the hotel; transportation between the airport and the Omni Hotel is readily available. AMTRAK service to Baltimore arrives at the Charles Street Station, just north of the downtown area. Maps and more detailed information will be in the Final Announcement.

#### REGISTRATION

A substantial reduction in the registration fee will be offered for registration prior to February 15, 1991. To encourage attendance by precollege earth science teachers, registration fees will be reduced for secondary school teachers in public and private schools. One-day registration will be available during the meeting for professionals and students unable to attend more than one day.

#### HOUSING

A large block of rooms has been reserved for meeting participants and their guests at the Omni Inner Harbor Hotel. For conference planning purposes and to insure guaranteed room rates, it is important that you reserve your room before February 14, 1991.

#### ADDITIONAL INFORMATION

Detailed information concerning fees and registration forms for registration, field trips, short courses, and social functions will appear in the December 1990 issue of *GSA News & Information* and as part of the GSA Northeastern-Southeastern *Abstracts with Programs* for 1991. Symposia, field trips, and short courses listed in this announcement are only tentative; additional suggestions are always appreciated. Inquiries or suggestions may be directed to: Emery T. Cleaves, NE-GSA Chairman, Maryland Geological Survey, 2300 St. Paul Street, Baltimore, MD 21218, (301) 554-5504; and Juergen Reinhardt, SE-GSA Chairman, U.S. Geological Survey, 926 National Center, Reston, VA 22092, (703) 648-6789.

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#### PEOPLE

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GSA Fellow **Claire B. Davidson**, U.S. Geological Survey, Reston, Virginia, has received a Superior Service Award from the Department of the Interior for her exceptional contributions to the geologic, stratigraphic, and aquifer nomenclature used by the USGS in its reports and maps.

Fellow **W. Gary Ernst**, Stanford University, has been elected to the Carnegie Institution's Board of Trustees.

Fellow **Charles G. Groat** has been named Executive Director of the American Geological Institute, Alexandria, Virginia.

Fellow **Michel T. Halbouty**, Michel T. Halbouty Energy Co., Houston, Texas, received an honorary Doctor of Geosciences degree from the USSR Academy of Sciences for his contributions to the science of geology.

Fellow **Donald L. Johnson**, University of Illinois, is a co-recipient of the G. K. Gilbert Award for Research on Soil Evolutionary Models given by the Geomorphology Specialty Group of the Association of American Geographers at Toronto.

Fellow **W. Barclay Kamb**, California Institute of Technology, has been elected to the National Academy of Sciences.

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# 1989

# ANNUAL REPORT

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*The Geological Society of America*



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## Report of the President by Randolph W. Bromery

The Geological Society of America began the first year of its second century with a significant change in the way that the Society conducts its business. The Executive Committee formulated a *Strategic Plan* that updates and restates the mission and purpose of the Society. Within the scope of restating the mission, a strategic plan was carefully formulated, and a series of recommendations on program proposals and objectives was outlined. A Committee on Long-Range Planning was formed which will meet annually to: review the basic mission and strategic goals and objectives of the Society; with respect to the mission and strategic objectives of the Society, (a) assess the purpose and objectives of the Society in each of its major program areas, and (b) examine proposals for new policies and program initiatives and map these new policies and initiatives against the mission of the Society and its current and future financial resource projections. Finally, the Long-Range Planning Committee will solicit and propose new policies and program initiatives for the Society that will advance its strategic goals.

Another highlight of this past year was the adoption of a new dues structure and member subscription policy that allows members and student associates to subscribe separately to those monthly journals they wish to receive. The change in dues structure was well received with more than one-half of all Members and Fellows choosing to continue to receive both journals. Sixty-five percent of the student members are subscribing to both journals.

For the first time in the history of the Society and in response to a member poll, the Council approved a dual slate for councilor positions and vice-president of the Society. Beginning in fall 1990, voting members will choose between two candidates for each Council position and the vice-president.

Following a slight decrease in membership in 1988, the Society experienced an increase in the number of members in 1989; however, since one year does not constitute a trend, we must all encourage others in our profession to become members of our learned Society.

The Geological Society of America, now entering the first year of its second century, still finds itself in a national and world society relatively ignorant of the direct and indirect relation of geology to everyday life and the future of our society as we know it. Also, college and university enrollments in geology are declining, and as I attended several commencements this past year in my new role in higher education, I became very concerned with the smaller numbers of students graduating in science and mathematics. A nation



that was once the leader in science and mathematics is in a state of decline, and if this trend continues, within the next two decades colleges, universities, and industry will have to recruit from outside the country to fill those critically needed teaching, research, and professional management positions. In the meantime, our nation will have to cope with an alarming level of functional illiteracy and adapt to an aging population, and a population that will be, in the not too distant future, one dominated by people of color. Ironically, it is this latter population, now grossly under-represented in our profession in particular and science in general, that offers the only hope to meet our long-term future professional needs, and an integral part of the hope for a future re-emergence of our nation to a leadership position in science and mathematics.

It has been a distinct honor serving as the President of the Geological Society of America this past year, the first year of its second century. I have learned much and enjoyed working with our Executive Director, our very efficient headquarters staff, the Four Education, and my many colleagues who served as members of the Council. I also want to thank the Members and Fellows for their support. With your continued participation and support, our Society can look forward to a more diverse membership and an exciting, effective, and well-planned second century.

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*"The Geological Society of America, now entering the first year of its second century, still finds itself in a national and world society relatively ignorant of the direct and indirect relation of geology to everyday life and the future of our society as we know it."*

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# Annual Report of the Executive Director

## by F. Michael Wahl



The year 1989 was one of transition for the Society as we moved forward into our second century.

Significant highlights as cited in the President's Annual Report include the adoption of a *Strategic Plan* for GSA, approval of a new dues structure and member subscription policy, and a dual slate for councilor positions and the vice-presidency of the Society.

Other significant accomplishments included increased activity in the areas of education and public information, a new all-time high for the number of manuscripts submitted to *Geology*, the appointment of two new editors for the *GSA Bulletin*, the formation of a new International Division, and an expansion of the GSA desk-top publishing system. Also during the year we offered more short courses than ever before and increased the public relations effort of the Society at the national level.

In the fiscal category, we finished the year slightly on the up side in the Operations section, primarily because of higher than expected revenue in the Other Publications category. As in 1988, several anticipated DNAG (Decade of North American Geology) products were not completed during the year, thus resulting in overall publication revenue that was lower than projected. Revenue from the St. Louis Annual Meeting was less than budgeted, but expenses were also lower than anticipated.

### Headquarters Operation

Following the extremely high level of activity at GSA headquarters in 1988 that was related to the Centennial Celebration, one might have expected a reduction in intensity in 1989. That was definitely not the case as the staff continued to take on new initiatives in addition to coordinating ongoing activities. The number of permanent GSA employees during 1989 was 45. In addition, the Society employed 6 persons on a part-time basis at different times throughout the year. This number does not include proofreaders or temporary editorial personnel who work on a contract basis, as needed.

The Society is indeed fortunate to have such a dedicated group of professionals who do whatever is necessary to meet the needs of the Society and its membership.

### Membership

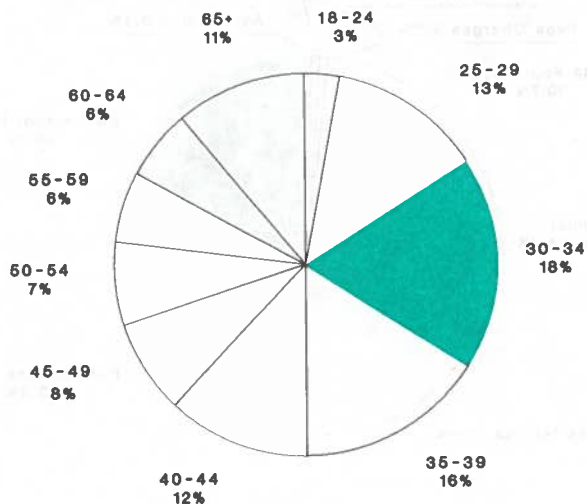
Total Society membership for the year was up slightly compared to 1988 statistics. This was better than anticipated, because of poor economic conditions that continued to exist in some employment sectors. Total membership was 16,701, compared with 16,427 in 1988—a net increase of 274.

Fifty-nine percent of our members are between the ages of 25 and 44, the same ratio that existed during the previous year. Those over 65 years of age made up 11%. Of the total membership, about 45% have been affiliated with the Society for six years or less, while another 33% have been members for 21 years or more. In terms of section affiliation, nearly 31% of the membership belongs to the Cordilleran Section, followed by the Northeastern Section with 19%, the Rocky Mountain Section with nearly 16%, the Southeastern Section with 13%, and the North-Central and South-Central Sections with 11% and 10%, respectively. The number of Senior Members and

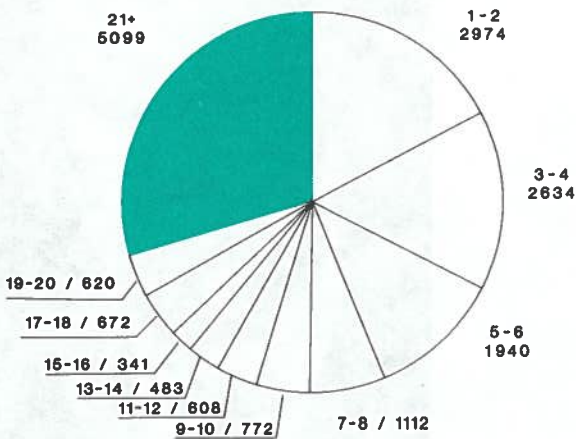
### MEMBERSHIP STATISTICS 1972-1989

Year	Fellows	Members	Students	Honorary Fellows	Totals
1989	2959	9972	3718	52	16,701
1988	3020	9682	3672	53	16,427
1987	3074	9597	3864	50	16,585
1986	3108	9335	4076	49	16,568
1985	3143	9074	4001	49	16,267
1984	3182	8422	3713	45	15,362
1983	3164	7922	2871	44	14,001
1982	3199	7901	2243	43	13,386
1981	3214	7633	1828	43	12,718
1980	3229	7500	1834	40	12,603
1979	3237	7306	1874	42	12,459
1978	3251	7208	1903	42	12,404
1977	3282	6972	2095	42	12,391
1976	3334	6771	2377	45	12,527
1975	3347	6438	2224	45	12,054
1974	3327	5975	2917	44	12,263
1973	3332	5452	1871	46	10,701
1972	3293	5289	873	49	9504

### MEMBERSHIP AGE—1989



### YEARS OF AFFILIATION—1989 (years/no. of members)



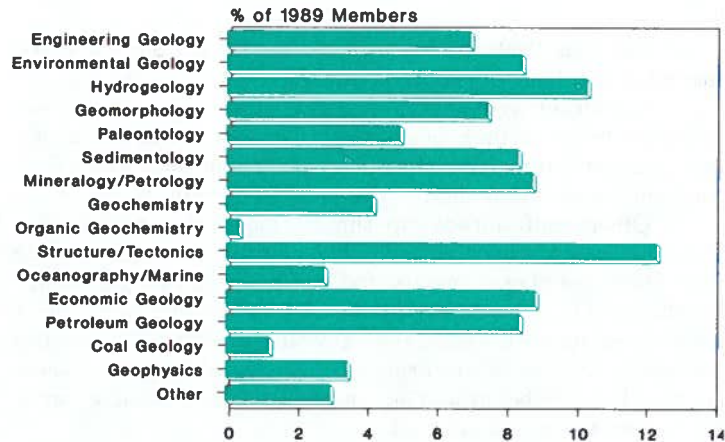
Fellows continues to grow each year—a category now composing slightly more than 6% of the total membership.

The major professional interest of our membership is in structure and tectonics (12.4%), followed closely by hydrogeology (10.3%), economic geology (8.9%), mineralogy and petrology (8.8%), and petroleum geology (8.4%).

#### Sources of Revenue

Society dues in 1989 remained at \$70 for Members and Fellows. Of this amount, \$42 per member (60%) was allocated to cover the yearly costs of the *GSA Bulletin*, *Geology*, and *GSA News & Information*. The actual production and distribution costs for these publications were slightly more than \$81 per member for the year. The difference was paid from other publications revenue and through an endowment income subsidy. The remaining \$28 of each member's dues was assigned as Membership Services Department income to maintain membership records and to cover the cost of all member-

### MAJOR PROFESSIONAL INTEREST

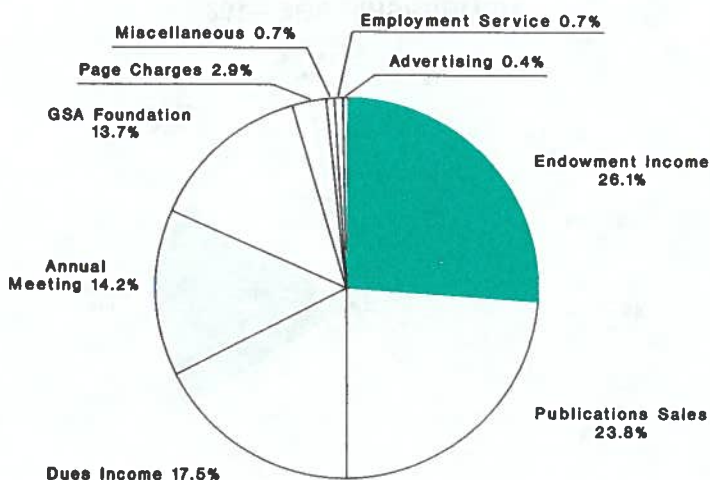


ship services and activities, including the GSA representatives program. For the year, income from dues represented only 17.5% of the total revenue of the Society. Endowment income was the major revenue source at 26.1%, followed closely by publications sales at 23.8%. As in previous years, income from the endowment was used to subsidize the cost of member publications and to underwrite the cost of Council and committee activities.

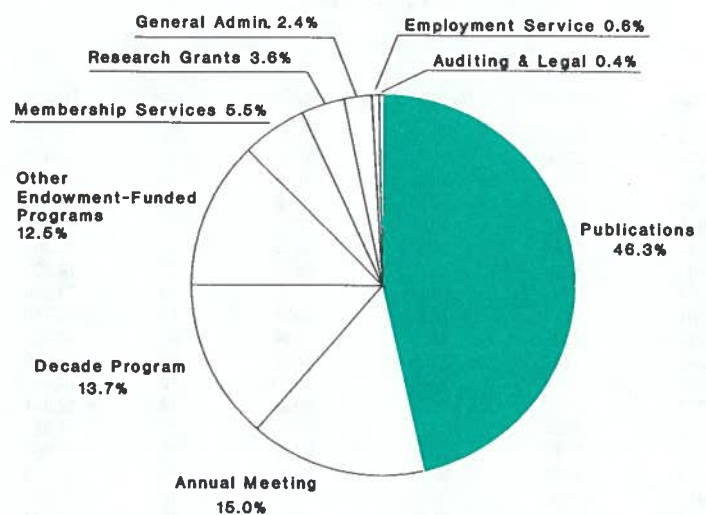
#### Employment Service Program

During 1989 the Employment Service program operated at a slight net gain. The total number of employers using the program was 69, slightly higher than in 1988. The total number of applicants using the system for the year was 443, an increase of 16% over 1988. The total number of positions advertised through the program was 144, and the number of persons who secured employment through the program was 25.

### REVENUE BY SOURCE—1989



### EXPENSES BY BUDGET CATEGORY—1989





## EMPLOYMENT SERVICE STATISTICS

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
<b>EMPLOYERS</b>										
Year-round	47	57	43	32	27	27	15	20	16	20
Annual Meeting	116	77	41	42	39	33	31	30	50	49
Total	163	134	84	74	66	60	46	50	66	69
<b>POSITIONS</b>										
From employers year-round	47	57	43	32	27	27	76	67	37	49
From Employers at Annual Meeting	193	165	70	71	61	111	132	58	104	95
Total	240	222	113	103	88	138	208	125	141	144
<b>Types of positions</b>										
<b>Academic</b>										
Year-round	28	19	33	16	9	14	6	7	5	14
Annual Meeting	100	95	54	50	46	39	29	26	42	32
<b>Industry</b>										
Year-round	16	32	8	12	16	10	70	54	29	29
Annual Meeting	82	58	10	8	11	32	21	11	56	39
<b>Government and other</b>										
Year-round	3	6	2	4	2	3	-	6	-	3
Annual Meeting	11	12	6	13	4	40	82	21	9	27
<b>Total applicants at Annual Meeting</b>										
Annual Meeting	296	309	263	231	218	218	270	273	315	290
Total applicants for year	465	474	527	422	404	352	385	348	381	443
Total applicant successes (joined year before)	40	41	22	8	20	19	15	20	20	25

## Publications

GSA published 8851 pages of science in 1989. Total publication expenditures were slightly more than \$2.2 million, a little more than 45% of all Society expenditures. In the Society periodicals, the number of science pages published in the *GSA Bulletin* during 1989 totaled 1696, and for *Geology* it was 1208 pages.

The number of manuscripts received for possible publication in the *GSA Bulletin* was 312, slightly higher than in the previous year. A total of 141 articles, including Discussions/Replies, were accepted for publication, compared with 143 the previous year. For *Geology*,

660 manuscripts were received and 376 were published. The average time interval from acceptance to publication remained from six to seven months for *Bulletin*, and by the end of the year had also increased to six months for *Geology*. Previously the interval was from three to four months. This was the result of a substantial increase in the number of manuscripts received while the number of pages published each month remained constant.

## New Books, Maps, and Other Publications

Ten new books were published in 1989 totaling 1879 pages. These included nine Special Papers and one Memoir. Three volumes were published in the DNAG Geology of North America series. The only new products in the Map and Chart series were three new transects.

In the *Abstracts with Programs* series, four single volumes and one combined volume for the joint Rocky Mountain/Cordilleran meeting were produced, plus the usual volume for the 1989 Annual Meeting. The total number of pages for the series was 955. The total number of abstracts processed was 3577, down nearly 17% from our centennial year, when we reached an all-time high of 4295.

Miscellaneous publications, including Division newsletters, memorials, etc., totaled 654 pages.

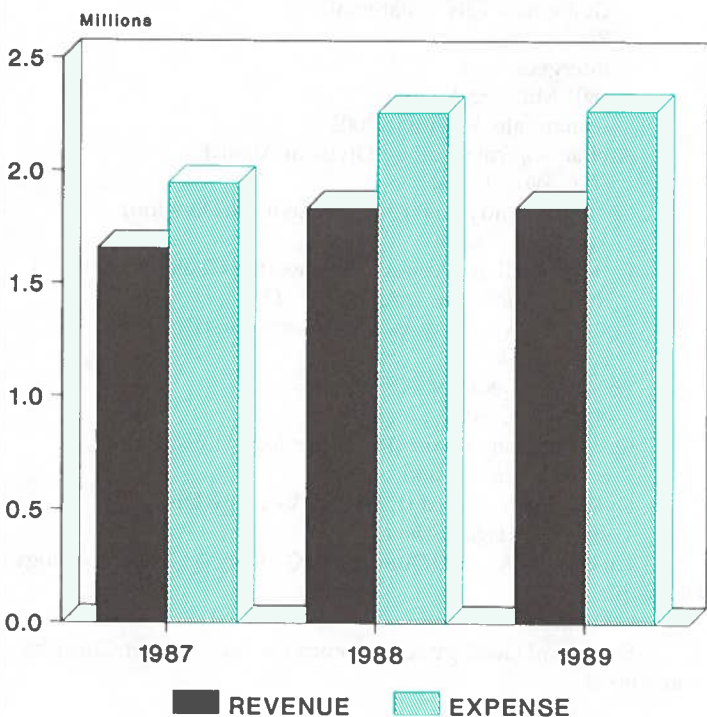
## Meetings

The annual meeting in St. Louis had several "firsts" associated with it. The first Young Scientist Award (Donath Medal) was awarded, and the first annual awards for Excellence in Earth Science Teaching to 18 educators from around the country were announced. It was also the first meeting for GSA's new International Division, and a first for oral and poster sessions on Geoscience and the Arts. Earthquakes were a hot topic; a special forum on the Loma Prieta earthquake in California was attended by more than 1000 people. Another highlight was the blue-ribbon panel discussion on the future of funding for research at the Geoscience Research and Public Policy symposium.

The technical program included presentation of a total of 1872 papers in 109 half-day oral sessions and 8 poster sessions. Total meeting registration was 4986, the fifth highest in GSA history. The 19 field trips were attended by 490 participants, almost 10% of all meeting registrants. A total of 10 short courses were attended by 367 persons.

Section meetings during the year had a combined registration of 3368 persons. A total of 1505 papers were presented in 160 sessions, and 680 registrants participated in a total of 45 field trips.

## PUBLICATIONS REVENUE / EXPENSE COMPARISON—1987, 1988, 1989



## ANNUAL MEETING REGISTRATION STATISTICS 1976-1989

Year	Site	Preregistration	Percent preregistered	Total
1989	St. Louis	3815	77%	4986
1988	Denver	5509	73%	7478
1987	Phoenix	3813	73%	5201
1986	San Antonio	3378	76%	4452
1985	Orlando	2665	60%	4409
1984	Reno	4331	71%	6065
1983	Indianapolis	2717	65%	4153
1982	New Orleans	3026	63%	4793
1981	Cincinnati	2875	62%	4670
1980	Atlanta	2844	66%	4285
1979	San Diego	2339	51%	4574
1978	Toronto	2404	50%	4826
1977	Seattle	1987	50%	3956
1976	Denver	2797	52%	5351

Field trip attendees at the section meetings represented 20% of all meeting registrants, a good indication that field trips are still an important part of the section meeting format.

### 1989 SECTION MEETING STATISTICS

Section and meeting location	Total registration	Papers presented	Half-day sessions
Cordilleran and Rocky Mountain Spokane, Washington	1164	608	64
North-Central Notre Dame, Indiana	374	177	23
South-Central Arlington, Texas	279	155	20
Northeastern New Brunswick, New Jersey	915	315	30
Southeastern Atlanta, Georgia	636	250	23

### Research Grants

The Committee on Research Grants awarded \$180,290 for the support of research in 1989. This sum included \$150,000 from Penrose Endowment income, \$3500 income from the Harold T. Stearns Fund, \$700 income from the Dillon Fund for Alaska Research, and \$23,500 from the GSA Foundation.

In all, a total of 210 projects were selected for funding from the 496 proposals received. These included 144 that supported doctoral research and 62 that supported master's research. The average grant was \$859, and the award rate was 43% of all proposals received.

Three of the 11 GSA divisions awarded research grants through the Committee on Research Grants, and two divisions awarded grants under their own auspices.

Recipients of specialized Society awards in 1989 were as follows:

- John T. Dillon Alaska Research Award  
*Arlene V. Anderson*  
University of Alaska, Fairbanks
- Robert K. Fahnstock Memorial Research Award  
*Ted Roy Turner*  
Montana State University, Bozeman
- Harold T. Stearns Fellowship Awards  
*Wendy A. Bohrsen*  
University of California, Los Angeles  
*Carter D. Hull*  
University of Oregon, Eugene  
*Dale A. Kramer*  
Bowling Green State University  
*Michael Donald Moore*  
University of California, Berkeley

### Decade of North American Geology

The DNAG Project continued to move slowly but inexorably toward completion. It was supposed to be done by the end of the year, but laggards continue to slow down progress. Nevertheless, quite a bit of movement took place, and the bulk of the project will be completed during 1990.

At the beginning of 1989, there were 17 volumes of *The Geology of North America* in or through production, comprising 444 chapters. By the end of the year, one more book had come on-line,

bringing the expected total of chapters to 502. During the year, the number of chapters that had been written rose by 82 to 466 (93% of total), and the number of chapters that were through review and in production rose by 32 to 369 (73% of total). The number of chapters printed or at the printer rose by 78 to 240 (48% of total).

The Centennial Special Volumes also made substantial progress toward completion. Of the 151 chapters in six books in this series, 52 additional chapters were completed and in production by the end of the year, bringing the total in or through production to 123 (81% of total).

During the year, three volumes of *The Geology of North America* were published: *Hydrogeology*, *The Northeastern Pacific Ocean and Hawaii*, and *The Geology of North America: An Overview*. One transect was also published.

At the end of the year, *The Appalachian Ouachita Orogen in the United States* was at the printer, and the Centennial Special Volume, *Archaeological Geology of North America*, was in the final paging process. Three transects, two wall maps, and the two sheets of stacked transects were also in production.

### Penrose Conferences

The Society sponsored two Penrose Conferences in 1989:

*Late Eocene-Oligocene Climatic and Biotic Evolution*, July 31-August 6, 1989, Rapid City, South Dakota; conveners: Donald R. Prothero, Philip R. Bjork, William A. Berggren.

*The Eocene Tectonic Transition: Oregon to Alaska*, September 4-10, 1989, Penticton, British Columbia; conveners: Ralph A. Haugerud, Randall R. Parrish, Raymond A. Price.

### Medal and Award Winners for 1989

Penrose Medal:

*Warren Bell Hamilton*

Day Medal:

*Dan McKenzie*

Young Scientist Award (Donath Medal):

*Mark Cloos*

New Honorary Fellows

*Gabriel Dengo*  
Apartado 468  
Guatemala City, Guatemala  
*Rushdi Said*

Intergeosearch

3801 Mill Creek Drive  
Annandale, Virginia 22003

Archaeological Geology Division Award:

*H. E. Wright, Jr.*

Gilbert H. Cady Award (Coal Geology Division):

*Robert M. Kosanke*

E. B. Burwell, Jr., Award (Engineering Geology Division):

*Robert B. Johnson and Jerome V. DeGraff*

George P. Woollard Award (Geophysics Division):

*Seiya Uyeda*

History of Geology Division Award:

*Albert V. Carozzi*

O. E. Meinzer Award (Hydrogeology Division):

*Stanley Nelson Davis*

G. K. Gilbert Award (Planetary Geology Division):

*Harrison Hagan Schmitt*

Kirk Bryan Award (Quaternary Geology & Geomorphology Division):

*Kevin M. Scott*

Structural Geology & Tectonics Division Career Contribution Award:

*John Rodgers*

## Report of the Treasurer

by Robert L. Fuchs



In 1989, GSA finances remained little changed from the prior year. The report of the Society's independent auditors, Deloitte & Touche, including financials for the six GSA sections, indicates total assets as of December 31, 1989, of \$19,492,260, up 1.5% from 1988's \$19,157,054. Liabilities and deferred revenues at the end of 1989 were \$3,069,896, resulting in a net worth of \$16,422,364, an increase of 0.6% from 1988's net worth of \$16,317,173. The Society continued in a strongly liquid position at year end, with cash and cash equivalents of \$4,884,322 (maturities less than three months).

Investment performance improved significantly in 1989 as compared to the prior year. Realized capital gains were \$379,919 against \$43,096 in 1988. In addition, interest and dividend income was up 6.1%, to \$1,024,426. At year end the carrying value of cash and investments was \$15,746,341, an increase of 1.6% over the previous year.

On the negative side, the Society's operating deficit increased threefold in 1989, to \$391,842, as a result of changes in two categories. The 1988 Centennial meeting generated a surplus of \$97,000, as compared to this year's annual meeting deficit of \$53,000, a negative swing of \$150,000. Net general and administrative costs increased \$141,000 or 16%, entirely the result of a noncash adjustment of \$200,000 to the balance sheet, representing a reclassification of GSA's 1980 start-up advance to the Foundation. If the large investment gains are included, revenue and support in 1989 essentially matched expenses.

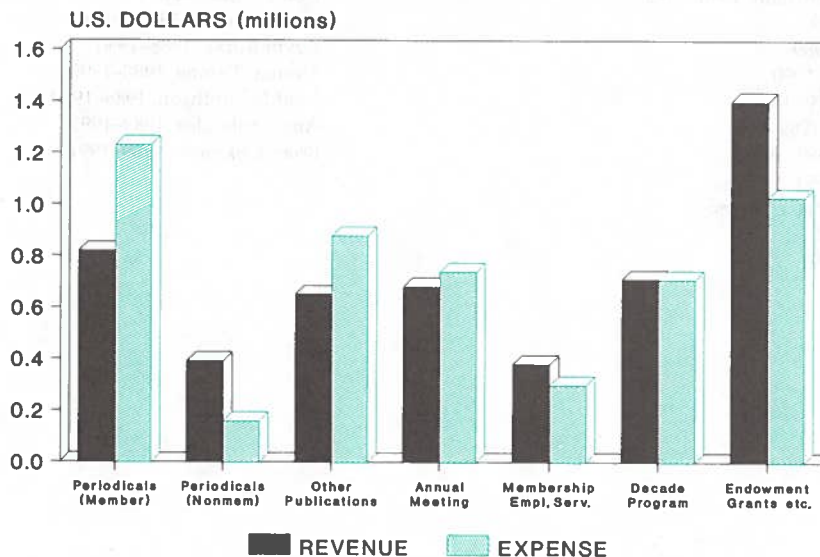
In the accompanying graph, revenues and expenses are allocated into the appropriate major sectors of the Society's activities. Support was required in Member Periodicals, Other Publications, and Annual Meeting. Support came from Nonmember Periodicals, Membership and Employment Service, and Endowment. Excess costs of the Decade program over sales are accrued, to be reimbursed by the GSA Foundation from sales of these publications. In this analysis we have placed general and administrative costs in the Endowment category. The graph clearly displays the continuing and important role played by the Penrose Endowment Fund and the Foundation in subsidizing GSA's publications.

The Society owns its offices and warehouse in Boulder, Colorado. Real estate book value is \$1,729,928; market value is appraised at \$3,855,000, more than twice the book value. GSA operations have rent-free use of a large amount of real property. This is another form of endowment support, less evident but still very important to the membership. New programs planned by the Society, particularly in the area of education, and the expansion of present activities will ultimately require enlarging present headquarters facilities. GSA and the Foundation are reviewing ways to finance this expansion.

The increase of 0.6% in net worth reverses 1988's decline of 1.2%. The investment portfolio value improved by a full percentage point more, the result of changes in money management in 1989. Further refinement was accomplished during the first quarter of 1990 with the transfer of the Society's fixed income portfolio to Delaware Investment Advisers and Warburg, Pincus Counsellors from the Bank of New York (formerly Irving Trust Company). This move also entailed hiring two new custodians for GSA's financial assets, Northern Trust and Fiduciary Trust.

The lack of growth in the Society's net worth during the past two years is troublesome. In part this can be attributed to the shift of contribution income to the GSA Foundation, which has now built its cash and investments to over \$800,000. However, the cash demands of the final phase of the DNAG program are a heavy burden on both the Society and the Foundation. The Executive Committee has appointed a special task force to review this situation and recommend action to preserve and improve the per member endowment value.

### 1989 REVENUES AND EXPENSES



## 1989 GSA Committees and Representatives

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### EXECUTIVE COMMITTEE

Randolph W. Bromery—President and Chairman  
Raymond A. Price, Vice-President  
Albert W. Bally, Past President  
Robert L. Fuchs, Treasurer  
William W. Hay, Council Member-at-Large

### AUDIT COMMITTEE

William W. Hay—Chairman, 1987–1989  
Priscilla C. Grew, 1988–1990  
Eldridge M. Moores, 1989–1991  
Ex Officio: Robert L. Fuchs

### COMMITTEE ON COMMITTEES

John S. Scott—Chairman  
Gerard C. Bond  
Robin Brett  
Erle G. Kauffman  
Eldridge M. Moores  
Mary Lou Zoback

### COMMITTEE ON THE ARTHUR L. DAY MEDAL AWARD

Eldridge M. Moores—Chairman, 1989  
Frederick A. Cook, 1987–1989  
Leigh H. Royden, 1987–1989  
Russell S. Harmon, 1988–1990  
Samuel M. Savin, 1988–1990  
Bruce D. Marsh, 1989–1991  
Denis M. Shaw, 1989–1991

### COMMITTEE ON EDUCATION

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(term ends March 31, 1989)  
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(term begins April 1, 1989)  
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M. Gordon Wolman, January 1, 1987–December 31, 1989

#### 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—

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Donald E. Hattin, 1987–1990  
Donald L. Baars, 1988–1991  
Paul R. Seaber, 1989–1992 (Representative-elect; term begins during NACSN meeting in St. Louis)

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

#### GSA REPRESENTATIVE ON U.S. NATIONAL COMMITTEE ON ROCK MECHANICS (USNCORM)

Richard W. Galster, July 1, 1986–June 30, 1992

#### GSA REPRESENTATIVE TO U.S. NATIONAL COMMITTEE ON TUNNELING TECHNOLOGY

Richard E. Gray, July 1, 1986–June 30, 1992



**PENROSE MEDAL**

Recipient: *Warren Bell Hamilton*  
U.S. Geological Survey  
Denver, Colorado

Citationist: *William R. Dickinson*  
University of Arizona  
Tucson, Arizona



**ARTHUR L. DAY MEDAL**

Recipient: *Dan McKenzie*  
Bullard Laboratories  
Cambridge, England

Citationist: *John G. Sclater*  
University of Texas  
Austin, Texas



**YOUNG SCIENTIST AWARD (DONATH MEDAL)**

Recipient of the *first* Donath Medal:  
*Mark Cloos*  
University of Texas  
Austin, Texas

Shown with  
*Dr. and Mrs. Fred A. Donath*  
Long Beach, California

Citationist: *Ronald L. Shreve* (not shown)  
University of California  
Los Angeles, California

Preliminary Announcement and Call for Papers  
**CORDILLERAN SECTION, GSA, 87th Annual Meeting  
and the Seismological Society of America**  
San Francisco, California  
March 25–27, 1991

The Cordilleran Section of the Geological Society of America will meet jointly with the Seismological Society of America, the Pacific Coast Section of the Paleontological Society of America and the Far Western Section of the National Association of Geology Teachers at the Cathedral Hill Hotel in San Francisco. The meeting is being hosted by the Department of Geosciences, San Francisco State University.

### ENVIRONMENT

The meeting will be held at the Cathedral Hill Hotel on Van Ness Avenue in the heart of downtown San Francisco. Certainly one of the most beautiful and exciting cities in the world, San Francisco abounds with the best of restaurants, entertainment, and cultural events. Only a short walk from the hotel or a few minutes by car or public transportation are Golden Gate Park with the California Academy of Sciences, several fine museums, Fisherman's Wharf, Ghirardelli Square, the Cannery, Chinatown, Union Square, Ocean Beach, Japantown, and many other attractions. The weather in late March should be spring-like, with mild temperatures. The probability of a large earthquake occurring (magnitude 7 or greater) nearby during the course of the meeting is considered to be much less than 1%.

### CALL FOR PAPERS

Papers are invited for presentation in oral technical sessions, symposia, theme sessions, and poster sessions. Papers dealing with all aspects of the Cordilleran region of North America, as well as those of general geologic interest, will be considered for the program. Technical sessions will allow 15–20 minutes for presentation and discussion. Symposia and theme sessions may allow equivalent or longer times for presentation at the option of conveners and symposium coordinators.

### FIELD TRIPS

Both premeeting and postmeeting field trips are planned. For details, contact the respective field trip leaders. General questions should be addressed to Field Trip Coordinator Clark Blake, U.S. Geological Survey, MS 975, 345 Middlefield Road, Menlo Park, CA 94025, (415) 329-4951. Preregistration forms will be available in the Final Announcement in the December 1990 issue of *GSA News & Information*.

### Premeeting

1. **Comparison of Structural and Metamorphic Histories of Terranes of the Western Sierra Nevada, California** (3 days). Scott Paterson, Department of Geological Sciences, University of Southern California, Los Angeles, CA 90089, (213) 743-3388; Richard Schweickert, University of Nevada, Reno; Othmar Tobish, University of California, Santa Cruz; Robert Miller, San Jose State University.

2. **Franciscan Complex, Coast Range Ophiolite and Great Valley Sequence: Pacheco Pass to Del Puerto Canyon** (2 days). Allan Bennison, 125 West 15th St., Tulsa, OK 74119, (918) 587-0091; Will Elder, USGS, Menlo Park; Gary Ernst, Stanford University; Clark Blake, USGS, Menlo Park; Brett Cox, USGS, Menlo Park; Tor Nilsen, Applied Earth Technology, Inc.; Tekla Harms, Amherst College.

3. **Tectonic Framework, Loma Prieta Area** (1 day). Bob McLaughlin, U.S. Geological Survey, MS 975, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-4945.

4. **Structural Development, East Bay Hills** (1 day). David Jones, Department of Geology and Geophysics, University of California, Berkeley, CA 94720, (415) 642-2514; Garniss Curtis, University of California, Berkeley.

5. **Sedimentology and Stratigraphy of the Merced Formation, San Francisco** (1 day). Ed Clifton, U.S. Geological Survey, MS 999, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 345-3112.

6. **Quaternary Tectonics of the Northern San Andreas Fault, San Francisco Peninsula, Point Reyes, and Point Arena** (2 days). Carol Prentice, U.S. Geological Survey, MS 977, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-5690; Tina Niemi, Stanford University; Tim Hall, Geomatrix Consultants.

7. (Tentative) **Marine Geology Trip to San Francisco Bay and Continental Shelf** (1 day). James Gardner, U.S. Geological Survey, MS 999, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 354-3087.

### Postmeeting

8. **Geology and Wine of Sonoma County** (1 day). Terry Wright, Department of Geology, Sonoma State University, Rohnert Park, CA 94328, (707) 664-2304.

9. **Geology of the Sutter Buttes** (2 days). Brian Hausback, Geology Department, California State University, 6000 J St., Sacramento, CA 95819, (916) 278-6521; Tor Nilsen, Applied Earth Technology, Inc.

10. **Both Sides of the San Andreas Fault: San Francisco to Point Reyes** (2 days). Clyde Wahrhaftig, U.S. Geological Survey, MS 904, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-5697; Earl Brabb, USGS, Menlo Park.

11. **Soils, Geomorphology, and Paleoseismology along the Hayward Fault near Point Pinole** (1 day). Glenn Borchardt, California Division of Mines and Geology, 380 Civic Drive, Pleasant Hill, CA 94523, (415) 643-5926.

12. **Geological Setting of the San Francisco Bay Area** (1 day). Raymond Sullivan and Jon Galehouse, Department of Geosciences, San Francisco State University, San Francisco, CA 94132, (415) 338-7730.

### SYMPOSIA

The following symposia will include both invited papers and selected volunteered papers. Three joint GSA-SSA symposia will highlight the meeting. Prospective authors are encouraged to contact the respective conveners.

1. **Neotectonic Framework and Seismic Hazards of the San Andreas Transform Boundary—Hollister to Cape Mendocino** (GSA-SSA). David Schwartz, U.S. Geological Survey, MS 977, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-5651; Carol Prentice, USGS, Menlo Park; Patrick Williams, Lawrence Berkeley Laboratory.

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**CORDILLERAN/Seismological** continued from p. 259

- 2. Tectonics of the West Coast of North America: Geological and Geophysical Constraints (GSA-SSA).** Walter Mooney, U.S. Geological Survey, MS 977, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-4764; Phil Gans, Stanford University.
- 3. Volcanic Hazards and Cenozoic Volcanism in the Cordillera (GSA-SSA).** Steve McNutt, California Division of Mines and Geology, 630 Bercut Drive, Sacramento, CA 95814, (916) 322-9317; Gail Mahood, Stanford University.
- 4. Paleobiology of Oceanic Islands (Paleontological Society).** Matthew James, Department of Geology, Sonoma State University, Rohnert Park, CA 94928, (707) 664-2301.
- 5. Geosciences Department: Collective Effort in a Changing World. (National Association of Geology Teachers).** Howard Stensrud, Department of Geology and Physical Sciences, California State University, Chico, CA 95929, (916) 859-5262; Dorothy Stout, GSA Education Committee, Cordilleran Section.
- 6. San Francisco Bay System—Past, Present and Future.** Doris Sloan, Department of Geology and Geophysics, University of California, Berkeley, CA 94720, (415) 642-3703; Ed Clifton, USGS, Menlo Park.
- 7. Improving Scientific Literacy Through Innovative Earth Science Education Programs.** Edward Geary, Department of Geology, San Jose State University, San Jose, CA 95192, (408) 924-5020; Carol Stadium, California State University, Fullerton; Leslie Gordon, USGS, Menlo Park.
- 8. Cordilleran Pluton Tectonics.** Scott Paterson, Department of Geological Sciences, University of Southern California, Los Angeles, CA 90089, (213) 743-3388; Robert Miller, San Jose State University.
- 9. Salinia to Baja: How Allochthonous Are They?** David Howell, U.S. Geological Survey, MS 902, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-5430.
- 10. Recognition and Controls of Depositional Sequences on Tectonically Active Margins.** Scott Morgan, Exxon Production Research, P.O. Box 2189, Houston, TX 77252, (713) 965-7621; Karen Grove, San Francisco State University, (415) 338-7727.
- 11. Use of Hydrogeologic Models in Governmental Decision-making.** Tim Durbin, Hydrologic Consultants, Inc., 260 Russell Blvd., Suite B, Davis, CA 95616, (916) 756-0925; Jeff Lefkoff, Hydrologic Consultants, Inc.
- 12. Geologic Hazards in the Submarine Environment.** Gary Greene, U.S. Geological Survey, MS 999, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 354-3078; Sam Clarke, USGS, Menlo Park; Michael Kennedy, California Division of Mines and Geology.
- 13. Trans-Alaska Crustal Transect (TACT).** Warren Nokleberg, U.S. Geology Survey, MS 904, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-5732; Robert Page, USGS, Menlo Park.

### THEME SESSIONS

Theme sessions are similar to symposia in their focus on specific topics, but each is an open forum where all papers are volunteered (whereas symposia include many invited papers). Prospective authors are encouraged to contact the respective conveners. The following theme sessions have been proposed and will be held if enough relevant papers are submitted.

- 1. Landslides along the Pacific Coast.** David Keefer, U.S. Geological Survey, MS 998, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-4893; John Galloway, USGS, Menlo Park.
- 2. Construction of Miogeoclinal Carbonate Platforms.** Calvin Stevens, Department of Geology, San Jose State University, San Jose, CA 95192, (408) 924-5029; Harry Cook, USGS, Menlo Park.

- 3. Geosciences and the Arts.** Ray Pestrong, Department of Geosciences, San Francisco State University, San Francisco, CA 94132, (415) 338-2080.
- 4. Geology and Geophysics of the San Jose 1:100,000 Sheet (Poster Session).** Clark Blake, U.S. Geological Survey, MS 975, 345 Middlefield Rd., Menlo Park, CA 94025, (415) 329-4951; Carl Wentworth, USGS, Menlo Park.

### ABSTRACTS

Abstracts are limited to about 250 words and must be submitted camera-ready on the official 1991 GSA abstract form, available from the Abstracts Coordinator, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, (303) 447-8850.

### ABSTRACTS DEADLINE: NOVEMBER 15, 1990

An original and five copies are required for each abstract. Authors of symposium or theme-session papers should send their abstracts directly to the appropriate convener (see lists above). Other abstracts should be sent to Technical Program Chairman Ivan Wong, Woodward-Clyde Consultants, 500 12th St., Suite 100, Oakland, CA 94607.

Abstracts will be reviewed for informative content and format, appropriate geographic coverage (Cordilleran region), and originality. Only one volunteered paper may be presented by each individual, although a person may also co-author papers presented by others and may present additional papers invited for symposia.

### PROJECTION EQUIPMENT

All slides must be 2" x 2" and fit standard 35-mm carousel trays. Two projectors and two screens will be available for all oral sessions. Overhead projectors will *not* be available. Please bring loaded carousel trays, if possible.

### POSTER SESSIONS

Poster sessions will be located adjacent to the exhibit area. If you wish to take advantage of this highly effective means of communication, please indicate your preference for a poster session on the GSA abstract form.

### EXHIBITS

Exhibits will be located on the main floor of the hotel. The cost of standard booths will be \$300 for commercial exhibitors and \$150 for educational or nonprofit institutions. For further information and space reservations, please contact Exhibits Chairman Jim Marone, Bechtel Corporation, P.O. Box 3965, MS 45/31, San Francisco CA 94119, (415) 768-7297.

### SCIENCE THEATER

A science theater will be running concurrently with the technical sessions, offering the latest geological films of both professional and educational interest. For further information, contact Richard Lambert, Skyline College, 3300 College Drive, San Bruno CA 94066, (415) 355-7000, ext. 4162.

### GEOLOGIC PHOTO CONTEST

A photo contest, open to all registrants, will tap the broad spectrum of geologic aesthetics. Details will be available in the Final Announcement. For further information, contact Ray Pestrong, Department of Geosciences, San Francisco State University, San Francisco, CA 94132, (415) 338-2080.

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CORDILLERAN/Seismological continued from p. 260

#### STUDENT SUPPORT

The GSA Cordilleran Section has funds available for grants to support GSA Student Associates of the Cordilleran Section who are presenting papers at the meeting. Students are strongly encouraged to apply for these grants, and we anticipate that most students who qualify will be funded to some degree. Send applications to Section Secretary Bruce A. Blackerby, Department of Geology, California State University, Fresno, CA 93740, (209) 278-2955 (direct) or 278-3086 (department). Applications should include certification that the student is a GSA Student Associate of the Cordilleran Section. *All letters must be received by January 31, 1991.*

#### SPECIAL EVENTS

After-hours events will include a no-host welcoming party for all registrants on Sunday evening, and alumni gatherings on Tuesday evening. The annual luncheons for the Seismological Society of America and the Paleontological Society of America will be held Tuesday at noon.

#### ACCOMMODATIONS

A large block of rooms at the Cathedral Hill Hotel, site of the meeting, has been reserved for attendees. A special reduced price of \$89 per night for single or double occupancy has been arranged. This rate represents an excellent value for lodging in downtown San Francisco; attendees are strongly urged to make their reservations early. Reservation forms will be available in the Final Announcement.

#### DETAILED INFORMATION

Information concerning registration, accommodations, and activities will appear in the December 1990 *GSA News & Information* and as part of the Cordilleran Section *Abstracts with Programs* for 1991. Preliminary questions and suggestions should be addressed to one of the co-chairmen: Ray Sullivan, Department of Geosciences, San Francisco State University, San Francisco, CA 94132, (415) 338-7730, or Ivan Wong, Woodward-Clyde Consultants, 500 12th Street, Suite 100, Oakland, CA 94607, (415) 874-3014.

## GEOPHYSICAL FRAMEWORK OF THE CONTINENTAL UNITED STATES

*edited by L.C. Pakiser and Walter D. Mooney, 1990*

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# OVERVIEW OF GSA 1990

## SYMPOSIA

- S1. Seafloor Hydrothermal Mineralization: New Developments, SEG. *Oct. 28 a.m.*
- S2. Geologic Setting and Generation of Very Large Volcanic-Hosted Massive Sulfide Deposits, SEG. *Oct. 28 a.m.*
- S3. The Origin of Animals, PS. *Oct. 30 a.m.*
- S4. Active Tectonics in the Mid-Continent, Engineering Geology Division. *Oct. 29 a.m.*
- S5. Extinction and Recovery of Plankton from the K/T Boundary Event, CF and SEPM/N. Amer Micropaleo Section. *Oct. 30 a.m.*
- S6. Thermodynamic Mixing Properties of Petrologically Important Minerals, MSA. *Oct. 29 p.m.*
- S7. Geoscience Organizations: Their Efforts and Impact on Geoscience Education, NAGT. *Oct. 29 p.m.*
- S8. Geochemistry of Metalliferous Black Shales, GS—ODG and IGCP/Group 254. *Oct. 28 p.m.*
- S9. Transient Responses to Global Change: The Geomorphic and Hydrologic Record, Hydrogeology and Quaternary and Geomorphology Divisions, Parts I & II. *Oct. 31 a.m./p.m.*
- S10. Oxygen and Carbon Isotopes in Paleozoic and Early Mesozoic Marine Sediments: Toward a Global Isotope Stratigraphy, GS. *Oct. 30 a.m.*
- S11. Geology of Venus, Planetary Geology Division. *Oct. 30 a.m.*
- S12. The Effects of Scale on Archaeological and Geological Perspectives, Archaeological Geology Division. *Oct. 30 p.m.*
- S13. Geological Societies and Information Transfer in the Electronic Age, GIS. *Oct. 29 a.m.*
- S14. Salt Tectonics, Structural Geology and Tectonics Division. *Oct. 29 a.m.*
- S15. The Effects of Past Global Change on Life, NAS/NRC and 1990 Annual Meeting Committee. *Oct. 29 p.m.*
- S16. Eustasy: The Ups and Downs of a Major Concept, History of Geology Division. *Oct. 29 a.m.*
- S17. Practical Applications of Coal Geology, Coal Geology Division. *Oct. 29 a.m.*
- S18. Structure, Tectonics, and Geophysics of the Southern Margin of North America, Geophysics Division. *Oct. 30 a.m.*
- S19. Geological Overviews, 1990 Annual Meeting Committee. *Oct. 31 a.m.*

## ASSOCIATED SOCIETIES SPONSORING SESSIONS

- CF .....Cushman Foundation
- GS .....Geochemical Society
- GIS .....Geoscience Information Society
- MSA .....Mineralogical Society of America
- NAGT .....National Association of Geology Teachers
- PS .....Paleontological Society
- SEG .....Society of Economic Geologists

## THEME SESSIONS

- T1. Strontium Isotopes and Sedimentary Geology. *Oct. 29 a.m.*
- T2. Mesozoic Tectonic Evolution of Mexico and the Gulf of Mexico. *Oct. 30 p.m.*
- T3. Problems and Solutions to Monitoring Ground Water in Karst Terranes, Hydrogeology Division. *Nov. 1 p.m.*
- T4. Cretaceous/Tertiary Boundary Sections in the Southern United States. *Oct. 31 p.m.*
- T5. Hydrogeology of Arid Regions, Hydrogeology Division. *Oct. 29 a.m.*
- T6. Erosional Landscapes of the South-Central United States. *Nov. 1 p.m.*
- T8. Geologic Effects of Hurricane Hugo. *Nov. 1 a.m.*
- 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. *Oct. 29 p.m.*
- T10. Effects of the Loma Prieta Earthquake, Engineering Geology Division. *Oct. 30 p.m.*
- T11. Amino Acid Geochemistry: Applications in Stratigraphy and Geochronology. *Oct. 30 a.m.*
- T12. Metageology: Expanding Geologic Awareness, Parts I & II. *Oct. 30 a.m./p.m.*
- T13. Late Proterozoic Evolution of Organisms and Environments. *Oct. 30 p.m.*
- T14. Regulatory Geology: Site and Performance Evaluations in the Face of Geological Uncertainty. *Oct. 31 p.m.*
- T16. Paleosols and Subaerial Exposure Surfaces in Carbonate Sequences. *Nov. 1 a.m.*
- T17. Upper Cretaceous Stratigraphy and Paleontology, U.S. Gulf Coastal Plain and Adjacent Regions. *Oct. 31 a.m.*
- T18. Isotope Fractionations in Organic Matter: Biosynthetic and Diagenetic Processes. *Oct. 29 p.m.*
- T19. Calibration of Controls on Stratigraphic Sequences, Parts I & II, Sedimentary Geology Division. *Oct. 31 a.m./p.m.*
- T20. Geoscience Transects (Posters), Geophysics Division. *Oct. 30 p.m.*
- T21. Applications of Organic Matter Biomarkers in Sedimentary Geology. *Oct. 29 p.m.*
- T22. Salt Tectonics, Structural Geology and Tectonics Division. *Oct. 29 p.m.*
- T23. Tectonostratigraphic Correlation of Late Cretaceous—Early Tertiary Island Arc-Rocks in the Caribbean Region, International Division. *Nov. 1 a.m.*
- T24. Geological Resources, Hazards, and Populations. *Nov. 1 p.m.*
- T25. Friction Melting Processes and Products in Geologic Materials. *Oct. 31 p.m.*
- T26. Writing Assignments: A Tool for Teaching and Learning Geology, Part I (Posters), Parts II & III, NAGT. *Oct. 30 p.m., Oct. 31 a.m./p.m.*
- T27. Geochemistry and Global Change. *Oct. 30 p.m.*
- T30. Granites/Rhyolites: Interrelations, Processes, Geometries, Geochemistries, Parts I & II. *Oct. 31 a.m./p.m.*
- T31. Water and Volcanoes. *Oct. 29 a.m.*
- T33. Opportunities for Scientific Drilling in the Continental Crust: Shallow- to Intermediate-Depth Projects. *Oct. 30 p.m.*

# ANNUAL MEETING PROGRAM

## PROGRAM BY SCIENTIFIC DISCIPLINES

KEY: I, II, ... X = Discipline session number; P = Posters; S = Symposium;  
T = Theme Session (listed under disciplines having the majority of the abstracts).

DISCIPLINE	SUN, OCT. 28 8:00 a.m.–12:00 N 1:00–5:00 p.m.		MON, OCT. 29 8:00 a.m.–12:00 N 1:00–5:00 p.m.		TUES, OCT. 30 8:00 a.m.–12:00 N 1:30–5:30 p.m.		WED, OCT. 31 8:00 a.m.–12:00 N 1:30–5:30 p.m.		THURS, NOV. 1 8:00 a.m.–12:00 N 1:00–5:00 p.m.	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
ARCHAEOLOGY					I	S12				
COAL			S17	I			P			
COMPUTERS						P				
ECONOMIC	S1	S2	I		P	II	III			IV
ENGINEERING			S4	T9	P	T10		I		T24
ENVIRONMENTAL			P	T9	T12	T12		I		
EXPERIMENTAL PETROLOGY						P				I
GEOCHEMISTRY		S8	I, T1	II,III T18, T21	IV,S10	V,T27 P	VI	VII,VIII	IX,X	P
GEOLOGY EDUCATION				S7		P	T26	T26		I
GEOMORPHOLOGY			P		I					T6
GEOPHYSICS					S18	I, T20	P			
GEOSCIENCE INFORMATION			S13			I, P				
HISTORY			S16		I					
HYDROGEOLOGY			T5	I	P		S9	S9, T14	II	T3
IGNEOUS PETROLOGY						I	T30	II, T30	III	P
MARINE				P					I	
METAMORPHIC PETROLOGY			I		II		III	P		IV
MICROPALEONTOLOGY				P	S5		I			
MINERALOGY/ CRYSTALLOGRAPHY				S6			I	P		
PALEOCEANOGRAPHY/ PALEOCLIMATOLOGY				P		I				II
PALEONTOLOGY			I	II	S3		P	III,T4 T31	IV,P	V
PETROLEUM			P							
PLANETARY				I	S11		P			
PRECAMBRIAN						T13,P		I		
QUATERNARY				I	T11	II	S9	S9, P	III	
SEDIMENTOLOGY				P	I				II,III T8	IV
SEDIMENTARY PETROLOGY			I	II		III			T16,P	
STRATIGRAPHY			P				T17, T19	T19	I	II
STRUCTURAL			S14	I, T22	II, P	III	IV	V, T25		
TECTONICS				I, T22	II	T2, T20P	III, P	IV	V, P, T23	VI
VOLCANOLOGY			T31			P				I

**OCTOBER 31**  
**Wednesday A.M.**

SESSION 85, 8:30 a.m., DCC:W 107  
CF—MICROPALAEONTOLOGY

SESSION 86, 8:00 a.m., DCC:West Hall  
COAL GEOLOGY (POSTERS)

SESSION 87, 9:00 a.m., DCC:W Blrm B  
GEOLOGICAL OVERVIEWS (S19)

SESSION 88, 8:00 a.m., DCC:West Hall  
GEOPHYSICS (POSTERS)

SESSION 89, 8:00 a.m., DCC:W 108-115  
GS—GEOCHEMISTRY VI: SEDIMENTARY GEOCHEMISTRY

SESSION 90, 8:00 a.m., DCC:Theater  
HYDROGEOLOGY AND QUATERNARY GEOLOGY AND GEOMORPHOLOGY  
DIVISIONS SYMPOSIUM (S9): TRANSIENT RESPONSES TO GLOBAL  
CHANGE: THE GEOMORPHIC AND HYDROLOGIC RECORD (PART I)

SESSION 91, 8:00 a.m., DCC:W 116  
MSA—METAMORPHIC PETROLOGY III: METAMORPHIC FLUID-ROCK  
INTERACTION AND FLUID FLOW STUDIES

SESSION 92, 8:00 a.m., DCC:W 109  
MSA—MINERALOGY I

SESSION 93, 8:00 a.m., DCC:West Hall  
PLANETARY GEOLOGY AND REMOTE SENSING (POSTERS)

SESSION 94, 8:00 a.m., DCC:West Hall  
PS—PALEONTOLOGY: PALEOZOIC PALEONTOLOGY (POSTERS)

SESSION 95, 8:00 a.m., DCC:W 117  
SEG—ECONOMIC GEOLOGY III: MOSTLY MVT DEPOSITS

SESSION 96, 8:00 a.m., DCC:W Blrm A  
STRUCTURAL GEOLOGY IV: THRUST AND FOLD BELTS

SESSION 97, 8:00 a.m., DCC:W Blrm C  
TECTONICS III: CENOZOIC TECTONICS, WESTERN CORDILLERA,  
CARIBBEAN

SESSION 98, 8:00 a.m., DCC:West Hall  
TECTONICS (POSTERS I)

SESSION 99, 8:00 a.m., DCC:W 105-106  
T 17. UPPER CRETACEOUS STRATIGRAPHY AND PALEONTOLOGY, U.S.  
GULF COASTAL PLAIN AND ADJACENT REGIONS

SESSION 100, 8:00 a.m., DCC:W 101-103  
T 19. SEDIMENTARY GEOLOGY DIVISION: CALIBRATION OF CONTROLS ON  
STRATIGRAPHIC SEQUENCES (PART I)

SESSION 101, 8:00 a.m., DCC:W 102-104  
T 26. NAGT: WRITING ASSIGNMENTS: A TOOL FOR TEACHING AND  
LEARNING GEOLOGY (PART I)

SESSION 102, 8:00 a.m., DCC:W Blrm D  
T 30. GRANITES/RHYOLITES: INTERRELATIONS, PROCESSES,  
GEOMETRIES, GEOCHEMISTRIES (PART I)

**OCTOBER 31**  
**Wednesday P.M.**

SESSION 103, 3:45 p.m., DCC:W Blrm C  
ENGINEERING GEOLOGY

SESSION 104, 1:30 p.m., DCC:W Blrm C  
ENVIRONMENTAL GEOLOGY

SESSION 105, 1:00 p.m., DCC:W 108-115  
GS—GEOCHEMISTRY VII: FLUID INCLUSIONS

SESSION 106, 3:00 p.m., DCC:W 108-115  
GS—GEOCHEMISTRY VIII: STABLE ISOTOPES

SESSION 107, 1:30 p.m., DCC:Theater  
HYDROGEOLOGY AND QUATERNARY GEOLOGY AND GEOMORPHOLOGY  
DIVISIONS SYMPOSIUM (S9): TRANSIENT RESPONSES TO GLOBAL  
CHANGE: THE GEOMORPHIC AND HYDROLOGIC RECORD (PART II)

SESSION 108, 1:30 p.m., DCC:W 116  
MSA—IGNEOUS PETROLOGY II: XENOLITHS, ULTRAMAFIC ROCKS AND  
THE MANTLE

SESSION 109, 1:30 p.m., DCC:West Hall  
MSA—METAMORPHIC PETROLOGY (POSTERS)

SESSION 110, 1:30 p.m., DCC:West Hall  
MSA—MINERALOGY/CRYSTALLOGRAPHY (POSTERS)

SESSION 111, 1:30 p.m., DCC:W 102-104  
PRECAMBRIAN GEOLOGY

SESSION 112, 1:30 p.m., DCC:W 117  
PS—PALEONTOLOGY III: CLADISTICS AND PHYLOGENY

SESSION 113, 1:30 p.m., DCC:West Hall  
QUATERNARY GEOLOGY (POSTERS)

SESSION 114, 1:30 p.m., DCC:W 107  
STRUCTURAL GEOLOGY V: MODELS, EXPERIMENTS, STRAIN

SESSION 115, 1:30 p.m., DCC:W 105-106  
TECTONICS IV: PALEOZOIC, MESOZOIC AND EARLY TERTIARY TECTONICS  
OF THE CORDILLERA

SESSION 116, 1:30 p.m., DCC:W Blrm D  
T 4. CRETACEOUS/TERTIARY BOUNDARY SECTIONS IN THE SOUTHERN  
UNITED STATES

SESSION 117, 1:30 p.m., DCC:W 109  
T 14. REGULATORY GEOLOGY: SITE AND PERFORMANCE EVALUATIONS  
IN THE FACE OF UNCERTAINTY

SESSION 118, 1:30 p.m., DCC:W 101-103  
T 19. SEDIMENTARY GEOLOGY DIVISION: CALIBRATION OF CONTROLS ON  
STRATIGRAPHIC SEQUENCES (PART II)

SESSION 119, 3:30 p.m., DCC:W Blrm A  
T 25. FRICTIONAL MELTING PROCESSES AND PRODUCTS IN GEOLOGIC  
MATERIALS

SESSION 120, 2:15 p.m., DCC:W Blrm B  
T 26. NAGT: WRITING ASSIGNMENTS: A TOOL FOR TEACHING AND  
LEARNING GEOLOGY (PART II)

SESSION 121, 1:30 p.m., DCC:W Blrm A  
T 30. GRANITES/RHYOLITES: INTERRELATIONS, PROCESSES,  
GEOMETRIES, GEOCHEMISTRIES (PART II)

**Hyatt Regency Hotel:**

- Sedimentary Div. Breakfast, 7:00–9:00 a.m., Cascade Blrm. B
- AWG Breakfast, 6:45–10:00 a.m., Reunion Blrm. E
- Guest Hospitality, 8:00 a.m.–4:30 p.m., Regency Blrm.
- Guest Tour—Waxahachie Gingerbread Trail, 9:00 a.m.–3:00 p.m.
- Guest Tour—Autumn at the Arboretum, 12:00 N–3:00 p.m.
- Geophysics Div. Luncheon, 12:00 N–1:30 p.m., Cascade Blrm. B
- History Div. Luncheon, 12:00 N–1:30 p.m., Cascade Blrm. A
- Hydrogeology Div. Luncheon, 12:30–3:30 p.m., Reunion Blrm. E

- MSA Luncheon, 12:15–2:00 p.m., Reunion Blrm. F
- PS Luncheon, 12:15 a.m.–5:00 p.m., Reunion Blrms. B-C
- GIS 25th Anniversary Dinner, 6:00–9:30 p.m., Reunion Blrm. C

**WEDNESDAY, OCTOBER 31**

- Bachman Lake Fun Runs (5K/10K), 6:30 a.m.
- Dallas Convention Center:
- Registration, 7:30 a.m.–2:00 p.m.
  - Exhibits Open, 8:00 a.m.–4:00 p.m. (Last Day!)
  - Science Theater, 9:00 a.m.–4:30 p.m., Room WIII

**NOVEMBER 1**  
**Thursday A.M.**

- SESSION 122, 8:00 a.m., DCC:D 108-115  
GS—GEOCHEMISTRY IX: MINERAL DISSOLUTION
- SESSION 123, 10:00 a.m., DCC:W 108-115  
GS—GEOCHEMISTRY X: MINERALS AND MINERAL SURFACES
- SESSION 124, 8:00 a.m., DCC:W Blrm D  
HYDROGEOLOGY II
- SESSION 125, 8:15 a.m., DCC:W 117  
MARINE GEOLOGY
- SESSION 126, 8:00 a.m., DCC:W 102-104  
MSA—IGNEOUS PETROLOGY III: ANORTHOSITES AND GRANITIC ROCKS
- SESSION 127, 8:00 a.m., DCC:W 105-106  
PS—PALEONTOLOGY IV: PALEOBIOGEOGRAPHY
- SESSION 128, 8:00 a.m., DCC:West Hall  
PS—PALEONTOLOGY II: GENERAL PALEONTOLOGY AND PALEOBOTANY (POSTERS)
- SESSION 129, 8:15 a.m., DCC:W 116  
QUATERNARY GEOLOGY III
- SESSION 130, 8:00 a.m., DCC:West Hall  
SEDIMENTARY PETROLOGY (POSTERS)
- SESSION 131, 8:00 a.m., DCC:W 107  
SEDIMENTOLOGY II: FLUVIAL SEDIMENTOLOGY
- SESSION 132, 10:00 a.m., DCC:W 107  
SEDIMENTOLOGY III: QUANTITATIVE SEDIMENTOLOGY: OBSERVATIONS, PROCESSES, AND MODELS
- SESSION 133, 8:00 a.m., DCC:W 109  
STRATIGRAPHY I
- SESSION 134, 8:00 a.m., DCC:W Blrm B  
TECTONICS V: ACCRETIONARY PRISMS; ALASKA AND PACIFIC NORTHWEST TECTONICS
- SESSION 135, 8:00 a.m., DCC:West Hall  
TECTONICS (POSTERS)
- SESSION 136, 8:00 a.m., DCC:W Blrm A  
T 8. GEOLOGICAL EFFECTS OF HURRICANE HUGO
- SESSION 137, 8:00 a.m., DCC:W Blrm C  
T 16. PALEOSOLS AND SUBAERIAL EXPOSURE SURFACES IN CARBONATE SEQUENCES
- SESSION 138, 8:15 a.m., DCC:W 101-103  
T 23. INTERNATIONAL DIVISION: TECTONOSTRATIGRAPHIC CORRELATION OF LATE CRETACEOUS-EARLY TERTIARY ISLAND ARC ROCKS IN THE CARIBBEAN REGION

**NOVEMBER 1**  
**Thursday P.M.**

- SESSION 139, 1:00 p.m., DCC:West Hall  
GS—GEOCHEMISTRY (POSTERS II)
- SESSION 140, 3:00 p.m., DCC:W Blrm C  
MSA—EXPERIMENTAL PETROLOGY
- SESSION 141, 1:00 p.m., DCC:West Hall  
MSA—IGNEOUS PETROLOGY (POSTERS)
- SESSION 142, 1:00 p.m., DCC:W Blrm D  
MSA—METAMORPHIC PETROLOGY IV: FLUID INCLUSION, ISOTOPIC AND GEOCHEMICAL STUDIES OF METAMORPHIC ROCKS
- SESSION 143, 1:00 p.m., DCC:W Blrm C  
MSA—VOLCANOLOGY
- SESSION 144, 1:00 p.m., DCC:W 102-104  
NAGT—ENHANCING GEOLOGIC EDUCATION
- SESSION 145, 1:00 p.m., DCC:W 109  
PALEOCEANOGRAPHY/PALEOCLIMATOLOGY II
- SESSION 146, 1:00 p.m., DCC:W 108-115  
PS—PALEONTOLOGY V: EXTINCTION AND GENERAL PALEONTOLOGY
- SESSION 147, 1:00 p.m., DCC:W 105-106  
SEDIMENTOLOGY IV: SEDIMENTOLOGY AND STRATIGRAPHY
- SESSION 148, 1:00 p.m., DCC:W 117  
SEG—ECONOMIC GEOLOGY IV: POTPOURRI
- SESSION 149, 1:00 p.m., DCC:W 107  
STRATIGRAPHY II
- SESSION 150, 1:00 p.m., DCC:W Blrm B  
TECTONICS VI: CALEDONIDES-APPALACHIANS/PRECAMBRIAN
- SESSION 151, 1:00 p.m., DCC:W Blrm A  
T 3. HYDROGEOLOGY DIVISION: PROBLEMS AND SOLUTIONS TO MONITORING GROUND WATER IN KARST TERRANES
- SESSION 152, 1:00 p.m., DCC:W 117  
T 6. EROSIONAL LANDSCAPES OF THE SOUTH-CENTRAL UNITED STATES
- SESSION 153, 1:00 p.m., DCC:W 101-103  
T 24. GEOLOGICAL RESOURCES, HAZARDS AND POPULATION

- Meet the GSA Congressional Science Fellow, 12:15–1:15 p.m., W107

Hyatt Regency Hotel:

- Guest Hospitality, 8:00 a.m.–4:30 p.m., Regency Blrm.
- Guest Tour—The Aerobics Center: Walk Don't Run, 9:00 a.m.–1:30 p.m.
- Guest Tour—Fort Worth: Where the West Begins, 9:30 a.m.–3:30 p.m.
- Coal Div. Luncheon, 12:00 N–4:00 p.m., Reunion Blrm. A
- NAGT Luncheon, 11:45 a.m.–2:00 p.m., Reunion Blrm. E
- SEG Luncheon, 11:30 a.m.–2:00 p.m., Reunion Blrm. H
- Guest Tour—A Date With Dallas, 2:30–4:30 p.m.

- WILD WEST BARBECUE AND DANCE, 7:00–10:30 p.m., Longhorn Blrm.

**THURSDAY, NOVEMBER 1**

Dallas Convention Center:

- Science Theater, 9:00 a.m.–4:30 p.m., Room VIII
- T.A.C. (Thursday Afternoon Club), 3:30–5:00 p.m., West Hall
- Post-meeting Field Trips Begin, 5:00 p.m.

Hyatt Regency Hotel:

- Guest Hospitality, 8:00 a.m.–4:30 p.m., Regency Blrm.

## Position Available

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## Coordinator for Educational Programs

The Geological Society of America is committed to educational initiatives and seeks a full-time Coordinator for Educational Programs on the GSA staff in Boulder. A major new thrust for the Society in this area is called the SAGE Program (Scientific Awareness through Geological Education). Direction, development, and coordination of this program will be one of the prime responsibilities of the Coordinator for Educational Programs. The SAGE Program will serve the GSA Committees on Education, Minorities in the Geosciences, and Geology and Public Policy. Initially it will focus on the pre-college and public education sectors, but will have as its overall goal working with all relevant organizations to improve both public literacy about geology and the attractiveness of careers in geosciences.

The Coordinator must be a skilled organizer, motivator, fund raiser, and public spokesperson for quality educational activities. This is an excellent opportunity for a mid-career contribution to the leadership of reform in science education at all levels, with emphasis on the geological sciences.

### Qualifications desired:

- Ph.D. in some area of the geological sciences
- Strong personal commitment to science education
- Substantial knowledge of the problems and structure of science education
- Strong interest in public-issue education
- Demonstrated fund-raising ability
- Effective networking capabilities
- Outstanding ability to communicate and motivate
- Ability to work creatively and effectively with individuals and organizations at all levels.

Letters of application should include a full résumé; names, addresses, and telephone numbers of three professional references; and a statement of interest in and qualifications for the position. The salary range is \$50,000 to \$60,000 depending on qualifications and experience. The desired starting date is early 1991.

Nominations, applications, and supporting materials should be submitted no later than September 30, 1990, to:

Dr. F. Michael Wahl  
Executive Director  
Geological Society of America  
P.O. Box 9140  
Boulder, Colorado 80301

## GSA Annual Meetings

**1990 GSA Annual Meeting • Dallas, Texas**  
**October 29–November 1, 1990**

*Preregistration due*  
 September 28

*For information:*  
 GSA Meetings Department,  
 P.O. Box 9140, Boulder, CO 80301, (303) 447-2020



**1991 GSA Annual Meeting**  
**San Diego, California**  
**October 21–24, 1991**



R. Gordon Gastil, General Chair  
 Dept. of Geological Sciences  
 San Diego State University  
 San Diego, CA 92182

*Short course proposals due December 1, 1990*  
 GSA members and nonmembers are encouraged to submit short course proposals to be reviewed by GSA's Short Course Committee. For proposal guidelines contact: Edna Collis, Short Course Coordinator, GSA, P.O. Box 9140, Boulder, CO 80301; (303) 447-2020.

*Theme session and symposia proposals due January 1, 1991*  
 Technical Program: Richard W. Berry, Chair, and Gary H. Girty, Co-Chair; Dept. of Geological Sciences, San Diego State University, San Diego, CA 92182; (619) 594-5586.

For general information on program participation (1991 or beyond) contact: Sue Beggs, Meetings Manager, GSA Headquarters.

### Future

San Diego	October 21–24	.....	1991
Cincinnati	October 26–29	.....	1992
Boston	October 25–28	.....	1993
Seattle	October 24–27	.....	1994

## GSA Section Meetings

**1991 Section, Location, Dates**  
**Cordilleran**, Cathedral Hill Hotel  
 San Francisco, California, March 25–27

**North-Central**, University of Toledo  
 Toledo, Ohio, April 18–19

**Northeastern-Southeastern**  
 Omni Inner Harbor Hotel  
 Baltimore, Maryland  
 March 14–16

**Rocky Mountain–South-Central**  
 University of New Mexico  
 Albuquerque, New Mexico  
 April 22–24

*Contact*  
 Raymond Sullivan, Dept. of Geosciences, San Francisco State University, San Francisco, CA 94132, (415) 338-7730

Lon Ruedisili or Mark Camp, Dept. of Geology, University of Toledo, Toledo, OH 43606, (419) 537-2009

Emery Cleaves, Maryland Geological Survey, 2300 St. Paul Street, Baltimore, MD 21218, (301) 554-5504  
 Juergen Reinhardt, U.S. Geological Survey, 926 National Center, Reston, VA 22092, (703) 648-6789

G. Randy Keller, Dept. of Geological Sciences, University of Texas at El Paso, El Paso, TX 79968-0555, (915) 747-5501  
 John Geissman or Wolfgang Elston, Dept. of Geology, University of New Mexico, Albuquerque, NM 87131, (505) 277-4204

### Foundation to Fund Matching Student Travel Grants

The GSA Foundation will award matching grants up to a total of \$3000 each to the six GSA Sections. The money, when combined with equal funds from the Sections, will be used to assist students traveling to the 1990 GSA Annual Meeting in Dallas in October and 1991 Section meetings.

Travel grants will be awarded and administered by the Sections, whose officers should be contacted for further information.

**1992**

Cordilleran	.....	Eugene, Oregon
North-Central, April 16–17	.....	Iowa City, Iowa
Northeastern, March 26–28	.....	Harrisburg, Pennsylvania
Rocky Mountain	.....	Ogden, Utah
South-Central, February 24–25	.....	Houston, Texas
Southeastern, March 18–20	.....	Winston-Salem, North Carolina

# MEETINGS

(Asterisk indicates new or changed information)

## 1990

**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; phone 042-879-4141; fax 042-879-3066.

**IGCP Cretaceous Field Conference**, September 5–15, 1990, Jerusalem, Israel. Information: G. Gvirtzman, Geological Survey of Israel, 30 Malkhe Yisrael St., Jerusalem 95501, Israel; telex 26362 ENERGI; fax 972-2-381444.

**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. Information: Wolfgang Kalkreuth, Institute of Petroleum and Sedimentary Geology, 3303 33rd St. NW, Calgary, Alberta T2L 2A7, Canada; (403) 292-7119; fax 403-292-5377.

**\*Waste Management in Developing Countries**, September 10–11, 1990, Washington, D. C. Information: The Secretary, International Society of African Scientists, P.O. Box 9209, Wilmington, DE 19809.

**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.

**New Mexico Geological Society Annual Field Conference**, September 12–15, 1990, Red River, New Mexico. Information: Paul Bauer, New Mexico Bureau of Mines, Socorro, NM 87801; (505) 835-5106.

**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; (303) 443-2209.

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

**82nd Annual New England Intercollegiate Geological Conference**, with field trips in the Gaspé Peninsula, Quebec, September 21–22, 1990, Montreal, Quebec. Information: Walter Trzcienski, Dept. of Geology, University of Montreal, C.P. 6128, Succ. A, Montreal, Quebec H3C 3J7, Canada.

**Lessons Learned from Major Oil Spills: International Conference**, September 24–27, 1990, St. Petersburg, Florida. Information: Larry J. Doyle, Center for Nearshore Marine Science, University of South Florida, 140 7th Ave., St. Petersburg, FL 33701; (813) 893-9130.

**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.C. Box 4, Canberra, A.C.T. 2601, Australia; phone 062-49-3406; fax 61-62-490 738; telex 62693.

**Association of Ground Water Scientists and Engineers Annual Meeting**, September 25–26, 1990, Anaheim, California. Information: Jacqueline Mack, National Water Well Association, 6375 Riverside Dr., Dublin, OH 43017; (614) 761-1711; fax 614-761-3446.

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

**\*Workshop on the Death Valley–Yucca Flat Transect: A Combine Continental Scientific Drilling and Geodynamics Project**, October 1–3, 1990, Las Vegas, Nevada. Information: David J. Borns, OR 6233, Geochemistry Division, Sandia National Laboratories, P.O. Box 5800, Albuquerque, NM 87185; (505) 846-3572; fax 505-846-346.

**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 27 Greensburg, PA 15601; (412) 836-6813; fax 412-836-6817.

**Soils and Landscape Evolution, Binghamton Symposium in Geomorphology**, October 6–7, 1990, Binghamton, New York. Information: Peter L.K. Knuepfer, Dept. of Geological Science SUNY, Binghamton, NY 13901; (607) 777-2389; Leslie D. McFadden, Dept. of Geology, University of New Mexico, Albuquerque, NM 87131; (505) 277-2307.

**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.

**Geoscience Data Conference**, October 7–9, 1990, Dallas, Texas. Information: Infomart Registration Services, 1950 Stemmons Freeway, Dallas, Texas 75207; (214) 746-3500, fax 214-746-3501.

**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.

**International Symposium on Environmental Studies on Tropical Rain Forests**, October 7–13, 1990, Manaus, Brazil. Information: Organizing Committee—Forest '90, P.O. Box 3591, 2001 Rio de Janeiro, RJ, Brasil; phone 55-21-211-5581; telex 55-21-22395; fax 55-21-252-9269.

**Petroleum Computing in the '90s Symposium**, October 8–9, 1990, Midland, Texas. Information: Permian Basin Graduate Center, P.O. Box 1518, Midland, TX 79702; (915) 683-2832.

**5th Australasian Remote Sensing Conference**, October 8–12, 1990, Perth, Western Australia. Information: Golden West Convention, P.O. Box 411, West Perth, W.A. 6005, Australia; phone 619-32279; telex AA 95380; fax 619-4814029.

*Meetings continued on p. 2*



Meetings continued from p. 270

**American Institute of Professional Geologists Annual Meeting**, October 9–12, 1990, Long Beach, California. Information: Stephen M. Testa, Applied Environmental Services, 6695 E. Pacific Coast Highway, Second Floor, Long Beach, CA 90803; (213) 594-9485; fax 213-596-6376.

**American Association of Stratigraphic Palynologists Annual Meeting**, October 10–12, 1990, Banff, Alberta, Canada. Information: David J. McIntyre, Institute of Sedimentary and Petroleum Geology, 303-33 St. N.W., Calgary, Alberta T2L 2A7, Canada; (403) 292-7089.

**Coal and Coal Bed Methane: An Introduction to Sampling Techniques for the Petroleum Industry**, October 10–12, Calgary, Alberta. Information: Slavko Stuhec, Alberta Geological Survey, Alberta Research Council, P.O. Box 8330, Station F, Edmonton, Alberta T6H 5X2, Canada; (403) 438-7619.

**Society of Vertebrate Paleontology 50th Anniversary Meeting**, October 10–13, 1990, Lawrence, Kansas. Information: SVP 90, Vertebrate Paleontology Division, Museum of Natural History—Byche Hall, University of Kansas, Lawrence, Kansas 66045-2454; (785) 864-3216.

**Conference on Eastern Regional Ground Water Issues**, October 7–19, 1990, Springfield, Massachusetts. Information: FOCUS Eastern Conference, National Water Well Association, P.O. Box 182039, Dept. # 017, Columbus, OH 43218; (614) 761-1711.

**Geodynamics of the Arabian Plate**, October 20–25, 1990, Safat, Kuwait. Information: Waris E.K. Warsi, Dept. of Geology, University of Kuwait, P.O. Box 5969, Safat 13060, Kuwait; or Muawia Barazangi, NSTOC, Snee Hall, Cornell University, Ithaca, NY 14853-1504.

**Biodiversity and Landscapes: Human Challenges for Conservation in the Changing World**, October 22–25, 1990, University Park, Pennsylvania. Information: K. C. Kim, 117 Land and Water, Center for Biodiversity Research, Penn State, University Park, PA 16802; (717) 863-0159.

**Alberta Geological Survey Field Trip to the San Juan Basin**, October 24–26, Edmonton. Information: Dennis Nikols, Alberta Geological Survey, Alberta Research Council, P.O. Box 8330, Station F, Edmonton, Alberta T6H 5X2, Canada; (403) 438-7622; fax (403) 438-3364.

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

**Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection and Restoration**, October 31–November 2, 1990, Houston, Texas. Information: Petroleum Hydrocarbons Conference, National Water Well Association, P.O. Box 182039, Dept. # 017, Columbus, OH 43218; (614) 761-1711.

**Eastern Oil Shale Symposium**, November 6–8, 1990, Lexington, Kentucky. Information: Geaunita H. Caylor, Symposium Coordinator, University of Kentucky/OISTL, 201 Porter Bldg., Lexington, KY 40506-025; (606) 257-2820.

**Computational Science in Industry and the Comprehensive University**, November 8–10, 1990, Pomona, California. Information: Bruce P. Hillam, Dept. of Computer Science, California State

Polytechnic University, 3801 West Temple Avenue, Pomona, CA 91768; (714) 869-3440.

**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

**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.).

**Metalliferous Black Shales and Related Ore Deposits Symposia**, October 27–28, 1990, Dallas, Texas. Information: Bartholomew Nagy, Laboratory of Organic Geochemistry, Dept. of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-6973; Philip A. Meyers, Dept. of Geological Sciences, University of Michigan, Ann Arbor, MI 48109-1063, (313) 764-3335; Joel S. Leventhal, U.S. Geological Survey, MS 973 Denver Federal Center, Denver, CO 80225, (303) 236-1522; Lisa M. Pratt, Dept. of Geology, Indiana University, Bloomington, IN 47405, (812) 855-9203.

**\*AGU Fall Meeting**, December 3–7, 1990, San Francisco. Information: 1990 Fall Meeting, American Geophysical Union, 2000 Florida Avenue, N.W., Washington, DC 20009; (202) 462-6900; fax 202-328-0566. (*Abstracts deadline: September 6, 1990.*)

## 1991

**\*United Nations Institute for Training & Research/United Nations Development Programme, 5th International Conference on Heavy Crude and Tar Sands**, February 17–22, 1991, Caracas, Venezuela. Information: Sigfrid Steinhold S., 5th UNITAR/UNDP Conference, 801 U.N. Plaza, 5th Floor, New York, NY 10017; (212) 370-1122; fax (212) 986-5779.

**10th Annual Symposium on Caribbean Geology: Tectonics and Mineral Deposits of the Caribbean**, February 20–24, 1991, Mayagüez, Puerto Rico. Information: J. H. Schellekens, Dept. of Geology, University of Puerto Rico, P.O. Box 5000, Mayagüez, Puerto Rico 00709-5000; (809) 265-3845.

**Society for Mining, Metallurgy, and Exploration Annual Meeting**, February 25–28, 1991, Denver, Colorado. Information: Meetings Department, Society for Mining, Metallurgy, and Exploration, P.O. Box 625002, Littleton, CO 80162; (303) 973-9550; fax 303-979-3461.

**Second International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics** (including special session on the Loma Prieta [California] earthquake of October 17, 1989), March 11–15, 1991, St. Louis, Missouri. Information: Shamsheer Prakash, Dept. of Civil Engineering, 308

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Butler Carlton Hall, University of Missouri, Rolla, MO 65401-0249; (314) 341-4489; fax 314-341-4729.

**\*European Union of Geosciences, Sixth Biennial Meeting**, March 24–28, 1991, Strasbourg, France. Information: E.U.G. VI Organizing Committee, Institute of Mineralogy, University of Trieste, Piazzale Europa, 1-34100 Trieste, Italy.

**\*Petroleum-Reservoir Geology in the Southern Midcontinent**, March 26–27, 1991, Norman, Oklahoma. Information: Kenneth S. Johnson or Jock A. Campbell, Oklahoma Geological Survey, University of Oklahoma, 100 E. Boyd, Rm. N-131, Norman, OK 73019; (405) 325-3031.

**\*Engineering Geology and Geotechnical Engineering, 27th Symposium**, April 9–13, 1991, Logan, Utah. Information: James McCaLpin, Dept. of Geology, Utah State University, Logan UT 84322-4505; (801) 750-1220.

**\*Association of American Geographers Annual Meeting**, April 13–17, Miami, Florida. Information: AAG, 1710 16th Street NW, Washington, DC 20009-3198; (202) 234-1450. (*Paper and poster submissions deadline: September 24, 1990.*)

**International Conference on Environmental Pollution**, April 15–19, Lisbon, Portugal. Information: ICEP Conference Office, ICTR Secretariat, 11–12 Pall Mall, London SW1Y 5LU, England; phone 01-930-6825; telex 925312 REICO G; fax 01-976-1587.

**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.

**Association of Exploration Geochemists 15th International Geochemical Exploration Symposium**, April 29–May 1, 1991, Reno, Nevada. Information: Harold Bonham, 15th IGES, P.O. Box 9126, Reno, Nevada, 89507; (702) 784-6691; fax 702-784-1709.

**Eighth Thematic Conference on Remote Sensing for Exploration Geology**, April 29–May 2, 1991, Denver, Colorado. Information: Robert H. Rogers, ERIM Thematic Conferences, P.O. Box 8618, Ann Arbor, MI 48107-8618; (313) 994-1200.

**\*Society for the Preservation of Natural History Collections, 6th Annual Meeting**, May 6–11, 1991, Ottawa, Ontario. Information: G. R. Fitzgerald, Canadian Museum of Nature, Earth Sciences (Paleobiology), P.O. Box 3443, Station D, Ottawa, Ontario KIP 6P4, Canada.

**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.

**Brazil Gold '91**, May 13–17, 1991, Belo Horizonte, Brazil. Information Organizing Committee, Av. Afonso Pena, 3880-3/5 andares, 30130 Belo Horizonte MG, Brazil, or Charles Thorman, U.S. Geological Survey, Box 25046, MS 905, Denver Federal Center, Denver, CO 80225, (303) 236-5601; fax 303-236-5603.

**\*14th International Radiocarbon Conference**, May 20–24, 1991 Tucson, Arizona. Information: Austin Long, Dept. of Geoscience, University of Arizona, Tucson, AZ 85721; (602) 621-8888; fax 602-621-2672; telex 650-3839821.

**\*Geological Association of Canada–Mineralogical Association of Canada Annual Meeting** held jointly with the **Society of Economic Geologists**, May 27–29, 1991, Toronto, Ontario. Information: J. J. Fawcett, Dept. of Geology, Earth Sciences Center, University of Toronto, 22 Russell St., Toronto, Ontario M5S 3B1, Canada (416) 978-3027.

**11th International Symposium on Ostracoda**, July 8–13, 1991 Warrnambool, Victoria, Australia. Information: Peter J. Jones, Bureau of Mineral Resources, P.O. Box 378, Canberra A.C.T. 2601, Australia; phone (06) 249 9737; fax 06-257 6465.

**\*Sedimentary and Paleolimnological Records of Saline Lakes**, August 13–16, 1991, Saskatoon, Saskatchewan, Canada. Information: Robin W. Renaut, Dept. of Geological Sciences, University of Saskatchewan, Saskatoon, Saskatchewan S7N 0W0, Canada; fax 306-966-8593; W. M. Last, Dept. of Geological Sciences, University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada; fax 204-261-7587.

**SEPM Midyear Meeting—Continental Margins, Tectonics, Eustatic 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.

**1st International Meeting of Young Geologists**, August 22–24, 1991, Budapest, Hungary. Information: Anna Balog, Dept. of Geology, Technical University of Budapest, H-1521 Budapest, Hungary; phone (36-1) 16-67-370; fax 36-1-16-66-808; telex 225931.

**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 E. 47th St., New York, NY 10017; (212) 705-7139.

**\*Geometry of Naturally Deformed Rocks (John Ramsay Meeting)**, September 9–11, 1991, Zürich, Switzerland. Information: E. Povung, Geologisches Institut, ETH-Zentrum, CH-8092, Zürich, Switzerland; phone 256 36 80; fax 252-70-08. (*Abstracts deadline: June 1, 1991.*)

**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-4413 Münster, Federal Republic of Germany.

**\*Gold and Platinum in Central Africa**, September 11–13, 1991, Bujumbura, Burundi. Information: W. Pohl, Institute of Geosciences, Technical University, P.O. Box 3329, D-33 Braunschweig, Federal Republic of Germany.

**Second International Conference on the Abatement of Acid Drainage**, September 16–18, 1991, Montreal, Québec. Information: *Meetings continued on p. 2*

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Pamela Friedrich, Centre des Recherches Minérales, 1665, boulevard Lamel, Édifice 2, 1<sup>er</sup> étage, Québec, Québec G1N 3Y7, Canada.

1991 AAPG International Conference and Exhibition, September 19–October 2, 1991, London, England. Information: 1991 AAPG International Conference, P.O. Box 979, Tulsa, OK 74101-0979.

International Symposium on Debris Flow and Flood Disaster Protection, October 14–20, 1991, Emeishan City, Sichuan Province, China. Information: Tong Yuling, International Research and Training Centre on Erosion and Sedimentation (IRTCS), P.O. Box 366, Beijing, China 100044; phone 8413372; telex 22786 ITCES CN; fax 412539.

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

10th International Symposium on Environmental Geochemistry, September 16–19, 1991, Uppsala, Sweden. Information: Mats Olsson, Dept. of Forest Soils, Swedish University of Agricultural Sciences, Box 7001, S-750 07 Uppsala, Sweden; phone 46 18 672212; fax 6 18 300831. (Abstracts deadline: March 28, 1991.)

Geological Society of America Annual Meeting, October 21–24, 1991, San Diego, California. Information: GSA, Meetings Dept., P.O. Box 9140, Boulder, CO 80301; (303) 447-2020; fax 303-447-1133.

11th International Circum-Pacific Terrane Conference, November 1–28, 1991, Santiago, Chile. Information: D. G. Howell, U.S. Geological Survey, MS 902, 345 Middlefield Rd., Menlo Park, CA 94025; (415) 329-5430.

Geology of 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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# 1990 ANNUAL MEETING OCTOBER 29–NOVEMBER 1

Dallas Convention Center  
and Hyatt Regency Hotel  
Dallas, Texas



**PREREGISTRATION DEADLINE: SEPTEMBER 28**

For registration and housing information see the August issue of *GSA News & Information* or contact the Meetings Department, (303) 447-2020; GSA, P.O. Box 9140, Boulder, CO 80301.

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