



GSA news & information

VOLUME 3, NUMBER 7

G.S.A. ARCHIVES

JULY 1981

Publications Study Committee:

REPORT TO MEMBERS

The report of the Special Publications Study Committee was presented to Council at its meeting in Boulder, May 19 and 20, 1981. The report is lengthy, so members of the Committee have prepared the following summary of their recommendations to Council. Decisions on those recommendations are addressed in a report by the President that follows on page 107.

Responses to the Opinion Poll mailed in December 1980 demonstrate the loyalty and concern of members for their Society; the Society is very much alive if not entirely well. Approximately 5,000 members responded and several hundred took the time to express their thoughtful views in writing. The poll asked a specific question: If all members were to receive a journal as part of their membership benefits, which publication would they prefer, the *Bulletin* or *Geology*? Responses were evenly split (2,348 and 2,393, respectively), and a very large number took the initiative to indicate that they preferred to receive both journals. In the accompanying letters, concerns were expressed about the roles of the Society, the status of its publications, and about the high cost of membership in relation to benefits received. There also was widespread opposition to microfiche (although a few members wrote in support, too) and of relief that members were finally being consulted about a substantive issue.

Principal roles of the Society are to disseminate geologic information and to promote communication among earth scientists through meetings and publications. The issues addressed by the Committee concern the latter role, publications, but the roles cannot, of course, be viewed as completely separate issues. Publishing is a highly competitive business and competition can be ignored only at great peril. Competition is met by producing superior products at modest costs. Therefore, the Committee could not discuss publication problems without becoming involved in financial as well as scientific goals.

Publication expenditures can be divided simplistically into printing costs (composition, printing, binding, mail-

ing) and processing costs (manuscript handling, review, editing, mockup). The former are controlled by the marketplace and choices of page size, paper, and illustrations; the latter by methods and extent of editing as well as overhead costs. Printing costs have been higher than need be but are now reasonable and comparable to those of competing journals. Processing costs have been and still are too high. Most of the Committee's recommendations, therefore, address ways to increase the quality of publications, the efficiency of processing and possible ways to increase revenues to offset costs. The Society is not the first to have to evaluate its program with these goals in mind. Lessons from several other organizations indicate that unit-costs of products can be reduced most readily by reducing processing costs, by increasing circulation, and by augmenting income through voluntary page-charges, the sale of appropriate advertising, grant solicitations, more aggressive marketing and income-generating programs such as reprint-volume publication, short-courses and the sale of course-notes, audiovisual tapes of symposia and other appropriate means of serving the profession, all of which require more widespread membership participation.

Although the Society has published classics in its *Memoirs*, *Special Papers*, and *Maps and Charts*, the principal vehicles for disseminating information will continue to be the *Bulletin* and *Geology*. Combining the journals would reduce costs somewhat (we estimate by 15 percent) but would diminish flexibility because they serve different purposes and partially different audiences. Moreover, poll results demonstrate a demand for each, even though both are aimed at generalist audiences in the earth sciences.

The Committee is unanimous in recommending that all members receive at least one journal as part of annual membership. Press runs exceeding 10,000 will not only result in considerably reduced unit-costs, but will make a journal more attractive to authors and possible advertisers.

(continued next page)

No consensus arose from either member responses to the opinion poll or Committee deliberations as to which of several options to pursue. Therefore, alternatives presented to Council were: (1) that all members receive both journals; (2) that all members receive the *Bulletin* (the Society's flagship) with an option to subscribe to *Geology* at reduced cost; (3) that members be given the option to choose the journal they prefer. The Committee favors alternatives (1) or (2), but all are workable. The third does not assure maximum press runs so has the highest unit costs; the second penalized those who prefer *Geology*; the first produces the lowest unit costs but means some would receive a journal they possibly do not want. Each of the options would produce economies, relative to the current system, that would result in lower costs of publications to members.

Revitalization of Society publications requires improvements in content through more aggressive editorial leadership and management. Therefore, significant changes are suggested in the publication structure, with increased responsibility and authority particularly at the level of editorial selectivity, innovation, and decision-making. Separation of scientific editorial responsibilities from production management is urged. The Boulder headquarters should remain the publishing and management center, but editorial leadership and manuscript acceptance should rest with Society members who are separate from the headquarters staff. Moreover, the Committee recommended to Council the kinds of scientists who should be involved as editors.

The Committee was unanimous on all further recommendations. We recommend that:

1. The *Bulletin* be published as a one-part printed journal and that the two-part format be abandoned.

2. Microfiche copies of the *Bulletin* and *Geology* be an option available to members and subscribers at the same price as printed issues of the journals.

3. Voluntary page-charges be reinstated for manuscripts accepted for publication in both the *Bulletin* and *Geology*.

4. Grant and gift funds, rather than page-charges, be sought toward publication of *Memoirs* and *Maps and Charts*.

5. Profession-related advertising be accepted for *Geology*, the *Bulletin*, *News & Information*, and *Programs and Abstracts* of both annual and sectional meetings.

6. *News & Information* be continued as a separate monthly publication but that it be printed less expensively on cheaper paper and in larger format.

7. The use of bank credit cards be instituted as a service to members for payment of dues, registration at meetings, and purchase of Society publications.

8. *Special Papers* be dropped as a series in favor of *Memoirs* and *Bulletin* articles.

9. *Memoir* costs be reduced through use of 8½ x 11-inch pages with two or three columns, but that hard covers be retained.

10. *Maps and Charts* continue to be published by the Society but with greater selectivity, improved editing, and more effective marketing.

11. External Editors be appointed for each of the major publication series, the *Bulletin*, *Geology*, *Memoirs*, *Maps and Charts* (total of four).

12. Editors be appointed for 3 years, subject to the pleasure of Council, with an option for renewal of an additional 3 years. Editors' positions to be honorary but with travel and office expenses to be borne by the Society.

13. Editors to be nominated by the Publications Committee and appointed by Council.

14. The Publications Committee be assigned greater authority and that it be reconstituted to consist of eight people, one of whom (the Chairman) be a member of Council. Four of the remaining members to be the Editors and three to be appointed from those recommended by the Committee on Committees, each to serve 3 years.

15. Publishing production be the responsibility of a Publications Manager employed at Boulder and responsible to the Executive Director.

16. The Society explore the possibility of marketing reprint volumes of general interest based on material from all Society publications.

Various specifics are included in our lengthier report to Council which is available on request from the Executive Director at a cost of \$2.50 to cover duplication and mailing costs.

We are pleased to be able to report that changes already instituted by Society leaders have significantly increased the flow and quality of manuscript submittals. But the success of a professional group depends ultimately on its membership and we believe that the constructive responses of the membership proclaim a healthy future for GSA.

SPECIAL PUBLICATIONS STUDY COMMITTEE

Members: Robert G. Blackadar
Gregory A. Davis
E. R. Ward Neale
Steven S. Oriel
Thomas J. M. Schopf
Brian J. Skinner, Chairman
Arthur A. Socolow
William A. Thomas, Vice-Chairman

Conferees: Fred A. Dix, Jr., AAPG
Christopher G. A. Harrison, AGU

Decisions on publications

To the Membership of the Geological Society of America from Howard R. Gould, President:

The preceding report summarizes the very lengthy report of the Special Publications Study Committee. The report was studied carefully, and in depth, and was discussed extensively at two sessions of the Executive Committee and at a day-long session of the Council.

The primary concern was to arrive at decisions that would best serve the future interests of the science and the membership at an affordable price. The problems are indeed complex, and almost any innovative change is accompanied by some element of risk. This was the first over-all study of the Society's publications program that has been made in many years.

The Council, at the meeting on May 19-20, 1981, ratified most of the recommendations as made by the Committee, but made minor modifications in a few of them. The Committee presented options on two major points, and the Council selected one of the options presented in each case.

So that all of the membership will be informed as quickly as possible of the procedures that will be followed for the 1982 volume year, and of the prices for members, I will summarize the key items approved by Council.

Both the *Bulletin* and *Geology* will continue to be published as separate journals. The *Bulletin* will return to a one-part, printed, monthly journal that will range in length from 96 to 160 pages per issue. *Part II* will cease to exist after the December 1981 issue is published. However, microfiche editions of the complete one-part *Bulletin* and *Geology* will be available to those who prefer them in that format.

For 1982, every dues-paying member will receive the *Bulletin* and *Geology* as well as *News & Information*. Because of the significant increase in press run, plus a series of other economies being put into place, the membership will receive one of the biggest bargains imaginable in geological literature. The member price was set by Council at \$48.

This is in contrast to 1981 prices of \$84 for the entire package (\$24 basic dues, plus \$27 for *Bulletin, Part I*, plus \$15 for *Bulletin, Part II*, plus \$18 for *Geology*). If, in 1981, only *Part I* was ordered, the total price of the package was \$69, which makes the 1982 price a reduction of \$21 from that 1981 price. The package price to students has now been reduced to \$28. If dues-exempt members wish to receive the two journals in 1982, they may do so also for \$28; of course, if they wish to retain membership and receive only *News & Information*, they may, as in the past, have this privilege at no cost.

The 1982 prices for *Abstracts with Programs* and for the Membership Directory/Yearbook will remain at the 1981 price level; that is, \$6 for the annual meeting edition

of *Abstracts with Programs*, \$3 each for the section meeting editions, and \$6.50 for the Membership Directory/Yearbook.

Another major decision was endorsement of the Committee's recommendation that there be appointed external science editors for the four major areas of the Society's scientific publications, that is, an editor for each of the following: *Bulletin*, *Geology*, books, and the map and chart series. The concept is that voluntary editors in their own institutions can breathe new life into the scientific content in each series and bring them to the forefront of new science. The processing, manufacturing, and distribution of the Society's publications would continue to be carried out by the headquarters staff, to be reduced where possible.

In a drastic departure from long-standing GSA policy, Council approved the concept of acceptance of professionally oriented commercial advertising in all series of the Society's periodical publications. Advance arrangements are necessary before this can be put into operation, and the membership should not expect to see commercial advertising in any GSA publication until sometime in 1982.

Another reversal of policy is the decision that solicitation of voluntary page charges for articles in the *Bulletin* be reinstated. When the *Bulletin* was split into two parts, such solicitation was stopped. Now that the *Bulletin* is reverting to a one-part, printed journal, solicitation for voluntary page charges at \$100 per page for the *Bulletin* will be applied. Also, the voluntary page charges for *Geology* will be increased to \$100 per page. Furthermore, special feature options such as color plates and fold-out maps will be available at the discretion of the editor to authors in the *Bulletin* if they pay the entire cost of the special feature.

Internal changes also are involved. A new structure for the Publications Committee was approved. In the future, the Publications Committee will be chaired by a member of Council. In addition, the four "external" science editors will be members, and three members-at-large will be appointed by Council.

Another major change was the approval of acceptance of two credit cards, "VISA" and "Master Charge," for purchase of publications, payment of dues, and pre-registration at meetings. Arrangements will be made so that this procedure will be in place before the end of the year.

Many other operational details will be changed but will not directly impact the membership.

We all owe a great deal to the diligent and effective work of the Special Publications Study Committee and to its chairman, Brian Skinner. The Society is entering a new and exciting era in its publications program.

GSA Council Meeting Announcements, May 1981

Council lists nominees for 1982

For Councilor (1982-83) and President (1982)
Digby J. McLaren, Ottawa, Ontario
For Councilor and Vice-President (1982)
Paul A. Bailly, Lakewood, Colorado
For Councilor and Treasurer (1982)
William B. Heroy, Jr., Dallas, Texas

For Councilors (1982-1984)
Haydn H. Murray, Bloomington, Indiana
Thornton L. Neathery, University, Alabama
Arthur A. Socolow, Harrisburg, Pennsylvania
Rosemary J. Vidale, Los Alamos, New Mexico

Medal and award winners for 1981

The 1981 medalists and award winners announced by the Council at its May 1981 meeting are as follows:

PENROSE MEDAL: *John Rodgers*, Department of Geology and Geophysics, Yale University, New Haven, CT 06520

DAY MEDAL: *Donald L. Turcotte*, Department of Geological Sciences, Cornell University, Ithaca, NY 14850

KIRK BRYAN AWARD: *John Ross Mackay*, Department of Geography, University of British Columbia, Vancouver, British Columbia V6T 1W5

MEINZER AWARD: *Gordon D. Bennett*, U.S. Geological Survey, M.S. 411, National Center, Reston, VA 22092

BURWELL AWARD: Not available at press time.

CADY AWARD: Not available at press time.

NATIONAL MEDAL OF SCIENCE: The Council named *Frank Press* as the Society's nominee for the National Medal of Science.

Honorary Fellowships for 1981

The 1981 Honorary Fellows announced by the Council at its May 1981 meeting are as follows:

Jean Aubouin
Department of Structural Geology
Université Pierre et Marie Curie
Paris, France

Desmond Pretorius
Economic Geology Research Unit
University of Witwatersrand
Milner Park, Johannesburg 2001, South Africa

Hitoshi Sakai
Institute for Thermal Spring Research
Okayama University
Misasa, Tottori, Japan 682-02

Future GSA annual meeting dates

1982	October 18-21	New Orleans
1983	October 31- November 3	Indianapolis
1984	November 5-8	Reno
1985	October 14-17	Boston
1986	November 10-13	San Antonio

Penrose Conferences approved

Two Penrose Conferences were approved by Council at the May 1981 meeting. They are the following:

"Hydrodynamics and Geochemistry of Ore Generation in Sedimentary Environments"

Suggested time: Late spring, 1982

Conveners: William C. Kelly
Department of Geological Sciences
University of Michigan
Ann Arbor, MI 48109 (313) 764-1435

John M. Sharp, Jr.
Department of Geology
University of Missouri
Columbia, MO 65211 (314) 882-6558

Donald E. White
USGS, Branch of Field Geochemistry
& Petrology
345 Middlefield Road
Menlo Park, CA 94025 (415) 323-8111

"Laramide Deformation of the Rocky Mountain Foreland, Western United States"

Conveners: David R. Lageson
Department of Earth Sciences
Montana State University
Bozeman, MT 59717 (406) 994-3331

Gary D. Couples
Department of Geology
Texas A&M University
College Station, TX 77843 (713) 845-2451

GSA News & Information

Vol. 3, no. 7 July 1981

GSA NEWS & INFORMATION (ISSN 0164-5854) is the monthly newsletter of The Geological Society of America, Inc., P.O. Box 9140, Boulder, Colorado 80301. Second-class postage rates paid at Boulder, Colorado, and at additional mailing office.

Prepared from contributions from the staff and membership by John C. Frye, Executive Director; James R. Clark, Production Manager; and June Thomas and Ann H. Fogel, Production Assistants.



CENTENNIAL NEWS

A Possible Centennial Project for GSA Sections

At the Northeastern Section meeting in Bangor, discussion of possible Centennial projects for the GSA sections led to an idea, since broached at the South-Central, Rocky Mountain, and North-Central section meetings, for a Centennial project that is not only of potential lasting value but also complements extremely well the international project to synthesize the geology of North America.

The idea is essentially as follows: Preparing guides to key outcrops in each region that illustrate the main features of the geology of the region. Each geology department knows of certain outcrops that are particularly instructive about the stratigraphy, structure, igneous or metamorphic history, and so forth, of a region. New faculty or other geologists moving into a region often do not know where to find these outcrops, either to teach themselves about the regional geology or to set up field trips for various purposes. A set of illustrated explanations of the key outcrops in a region, either as individual pamphlets or organized in some way into booklets, could be a real service to the profession and provide a kind of "ground truth" for the regional syntheses. The Bangor group also suggested that pamphlets on localities of interest to the nongeological public could be prepared at the same time.

The next step in follow-up on this idea is to get a reaction from the potential users. If the response is

generally favorable, workshops will be set up at each sectional meeting next spring to discuss the idea in more detail and set up action committees to come forth with specific proposals for the localities to be immortalized and the persons who might do the job.

WE WOULD LIKE SOME FEEDBACK on this proposal and on both of its parts. Is the idea of a set of guides to critical localities for understanding regional geology attractive as a Centennial project for each section? Would you favor guides for both the student and professional and also the general public? Please send your reactions to me (A. R. Palmer, Centennial Science Program Coordinator, P.O. Box 9140, Boulder, CO 80301), and I will see that they are forwarded to your section Centennial representative. You may also contact your representative directly, if you wish, but I'd appreciate copies of any correspondence on this topic. Communication is the name of the game!

Your Section Centennial contact persons are:

Cordilleran	Martin L. Stout, Dept. of Geology California State University Los Angeles, CA 90032
Rocky Mountain	Stanley S. Beus, Dept. of Geology Box 6030, Northern Arizona Univ. Flagstaff, AZ 86011
North-Central	Donald L. Biggs, Dept. Earth Sciences Iowa State University of Science & Technology Ames, IA 50010
South-Central	August Goldstein, Jr. 1033 Mayo Building Tulsa, OK 74103
Northeastern	Philip H. Osberg Dept. of Geological Sciences University of Maine Orono, ME 04473
Southeastern	Thornton L. Neathery Geological Survey of Alabama P.O. Drawer O University, AL 35486

Opportunities offered by Smithsonian Institution Foreign Currency Grants Program

The Smithsonian Foreign Currency Program, a national research grants program, offers opportunities for support of research in Burma, Guinea, India, and Pakistan in the following disciplines: anthropology, archeology, and related disciplines; systematic and environmental biology; astrophysics and earth sciences; and museum programs.

Grants in the local currencies of the above listed countries are awarded to American institutions for the research of senior scientists. Collaborative programs involving host-country institutions are welcome. Awards are determined on the basis of competitive scholarly review. The deadline for submission is November 1 annually. For further information, write the Foreign Currency Program, Office of Fellowships and Grants, Smithsonian Institution, Washington, D.C. 20560, or call (202) 287-3321.

Science Policy Fellowships to be awarded by Brookings Institution

To encourage scientists to contribute to public policy issues that involve the natural sciences, the Brookings Institution in Washington, D.C., has established a Science Policy Fellowship program, slated to begin with the 1981-1982 academic year. The program will bring senior scientists to Washington for one year to work with the Brookings staff on science policy issues.

Fellowships will be awarded annually to three scientists from among candidates nominated by an advisory committee, by departments of natural science at universities and private research institutions, and by the public sector. The new program is supported by a 3-year grant from the Sloan Foundation.

For additional information about the fellowships, contact Jim Farrell, The Brookings Institution, 1775 Massachusetts Avenue, N.W., Washington, D.C. 20036. Telephone (202) 797-6220.

Announcing formation of the Division of Structural Geology and Tectonics

A new division of the GSA devoted to structural geology and tectonics was approved by the Council at the November meeting in Atlanta. The scope of this division includes studies of the geometry and mechanisms of natural and experimental deformation at all scales. This includes plate tectonics as applied to regional interpretation and to the tectonics of mountain belts. Its purpose is to bring together scientists interested in structural geology and tectonics to facilitate the presentation and discussion of their problems and ideas, to stimulate communication with other earth scientists, to promote research and publication, and to advise and assist the officers and committees of the Society in related matters. The first official act of the division will be to sponsor a symposium, *Frontiers of Structural Geology*, at the 1981 annual meeting in Cincinnati. The executive committee took an informal poll to determine subjects and potential speakers. Four of the speakers, George Davis, Peter Geiser, Paul Hoffman, and Sharon Mosher, agreed to organize the symposium as well as to speak. It has been designated as the Centennial Symposium for 1981. A subject of this scope cannot be covered in one symposium, so others will be held at future meetings if the members so desire. A business meeting for the division and a cocktail party will also be held in Cincinnati. Both events will provide an excellent opportunity for interested members of the Society to make suggestions and help chart the future of the division. The founding officers are Don Wise, chairman; Dave Dunn, first vice-chairman; Campbell Craddock, second vice-president; Richard Groshong, secretary-treasurer; and Sharon Mosher, Joint Technical Program Committee representative and coordinator of the symposium at the Cincinnati meeting.

This new division is the outgrowth of an informal evening discussion that occurred at the Penrose Confer-

ence on the Role of Pressure Solution and Dissolution Phenomena in Geology held in May 1980. There it was recognized that much excellent structural geology-tectonics research is in progress throughout North America but that the results are presented at many different meetings at diverse localities. Unfortunately, attending all these meetings exceeds the time or money available to most individuals. It was considered highly desirable to have one meeting that would emphasize field, experimental, and theoretical research that illuminates general principles or provides examples of interest to a wide range of structural and tectonic geologists. Walter Alvarez, David Gray, and Richard Groshong became an ad hoc committee to pursue this concept. They circulated an open letter announcing an organizational discussion session at the GSA annual meeting in November 1980. At that session, it was generally agreed that division status within the GSA should be sought. A set of bylaws was drafted by the ad hoc committee (including Dave Dunn) and the first group of officers nominated; because of the remarkable evidence of support from those at the meeting, the division was approved by the Council one day later. The division is allowed to set its own schedule at the national meeting and has the privilege of sponsoring a symposium at the meeting. The important business remaining is to determine the other activities that the division should sponsor. For example, suggestions have included mini-Penrose Conferences in conjunction with the national meeting, sessions for general discussion of long-range plans for structural geology-tectonics, and the sponsoring of short courses, among others. The division should really begin to gather steam during the coming year. See you in Cincinnati!

Richard H. Groshong, Jr.
Secretary-Treasurer

Montana Geological Society sponsors field conference and symposium, August 1981

In August 1981, the Montana Geological Society is sponsoring a field conference and symposium covering the "Geology of Southwestern Montana." The meeting will feature a field bus tour with outcrop stops examining the geology from the craton to the geosyncline and then through the overthrust belt. Trip participants will assemble in Billings on Saturday, August 22, 1981. The tour will proceed to western Montana via the Crazy Mountains Basin and Gallatin Valley to the headwaters of the Missouri River at Three Forks. Classic outcrops of Paleozoic and Mesozoic rocks will be reviewed before the tour continues on through the Madison and Beaverhead Valleys to Dillon, Montana. The group will be hosted on the campus of Western Montana College, and a full-day symposium of papers is scheduled for Monday. On Tuesday the field tour will continue, and there will be field discussion of the entire region bounded by the Snake River Plains, Central Idaho Thrust Belt, and the Idaho-Boulder batholith. The field tour loop will close through a different route on the return to Billings on Wednesday, August 26.

The Pioneer, Beaverhead, Centennial, Ruby-Blacktail, Tobacco Root, Snowcrest-Gravelly, Madison, and other great ranges of the region will be discussed. The regional stratigraphy, geologic structure, volcanism, Tertiary beds, petroleum prospects, ore mineralization, and so on will all be considered both on the outcrop and by the papers. The stops will include a "hands on" outcrop school on conodont field study methods for the petroleum geologists. Several discussion stops at select vistas with descriptive narratives by geologists working in the area are scheduled.

Final plans have been formulated; charter buses and generous hosting by the college will keep the expense of the trip to a minimum.

Preregistration advertising will be published soon. Preliminary information regarding this meeting can be obtained from the Montana Geological Society, c/o John J. Tonnsen, General Chairman of Field Conference and Symposium, 200 Electric Building, Billings, MT 59101.



CINCINNATI, OHIO

More highlights of upcoming annual meeting November 2-5, 1981



CINCINNATI

FRANK PRESS TO ADDRESS 1981 ANNUAL DINNER



Frank Press, president-nominee for the National Academy of Sciences and former National Science Advisor to President Carter, will address the GSA Annual Dinner on Wednesday evening, November 4, 1981.

Frank Press was born in Brooklyn, New York, in 1924. He received his undergraduate degree in physics from the City College of New York and advanced degrees in geophysics from Columbia University in 1946 and 1949; he then joined the Columbia faculty, becoming associate professor in 1952. At Columbia he worked at the unique Lamont Geological Observatory with the late Maurice Ewing, a pioneer in geophysics and oceanography. In 1955 Dr. Press was appointed professor of geophysics at the California Institute of Technology and two years later became director of its Seismological Laboratory. He was named in 1965 as the head of the then Department of Geology and Geophysics at the Massachusetts Institute of Technology (MIT); under his leadership, this department expanded into planetary sciences, oceanography, interdisciplinary studies, and the joint program with the Woods Hole Oceanographic Institution, and was renamed the Department of

Earth and Planetary Sciences. In 1977 he was appointed by President Carter as the President's Science Advisor and Director of the Office of Science and Technology Policy. In January 1981 he returned to MIT where he was appointed Institute Professor, a title MIT reserves for scholars of special distinction. Dr. Press has been elected as the 19th President of the National Academy of Sciences (NAS) and will assume his new office on July 1, 1981.

The after-dinner address will be in the Grand Ballroom of Stouffer's Hotel. Everyone is welcome to attend.

1981 SYMPOSIA

1. *Archaeological Geology in the Eastern Mediterranean*: Archaeological Geology Division; Norman Herz
2. *The Origin of Coal*: Coal Geology Division; Norman C. Hester and James C. Cobb
3. *The Role of Government Agencies in Development of Engineering Geology*: Engineering Geology Division; James W. Skehan, S. J. and Richard H. Jahns
4. *Active Mid-Plate Tectonics*: Geophysics Division; Robert M. Hamilton and Otto W. Nuttli
5. *The History of American Paleontology: Selected Views*: History of Geology Division; Kennard B. Bork
6. *Regional Hydrogeology—Past, Present, and Future*: Hydrogeology Division; Harry LeGrand and Wayne Pettyjohn
7. *Marine and Continental Correlation of the Cenozoic*: Madeleine Briskin, Rhodes W. Fairbridge, and George J. Kukla, William A. Berggren, Claude Deplessy, and Alan Hecht
8. *1981 Centennial Frontier Symposium: Frontiers of Structural Geology*: Structural Geology Division; Donald U. Wise, George Davis, Peter Giser, Paul Hoffman, and Sharon Moser
9. *Paleozoic Foraminiferal Evolution, Paleoecology and Paleobiogeography*: Cushman Foundation; Charles A. Ross and Raymond C. Douglass
10. *Shales and Subsurface Hydrology*: Geochemical Society; Donald L. Graf and Yousif Kharakha
11. *The Future of the Journal*: Geoscience Information Society; Mary W. Scott
12. *Microstructure of Minerals as Determined by X-Ray and Electron Diffraction*: Mineralogical Society of America; C. T. Prewitt and J.D.C. McConnell
13. *Recent Advances in Sedimentary Geology: Implications for Instruction*: National Association of Geology Teachers; Lee J. Suttner
14. *Biotic Interactions in Recent and Fossil Benthic Communities*: Paleontological Society; Michael J. S. Tevesz and Peter L. McCall
15. *Metal Deposits in Shale, Part II*: Society of Economic Geologists; Stephen E. Kesler
16. *Comparative Planetary Geology*: Leon T. Silver and Harold Masursky
17. *Ordovician Stratotype Sections, Biostratigraphy, and Interpretative Lithostratigraphy in Kentucky and Nearby States*: John Pojeta and Earle R. Cressman
18. *Hydrology of High-Level Nuclear Waste*: P. A. Witherspoon and F. J. Pearson
19. *Pennsylvanian-Mississippian Boundary in the Appalachian Basin*: Charles L. Rice and Donald C. Haney
20. *Late Miocene Paleooceanographic and Biogeographic Reconstructions*: Michael L. Bender and Lloyd H. Burckle
21. *Melanges: Their Nature, Origin, and Significance*: Loren A. Raymond

SUNDAY "AT LARGE" SYMPOSIA

22. *Groundwater Flow in Karst Systems*: James F. Quinlan
23. *Paleogeography and Climate*: Eric J. Barron
24. *Geology and Mineral Resources of the Precambrian St. Francois Terrane, Southeastern Missouri*: Jerry D. Vinegard
25. *Metal Deposits in Shales, Part I*: Society of Economic Geologists; Stephen E. Kesler
26. *Organic Geochemistry of Solid Fossil Fuels*: Organic Geochemistry Division/Geochemical Society; John C. Winters

Report of the Committee on Investments

To the Council and Membership of the Geological Society of America:

The purpose of the Committee on Investments is to advise the Council about investment and reinvestment of the funds, securities, and other capital of the Society. In addition, the Budget Committee member of the Executive Committee serves as a nonvoting *ex officio* member of this committee.

On December 31, 1980, the market value of the combined investment accounts of the Society was \$9,633,444. Adjusting for transfers to Boulder during 1980 of \$600,000, this year-end value would have been \$10,233,444. The corresponding value at December 31, 1979, was \$8,609,824, indicating an appreciation of 18.9% during 1980. During this same time period, the Standard and Poor's 500 Industrials Index with income

increased 25.8%. The equity portion of the portfolio, which would more nearly equate to this index, increased about 23%.

At the end of 1980, 42% of the investment portfolio was in debt and money market instruments, and 58% in equities. The income yield at year end was 8.4%, versus 7.8% one year earlier when the portion in debt and money market instruments was 44%. This overall increase in yield was due to the higher interest rates that prevailed through most of the year.

Several important policy and operating changes were made during the year. Money management responsibilities were reorganized and redirected. Irving Trust Company was given principal responsibility for the cash and bond segments of the portfolio. Emphasis on investing in common stocks was assigned to Reich & Tang, Inc., and to a new money manager, William G. Campbell &

GEOLOGICAL SOCIETY OF AMERICA SUMMARY OF INVESTMENTS BY FUNDS IN CUSTODY OF IRVING TRUST COMPANY December 31, 1980

	<u>Principal Amount</u>	<u>Cost</u>	<u>Market Value</u>
Penrose Endowment Fund, Adv. Cust.			
Cash		\$ 623.06	\$ 623.06
Common Stocks		2,709,043.60	3,255,491.75
Fixed Income Investments	\$2,083,436.71	2,185,415.05	1,792,834.90
Short Term Investments	587,000.00	587,000.00	587,000.00
Total		<u>\$5,482,081.71</u>	<u>\$5,635,958.71</u>
Penrose Endowment Fund, Spec. Cust. (Reich & Tang)			
Cash		\$ (11,240.00)	\$ (11,240.00)
Common Stocks		1,739,217.05	2,218,256.00
Short Term Investments	\$ 797,111.73	797,111.73	797,111.73
Total		<u>\$2,525,088.78</u>	<u>\$3,004,127.73</u>
TOTAL PENROSE ENDOWMENT FUND INVESTMENTS			
		<u>\$8,007,170.49</u>	<u>\$8,640,086.44</u>
Reserve Fund, Adv. Cust.			
Cash		\$ 33,313.87	\$ 33,313.87
Fixed Income Investments	\$ 444,800.88	413,730.33	391,241.71
Short Term Investments	375,000.00	375,000.00	375,000.00
Total		<u>\$ 822,044.20</u>	<u>\$ 799,555.58</u>
Reserve Fund, Becker			
Cash		\$ 144.95	\$ 144.95
Fixed Income Investments	\$ 40,000.00	39,985.80	40,762.50
Short Term Investments	29,000.00	29,000.00	29,000.00
Total		<u>\$ 69,130.75</u>	<u>\$ 69,907.45</u>
TOTAL RESERVE FUND INVESTMENTS			
		<u>\$ 891,174.95</u>	<u>\$ 869,463.03</u>
Medals and Awards Fund, Adv. Cust.			
Cash		\$ 473.41	\$ 473.41
Common Stocks		19,733.48	11,009.00
Fixed Income Investments	\$ 81,000.00	81,063.75	74,958.75
Short Term Investments	16,000.00	16,000.00	16,000.00
Total		<u>\$ 117,270.64</u>	<u>\$ 102,441.16</u>
Current Fund, Adv. Cust.			
Cash		\$ 219.52	\$ 219.52
Common Stocks		13,635.00	14,233.75
Short Term Investments	\$ 7,000.00	7,000.00	7,000.00
Total		<u>\$ 20,854.52</u>	<u>\$ 21,453.27</u>

Annual Report for 1980 The Geological Society of America

Company, Inc. The Campbell group was allocated a \$1 million segment of the portfolio in early January 1981.

A Special Investment Fund was established to invest a small portion of the GSA portfolio in small-to-medium-sized natural resource companies, this fund to be managed by a subcommittee of geologists experienced in this type of investment. This fund commenced in January 1981 at \$100,000 and had appreciated about 5% by the end of the first quarter. Members of the subcommittee are John Kilkenny, Robert Folinsbee, Anthony Reso, Caswell Silver, James Anderson, and R. L. Fuchs.

Respectfully submitted,
Robert L. Fuchs, Chairman;
C. Harry Burgess, *Thomas W. Stern*,
Donald A. Parks, Members;
William B. Heroy, Treasurer;
Jack Simon, ex officio

USES OF ENDOWMENT FUND INCOME
 Calendar Year 1980

Endowment (Reserve) Fund Obligations:		
Investment Mgmt. Fees	\$34,450	
AGI Dues	17,150	
Inst. of Paleontology	20,000	
Research Grants (Net)	71,200	
Unfunded Retirement Exp.	7,000	
Routine Council & Comm. Exp.	71,350	\$221,150
<hr/>		
Support of Centennial Program		98,500
Foundation Organizational Expense		34,000
Support of Current Fund Operations		<u>246,350</u>
		<u>\$600,000</u>

UPDATE

In July Geology

1. Estimates of vertical crustal strain rates along the western margins of the Colorado Plateau, by W. K. Hamblin, P. E. Damon, W. B. Bull
2. Cobble imbrication as a sensitive indicator of subtle local changes in river flow direction, by M. E. Kauffman, D. F. Ritter
3. Continental underthrusting beneath the Southern Alps of New Zealand, by R. G. Allis
4. Mesozoic evolution, hinterland of the Sevier orogenic belt, by R. W. Allmendinger, T. E. Jordan
5. Feldspar diagenesis in the Frio Formation, Brazoria County, Texas Gulf Coast, by L. S. Land, K. L. Milliken
6. Northwestern Africa and the Avalonian plate: Relations during late Precambrian and late Paleozoic time, by A. Piqué
7. Deformation of the southeast part of the Columbia Plateau, by P. R. Hooper, V. E. Camp
8. Cortlandt-Beemerville magmatic belt: A probable late Taconian alkalic cross trend in the central Appalachians, by N. M. Ratcliffe

Announcing Fifth Conference on Geopressured-Geothermal Energy, U.S. Gulf Coast

The Fifth Conference on Geopressured-Geothermal Energy, U.S. Gulf Coast, will be held October 13-15, 1981, at Louisiana State University, Baton Rouge, Louisiana. Conference Chairman: Don Bebout, Louisiana Geological Survey. Subject: Results of well tests of the Gulf Coast geopressured resource; results of research concerning geology, salinity determination from logs, controls on methane content, reservoir mechanics, technology, economics of development, legal, institutional and environmental issues. Sponsors: Louisiana Geological Survey, Department of Natural Resources; Energy Programs Office, Louisiana State University; U.S. Department of Energy. For further information, contact Ann Bachman, Conference Coordinator, Energy Programs Office, 105 Hill Memorial, Louisiana State University, Baton Rouge, LA 70803; (504) 388-6816. For preregistration materials, contact: Short Courses and Conferences

Division of Continuing Education
 Louisiana State University
 Baton Rouge, LA 70803 Phone (504) 388-6621



Announcing formation of the Planetary Geology Division

The Planetary Geology Division was established by Council on May 20, 1981. The officers are

Chairman	Leon T. Silver
1st Vice-Chairman	Harold Masursky
2nd Vice-Chairman	Robin Brett
Secretary/Treasurer	Joseph M. Boyce

The division representative to Council is Dallas L. Peck.

The 1982 dues will be \$3. Those interested in affiliation will have an opportunity to join by checking the appropriate box on the 1982 dues statement which will be mailed in September.

PENROSE CONFERENCE GUIDELINES

PURPOSE

The Penrose Conferences were established by the Geological Society of America in 1969 as an important effort in its promotion of the Earth sciences. The conferences provide the opportunity for exchange of current information and exciting ideas pertaining to the science of geology and related fields. They are intended to stimulate and enhance individual and collaborative research and to accelerate the advance of the science by the interactions and development of new ideas. The conferences consist of a critical mass of active scientists from the Society, the national and international science communities, and students, sequestered in an attractive meeting place for several days of focused discussion. The participants do not seek simply to resolve technical controversies; their objectives are to provide stimulus and excitement for their field, to air new ideas and develop new associations, and to provoke new research on important questions.

SUBJECT/TOPIC

Ideal subjects for conferences are those Earth science topics for which recent work suggests a potential for further significant advances in the near future. Each conference subject should be under current investigation and active discussion by a number of able researchers in the field and/or in the laboratory. Topics should be broad enough so that a range of specialists can discuss them from several points of view, but not so broad that a lack of communication can develop.

CONVENERS

Conveners must have technical competence and be knowledgeable about current activities in the specialized fields that are to be represented at a conference. Responsibility for organizing a conference *must be shared by at least two conveners*, each of whom can draw upon his or her own experience and expertise in developing a well-integrated, effective conference program that will foster communication and stimulate research progress among experts in diverse but related fields. At least one of the conveners must be a member of GSA.

SIZE/TIME

It is essential that the conferences be informal. Groups should be small enough that personal discussion among all participants is encouraged, and large enough to provide diversity and depth. As an empirical rule, the maximum number for success is about 80. Normally, the minimum number required to convene a conference is 50.

Typically, conferences in the past have lasted five days. Participants are expected to attend the entire conference, and conferences which extend more than five days tend to force premature departure.

A period of approximately nine to twelve months between the date of approval by the Penrose Conference

Committee and the date of the conference is normally required. In no case should there be less than six months from the time of conference announcement in *GSA News & Information* and *Geotimes* and the conference dates.

Care should be taken to avoid scheduling conferences at the same time as other scientific meetings, especially other GSA meetings, including other Penrose Conferences. Conveners should check the calendar of events in *Geotimes* before proposing a date. A schedule of future approved and recommended Penrose Conferences will be provided prospective conveners with proposal-writing guidelines.

LOCATION

Essential qualities of a good site are that it be removed from the distraction of other meetings and other demands on the time and attention of the participants. The site should offer adequate meeting facilities and comfortable surroundings where participants can live, eat, work, and relax together. Climate, accessibility, meals, sleeping accommodations, recreational facilities, and economy should all be considered in selecting a site.

Although there are no restrictions about holding conferences anywhere in the world, logistics, cost, and other problems dictate caution in organizing conferences outside of North America. The Penrose Conference Committee is of the opinion that conferences held outside of North America may add an important dimension to the Penrose Conference program. However, such conferences are approved only if there are special circumstances that make a North American site much less appropriate. For a conference convened outside of North America, the cost of special liability insurance must be included in the conference budget.

Conveners may suggest specific sites or, in the event they choose to work with a conference coordinator, suggest a geographical area within which the coordinator can negotiate a specific site. Final site selection must be approved by the Penrose Conference Committee. Conveners should not officially and formally negotiate with the site management before a proposal has been approved by the Penrose Conference Committee.

PARTICIPATION

Anyone interested in attending a specific conference is encouraged to contact the conveners of that conference. Contrary to the assumption by some, an invitation is not required for application to participate. However, conveners initially should invite a few key speakers necessary to the organization and success of the conference. Aside from these invitations issued in the early planning stages of a conference, the conveners utilize indications of interest from those actively working in the field to complete the list of conference participants. Participation is not restricted to members of the Geological Society of America. GSA members, however, will receive preference when there is a choice

between equally qualified persons. The final decision on participation will be made by the conveners, whose decision shall not be subject to appeal. Acceptances for participation are not transferable.

Participation by graduate students is encouraged by providing incentives such as reduced registration fees. The cost of supporting graduate student participation is to be included in each conference budget.

In addition to *GSA News & Information* and *Geotimes*, all conferences are announced in other Earth science journals, newsletters, and so forth.

All participants are expected to live at the conference site. Spouses, families, and others who are not registered participants are requested not to visit the conference site and are not allowed to participate in conference activities.

All participants are expected to attend the entire conference and all must pay the full conference registration fee. Exceptions can be made only for invited key speakers, whose attendance is deemed essential by the conveners even though they may not be able to be present for the entire conference.

SPONSORSHIP

The Geological Society of America is the principal sponsor of the Penrose Conferences; however, the Society welcomes other societies, organizations, and institutions as co-sponsors. Conveners must identify sponsors in their proposals, and the Penrose Conference Committee reserves the right to approve co-sponsors at the time the proposals are being considered. Recognition is given to co-sponsors in the conference announcements, as well as during the conference.

FINANCING

The Society ordinarily accepts no fiscal responsibility for a conference. If a conference coordinator is contracted, the coordinator assumes fiscal responsibility. If the conveners do not use a coordinator, they accept full fiscal responsibility. In the latter case, conveners must prudently budget their conference in such a way as to break even. If surplus monies are generated, they must be returned to the Society. At the conclusion of a conference, a written financial report must be given to the Penrose Conference Committee and the GSA Council. If the services of a conference coordinator are utilized, it is the responsibility of the coordinator to prepare and transmit this report.

INITIATION OF A PROPOSAL

Anyone interested in convening a Penrose Conference may submit a proposal, but at least one of the conveners must be a member of the Geological Society of America. Guidelines for preparation of a proposal and general information about Penrose Conferences may be obtained by writing or calling

Executive Director
The Geological Society of America
3300 Penrose Place, P.O. Box 9140
Boulder, CO 80301 (303) 447-2020

Proposals for Penrose Conferences should be sent to
Executive Director
The Geological Society of America
3300 Penrose Place, P.O. Box 9140
Boulder, CO 80301

The Penrose Conference Committee reviews the proposals as they are received. In acceptance of a proposal, the Penrose Conference Committee may offer advice, which in some cases may be a condition of acceptance. The committee chairman will address an advisory letter to the conveners calling attention to any matters that seem likely to pose a problem that must be resolved if the conference is to be successful. Proposals are then recommended for approval or rejection by the Society's Executive Committee who reserves full authority for the final approval.

PENROSE CONFERENCE COORDINATOR

Conveners are encouraged, but not required, to utilize the services of a professional conference coordinator to assist in all areas of non-program planning and execution. If utilized, the coordinator assumes responsibility for all financial matters relating to the conference and associated field trips, if any. The coordinator also is responsible for negotiating arrangements with the conference facility concerning prices, space for meetings, food, recreation, lodging, transportation, scheduling projection facilities, and handling other administrative chores as they arise. During the conference, the coordinator will provide on-site assistance in non-program matters, thereby freeing the conveners to concentrate on the technical and scientific aspects of the program.

PROGRAM

Care must be taken not to overstructure the program and to allow sufficient time for free discussion by all participants. It is important to note that all participants need not expect to make formal presentations. Contributions also can be presented in informal discussions or in poster sessions. (More detailed suggestions for structuring a program will be provided in the proposals-writing guidelines to be published in the September issue.)

CONFERENCE REPORTS AND PUBLICITY

As soon as conveners have been informed by the Executive Director that their conference has been approved, they must prepare a conference announcement suitable for publication in appropriate scientific journals. If a coordinator is contracted, the announcement should be sent to the coordinator for editing and then forwarded to the Executive Director. Announcements of conferences not being planned by a coordinator should be sent directly to the Executive Director. During planning of the conference, periodic progress reports must be made to the Penrose Conference Committee by the conveners or the coordinator. As soon as the conference is over, the conveners are required to send a brief formal report to the Executive

(continued next page)

Director of the Society. The report should include an evaluation of the technical and logistical success of the conference based on the participants' comments and the conveners' experience, as well as suggestions for improvement of the Penrose Conference format as whole.

Within three months, the conveners will prepare and submit a news report for publication in *Geology*. This report will cover the most interesting scientific and technical aspects of the conference, and, wherever appropriate, include recommendations on research opportunities and priorities that were developed during the conference and may be of value to organizations responsible for supporting and coordinating research in the field covered by the conference.

The purpose of the report is to inform those not in attendance of the main trends of thought and discussion that prevailed at the conference. The report should not publish specific data or concepts for which individual participants expect to receive priority through publications authored by them in regular journals of their individual choice. In balancing the opposing needs to inform and to preserve priority, the conveners must perform this task with responsibility and delicacy.

Other similar reports on the conference may be prepared and submitted to other journals for publication, but only after the letter of acceptance to publish the initial report has been received from *Geology*.

As an incentive to free exchange of information and to encourage open and frank discussion, no formal scientific report may be derived from the conference. It is anticipated that symposia, at GSA meetings or elsewhere, may develop from some conferences. These should consist of a related series of formal papers, each reflecting the author's own ideas, rather than a synthesis of what was presented at a particular conference.

The Society hopes and expects that all participants will freely discuss with their colleagues the significant results of their participation. The intent is that the conferences shall promote generation of new concepts and nurture new research efforts in all phases of the Earth sciences.

ADHERENCE TO GUIDELINES

These guidelines, formulated by the Penrose Conference Committee and approved by the GSA Council, provide rules based on experience gained from past conferences; changes and improvements will be incorporated as experience dictates. Once approval has been given by the Society, the conveners are fully responsible for the conference in accordance with the guidelines, and their acceptance implies agreement to abide by them. In cases of flagrant violation of the guidelines, the Executive Director of the Society is empowered to take appropriate action, including postponement or cancellation of the conference.

May 19, 1981

MEETING ANNOUNCEMENT

Conference on Scientific Ocean Drilling (COSOD)
Sponsored by JOIDES*

Organization and Coordination of Plans for Future Ocean Drilling-Related Scientific Programs

November 16-18, 1981, Austin, Texas

Convened by: COSOD Steering Committee,
R. L. Larson, Chairman

Sessions Planned:

November 16, 17

Reports and Workshop. Discussions on the relation of the following topics to ocean drilling:

- Origin and Evolution of Oceanic Crust
- Origin and Evolution of Marine Sedimentary Sequences
- Tectonic Evolution of Continental Margins and Oceanic Crust
- Causes of Long-Term Changes in the Atmosphere, Oceans, Cryosphere, Biosphere, and Magnetic Field
- Tools, Techniques, and Associated Studies

November 18

General Discussion on Coordination of Existing and Planned Scientific Ocean-Drilling Programs

The meeting will be open to the general scientific community from whom ideas and suggestions relating to the above topics are requested. Please submit ideas to Dr. Roger L. Larson, Chairman, COSOD Steering Committee, Graduate School of Oceanography, Univ. of Rhode Island, Kingston, R.I. 02881. Further information may be obtained from Ms. Doris Rucker, Joint Oceanographic Institutions, Inc., 2600 Virginia Ave., N.W., Suite 512, Washington, D.C. 20037. Telephone (202) 333-8276.

*Joint Oceanographic Institutions Deep Earth Sampling

Articles in *Bulletin*, Part II, June 1981

Articles in *Bulletin*, Part II are listed below. (Summaries only of these articles are in *Bulletin*, Part I.)

1. Petrology and K-Ar ages of dredged samples from Laysan Island and Northampton Bank volcanoes, Hawaiian Ridge, and evolution of the Hawaiian-Emperor chain, by G. Brent Dalrymple, David A. Clague, Michael O. Garcia, and Stephen W. Bright. (On microfiche: 50 p., 9 figs., 8 tables)
2. Gravity, isotope, and geochemical study of the Alvord Valley geothermal area, Oregon, by John Cleary, Ian M. Lange, Anthony I. Qamar, and H. Roy Krouse. (On microfiche: 29 p., 5 figs., 4 tables)
3. *Supplementary data for*: Rb-Sr and U-Pb geochronology and distribution of rock types in the Precambrian basement of Missouri and Kansas, by M. E. Bickford, K. L. Harrower, W. J. Hoppe, B. K. Nelson, R. L. Nusbaum, and John J. Thomas. (On microfiche: 34 p., 4 tables)

1982 Section Meeting Announcements

PAPERS for all section meetings of the Geological Society of America are invited from GSA Fellows, Members, Student Associates, and nonmembers. Accepted abstracts will be published in the appropriate issue of *Abstracts with Programs*, which will be distributed as a formal publication prior to the section meeting. Depending on limitations set by the individual sections, any author may submit as many abstracts as he or she wishes; however, no more than two from any author or coauthor will be accepted for publication.

Abstracts will be selected on the basis of geologic significance, amount of new information, broad interest, and relevance to the section's geographic coverage.

GSA members are encouraged to order their section meeting book(s) on their dues statement at the member price of \$3. Nonmember price is \$5.

Abstracts, which are limited to 250 words, must be submitted camera-ready on official 1982 GSA forms that may be obtained from the local committee officers listed on the facing page or from the

Abstracts Coordinator
Geological Society of America
P.O. Box 9140
Boulder, Colorado 80301

If the typing of the original copy will not reproduce satisfactorily, accepted abstracts will be retyped at GSA headquarters; the senior author will be charged \$15. There will be no opportunity for authors to review or revise the retyped material. *Abstracts submitted on other than the GSA form will be returned without consideration for the meeting.*

PLEASE NOTE ABSTRACT DEADLINES. Acceptance or rejection of abstracts will be based on the abstracts as submitted by the author. There will be no

opportunity to revise or withdraw them. Final decisions on acceptance or rejection of abstracts are the responsibility of the Program Committee.

POSTER SESSIONS. Some sections will have space for poster sessions during their 1982 meetings. It will be necessary to submit the usual 250-word abstract explaining the material on display. Even though a formal paper is not read, the abstract is printed in *Abstracts with Programs*. Decisions on whether papers are accepted for oral presentations or poster sessions will be made by the Program Committee. The authors, however, may indicate their preference if they so desire.

STUDENT PAPERS are welcomed and encouraged. Some sections give a Best Student Paper award. To be considered for the award, the paper must be by an individual student author, and it must be identified as being a student paper.

ALL SLIDES must be in a 2" x 2" frame and of a thickness that will fit comfortably in a standard Kodak carousel projection magazine. Slides should be designed for easy reading on 10-foot-wide screens by viewers who are as far away as 70 feet. Overhead projectors and chalkboards may be available on request.

DETAILED INFORMATION for registration, housing, field trips, short courses, guest activities, welcoming parties, business meetings and luncheons, annual dinners, and other events will be announced in future issues of *GSA News & Information*, as well as being included in the appropriate issues of *Abstracts with Programs*.

EXHIBIT SPACE may be made available at some section meetings. For information, please write or call the local committee officers listed on the following page.

SPECIAL NOTE

TO MEMBERS LIVING OUTSIDE CONTERMINOUS UNITED STATES

Those who live outside the conterminous United States may receive copies of the 1982 *Abstracts with Programs* for the section meetings too late to take advantage of the preregistration and housing forms.

Therefore, those who are planning to attend any of the section meetings are urged to write to the appropriate local committee officers listed on the facing page for copies of the preregistration forms, housing applications, and field-trip information.

GSA EMPLOYMENT SERVICE—GENERAL INFORMATION

Throughout the year, the Membership Department maintains a computer file of geoscientists seeking employment. The information on this file includes the applicant's name, address, phone number, areas of specialty, type of employment desired, degrees held, years of professional experience, and current employment status.

Employers may request printouts of applicant listings within any one, or combination of several, specialty codes by completing the Employers Request form on the following page. The cost of a printout of one to two specialty codes is \$50; each additional specialty listing is \$15. A printout of the entire applicant listing in all specialties may be purchased for \$150.

In addition to offering applicant listings throughout the year, GSA also conducts the Employment Interview Service each fall in conjunction with the Society-wide annual meeting. Interview space is rented to participating employers in half-day increments and our staff schedules all interviews with attending job applicants for every recruiter renting booth space. Additional services available

for employer participants include a message service, complete listing of applicants, copies of resumes at no additional charge, and posting of all vacancies.

Geoscientists seeking positions may register with the Employment Service by completing the attached application form and submitting it along with a one-page typed resume and \$15 payment to the address given below. Applicant registration is good for one year.

For additional information and submission of forms contact

Clara Hodgson, Membership Coordinator
Geological Society of America
P.O. Box 9140
Boulder, CO 80301
(303) 447-2020

APPLICANT AND EMPLOYER FORMS ARE
BACK-TO-BACK ON THE FOLLOWING PAGES

GSA SECTION

MEETINGS 1982

SOUTHEASTERN

Shoreham Hotel
Washington, D. C.
March 25-27, 1982

ABSTRACT DEADLINE: October 29, 1981

Submit completed abstracts to
Juergen Reinhardt, Program Comm. Chm.
U.S. Geological Survey
928 National Center
Reston, Virginia 22092
(703) 860-6596

SOUTH-CENTRAL

University of Oklahoma
Norman, Oklahoma
March 29-30, 1982

ABSTRACT DEADLINE: November 2, 1981

Submit completed abstracts to
Patrick Sutherland, Program Comm. Chm.
School of Geology and Geophysics
University of Oklahoma
Norman, Oklahoma 73019
(405) 325-3253

NORTH-CENTRAL

Purdue University
West Lafayette, Indiana
April 29-30, 1982

ABSTRACT DEADLINE: December 2, 1981

Submit completed abstracts to
Terry R. West, Program Comm. Chm.
Department of Geosciences
Purdue University
West Lafayette, Indiana 47907
(317) 494-8171

NORTHEASTERN

Shoreham Hotel
Washington, D. C.
March 25-27, 1982

ABSTRACT DEADLINE: October 29, 1981

Submit completed abstracts to
Juergen Reinhardt, Program Comm. Chm.
U.S. Geological Survey
928 National Center
Reston, Virginia 22092
(703) 860-6596

CORDILLERAN

Anaheim Convention Center
Anaheim, California
April 19-21, 1982

ABSTRACT DEADLINE: November 16, 1981

Submit completed abstracts to
Margaret S. Woyski, Program Comm. Chm.
Department of Earth Sciences
California State University
Fullerton, California 92634
(714) 870-3882

ROCKY MOUNTAIN

Montana State University
Bozeman, Montana
May 7-8, 1982

ABSTRACT DEADLINE: December 15, 1981

Submit completed abstracts to
Robert A. Chadwick, Program Comm. Chm.
Department of Earth Sciences
Montana State University
Bozeman, Montana 59715
(406) 994-3331



**THE
GEOLOGICAL SOCIETY
OF AMERICA**
P.O. Box 9140, Boulder, Colorado 80301

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GSA _____

Add. _____

APPLICATION FOR EMPLOYMENT MATCHING SERVICE
(Please type or print legibly with **Black Ink**)

Name _____ Date _____
(last name first)

Mailing address _____

City _____ State _____ Zip _____ If not U.S. citizen
code _____ list visa _____

Date available _____ Telephone () _____
area code number (for contact during business hours)

EXPERIENCE

Must use speciality codes listed below

Choose as many as three that best describe your expertise in order of importance. MUST have at least one listed

* 1. _____ 2. _____ 3. _____

TYPE OF POSITION DESIRED

- | | | |
|-------------------------------------|---|--|
| Interested in | Specific interest | Will accept employment in |
| <input type="checkbox"/> Academic | <input type="checkbox"/> Administrative | <input type="checkbox"/> U.S. only |
| <input type="checkbox"/> Government | <input type="checkbox"/> Exploration/Production | <input type="checkbox"/> U.S. with foreign assignments |
| <input type="checkbox"/> Industry | <input type="checkbox"/> Field | <input type="checkbox"/> Either |
| <input type="checkbox"/> Other | <input type="checkbox"/> Research | |
| | <input type="checkbox"/> Teaching | |

*Present speciality (choose one from codes below) _____ Years of experience in this speciality _____

Present employer _____ May he be contacted? Yes No

If you do not wish to be listed for employment with a specific organization, check here and list organization on an attached sheet.

Give number of years experience for any of the following that are applicable:

Administrative _____ Exploration/Production _____ Field _____ Research _____ Teaching _____ Total geological working experience _____
Foreign languages _____ Spoken (fluency) _____ Written _____

ACADEMIC TRAINING

College or University	Degree (rec'd or expected)	Year	Major	Minor

Postgraduate work beyond highest degree in (field) _____ Number of years _____

SPECIALTY CODES

Select those that best describe your ability. Use codes in bold face only when other breakdowns are inadequate.

- | | | | | |
|---|---------------------------|----------------------------------|-------------------------------|--------------------------------|
| 100. Economic Geology | 222. inorganic | 350. Mathematical Geology | 453. micropaleontology | 621. photogeology |
| 101. coal geology | 223. stable isotopes | 351. computer science | 454. paleobotany | 622. photogrammetry |
| 102. geothermal, etc. | 224. unstable isotopes | 352. statistical geology | 455. paleoecology | 630. Science Editing |
| 103. metallic deposits | 250. Geomorphology | 400. Mineralogy | 500. Petroleum Geology | 650. Sedimentology |
| 104. nonmetallic deposits | 251. Pleistocene geology | 401. crystallography | 501. exploration | 700. Seismology |
| 105. mining geology | 300. Geophysics | 402. clay mineralogy | 502. subsurface stratigraphy | 720. Stratigraphy |
| 120. Engineering Geology | 301. exploration | 410. Museum (curator) | 520. Petrology | 721. Cenozoic |
| 121. rock mechanics | 302. paleomagnetism | 420. Oceanography | 521. igneous | 722. Mesozoic |
| 150. Environmental Geology | 303. theoretical | 421. marine geology | 522. metamorphic | 723. Paleozoic |
| 151. public education and communication | 320. Hydrogeology | 422. coastal geology | 523. sedimentary | 724. Precambrian |
| | 321. hydrochemistry | 450. Paleontology | 550. Planetology | 750. Structural Geology |
| 200. General Geology | 322. ground water | 451. invertebrate | 600. Regional Geology | 751. tectonics |
| 220. Geochemistry | 323. surface water | 452. vertebrate | 620. Remote Sensing | 752. tectonophysics |
| 221. organic | 330. Library | | | 800. Volcanology |

* **Resumé must be attached.** Only one page typewritten on one side will be accepted for reproduction to employers. Include concise detail of work experience and college majors and minors on degrees.

* **Fee—\$15.00. Payment must accompany form.** Make check payable to the Geological Society of America.

I agree to release GSA or their representatives from responsibility for errors that may occur in processing or distributing this data. I understand that GSA makes no guarantee of contact by an employer in this service. I agree to notify GSA Employment Service immediately of (1) change of address, (2) acceptance of a position.

I will attend the 19____ GSA Annual Meeting in _____

This application will be active for 1 year.

* Signature (required) _____

*THESE ITEMS ARE ABSOLUTELY NECESSARY TO PROCESS THIS APPLICATION



**THE
GEOLOGICAL SOCIETY
OF AMERICA**

P.O. Box 9140, Boulder, Colorado 80301

EMPLOYER'S REQUEST FOR EARTH SCIENCE APPLICANTS

(Please type or print legibly with **Black Ink**)

R _____ -1

Name _____ Date _____

Organization _____

Mailing address _____

R _____ -2

City _____ State _____ Zip code _____ Telephone number (____) _____

Area code Number

SPECIALTY CODES (see list below)

List the specialty code numbers that you wish to order, or check here if you want entire file of applicants in **ALL** specialties.

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102. geothermal, etc.	224. unstable isotopes	352. statistical geology	455. paleoecology	630. Science Editing
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104. nonmetallic deposits	251. Pleistocene geology	401. crystallography	501. exploration	700. Seismology
105. mining geology	300. Geophysics	402. clay mineralogy	502. subsurface stratigraphy	720. Stratigraphy
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150. Environmental Geology	303. theoretical	421. marine geology	522. metamorphic	723. Paleozoic
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200. General Geology	321. hydrochemistry	450. Paleontology	550. Planetology	750. Structural Geology
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Experience desired (yrs)

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I am interested in interviewing applicants through the GSA Employment Service at the 19____ Annual Meeting in _____.

See attached sheet for current fee schedule.

1. I agree to use this service for valid recruiting purposes.
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NEW GSA PUBLICATIONS

Cordilleran metamorphic core complexes

Memoir 153—Edited by Max D. Crittenden, Jr., Peter J. Coney, and George H. Davis. 1980. vi + 490 pages, 191 figures, 27 tables. LC: 80-67489. ISBN: 0-8137-1153-3 .\$.27.00

The 18 papers in this volume describe a series of metamorphic terranes extending from British Columbia to northern Mexico. Although they differ significantly in age and local tectonic setting, most lie west of the Cordilleran thrust and foldbelt and are characterized by a core of metamorphic or igneous rocks that exhibit gently dipping mylonitic foliation, usually with a pervasive lineation that may be unidirectional over tens or hundreds of square miles, and by a zone of detachment and steep metamorphic gradient separating the core from cover rocks that typically are unmetamorphosed and in which deformation dies out upward. The largest and most completely studied is the Shuswap Complex of British Columbia, which has been modeled as a metamorphic culmination genetically related to the Cretaceous and early Tertiary thrusts and folds of the southern Canadian Rockies. By analogy, a similar tectonic relationship seemed possible for those to the south. Data presented in this volume show, however, that many of the complexes in the United States, particularly those south of the Snake River Plain, are startlingly young; in some it is clear that metamorphism and deformation continued until mid-Tertiary time.

The volume presents a large amount of new chemical, petrographic, structural, and geochronologic data, as well as tectonic analyses based on the results of recent geologic mapping and regional synthesis. Although most authors ascribe the complexes to plate-tectonics processes originating at the Pacific plate boundary, opinions as to origin are diverse, and detailed relations to both the Cordilleran thrust and foldbelt and structures of the Basin and Range province are complex and in part enigmatic. The volume presents the level of understanding of these structural and intrusive features as of approximately the end of 1978 or the early part of 1979 and will provide a sound basis for continuing and revitalized study.

CONTENTS: Dedication to Peter Misch. Part 1. Introduction and overview. Introduction: Peter J. Coney. Cordilleran metamorphic core complexes: An overview: Peter J. Coney. Part 2. Southern Basin and Range. Structural characteristics of metamorphic core complexes, southern Arizona: George H. Davis; Mylonitization and detachment faulting in the Whipple-Buckskin-Rawhide Mountains terrane, southeastern California and western Arizona: Gregory A. Davis, J. Lawford Anderson, Eric G. Frost, and Terry J. Shackelford; Geologic and geochronologic reconnaissance of a northwest-trending zone of metamorphic core complexes in southern and western Arizona: William A. Rehrig and Stephen J. Reynolds; Mid-Tertiary plutonism and mylonitization, South Mountains, central Arizona: Stephen J. Reynolds and William A. Rehrig; Geology of a zone of metamorphic core complexes in southeastern Arizona: Norman G. Banks; Evidence for multiple intrusion and deformation within the Santa Catalina-Rincon-Tortolita crystalline com-

plex, southeastern Arizona: Stanley B. Keith, Stephen J. Reynolds, Paul E. Damon, Muhammad Shafiqullah, Donald E. Livingston, and Paul D. Pushkar; Distribution and U-Pb isotope ages of some lineated plutons, northwestern Mexico: T. H. Anderson, L. T. Silver, and G. A. Salas. Part 3. Eastern Great Basin. Transition from infrastructure to suprastructure in the northern Ruby Mountains, Nevada: Arthur W. Snoke; Metamorphic infrastructure in the northern Ruby Mountains, Nevada: Keith A. Howard; Structure and petrology of a Tertiary gneiss complex in northwestern Utah: Victoria R. Todd; Fabrics and strains in quartzites of a metamorphic core complex, Raft River Mountains, Utah: Robert R. Compton; Structural geology of the northern Albion Mountains, south-central Idaho: David M. Miller. Part 4. The Northwest. Bitterroot dome-Sapphire tectonic block, an example of a plutonic-core gneiss-dome complex with its detached suprastructure: Donald W. Hyndman; Structural and metamorphic evolution of the northeast flank of the Shuswap complex, southern Canoe River area, British Columbia: P. S. Simony, E. D. Ghent, D. Craw, W. Mitchell, and D. B. Robbins; Kettle dome and related structures of northeastern Washington: Eric S. Cheney; Metamorphic core complexes of the North American Cordillera: Summary: Max D. Crittenden, Jr.

Precambrian geochronology of North America, an annotated bibliography, 1951-1977

Microform Publication 11. Raymond G. Vugrinovich. 1980. 142 pages (773 bibliographic entries) on two 24 × 98-frame microfiche \$4.00

This bibliography was conceived as a source to which a worker could turn to find geochronological studies relevant to a particular area. Studies dealing solely with refinements in decay constants, improvements in analytical or mathematical techniques, and laboratory studies of the behavior of isotope systems under conditions approximating metamorphic environments have not been included. Abstracts reporting preliminary results have been included if the full-length paper was published at least one year later.

This bibliography brings together as many of the studies dealing with the Precambrian geochronology of North America as possible and provides a short summary of each study. Journal articles, symposium and conference papers, abstracts, and those Ph.D. theses found in *Dissertation Abstracts International* covering the period 1951 through 1977 are included.

The summaries give a review of the results of each study. They are not intended to serve as substitutes for the original papers. For this reason changes in decay constants, errors in measurements and ages, analytical techniques, and sections of papers dealing with subjects other than geochronology have been largely ignored. Structural, petrological, paleomagnetic, and stratigraphic data have been included only to clarify geochronological results.

MORE UPDATE

Tunnelling Association of Canada formed

The Tunnelling Association of Canada was officially formed in Ottawa in December 1980, after extensive preparatory work and consultation involving various Canadian organizations and individuals active in the tunnelling field. An executive committee covering various disciplines in tunnelling was appointed on a provisional basis, including consultants, contractors, equipment suppliers, owners, and researchers.

It is the objective of the new association to bring together people from all activities related to tunnelling in Canada and to become recognized as the national tunnelling body in Canada.

The officers of the association are D. H. MacDonald (president), E. Hoek (vice-president for western Canada), and G. Jenkins (vice-president for eastern Canada). Work is currently underway on a membership campaign, development of technical programs, formation of functional committees, and liaising with other national and international organizations involved in the tunnelling field. For liaison and/or further information, please write to C. F. Lee, Secretary-Treasurer, Tunnelling Association of Canada, c/o Geotechnical Engineering Department, Ontario Hydro (H15 G26), 700 University Ave., Toronto, M5G 1X6, Ontario, Canada.

Memorials Volume XI now available

Memorials Volume XI is now available (\$8.00), containing the following memorials:

- Harley Barnes, 1916-1979, by Frank M. Byers, Jr.
Thomas Robinson Beveridge, 1918-1978, by Jerry D. Vineyard
Wilmot Hyde Bradley, 1899-1979, by Vincent E. McKelvey
William Henry Corey, 1901-1979, by Philip R. Patten
Robert J. W. Douglas, 1920-1979, by Raymond A. Price and John O. Wheeler
Carl Owen Dunbar, 1891-1979, by Karl M. Waage
Rollin Farmin, 1903-1977, by Garth M. Crosby
James Donald Forrester, 1906-1979, by J. K. Richardson and L. H. Hart
Theodore (Ted) Galusha, 1911-1979, by Morris F. Skinner
Marcus Albert Hanna, 1898-1978, by W. Howard Hough
Thomas Cleon Hiestand, 1901-1979, by William H. Curry
David Marcel Larrabee, 1909-1979, by Gilbert H. Espenshade
Edward Richard Larson, 1920-1979, by Joseph Lintz, Jr.
Ralph Leonard Lupher, 1904-1979, by Grant M. Valentine
Thomas W. Mitcham, 1918-1979, by Paul I. Eimon
Leif Størmer, 1905-1979, by H. B. Whittington
Jasper Leonidas Stuckey, 1891-1979, by John M. Parker III and Stephen G. Conrad
William Taylor Thom, Jr., 1891-1979, by Sheldon Judson

Books may be purchased for \$8.00 through the Publications Sales Department, GSA, P.O. Box 9140, Boulder, CO 80301.

Two-year research on Mount Krakatau eruption to begin August 1981

To commemorate the centenary of the famous Mount Krakatau eruption, the Indonesian Institute of Sciences, Lembaga Ilmu Pengetahuan Indonesia (LIPI), will launch a series of scientific activities in the form of expeditions, research, and a symposium concerning Mount Krakatau.

The expedition and research activities will be conducted between August 1981 and August 1983. As the climax in the agenda of the commemoration, a symposium discussing the results of the two-year expedition and research activities on Mount Krakatau and its surroundings will be conducted in August 1983.

The scientific activities and the symposium will center on volcanology and geology, marine and terrestrial biology, oceanography, and social aspects related to the eruption. LIPI can supply information or advice; address: Lembaga Ilmu Pengetahuan Indonesia, Jl. Teuku Chik Ditiro 43, Jakarta, Indonesia.

Announcing 18th International Conference on Coastal Engineering, November 1982

The 18th International Conference on Coastal Engineering will be held November 14-19, 1982, in Cape Town, Republic of South Africa. The conference will bring together engineers, geologists, planners, and coastal scientists from all around the world to discuss and exchange information relative to coastal engineering. Topics that will be covered at the conference include the following:

- Wind current and wave action
- Tides and long waves
- Sedimentary processes and coastal morphology
- Estuary and inlet behavior
- Coastal structures and recreational facilities
- Ship motions as related to harbour entrance design
- Ocean outfall design and construction
- Environmental aspects in coastal engineering design

Contributions are invited on any of the above topics. A final Call for Papers will be distributed in August 1981. Every attempt will be made to include as many papers in the programme as possible, particularly to encourage young engineers and coastal scientists to take part in the conference. The Paper Review Committee, however, reserves the right to make the final decision on the acceptance of papers and the form of the presentation.

Five copies of a synopsis (not to extend beyond two pages, including illustrations) of each paper proposed for the conference should be sent before October 31, 1981, to

Professor Billy L. Edge, Secretary
Coastal Engineering Research Council
Department of Civil Engineering
Clemson University
Clemson, South Carolina 29631, USA

Requests for the Call for Papers or additional information can be sent to the same address.

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FOR MORE INFORMATION OR APPLICATION FORMS

GSA Membership Department, P.O. Box 9140, Boulder, Colorado, 80301, (303) 447-2020

WANTED: CONTRIBUTIONS TO NEW "LETTERS TO THE EDITOR" COLUMN

In an effort to provide an additional forum of communication regarding items of general interest to GSA members, the Committee on Membership is initiating a "Letters to the Editor" column in *GSA News & Information*. The following questions are composites of questions asked by members when they submitted their 1981 dues:

1. Has the Society ever considered establishing a professional code of ethics?

Yes, but no action was ever taken.

2. Has a reduced annual meeting registration fee for retired members ever been considered?

Yes, it is under consideration now by the Council.

3. How does one go about selecting an adequate microfiche reader?

There are four basic kinds of microfiche readers: hand-held readers, measuring 15 x 5 x 3 cm and ranging in cost from \$15 to \$90; portable readers, which come in carrying cases measuring approximately 35 x 40 x 10 cm and ranging in cost from \$150 to \$260; desk readers with average dimensions of 53 x 40 x 32 cm and priced from \$130 to \$500; and larger reader-printers, which are generally used by libraries and corporations, ranging in price from \$900 to \$3,500.

Most microfiche-reader manufacturers supply free catalogs or brochures to anyone interested in purchasing this equipment. A partial list of manufacturers can be found on p. 39 of the March 1979 issue of *GSA News & Information*, or you may write to the Marketing Manager, Geological Society of America, P.O. Box 9140, Boulder, CO 80301 for a copy of this list.

4. Has the Society taken a survey of the number of members who own a microfiche reader?

No.

5. What does the cost of basic dues provide for the members?

The basic dues assessed all GSA members cover the costs of producing the monthly newsletter, *GSA News & Information*; membership department operations, such as maintenance of the membership records, processing new members and changes in member category, claims for missing publications, changes of address, mailing labels, and dues billings; recruitment of new members and student affiliates; and member benefit programs

We invite your contributions to this monthly column. If you have a question or concern that would be of interest to the membership, please write to Editor, *GSA News & Information*, Geological Society of America, P.O. Box 9140, Boulder, CO 80301.

Necrology

Notice has been received of the following deaths: N. Wood Bass, Wheat Ridge, Colorado; A. F. Buddington, Cohasset, Massachusetts; Jorge Garcia Calderon, Edo de Mexico, Mexico; Paul F. Kerr, Palo Alto, California; Edgar Wesley Owen, San Antonio, Texas; Robert I. Roth, Wichita Falls, Texas; Morris Salkind, Kingston, New York; Harold C. Urey, La Jolla, California; Kenneth K. Welker, El Cajon, California.

JUNE BULLETIN BRIEFS

Article Summaries

• Petrology and K-Ar ages of dredged samples from Laysan Island and Northampton Bank volcanoes, Hawaiian Ridge, and evolution of the Hawaiian-Emperor chain: Summary.

G. Brent Dalrymple, David A. Clague, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California 94025; Michael O. Garcia, Hawaii Institute of Geophysics, University of Hawaii at Manoa, 2525 Correa Road, Honolulu, Hawaii 96822; Stephen W. Bright, Department of Geology, Middlebury College, Middlebury, Vermont 05753. (4 p., 2 figs.)

• Gravity, isotope, and geochemical study of the Alvord Valley geothermal area, Oregon: Summary.

John Cleary, Noranda, P.O. Box 15638, Denver, Colorado 80215; Ian M. Lange, Anthony I. Qamar, Department of Geology, University of Montana, Missoula, Montana 59812; H. Roy Krouse, Department of Physics, University of Calgary, Calgary, Alberta, Canada. (4 p., 1 fig., 2 tables)

Articles Complete in the June Issue of Part I

• Rb-Sr and U-Pb geochronology and distribution of rock types in the Precambrian basement of Missouri and Kansas.

M. E. Bickford, K. L. Harrower, W. J. Hoppe, B. K. Nelson, R. L. Nusbaum, Department of Geology, University of Kansas, Lawrence, Kansas 66045; John J. Thomas, Department of Geology, Skidmore College, Saratoga Springs, New York 12866. (19 p., 26 figs., 1 table)

Most of what we know about basement rocks in Kansas and Missouri is derived from cores and cuttings from deep drilling. These rocks may be divided into a northern terrane, underlain by rocks consisting of abundant granite commonly showing cataclastic textures and by metavolcanic to metasedimentary rocks; and a southern terrane, underlain almost exclusively by rhyolitic flows and ash-flow tuffs and

epizonal granite plutons. The northern terrane is interrupted in central Kansas by mafic igneous rocks and flanking arkosic sedimentary rocks of the Central North American Rift System.

Data from 63 Rb-Sr whole-rock analyses yield ages ranging from 1,153 to 1,748 m.y., but these are considered to represent only the minimum ages of the rocks. Ages derived from U-Pb analyses of suites of cogenetic zircons from 22 rock samples indicate that some rocks of the northern terrane were formed 1,610 to 1,650 m.y. ago. These are apparently intruded by younger granite plutons formed 1,450–1,470 m.y. and 1,340–1,380 m.y. ago. Rocks of the southern terrane were formed 1,460–1,480 m.y. ago in the St. Francois Mountains terrane of southeastern Missouri and its buried equivalents, but these are about 1,380 m.y. old in southwestern Missouri and southern Kansas. Rocks of the Central North American Rift System in Kansas are assumed to be about 1,100 m.y. old by geophysical and drill-hole extension to their outcrop in the Lake Superior region, where they have been dated.

Both the northern and southern terranes are notable for the great abundance of granitic rocks and the scarcity of intermediate to mafic igneous rocks. Quartzite is the most abundant metamorphic rock. Although the decrease in ages from north to south in the mid-continent region suggests their sequential accretion at the edges of a pre-existing continent, the rock assemblages are not consistent with convergent plate-margin suites of the Andean type. The great volumes of rhyolite and epizonal granite of the southern terrane may represent melting of thickened, somewhat older crust following accretion at the continental margin.

Major-element chemical data are presented for basement rocks from Kansas, Oklahoma, and Texas, and these are compared with the compositions of similar rocks from the St. Francois Mountains. Names and locations are given for wells from which samples were obtained.

• The Lake Bosumtwi impact crater, Ghana.

William B. Jones, Michael Bacon, Department of Geology, University of Ghana, Legon Accra, Ghana (present addresses: Jones, Esso Exploration [Europe-Africa] Inc., St. Clements House, Church Street, Walton on Thames, Surrey KT12 2QL, England; Bacon: Department of Geology, Chelsea College, 271 King Street, London W6 9LZ, England); David A. Hastings, Geological Survey Department, P.O. Box M80, Accra, Ghana (present address: Eros Data Center, Sioux Falls, South Dakota 57198). (8 p., 6 figs., 1 table)

The 1-m.y.-old Bosumtwi Crater, Ghana, has a nearly circular shape with a rim diameter of 11 km north-south and 10 km east-west. It is surrounded by a circular depression and an outer ridge of diameter 20 km. Polymict breccias averaging at least 20 m thick with clasts as much as 5 m long occur on the outer ridge, and the crater rim shows in situ shattered rock. Patches of suevite have been found in the circular depression north and south of the crater.

Analogy with better-known craters suggests that Bosumtwi has a central uplift rising to 200 m beneath the lake floor. An aeromagnetic anomaly of amplitude 50 nanotesla (nT) over the northern half of the lake is interpreted as due to a

layer of magnetized fallback breccia beneath the lake sediments. The normal polarity of the breccia shows that the crater was formed during the normal Jaramillo event of 0.97 to 0.85 m.y. ago, which agrees with the magnetic stratigraphy of the related Ivory Coast microtektites. A regional gravity survey indicates a negative Bouguer anomaly over the crater. There is some geochemical evidence that the meteorite was an iron, and its mass and energy are suggested as about 10^8 tons and 3×10^{19} joules or 7.3×10^3 megatons.

• Application of vitrinite reflectance anisotropy in the evaluation of coal metamorphism.

James C. Hower, University of Kentucky, Institute for Mining and Minerals Research, Lexington, Kentucky 40583; Alan Davis, Department of Geosciences, The Pennsylvania State University, University Park, Pennsylvania 16802. (17 p., 18 figs.)

Measurement of the maximum plus either the minimum or mean vitrinite reflectance provides a method for quantification of anisotropy of the reflectance. Previous research has suggested that anisotropy of vitrinite reflectance may be a direct indicator of static pressure (depth of burial) at which coal metamorphism occurred. The combination of thermal information (from vitrinite reflectance) and pressure information should, therefore, provide a means of evaluating the metamorphic history of a single coal seam or a series of coals in a sedimentary basin (given the independent placement of coal-rank parameters on a pressure-temperature grid).

Occurrence of coals in strata with diagnostic metamorphic minerals is rare. Therefore, evaluation of coal metamorphic conditions can seldom proceed parallel to mineralogical evaluation of rock metamorphic conditions. Rather, the coal petrologist has generally relied upon time-temperature nomograms to estimate metamorphic temperature from coal rank. In this study, the level of organic metamorphism (LOM)-time-temperature scale of Hood and others (1975) was considered the most versatile nomogram for evaluation of metamorphic conditions.

Coals from throughout the Appalachians were studied, but this study concentrates on coals from the Allegheny plateau in western Pennsylvania. Vitrinite maximum reflectance (in oil at 546 nm) and reflectance anisotropy ($(R_{\text{maximum}} - R_{\text{mean}})/R_{\text{maximum}}$ = anisotropy) were measured on Pennsylvania coals. In order to estimate rank gradients and subsequently paleogeothermal gradients, however, it was necessary to rely upon previously published volatile matter data from the Lower Kittanning, Upper Freeport, and Pittsburgh seams. From equivalent metamorphic temperatures from the LOM-time-temperature scale and from vertical separation of the seams, paleogeothermal gradients were calculated for Somerset County, adjacent to the Allegheny front (about 40 °C/km) and for Westmoreland County to the west (about 33 °C/km). Past depths of burial for both localities were calculated to have been 3.5 to 4 km for the Allegheny Group coals.

Calculated gradients are each in areas on the plateau where vitrinite reflectance is nearly constant within each area. Two similar areas, for which geothermal gradient could not be calculated directly due to insufficient vertical expo-

sure of coals, lie immediately to the north. The crustal blocks appear to be divided by the southwest-to-northeast Chestnut Ridge anticline, which marks a major tectonic division on the plateau, and by the southeast-to-northwest "Gwinn-type" lineament, which marks a northward reduction in amplitude of the plateau folds. Coal rank is 1.6%R (low volatile bituminous) in the Somerset County block (associated with the 40 °C/km gradient), 1.3%R (medium volatile) in the block northeast of the lineament (centered in Clearfield County), 0.9%R (high volatile A) in the Westmoreland County block (associated with the 33 °C/km gradient) west of Chestnut Ridge, and 0.8%R (high volatile A) in the block northeast of the lineament (Clarion County). The rank decrease west across Chestnut Ridge occurs in a zone about 50 km wide. Width of the zone of northeastward rank that decreases across the lineament is not as well defined but is probably of the same magnitude. As burial depths of the blocks appear to have been similar, the primary cause for rank variation was variation in geothermal gradients between blocks. Anisotropy did not change significantly across the region, suggesting that it can be correlated with past depth of burial.

- Petrology of late Paleozoic basin-fill sandstones, north-central Mexico.

Edgar I. Mellor, Atlantic Richfield Company, Midland, Texas 79702; John A. Breyer, Department of Geology, Texas Christian University, Fort Worth, Texas 76129. (7 p., 6 figs., 1 table)

The margins of the Pedregosa basin can be defined in outcrops of Pennsylvanian and Permian strata in southwestern New Mexico and southeastern Arizona. Siliciclastic basinal rocks crop out along the eastern flank of the Sierra del Cuervo, near Villa Aldama, Chihuahua, Mexico. The late Paleozoic rocks exposed near Villa Aldama have experienced four phases of deformation. Two sedimentary assemblages are recognized within the deformed late Paleozoic section. The upper sedimentary assemblage is a thin-bedded turbidite sequence. Sandstones near the stratigraphic top of the upper assemblage contain Wolfcampian fusulinids. The sandstones and siltstones in the late Paleozoic sequence are quartz-rich rocks with sub-equal amounts of feldspar and lithic fragments. The sediments are of continental block provenance, recycled from quartz-rich, shallow-marine sandstones exposed above rising basement blocks. Granitic debris denoting unroofing of Precambrian granites on the rising basement blocks is found only in a sandstone near the stratigraphic top of the late Paleozoic sequence. The rocks exposed near Villa Aldama indicate the existence of a Pennsylvanian-Permian deep-water basin. The mineralogy of the basin-fill sandstones corroborates previous interpretations of the geology of the margins and adjoining shelf and source areas of the Pedregosa basin.

- Structural and metamorphic history of the Shuksan Metamorphic Suite in the Mount Watson and Gee Point areas, North Cascades, Washington.

R. A. Haugerud, M. L. Morrison, E. H. Brown, Department of Geology, Western Washington University, Belling-

ham, Washington 98225 (present addresses: Haugerud: Department of Geological Sciences AJ-20, University of Washington, Seattle, Washington 98195; Morrison: Department of Geology, University of Calgary, Calgary, Alberta, Canada). (10 p., 6 figs.)

The blueschist-facies Shuksan Metamorphic Suite of the North Cascades has relict stratigraphy and sediment composition suggesting that it is of oceanic origin (broadly defined). The first metamorphic event affecting the rocks, which probably occurred on the sea floor, is a static epidote metasomatism of wide extent. The earliest penetrative structures (L_1 , S_1) formed during latest Jurassic-Early Cretaceous blueschist-facies metamorphism, which is inferred to have occurred during subduction. In this event recrystallization and intense penetrative strain were closely linked. Late metamorphic isoclinal fold axes (F_2) and later crenulations (L_3) formed at high angles to the L_1 lineation. F_2 folds reflect extreme shortening perpendicular to the axis of the Shuksan Belt. Microscopic textural relations indicate that Ca-amphibole, not Na-amphibole, was stable during the development of F_2 and suggest that these structures record events related to uplift of the suite. L_1 and F_2 structures can be interpreted to indicate either that uplift was the result of a distinct tectonic event or that metamorphism and uplift were part of a continuous tectonic process, with no change in the stress field. Final emplacement of the Shuksan Suite occurred along a fault system which at least locally is high-angle and includes zones of tectonic melange.

- Onshore marine Cenozoic along southwest Pacific coast of Mexico.

J. Wyatt Durham, Department of Paleontology, University of California, Berkeley, California 94720, and Departamento de Paleontología, Universidad Nacional Autónoma de México, México 20, DF; Shelton P. Applegate, Louis Espinosa-Arrubarrena, Departamento de Paleontología, Universidad Nacional Autónoma de México, México 20, DF. (11 p., 4 figs.)

Reconnaissance exploration along the Pacific coast of Mexico from the Isthmus of Tehuantepec to Puerto Vallarta in the northwest, beginning in 1977, has shown the presence of at least seven previously unreported areas with late Cenozoic sedimentary deposits. In addition marine Pleistocene deposits on the coast of Oaxaca were previously reported. In four of the newly discovered areas marine sediments occur. All of these occurrences, excepting the two southeastern ones, were encountered along the Federal coastal highway, route F 200. Beginning in the northwest these areas are: along the Rio Ameca, 10 km north of Puerto Vallarta; 10 km south of Puerto Vallarta; Tomatlan Basin (named herein), 79 km south of Puerto Vallarta, with fossil vertebrates; Campo Acosta Basin (named herein) beginning 115 km south of Puerto Vallarta, sediments at least partly marine; La Mira Basin (named herein), straddling the mouth of the Rio Balsas, with at least two marine incursions; San Nicolas Basin (named herein) about 200 km southeast of Acapulco, marine sediments encountered in water well; Colotepec Formation, marine, along the coast of Oaxaca

between Puerto Angel and Puerto Escondido; marine deposits near Santa Cruz, Oaxaca, about 100 km southwest of Salina Cruz, Oaxaca. Of the seven new areas, only the La Mira Basin has been examined in more than a most cursory manner.

In the La Mira Basin four formations are recognized: Ferrotepec Formation (named herein), marine, late early to middle Miocene in age; Barranca del Perro Muerto Formation (named herein), nonmarine; El Bordonal Conglomerate (named herein), nonmarine; Abanico Brisa Mar Formation (named herein), at least partly marine, of undifferentiated Plio-Pleistocene age. If the attitudes observed in the Ferrotepec Formation continue seaward, the total thickness of the sediments in the basin might attain 1,500 m. The fossils from the Ferrotepec Formation mostly belong to the "Tertiary Caribbean Province" of Woodring, but a few show affinities to north Pacific coast Miocene faunas. The La Mira Basin sediments indicate that the Rio Balsas has existed since early Miocene time.

The few fossils from the San Nicolas Basin suggest a late Miocene to Pliocene age. The few fossils from the beds near Santa Cruz are suggestive of a Plio-Pleistocene age.

Insofar, as is known, the sediments in the areas northwest of the La Mira Basin only attain a few metres in thickness. Offshore from the San Nicolas Basin, at Deep Sea Drilling Project (DSDP) Site 493, about 670 m of early Miocene to Pleistocene sediments are reported. The Santa Cruz beds appear to be about 50 m thick, and Palmer reports a 15 m thickness for the Colotepec Formation.

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- Sedimentation bordering the Rio Balsas delta and canyons, western Mexico.

F. P. Shepard, Scripps Institution of Oceanography, Geological Research Division, A-015, La Jolla, California 92093; Erk Reimnitz, U.S. Geological Survey, M.S. 99, Marine Geology Division, 345 Middlefield Road, Menlo Park, California 94025. (9 p., 14 figs.)

Western Mexico's second largest river apparently built its delta across the narrow continental shelf so that the river pours sediment directly onto the continental slope. As in other cases of shelf encroachment, the slope is characterized by numerous valleys, of which one with canyon-sized dimensions can be traced seaward to the Mid-America Trench. Evidence for turbidity currents was established by current-meter records and observations from scuba and vehicle diving. A dense grid of accurately located sounding and seismic lines shows the nature of deposition seaward of this delta, but in a zone off both sides of the main river mouth, seismic profiles of the slope suggest the presence of basement rock. However, it seems somewhat more likely that, despite some rock outcrops where erosion has exceeded deposition in Necesidad Canyon, the slopes appear to be underlain mostly by an appreciable thickness of sediments

that have been homogenized by extensive slumping which has destroyed any internal reflectors. Farther seaward from this zone, where slopes are gentler, there is a broad area in which good reflectors show clear evidence of natural levees, cross-bedding, valley fills, and other signs of slope progradation.

Despite all the evidence of progradation of the slope beyond the delta, we have clear indications that much sediment is being bypassed along the two main canyons of the area and that turbidity currents partly initiated by submarine landslides are eroding locally the steep canyon heads and transporting a large amount of sediment toward the Mid-America Trench with turbidity flows powerful enough to transport coarse sediment and coarse plant debris, and to leave large flow ripples along their broad, flat floors.

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- Three-dimensional gravity modeling of the Geysers hydrothermal system and vicinity, northern California.

Roger P. Denlinger, Robert L. Kovach, Stanford University, Stanford, California 94301 (present address, Denlinger: U.S. Geological Survey, Water Resources Division, Box 25046, Mail Stop 404, Denver Federal Center, Denver, Colorado 80225). (7 p., 11 figs., 3 tables)

The gravity low associated with the Geysers hydrothermal system is the southwest lobe of a regional 24-mgal gravity low centered near Mount Hannah in northern California. By subtracting the effect of a deep low-density source beneath Mount Hannah, a large 3- to 5-mgal gravity low is defined. This gravity low is interpreted to coincide with the present and past locations of the Geysers hydrothermal system. The producing steam field is now to the northeast of the anomaly and overlaps its northeastern boundary. The northeastern boundary of the anomaly consists of dense ultramafic and mafic rocks, between 0.5 and 1.0 km in thickness, which mask whatever density anomaly is associated with the steam reservoir below them. A three-dimensional density model constructed to fit this residual gravity field employs a low-density volume of about 100 km³ that has a density contrast of -0.06 g/cm³. If a deep low-density source is included in the model, the shallow density cannot be less than -0.04 g/cm³. This shallow low-density anomaly could be caused by a combination of high temperatures, unsaturated conditions, dissolution, and fracturing, and it may be flanked by density gradients due to chemical precipitation at the boundaries of the hydrothermal system.

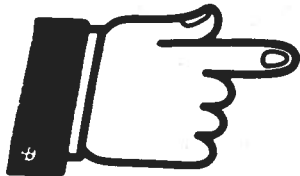
The possibility of a deep low-density source to the gravity low indicates a possible extension of the deep low-density source that produces the 24-mgal low centered near Mount Hannah. An overlapping low-velocity anomaly coincides with the low-density region below Mount Hannah, and the low-velocity anomaly also extends beneath The Geysers. These low-density and low-velocity sources may be representative of the heat source that generated the Geysers hydrothermal system.

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