



GSA news & information

VOLUME 3, NUMBER 10

G.S.A. ARCHIVES

OCTOBER 1981

GSA Research Grants awarded to 177 applicants in 1981

The Committee on Research Grants met at headquarters in Boulder, Colorado, on April 23 and 24, 1981. They reviewed 374 applications and recommended 177 of them to the Council for financial support. Applications were received from 106 female applicants this year (up from 94 in 1980 and 52 in 1979) with 56% of them receiving grants.

The total amount awarded was \$100,662 with grants ranging from \$100 to \$1,000 each. Funds provided by the Society's Endowment Fund were augmented by interest from the Harold T. Stearns Fund, in addition to donations from industry, former grant recipients, and GSA members.

The distribution of supported projects among generalized fields is shown in Table I.

TABLE I

	Requested	Funded
1. Paleontology	41	26
2. Sedimentology & Stratigraphy	93	35
3. Structure & Tectonics	56	32
4. Igneous & Metamorphic Petrology	76	39
5. Economic Geology	26	9
6. Quaternary Geology & Geomorphology	33	14
7. Geophysics	5	3
8. Other	44	19

The committee again is concerned that the value of the average grant remains decreased from that of years past. This decrease is due both to inflation and to the large number of proposals funded this year. Data pertaining to the rapid dollar value of the average grant are listed in Table II. This year the standards required for funding did not change compared to those of previous years, but the number of deserving applications was high.

The committee believes the GSA research grant program represents one of the most effective scientific

funding mechanisms in the country, yielding an enormous return for the relatively small amount of money expended. If the impact of the program is not to decline further with inflation, the level of funding must increase.

Harold T. Stearns Fellowship Award

By a generous contribution from Dr. Harold T. Stearns, the principal of the Harold T. Stearns Fellowship Award Fund has been increased by an additional \$10,000, bringing the fund to \$30,000. The committee voted to recommend four recipients for the 1981 awards for research on one or more aspects of the geology of the Pacific Islands and the circum-Pacific region. They are *Julie K. Brigham, University of Colorado, Boulder: Stratigraphy and Amino Acid Geochronology of the Gubik Formation, Arctic Coastal Plain, Alaska*

James C. Brophy, Johns Hopkins University, Baltimore, Maryland: The Geology & Petrology of the Cold Bay Volcanic Center, Alaska

Brian R. Globberman, University of California, Santa Cruz: Paleomagnetism and Tectonic Significance of Mesozoic Volcanic and Sedimentary Rocks from the Togiak Bay, Cape Newenham Area, Southwestern Alaska

Constance M. Soja, University of Oregon, Eugene: Brachiopods of the Kasaan Island Fauna, Kasaan Island, Southeastern Alaska

Robert K. Fahnestock Award

The Robert K. Fahnestock Award is given each year to honor the memory of Dr. Fahnestock, a former member of the Committee on Research Grants, who died indirectly as a result of serving on the committee. The

(continued next page)

TABLE II

	1960	1965	1970	1975	1979	1980	1981
Applicants	40	86	256	320	254	402	374
No. Supported	13	53	128	95	154	192	177
% Supported	32%	62%	50%	30%	60%	48%	47%
Amt. Requested	\$17,709	116,036	302,606	296,382	255,771	420,247	405,789
Total Granted	\$10,763	37,200	76,846	62,430	84,868	81,000	101,737
Average Grant	\$ 827	702	600	657	551	422	575
% of Funding	61%	32%	25%	21%	30%	19%	25%

grant is given to the applicant with the best application in geomorphology and sediment transport, Dr. Fahnestock's field. The recipient for 1981 is

Cathy W. Barnosky, University of Washington, Seattle: Late Quaternary Vegetation and Climate History of Southwestern Washington

The Gladys W. Cole Memorial Research Award

The committee discussed planning for the new research award titled "The Gladys W. Cole Memorial Research Award," established by W. Storrs Cole in memory of his wife. It is hoped that the first award will be made in 1982. It is a special award, distinct from the Penrose Research Grants, to be administered in accordance with guidelines specified by the donor as follows: An award for investigation of the geomorphology of semi-arid and arid terrains in the United States and Mexico to be given each year to a GSA Fellow between 35 and 60 years of age who has published one or more significant papers on geomorphology.

Outstanding Mention

The committee singled out twelve young scientists and their proposals for special mention in the belief that they should be brought to the attention of the Council and the membership of the Society. These persons are

Mary Lou Bevier, University of California, Santa Barbara: Petrology and Geochemistry of the Miocene Plateau Lavas of British Columbia, Canada

Paul D. Bouey, University of California, Davis: Obsidian Source Type Collection

Mark T. Brandon, University of Washington, Seattle: Geology of the Pacific Rim Complex and West Coast Fault on Western Vancouver Island, British Columbia

Sandra Jean Carlson, University of Michigan, Ann Arbor: Taxonomic and Functional Significance of Tooth Enamel Ultrastructure in Primitive Mammals and Reptiles

Pamela Polite Fisco, Rice University, Houston, Texas: Distribution and Ecology of Foraminifera in the North Victoria Land-Cape Adare Region, Antarctica

George E. Gehrels, California Institute of Technology, Pasadena: Structural, Petrologic, and Geochronologic Analysis of a Basement Complex and Overlying Metasedimentary and Metavolcanic Rocks in the Southernmost Alexander Terrane, Southeastern Alaska

Jennifer S. Getsinger, University of British Columbia, Vancouver: Metamorphism and Structure of the Three Ladies Mountain Area, Cariboo Mountains, British Columbia

Mary Lee Gillam, University of Colorado, Boulder: Age and Climate Effects on Soil Development, Lower Animas River Area, Colorado and New Mexico

Collin Hyde, Retired Ceramic Engineer, Rockford, Illinois: An Apparatus to Project Conoscopic Interference Figures

William Kohlberger, Yale University, New Haven, Connecticut: Revision of the Ohio Shale Dinichthyids and a Study of the Ontogeny and Phylogeny of the Placoderm Dermal Skeleton

D. Brooks McKinney, Johns Hopkins University, Baltimore, Maryland: Origin of the Comb Layered and Orbicular Rocks of Fisher Lake, California

Beth Okamura, University of California, Berkeley: Water Flow and the Effectiveness of Bryozoan Suspension-Feeding

Donations received from Marathon, Mobil, and Texaco

Contributions of \$6,000 were received from Mobil (\$2,000), Marathon (\$2,500), and Texaco (\$1,500) in support of the research grants program. Sixteen promising young earth scientists were partially supported by these funds. They are

Colin W. Baker, University of Michigan, Ann Arbor: Patterns of Evolution in Pleistocene Radiolaria

Robert Hugh Blodgett, University of Texas, Austin: Depositional Processes and Diagnosis of Continental Red Beds: Upper Triassic Dolores Formation, Southwestern Colorado

Douglas West Burbank, Dartmouth College, Hanover, New Hampshire: Stratigraphy and Chronology of the Late Cenozoic Intermontane Basins of Kashmir and Northwest Pakistan

Jamie M. Graham, University of Texas, Dallas: Biostratigraphy and Lithostratigraphy of Santonian Strata in the Del Rio-Davis Mountains Area, West Texas

Jay Mason Gregg, Michigan State University, East Lansing: The Origin of Xenotopic Dolomite Texture

Bernward J. Hay, Cornell University, Ithaca, New York: Global Paleooceanographic Influence during the Deposition of the Late Middle Ordovician Snake Hill and Utica Shales, New York

Paul L. Heller, University of Arizona, Tucson: Sedimentation and Tectonics of the Eocene Flysch Basin in Western Oregon and Washington

Alison H. Jones, Colorado School of Mines, Golden: A Paleomagnetic/Lithologic Study of the Regional Burn of Early Tertiary Coals, Powder River Basin, Wyoming and Montana

Conrad Christopher Labandeira, University of Wisconsin, Milwaukee: Biostratigraphy and Paleoeological Analysis of Upper Cambrian Trilobite Associations in West-Central Wisconsin and Eastern Minnesota

Tim K. Lowenstein, Johns Hopkins University, Baltimore, Maryland: Depositional & Secondary Alteration History of a Potash Evaporite: Application of New Thermodynamic & Depositional Models to the Permian Salado Formation of New Mexico

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Glen Mattioli, Northwestern University, Evanston, Illinois:
The Structure, Stratigraphy, and Depositional History of the Oceanic Formation at Bath Cliffs, Barbados, West Indies

Stuart A. Offer, Michigan State University, East Lansing:
Utilization of Tritium for Determining the Recharge Rate to an Aquifer in a Humid Region Using Water Samples from the Zone of Saturation

Paul T. Ryberg, University of Arizona, Tucson: Sedimentation, Structure, and Tectonics of the Roseburg Formation, Southwestern Oregon

Rudolph Torrini, Jr., Northwestern University, Evanston, Illinois: The Structure, Stratigraphy, and Depositional History of the Oceanic Formation at Bath Cliffs, Barbados, West Indies

Neil Andrew Wells, University of Michigan, Ann Arbor: Isotopic Determinations of Paleosalinities of Eocene Mammal-Bearing Final Tethyan Deposits of North-Central Pakistan

Allan G. Zakrzewski, University of Wisconsin, Milwaukee: Effects of Compressed Air Storage on the Porosities and Radial Permeabilities of Upper Cambrian Rocks from Northwest Illinois

Application forms and detailed instructions for 1982 grants will be sent, upon request, by the Executive Director, Geological Society of America, P.O. Box 9140, Boulder, Colorado 80301. Please note: Confidential evaluations from two faculty members are required from master and doctoral candidates and must accompany applications submitted. PLEASE USE THE NEW "APPRAISAL OF APPLICANT" FORMS, WHICH ACCOMPANY THE 1982 APPLICATION FORMS. Applications must be post-marked by February 15, 1982.



CENTENNIAL NEWS

Centennial Field Guides will be planned

Response to the inquiry in the July issue of *News & Information* about interest in guides to significant localities that illustrate important aspects of regional geology has been overwhelmingly positive. As a result, the first planning meeting to implement this idea will be held at the GSA meeting in Cincinnati. At that time, ground rules for identifying localities (such as indestructibility and accessibility) will be formulated together with plans for organizational workshops to get the Field Guide project underway at each of the spring Sectional meetings. These guides will be a significant contribution by the regional GSA sections to the Decade of North American Geology. Further details will be announced in the programs for the Section meetings.

Many thanks to those members who took the time to express their support for this project.

PLANETARY GEOLOGY COMES OF AGE

The Planetary Geology Division has been formed because comparative geology is now coming of age. We have returned samples from Earth's moon and have received remote sensing data in substantial quantities from Mercury, Venus, Mars, Phobos, Deimos, Amalthea, Io, Ganymede, Callisto, Mimas, Tethys, Dione, and Rhea. In August we will receive data (*Voyager II* flyby of Saturn) from Enceladus and Iapetus and much better data from Tethys. Comparisons of geologic processes of Mars, Venus, and Earth determine their evolution and relative importance in shaping their planetary crusts. These bodies are very similar in some aspects and very different in others. These similarities and differences are powerful tools to help determine how fundamental processes function on Earth and to understand the first billion years of Earth history. We formerly thought that internal activity was a function of the size of the body and the contained radioactive nuclides that provide heat. Small bodies died early and larger ones stayed active longer. Study of the small "solar systems" around Jupiter and Saturn has changed our thinking on the importance of tidal stresses in driving volcanic activity. The most active body that we know (Io) is the size of the Moon but is the most active body in the

solar system. Additionally, there is a question of what processes drive internal activity in bodies that are largely water ice. This puzzle is especially notable in Tethys, the satellite of Saturn, may be composed of almost entirely water ice but apparently has substantial internal activity. Titan's surface may be buried in organic materials and may have had erosional modifications by liquid ammonia or even nitrogen rain. The farther out we have gone, the more esoteric are the objects, and we have yet to study Uranus, Neptune, and Pluto.

Meteorite studies also provide important information to planetary geology if we assume that they are some of the building blocks of the solar system. Terrestrial cratering studies, studies of terrestrial outgassing, volcanism, and igneous processes, to name but a few processes, provide data very relevant to the evolution of the other planets. Contributions by not only geologists but also geochemists and geophysicists are all necessary for the solution of the many problems in planetary geology.

We look forward to increasingly cogent comparisons among the many bodies now available for study and increased understanding of the fundamental processes that have shaped Earth.

PENROSE CONFERENCES

Hydrodynamics and geochemistry of ore generation in sedimentary environments

A GSA Penrose Conference on "Hydrodynamics and Geochemistry of Ore Generation in Sedimentary Environments" will be held in late May 1982 in the Lake of the Ozarks area, Missouri. Conveners for this conference are William C. Kelly, Department of Geological Sciences, University of Michigan, Ann Arbor, MI 48109; John H. Sharp, Department of Geology, University of Missouri, Columbia, MO 65211; and Donald E. White, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, CA 94025.

The purpose of the conference is to bring together economic geologists, geochemists, hydrogeologists, and other scientists with overlapping interests to discuss how fluid dynamics, mass transport, and geochemical factors control the formation of mineral deposits in sedimentary rock environments. Economic geologists have amassed extensive data on and numerous field examples of such deposits. Recent advances in quantitative analysis of regional flow systems, the chemical evolution of fluids, and diagenesis should be capable of providing insights into the mechanisms responsible for mineral deposits formed contemporaneously with the enclosing sediment (syngenetic), later than sediments but prior to their lithification (diagenetic), and after the sediments were lithified (epigenetic).

Recent advances in such areas as quantitative modeling of sedimentary basins, regional flow systems, non-

equilibrium thermodynamics, mass and energy transport, sediment diagenesis, tectonic controls on heat flow, the properties of hydrothermal fluids, and so forth are all exciting concepts that can be applied to the formation of economic mineral deposits. On the other hand, economic geologists and others must provide critical age relationships and other data needed to properly calibrate the new quantitative models. Such models often represent theoretical extrapolations based upon short-time, small-scale data. Application of different scales to these systems may provide a new understanding of the strengths and limitations of these models.

Therefore, this Penrose Conference provides an opportunity to exchange new concepts and data from a number of fields, to provide contacts for new interdisciplinary research (within the overall geologic framework), and, hopefully, to stimulate new and exciting lines of research.

The conference is scheduled for five days; present plans call for a one-day, mid-conference, field trip to one or more Mississippi Valley-type deposits in Missouri. The registration fee is expected to be between \$350 and \$400 per person, including food and lodging. Those desiring to attend the conference are requested to contact the conveners at the above addresses. Include a brief description of topic(s) you wish to contribute. Application deadline is **December 15, 1981**.

Sonoma orogeny and Permian to Triassic tectonism in western North America

A GSA Penrose Conference on the Sonoma orogeny and Permian to Triassic tectonism in western North America will be held September 8 through 14, 1982, in Winnemucca, Nevada. The conveners are Hubert Gabrielse, Geological Survey of Canada, 100 West Pender Street, Vancouver, B.C., Canada V6B 1R8; Walter S. Snyder, Phillips Petroleum Company, Research and Development, Bartlesville, OK 74004; and John H. Stewart, U.S. Geological Survey, MS 41, 345 Middlefield Road, Menlo Park, CA 94025.

The Permian and Triassic history of western North America has been approached from many different viewpoints using a variety of techniques on geologically diverse terranes. To comprehend the scope of this history requires that scientists meet to compare notes on what they have found, on how their areas relate to other parts of western North America, on how to interpret their findings, and on what they think are important subjects for future research.

The Sonoma Penrose Conference is designed to better understand the paleogeographic setting, timing, kinematics, and origin of the Sonoma orogeny and, by discussion of other events in relation to the Sonoma orogeny, to characterize the entire Permian and Triassic history of western North America.

The Late Permian and Triassic history of western North America is characterized by major geologic changes, perhaps the most significant of any time during the Phanerozoic. During the Permian and Triassic, an Andean-type magmatic arc developed along the western margin of North America, an arc that persisted throughout the Mesozoic and Cenozoic. During most of the Paleozoic, in contrast, western North America was a passive continental margin characterized only by occasional orogenic events. The Triassic marks the start of the accretion of large terranes of Paleozoic and Mesozoic rocks onto the margin of western North America with the resulting westward shift of the continental margin. Furthermore, starting probably in the Triassic, rifting and/or large-scale strike-slip faulting reshaped the continental margin in parts of North America. The character and significances of these major changes will be an important focus of the conference.

The conference will consist of four days of discussion and two days of field trips to areas where critical evidence of the Sonoma orogeny can be seen.

Those who wish to apply to attend the conference should do so in writing, stating their reasons for wanting to attend the conference, before May 1, 1982, to John H. Stewart (address above).

GSA WILL NEED AN EXECUTIVE DIRECTOR IN 1982

*Read on if you want to help
the entire earth science community in North America.*

The Geological Society of America is *seeking an earth scientist with proven managerial experience and achievements*, and with a *working knowledge of the publication business* to replace its Executive Director, who will retire by mid-1982.

THE EXECUTIVE DIRECTOR . . .

- . . . is **in charge of GSA Headquarters**, with its staff of over 40 people in the Membership, Meetings, Publications, and Controller Departments, and the Data Processing and Mailing Service units.
- . . . **coordinates** (1) **publications** of GSA.
(2) annual **GSA meetings** arrangements, and
(3) **activities** of all GSA committees, sections, divisions, and relations with associated societies.
- . . . is **responsible for implementing the directives and policies** of the Council and the Executive Committee of GSA; also coordinates headquarters' work with the Centennial Science Coordinator and the President of the GSA Foundation.
- . . . works at the graciously modern GSA Headquarters building in Boulder, Colorado, a beautiful university and research town at the foot of the Rocky Mountains, 28 miles northwest of Denver International Airport.
- . . . holds a position with attractive compensation and comprehensive benefits.

If you are a *mature, broadly trained earth scientist* and if *you are intrigued by this opportunity*, mail your résumé with references and your questions, in strictest confidence, to

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



**THE
GEOLOGICAL SOCIETY
OF AMERICA**

A MESSAGE FROM THE GENERAL CHAIRMAN

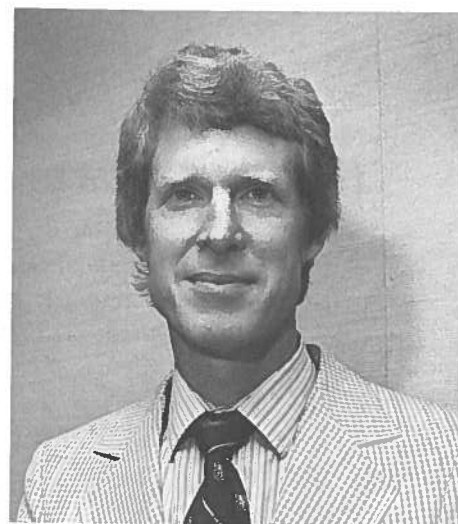
Dear Annual Meeting Registrant:

Cincinnati welcomes you to the 1981 Annual Meeting. By chance, this year marks the 100th anniversary of the first meeting of a group of geoscientists who formulated the idea of a Geological Society of America. That meeting took place in Cincinnati in 1881. With that historical reminder of the Society's upcoming centennial celebration in mind, your organizing committee has prepared a program we hope you will find scientifically and socially stimulating.

The technical program, assembled under the direction of Norm Hester and M. C. Noger, endured an embarrassment of riches of both symposia and submitted abstracts. The result is a program of the most exciting recent developments in geology. In addition to a wide range of symposia subjects presented by GSA divisions and associated societies, other symposia will include topics varying from comparative planetary geology to melanges to nuclear waste hydrology to Cenozoic marine and continental correlations. There are twenty-five symposia titles in all, and these will be accompanied by the regular technical sessions drawn from the 1100 abstracts submitted this year.

Lois Campbell and Tom Roberts have assembled an outstanding collection of field trips, highlighting Paleozoic structure, stratigraphy, paleontology, and sedimentation in the eastern midcontinent; engineering geology of slope failures; karst development and geohydrology; the Serpent Mound cryptoexplosion structure; Lake Erie shoreline processes; Quaternary stratigraphy; and Precambrian geology and mineralization in the St. Francois Mountains—in short, something for everyone.

For those preferring to enjoy the Ohio Valley in November, Marie and Terry Huizing have prepared a gourmet feast of both half- and full-day trips in the tri-state region. You may choose between visits to Kentucky's famous bluegrass region, a luncheon



General Chairman
Warren D. Huff

cruise on the Ohio River, trips to points of industrial and architectural interest, and several other activities unique to the culture and history of this area. Both the Welcoming Party on Sunday and the Oktoberfest on Tuesday will feature two of Cincinnati's most venerable public buildings, the Union Terminal and Music Hall.

Napoleon Bryant's committee has brought together a fascinating collection of films which will be shown continuously throughout the meeting. Outstanding jobs by Bob McWilliams on publicity, Dave Lienhart in arranging the complicated transportation schedule, Raman Singh as technical services chairman, and Kees DeJong in charge of student assistants have made the planning for this meeting truly a team effort. Malcolm Annis has handled the key job of co-chairman and treasurer of the local committee with skill and dedication.

Many others, including the GSA meetings staff, have worked tirelessly to see to every detail in the planning process and to ensure a successful meeting. So we invite you to come, relax, and enjoy yourself in Cincinnati in November.



1981 Annual Meeting Committee

Banister Row: Dave Lienhart, Malcolm Annis, Lois Campbell, Marie Huizing, Terry Huizing, Tom Roberts; Back Row: Warren Huff, Napoleon Bryant, Kees DeJong, M. C. Noger, Raman Singh, Norm Hester, Bob McWilliams

The committee happy in its work . . . ? ? ?



1981 ANNUAL MEETING COMMITTEE

General Chairman	Warren Huff	University of Cincinnati
Co-Chairman/Treasurer	Malcolm Annis	University of Cincinnati
Field Trips	Lois Campbell	University of Kentucky
	Thomas Roberts	University of Kentucky
Guest Program	Terry and Marie Huizing	Emery Industries Inc.
Publicity	Robert McWilliams	Miami University, Ohio
Science Theatre	Napoleon Bryant	Xavier University
Student Assistants	Kees DeJong	University of Cincinnati
Technical Program	Norman Hester	Consolidated Resources of America, Inc.
	Martin Noger	Kentucky Geological Survey
Technical Services	Raman Singh	Northern Kentucky University
Transportation	David Lienhart	U.S. Army Corps of Engineers

**GSA PUBLIC FORUM:
EXPLORATION OF
VENUS, JUPITER, AND SATURN**

Harold Masursky will be the principal speaker for the 1981 GSA Public Forum scheduled for Sunday, November 1, 2:00 to 4:00 p.m., in the Bronze Ballroom of Stouffer's Cincinnati Towers. Dr. Masursky's interest is in recent discoveries by Viking Mars, Venus Pioneer, and Voyager Jupiter and Saturn. The presentation will include use of 35mm slides and 16mm movies.

This is the second year GSA has sponsored a special lecture of public interest. This year's program of spectacular photography will be an attraction for both the general public and the geologists on hand for the GSA meeting.



General Chairman Huff and his team of Technical Program and Field Trip Chairmen

**NEW ORLEANS 1982 ANNUAL MEETING
CALL FOR SYMPOSIA PROPOSALS**

Individuals interested in organizing a symposium for the 1982 Annual Meeting should contact the Joint Technical Program Chairman for details:

Dr. William W. Craig
Department of Earth Sciences
University of New Orleans
New Orleans, LA 70122
(504) 286-6790 (office)
(504) 286-6325 (dept.)

Deadline for receipt of all proposals:
DECEMBER 15, 1981

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PRELIMINARY ANNOUNCEMENT AND CALL FOR PAPERS

NORTH-CENTRAL SECTION, GSA, 16th Annual Meeting West Lafayette, Indiana, April 29–30, 1982

The Department of Geosciences, Purdue University, will host the 16th Annual Meeting of the North-Central Section of the Geological Society of America concurrently with the East-Central Section of the National Association of Geology Teachers, North-Central Section of the Paleontological Society, and the Pander Society on April 29 and 30, 1982.

CALL FOR PAPERS. Technical sessions on Thursday, April 29, and Friday, April 30, will include the following: paleontology, paleoecology, stratigraphy, sedimentology, economic geology, geomorphology, hydrogeology, Quaternary geology, mineralogy and petrology, geochemistry, structural geology, geophysics, engineering and environmental geology, and general geology. Papers on these and other subject areas are solicited. Other sessions may be arranged after abstracts have been received by the Program Committee.

POSTER SESSION. A one-half day poster session including any of the above topics is also planned. Authors must indicate their preferences for oral or poster sessions on the abstract form.

SYMPOSIUM (April 29, 30)

- (1) Remote Sensing Applications to Geology (Don W. Levandowski and Robert Howe)
- (2) Mid-Continent Tectonics (William J. Hinze and Thomas C. Buschbach)
- (3) Coal Petrology of the Illinois Basin (Gunnar Kullerud)
- (4) Landslides and Slope Stability in Rock (Terry R. West and Alberto S. Nieto)
- (5) Evolution of Communities in Geologic Time: Invited symposium by Paleontological Society (J. John Sepkoski, Jr.)
- (6) Problems of Ground Water Supply and Use in the North Central States (Darrel I. Leap)

ABSTRACTS. Abstracts, which are limited to 250 words, *must* be submitted camera ready on official abstract forms available from

Terry R. West
Program Committee Chairman
Department of Geosciences
Purdue University
West Lafayette, IN 47907
(317) 494-3296

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

Abstracts are due **December 2, 1981**. Acceptance or rejection of an abstract will be based on the abstract as submitted by the author.

Send one original
and four copies to

Terry R. West
Department of Geosciences
Purdue University
West Lafayette, IN 47907

PROJECTION EQUIPMENT. All slides must be 2" x 2" and fit a standard 35-mm carousel projector. Only one projector will be available in each meeting room.

STUDENT AWARDS. Student papers are encouraged, and awards will be made to students presenting the most outstanding papers. Student papers should be clearly identified as such and should be authored exclusively by students. Prizes awarded for student papers with more than one author will be divided among the authors.

FIELD TRIPS. All field trips will be scheduled for Saturday, May 1. Field-trip coordinator is Edward J. Cray.

- (1) Coastal Evolution of Southern Lake Michigan (William L. Wood)
- (2) Geomorphology of the Middle Wabash Valley (Wilton N. Melhorn and Ned K. Bleuer)
- (3) Environmental and Engineering Geology and Urban Planning for the cities of Lafayette, West Lafayette, and Tippecanoe County, Indiana (Terry R. West, Chester Watts, and Abdul Shakoor)
- (4) Geology of the Kentland Structure, Kentland, Indiana—II, An Update (Raymond Gutschick)
- (5) The Silurian Reefs at Delphi and Pipe Creek Junior Quarries, Indiana, and the Deep-vs.-Shallow Water Question (Robert H. Shaver)

A tour of LARS (Laboratory for Applications of Remote Sensing), Purdue University, is planned in conjunction with the Symposium on Remote Sensing Applications to Geology.

SOCIAL EVENTS. A no-host welcoming party will be held on Wednesday evening, April 28, and the annual banquet will be held on Thursday evening, April 29. A spouse/guest program is planned.

DETAILED INFORMATION concerning registration, motel and hotel accommodations, and other activities will appear in a later issue of *GSA News & Information* and as a part of the *Abstracts with Programs* for 1982.

ADDITIONAL INFORMATION, REQUESTS, OR SUGGESTIONS SHOULD BE DIRECTED TO

Herbert J. Howe, Local Committee Chairman
Department of Geosciences
Purdue University
West Lafayette, IN 47907
(317) 494-3704

PRELIMINARY ANNOUNCEMENT AND CALL FOR PAPERS

ROCKY MOUNTAIN SECTION, GSA, ANNUAL MEETING Bozeman, Montana, May 7-8, 1982

The Rocky Mountain Section of the Geological Society of America will hold its annual meeting at Montana State University in Bozeman, Montana, on May 7-8, 1982. The host will be the Department of Earth Sciences, Montana State University.

TECHNICAL SESSIONS AND FIELD TRIPS. Two days of technical sessions will be held on May 7 and 8, with pre-meeting and postmeeting field trips on May 5, 6, and 9. On-site registration for those participating in field trips will begin at 7:00 a.m., May 5, in the lobby of the Holiday Inn, North 7th Avenue at the I-90 interchange, Bozeman. Technical and poster sessions will be arranged after abstracts of proposed papers have been reviewed by the Program Committee. Advance registration for field trips is required and may be completed by using the preregistration form available in the February issue of *GSA News & Information*.

FIELD TRIPS. Six field trips are planned: (1) Cenozoic history of the Yellowstone Valley south of Livingston, Montana; (2) Late Cretaceous volcanic and intrusive rocks near the eastern margins of the Boulder and Tobacco Root batholiths; (3) Stratigraphy, depositional environments, and paleotectonics of the LaHood Formation (Precambrian Y) at the southern margin of the Belt embayment; (4) Geology of the fold and thrust belt, west-central Montana; (5) Geology of the southeastern Gallatin Valley, Montana; and (6) Workshop on field teaching of geology.

GUIDEBOOKS. Guidebooks will include complete roadlogs and detailed geological discussions of areas covered by the field trips. Guidebooks will be available for purchase by nonparticipants in field trips. For further information on guidebooks and field trips, contact

Donald L. Smith, Field Trip Chairman
Department of Earth Sciences, Montana State University
Bozeman, MT 59717, (406) 994-3331

STUDENT AWARDS. Student papers are encouraged, and awards will be given to students presenting the most outstanding papers. This year, papers will be *preselected on the basis of the abstract and judged finally on the basis of the oral presentation*. Students wishing to compete for the awards should check "Student Paper" box on the abstract form. Such papers should be authored exclusively by currently registered students. For further information, contact the Program Chairman.

POSTER SESSIONS. Poster sessions are encouraged, and space for them will be provided. An award will be given for the outstanding poster session.

CAROUSEL PROJECTION EQUIPMENT will be provided for 2" x 2" (35mm) slides only. Please bring your own loaded carousel trays if possible. Dual projection will not be arranged except for symposia papers.

SYMPOSIA. Two symposia will be conducted. The first is "Structure and Tectonic Evolution of the Fold and Thrust Belt." This symposium will be subdivided into the following topics: (1) structural geology of the western Montana fold and thrust belt; (2) tectonics and regional geophysics of the Northwestern United States; and (3) oil and gas resources. The second symposium will be entitled "Geologic Aspects of the Disposal of High-Level Nuclear Waste in Igneous Rocks." Solicited and unsolicited papers will be selected by the Program Committee. If you plan to submit a paper for a symposium, please notify the Program Chairman by mid-November if possible. All papers in non-symposium sessions will be scheduled for 15 minutes, plus 5 minutes for discussion. Symposia papers may be longer.

ABSTRACTS ARE DUE DECEMBER 15, 1981

send one original
and four copies to

Robert A. Chadwick, Program
Chairman
Department of Earth Sciences
Montana State University
Bozeman, MT 59717
(406) 994-3331

Acceptance or rejection of an abstract will be based on the abstract as submitted by the author. Authors will be notified of acceptance well in advance of the meeting.

ABSTRACT FORMS may be obtained from

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

EXHIBITS. An exhibit hall will be available. Exhibitors will be charged an appropriate fee for display space. For further information contact

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

ANNOUNCEMENTS concerning registration, motel accommodations, and events for guests will appear in a later issue of *GSA News & Information* and as part of the *Abstracts with Programs* for 1982. Bozeman is easily accessible by air via Northwest and Frontier Airlines with non-stop or one-stop connections through Salt Lake City, Denver, Billings, and Minneapolis, or by automobile via I-90 (east-west) or U.S. 191 (north-south).

Additional information, requests, or suggestions should be directed to

John Montagne, Meeting Chairman
Department of Earth Sciences, Montana State University
Bozeman, MT 59717
(406) 994-3331

REQUEST FOR NOMINATIONS for GSA Honors and Awards

FEBRUARY 1, 1982, has been set as the deadline for receipt at headquarters of nominations for the Penrose Medal, Day Medal, Honorary Fellowship, and the National Medal of Science.

To ensure thorough consideration by the appropriate subcommittee, the membership is asked to submit with each nomination a brief biographical sketch, such as used in *American Men and Women of Science*, a summary of the nominee's principal contributions to geology, and a *selected* bibliography of no more than 20 titles. In choosing nominees, scientific achievements should be considered, rather than contributions in administration and service.

The accompanying multi-purpose form may be used to submit nominations for any one of the four honors and awards. Completed forms should be sent to the Executive Director at headquarters.

Please keep in mind that although the automatic carryover of names of nominees is not permitted, headquarters retains the back-up material on each past nominee, and only updated information is necessary. If you resubmit a name, please ask headquarters to attach the back-up material to your nomination.

A brief description of each of the four honors and awards follows:

Penrose Medal

The Penrose Medal was established in 1927 by Dr. R.A.F. Penrose, Jr., to be awarded in recognition of eminent research in pure geology, for outstanding original contributions or achievements which mark a major advance in the science of geology. The award is to be made only at such time as the Council may decide. Nominees are to be selected by the Council, may or may not be members of the Society, and may be from any nation or any race of people. The sole object of Dr. Penrose in making the gift was to encourage original work in purely scientific geology.

Day Medal

The Day Medal was established in 1948 by Pro-

Please use this form. 

fessor Arthur L. Day to be awarded annually, or less frequently, at the discretion of the Council, for outstanding distinction in contributing to geologic knowledge through the application of physics and chemistry to the solution of geologic problems. It was the intent of Professor Day to recognize outstanding achievement and inspire further effort, rather than to reward a distinguished career.

Honorary Fellows

Honorary Fellows of the Society are selected from those geologists who have distinguished themselves as geological investigators or who have rendered special service to the Society. Only in very unusual circumstances will nominees in North America be considered for election to Honorary Fellowship. The subcommittee will select for nomination to the spring Council a list of at least four candidates. Rarely are more than two Honorary Fellows elected in any one year. A majority vote of Council is required for election.

National Medal of Science

In 1959, Congress established a National Medal of Science to be awarded by the President of the United States to individuals "deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, or engineering sciences." In addition, achievements of an unusually significant nature will be considered and judged in relation to the potential effects of such achievements on the development of scientific thought.

The GSA subcommittee normally nominates one candidate to the spring Council. The Council then submits the nomination to a committee composed of scientists and engineers which assists the President in identifying a limited number of distinguished candidates for these awards.

REMINDER FROM THE MEMBERSHIP DEPARTMENT

Last year most members remitted their annual dues payments before the November 30 deadline. For them there was no delay in receiving the publications they desired.

This year the timing is even more critical because section meeting *Abstracts with Programs* will be mailed to members in early January. If your dues payment is not received at headquarters before mid-December, you may miss that much-needed *Abstracts with Programs* for the section meeting you plan to attend. REMEMBER, back orders take 6 to 8 weeks to reach you!

THE GEOLOGICAL SOCIETY OF AMERICA

**Nomination for Penrose Medal, Day Medal, Honorary Fellowship, or National Medal of Science
(Please circle one of the above)**

Name of nominee:

Address:

Biographical information:

Summary of principal contributions to geology:

(over)

Selected bibliography: (No more than 20 titles)

SUPPORTING LETTERS MAY BE ATTACHED.

Name of person making this nomination _____

Address _____

Date _____ Signature _____

Return to: Executive Director
The Geological Society of America
P.O. Box 9140
Boulder, CO 80301
(303) 447-2020

Annual Report for 1980—Report of the Treasurer

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

This report is for the calendar year 1980. Despite some new and unusual expenses, the Society ended up well in the black. These new expenses were "Centennial Program" (\$98,507) and "Foundation Organizational Expense" (\$29,554). The "Centennial" expenses will continue to build up for several years to come but hopefully will be replaced by Foundation support and sale of Centennial publications. The Foundation will not restore the 1980 organizational expenses but plans to be self-supporting from now on. The Council and Executive Committee believe that the Foundation has gotten off to a good start and that, down the road, it will more than make up the inflationary losses to the Penrose Fund.

The figures in this report are taken from the unqualified report by our independent auditors, Arthur Andersen & Co. During the year the Audit Committee interviewed several new auditing firms and recommended to Council that we make a change. The entire Executive Committee met with the Auditing Committee when representatives of Arthur Andersen presented their oral report. This arrangement was so helpful that it was decided to continue the practice in future years.

During the year it became very apparent that the Society would have to do something constructive in improving its information systems. The accounting function is fairly adequately handled by in-house equipment and personnel. However, serious problems exist with the

handling of information in the membership, subscription/publications, and sales areas. Arthur Andersen was requested to make a preliminary review of the problem, and as a result of their report to the Audit Committee and the Executive Committee, Council approved a comprehensive review and program to be conducted during the summer months. This report will be reviewed by the Executive Committee in September.

As of December 31, 1980, total assets of the Society were \$10,852,874, and total liabilities were \$876,913, for a net worth of \$9,975,961.

Total operating expenses for 1980 were \$2,023,301, and total operating revenue was \$1,499,954, which included \$61,502 in contributions. Thus the operating deficiency was \$523,347. This deficiency was made up from income from investments, which consisted of \$689,371 in interest and dividends. The favorable difference, \$166,024 plus \$268,313 in realized capital gains and \$7,792 in capital contributions, resulted in a net gain for the year of \$442,129.

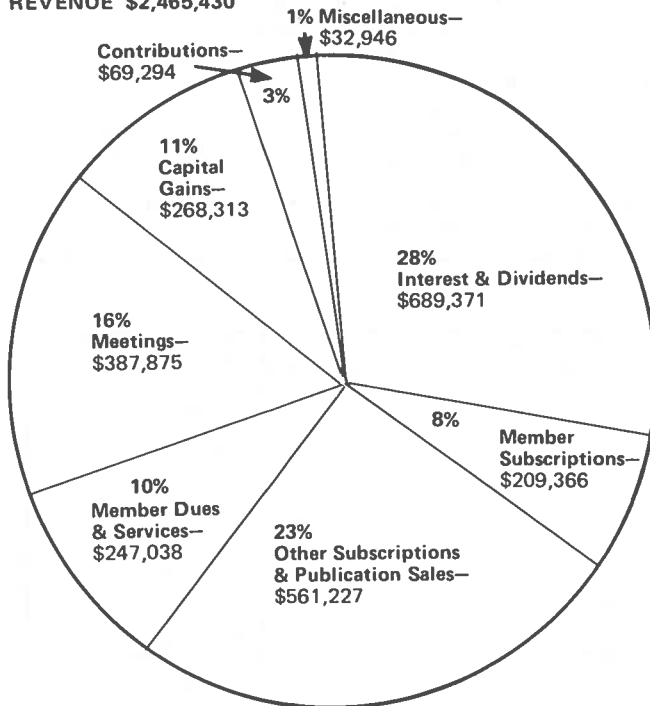
Inflation continues to be our number one problem. In order to attract and hold quality people, we have had to increase salaries substantially which, in view of the fact that we are heavily labor intensive, affects us significantly.

Following are diagrams showing the distribution of the Society's combined revenues and expenses for the calendar year 1980.

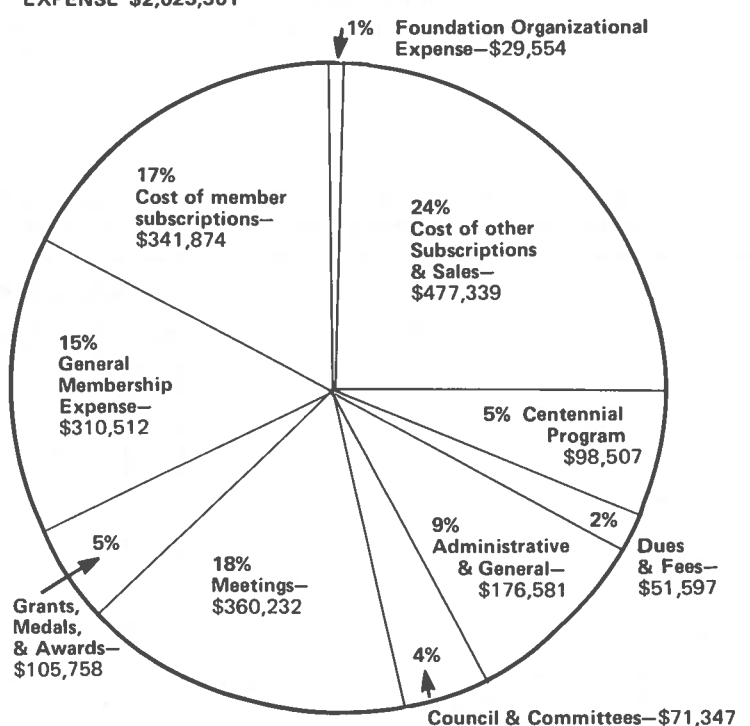
Respectfully submitted,
William B. Heroy, Jr., Treasurer

THE GEOLOGICAL SOCIETY OF AMERICA SOURCE AND APPLICATION OF FUNDS, 1980

REVENUE \$2,465,430



EXPENSE \$2,023,301



SPECIAL PREPUBLICATION OFFER

Geological Society of America Memoir 154

NAZCA PLATE:

CRUSTAL FORMATION AND ANDEAN CONVERGENCE

Edited by LaVerne D. Kulm, Jack Dymond, E. Julius Dasch, and Donald M. Hussong

Order your copy of the Nazca Plate volume now prior to publication in mid-November and get either or both of the GSA maps that supplement this Memoir at special reduced prices.

Memoir 154 is organized into five sections:

INTRODUCTION — One chapter covering the history of the Nazca Plate Project: project initiation, objectives, participants, cruise activities, and publications.

DIVERGENT BOUNDARY — Four chapters on the evolution of the oceanic crust at the spreading East Pacific Rise.

METALLIFEROUS SEDIMENTS — Eight chapters on the sedimentation on the evolving crust as it is transported across the Nazca Plate.

CONTINENTAL MARGIN AND TRENCH — Fifteen chapters covering the disruption and destruction of the subducting plate along the Peru-Chile Trench and its influence on the evolution of the Andean continental margin.

ANDEAN CONVERGENCE ZONE — Seven chapters on the effect of subduction on the volcanism, mountain building, and ore deposits of the Andes.

In *Nazca Plate: Crustal Formation and Andean Convergence*, 56 authors discuss the tectonics of the Nazca-Pacific divergent plate boundary, geochemistry of Nazca plate surface sediments, uranium and thorium isotopic investigations, formation and growth of ferromanganese oxides, economic appraisal of Nazca plate metalliferous sediments, biogeography of benthic foraminifera, estimation of depth to magnetic source using maximum entropy power spectra, a geophysical survey of the Chile Margin triple junction, volcanic gaps and the consumption of aseismic ridges in South America, convergence and mineralization, and many others. The volume is dedicated to George P. Woollard.

Hard bound, viii + 816 pages, 7" x 10", more than 400 illustrations and plates Price only \$18.00

ORDER THE NAZCA PLATE MEMOIR BEFORE NOVEMBER 15, 1981, AND YOU CAN ORDER EITHER OR BOTH OF THESE MAPS AT SPECIAL REDUCED PRICES

MC-26 Bathymetry of the Southeast Pacific

J. Mammerickx and S. M. Smith

In color, 43" x 47". Contour interval 1,000 meters, scale at equator 1:6,442,194 or 1.74 cm per degree of longitude.

Hundreds sold at \$ 8.00*

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*Folded in envelope

MC-34 Part I: Bathymetry of the Peru-Chile Continental Margin and Trench

R. A. Prince, W. J. Schweller, W. T. Coulbourn, G. L. Shepherd, G. E. Ness, A. Masias.

Covering latitude 3°-40°S and longitude 65°-85°W. Nine sheets in color, approximately 18" x 26" each. Scale 1:1,000,000.

Part II: Chemical Composition of Nazca Plate Surface Sediments

Jack Dymond, John B. Corliss

In color, 18" x 22". With 2-page text.

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To get your copy of the GSA Memoir 154 and specially priced map or maps, fill out the order form below. Your copy of the Memoir, with map or maps, will be mailed to you postage paid about November 30. This offer expires November 15, 1981.

ORDER FORM

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Please send to: _____ GSA member number _____

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Address _____

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Address all orders to:
 Geological Society of America
 Publication Sales Department
 P.O. Box 9140
 Boulder, Colorado 80301

Qty.	Series and number (or other brief description)	Price each	TOTAL
	Map MC-26 folded	4.00	
	Map MC-34 folded	8.25	
	Memoir 154	18.00	
	Colorado Residents add applicable sales tax	TAX	
		TOTAL	

- Payment in U.S. funds must accompany all orders for this special offer.
- GSA members discount (see reverse side of membership card) allowed when claimed.

- Denver metro residents—add 3½% sales tax; Boulder residents—add 5½% sales tax; Colorado residents—add 3% sales tax.
- This offer good only until November 15, 1981.

1981–1982 AGI Minority Participation Program Scholarship Winners

The Advisory Committee for the American Geological Institute's Minority Participation Program has awarded 65 scholarships for the 1981–1982 academic year, amounting to a total of \$51,000 and ranging between \$250 and \$1,500. The scholarship winners are listed below.

The AGI Minority Participation Program was formed to establish objectives and goals for attracting science-oriented students of Black, Hispanic, and American Indian ethnic origin into one of the geoscience disciplines. The scholarships are based on academic achievement to date, financial need, and judged potential for future professional geoscience success. The program was started in January 1975 and has helped many minority students achieve their goals for a particular academic year.

The scholarship program is dependent upon funds contributed by industrial firms, member professional societies, and individuals. The Advisory Committee would like to broaden its base of financial support for the program. Inquiries would be welcomed by contacting Chairman, AGI-MPP, AGI Headquarters, One Skyline Place, 5202 Leesburg Pike, Falls Church, VA 22041. Telephone (703) 379-2480.

Individuals desiring to be considered for the 1982–1983 academic year should direct inquiries to the above address. Deadline for receipt of applications: FEBRUARY 1, 1982.

Claudia J. Alexander, Senior University of Calif. at Berkeley	Norberto Gandara, Senior University of Texas, El Paso	Jimmy A. Lovato, Senior New Mexico Tech	Adolfo Requejo, Grad. Student University of Rhode Island
Sara Azua, Senior Texas A&I University	Abato J. Garza, Grad. Student Stephen F. Austin State Univ.	Gale Madyun, Grad. Student University of Montana	Geneva R. Roberts, Grad. Student Texas A&M University
Randolph Boone, Grad. Student Syracuse University	Kevin P. Gillard, Junior University of New Orleans	Norma Martinez, Grad. Student Baylor University	Lori C. Robison, Senior University of Arizona
Wanda Boyd, Senior Rider College	Derrick Givens, Senior Howard University	Paul E. Martinez, Grad. Student University of New Orleans	Denise Salcido, Freshman New Mexico State University
James Braddock, Grad. Student State University of New York	Victor L. Glenn, Grad. Student University of Pittsburgh	Kimberly J. Medina, Senior University of Kansas	Lauret E. Savoy, Grad. Student University of California at Santa Cruz
Diana S. Bustamante, Senior University of Arizona	David Gonzales, Senior Fort Lewis College	Eddie Mignardot, Senior New Mexico State University	Phillip Solano, Senior New Mexico Highlands University
Raul D. Bustos, Senior N.M. Highland University	Mark Gonzalez, Junior Carleton College	Chuck Mitchell, Junior Howard University	Alan P. Trujillo, Grad. Student Northern Arizona University
David Butler, Grad. Student University of Florida	Angela Goodall, Junior Virginia State University	Ray Newby, Grad. Student University of New Orleans	William Tsosie, Sophomore University of New Mexico
Gregory Cano, Junior Fort Lewis College	John Green, Sophomore University of New Orleans	Gene Norman, Senior Massachusetts Institute of Technology	Peter K. Valles, Junior California State Polytechnic University
Irma G. Castro, Senior Lamar University	Roxanna Guerra, Senior Texas A&I University	Ronald A. Parker, Grad. Student Elizabeth City State University	Roseann Vincent, Senior York College (CUNY)
Tonie M. Dees, Junior Mary Washington College	David G. Guetzow, Grad. Student University of Texas at Austin	Edwin Pinero, Grad. Student Texas A&M University	Howard West, Grad. Student University of Hawaii
Timothy A. Doucette, Freshman Tulane University	Anita Gutierrez, Grad. Student New Mexico State University	Sandra Pounder, Senior University of California at Santa Cruz	Elijah White, Grad. Student Elizabeth City State University
Mary Ann Eames-Ramirez, Soph. Louisiana State University	Clarence R. Hairston, Grad. Student Pennsylvania State University	Marisa Quinones, Grad. Student State University of NY at Stony Brook	Edith G. Williams, Grad. Student Stanford University
Charles R. Elerson, Senior Louisiana Tech University	Michael Hamlett, Senior University of the District of Columbia	Danny Luis Ramirez, Senior Hunter College—CUNY	Dawn J. Wright, Junior Wheaton College
Joe Faulkerson, Senior Tennessee Tech University	Darlette Johnson, Senior Virginia State University	Melanie E. Reed, Senior University of New Orleans	Ricardo L. Zepeda, Grad. Student University of California at Santa Barbara
Guy Felton, Sophomore University of Texas, Austin	Germaine Johnson, Senior University of New Orleans	Wendy L. Reed, Sophomore Virginia Polytechnic Institute & State University	
Richard J. Flores, Grad. Student Indiana University, Bloomington	Darryl J. Keith, Grad. Student Woods Hole Oceanographic Institution		

UPDATE

Office of Earth Sciences solicits suggestions

The Office of Earth Sciences (OES) and its Advisory Board, Assembly of Mathematical and Physical Sciences, National Research Council, are anxious to have the assistance of earth scientists in assuring that their responsibilities are fully met. These responsibilities include continued awareness and active concern for the health of the earth sciences, identification of opportunities for the earth sciences in meeting national needs, and fostering awareness of scientific advances that may help resolve national problems. Atmospheric, oceanographic, and solid-earth scientists are invited to suggest activities at the national level to the office and its advisory board.

The OES uses the solicited suggestions to complement its perception of important national topics that need attention. Research is not supported, but the suggestions receive attention in several ways. They are sent to appropriate units of the National Research Council when related activity is underway. In some cases, a suggestion may result in an independent committee being established to study and report on the topic. For example, a report is currently being prepared on the geological aspects of industrial waste disposal, a suggested topic. Such a report is usually read by government officials, scientists in the field, and the public.

It is the wish of the OES Advisory Board to make this resource known to the scientific community so that all earth scientists can actively participate. Effective reports can strengthen our sciences through increased support of the scientific and technological community, increased awareness of the importance of particular topics, and initiation or change in the emphasis of federally supported programs.

A suggestion should be sent to the Chairman of the Office of Earth Sciences, National Research Council, National Academy of Sciences Building, 2101 Constitution Avenue, N.W., Washington, DC 20418. The statement should include sufficient information for the advisory board to evaluate the national significance of the topic.

John C. Crowell
Chairman, Office of Earth Sciences

In October *Geology*

1. Structure and permeability: Geologic controls on induced seismicity at Nurek reservoir, Tadjikistan, USSR, by W. Leith, D. W. Simpson, W. Alvarez
2. Disequilibrium profile of the Potomac River near Washington, D.C.—A result of lowered base level or Quaternary tectonics along the Fall Line?, by J. C. Reed, Jr.
3. Comparison of uranium-series, radiocarbon, and amino acid data from marine molluscs, Baffin Island, Arctic Canada, by B. J. Szabo, G. H. Miller, J. T. Andrews, M. Stuiver
4. Sinistral strike-slip motion on the Dead Sea Rift: Confirmation from new magnetic data, by R. D. Hatcher, Jr., I. Zietz, R. D. Regan, M. Abu-Ajamieh
5. Petrography and implications of continental rocks from the Agulhas Plateau, southwest Indian Ocean, by R. B. Allen, B. E. Tucholke
6. Proterozoic zircon from augen gneiss, Yukon-Tanana Upland, east-central Alaska, by J. N. Aleinikoff, C. Dusel-Bacon, H. L. Foster, K. Futa
7. Upper mantle beneath a young oceanic rift: Peridotites from the island of Zabargad (Red Sea), by E. Bonatti, P. Hamlyn, G. Ottonello
8. Cretaceous volcanism and Jurassic magnetic anomalies in the Nauru Basin, western Pacific Ocean, by R. L. Larson, S. O. Schlanger
9. Paleotemperatures and the glacially induced changes in the oxygen-isotope composition of sea water during late Pleistocene and Holocene time in Tanner Basin, California, by M. I. Kahn, T. Oba, T.-L. Ku
10. Qualitative stability analysis of geologic systems, with an example from river hydraulic geometry, by R. Slingerland

CHANGE OF ADDRESS,*

The Geological Society of America, P.O. Box 9140, Boulder, CO 80301

NAME _____

(Please print)

New Address _____

City State/Province Zip Code

Country

Member Number _____

Former Address—Attach Mailing Label

Effective Date of Change

*North American members should report address changes 6 weeks in advance; all others, 3 months, in advance.

**Call for papers:
23rd U.S. Rock Mechanics Symposium**

The 23rd U.S. Symposium on Rock Mechanics will be held August 25-27, 1982, at the University of California, Berkeley. Announcement and call for papers has been issued by the co-sponsors, the U.S. National Committee for Rock Mechanics, the International Society for Rock Mechanics, and the University.

The theme of the symposium, "Issues in rock mechanics," will highlight aspects including in situ stress measurement; geological stress determinations; mechanical, thermal, and hydraulic properties of rock masses; rock mass exploration; rock fracture mechanics; brittle-ductile transition; deformation mechanisms and texture development; scaling of test data; numerical modeling; instrumentation; statistics in rock mechanics; rock reinforcement; energy recovery and storage; dynamic rock mechanics and related applications; creep mechanisms; and large-scale field experiments.

Prospective authors are invited to submit extended-abstracts of not more than three to four typed, double-spaced pages (1,000-1,200 words plus one or two figures) by January 29, 1982, to Organizing Committee, 23rd Rock Mechanics Symposium, c/o Professor Richard E. Goodman, Department of Civil Engineering, 440 Davis Hall, University of California, Berkeley, CA 94720. Authors will

be notified by March 1, 1982; the deadline for completed papers, ready for publication, is May 1, 1982.

For further information about papers, write to Goodman at the address above or call (415) 642-5525.

For a final symposium program with registration available in May 1982, write to Continuing Education in Engineering, University of California extension, 2223 Fulton St., Berkeley, CA 94720.

**ARTICLES IN *BULLETIN*, PART II,
AUGUST 1981**

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

1. Geochemistry and geochronology of late Cenozoic basalts of Southeast Asia, by Sandra M. Barr. (On microfiche: 74 p., 13 figs., 4 tables)
2. Quaternary glacial and marine stratigraphy of the Qivitu Peninsula, northern Cumberland Peninsula, Baffin Island, Canada, by Alan R. Nelson. (On microfiche: 119 p., 27 figs., 4 tables)

**PALEORECONSTRUCTION OF THE CONTINENTS
Geodynamics Series Volume 2**

Edited by M. W. McElhinny and D. A. Valencio, 1981, vi + 194 pages,
52 figures, 28 tables \$15.00

Eighteen papers analyze the evidence leading to the reconstruction of past configurations of continental blocks, define episodes of fracturing and separation of the continental blocks, and test whether the distribution of orogenic activity at any point in geologic time and recent horizontal movements can be integrated within a single geodynamic pattern.

This is the second volume of the Geodynamics Series comprising the final reports of the International Geodynamics Project co-published by AGU and GSA.

How to order: GSA members, who are not members of AGU, may buy any volume in the series at 20% discount only through GSA Publication Sales. The ordering procedures that members must follow are set forth on the back of the 1981 GSA membership card and on order forms in the *Spring 1981 Price List* and page 5 of the January 1981 issue of *GSA News & Information*. GSA will not offer the Geodynamics Series on standing order. The American Geophysical Union, 2000 Florida Avenue NW, Washington, DC 20009, welcomes standing orders. Write for details.



THE GEOLOGICAL SOCIETY OF AMERICA

Annual research awards program 1982

The Geological Society of America will continue its annual research awards program in 1982. Eligibility is not restricted to GSA members. New application forms for 1982 and detailed requirements are available in the geology departments of most colleges and universities in the United States or upon request from the Executive Director, the Geological Society of America, P.O. Box 9140, Boulder, Colorado 80301. **Please use the 1982 forms.**

The primary role of the research grant program is to provide partial support of masters and doctoral thesis research for graduate students at universities in the United States, Canada, Mexico, and Central America. If necessary, applications may be submitted in Spanish or French.

The Geological Society of America awarded \$100,000 for grants in 1981. The grants went to 176 students doing research for advanced degrees and to one postdoctoral applicant. The average amount granted was \$575. The highest grant was \$1,000, but there is no predetermined maximum amount.

Confidential evaluations from two faculty members are required from masters and doctoral candidates and must accompany applications submitted. **PLEASE USE THE NEW "APPRAISAL OF APPLICANT" FORMS, WHICH ACCOMPANY THE 1982 APPLICATION FORMS.**

Applications will also be accepted for the Harold T. Stearns Fellowship(s). These grants are awarded periodically in support of research on one or more aspects of the geology of Pacific Islands and of the circum-Pacific region. They are distinct from the GSA Penrose research grants and are restricted in their use to the particular region. The awardee(s) will be selected by the Research Grants Committee. Applications must be postmarked by **February 15**. Application forms are the same as those used for the Penrose research grants.

The Committee on Research Grants will meet soon after February 15 to evaluate applications and to award grants. All applicants for grants will be informed promptly of the committee's actions by the Executive Director of the Geological Society of America.

APPLICATIONS MUST BE POSTMARKED BY FEBRUARY 15, 1982.

(PLEASE POST)

AUGUST BULLETIN BRIEFS

Article Summaries

- Geochemistry and geochronology of late Cenozoic basalts of Southeast Asia: Summary.

Sandra M. Barr, Department of Geology, Acadia University, Wolfville, Nova Scotia B0P 1X0; Alan S. Macdonald, R. R. No. 3, Wolfville, Nova Scotia B0P 1X0. (4 p., 4 figs.)

- Quaternary glacial and marine stratigraphy of the Qivitu Peninsula, northern Cumberland Peninsula, Baffin Island, Canada: Summary.

Alan R. Nelson, Institute of Arctic and Alpine Research and Department of Geological Sciences, University of Colorado, Boulder, Colorado 80309 (present address: Engineering and Research Center, D-1632, U.S. Water and Power Resources Service, Denver Federal Center, Denver, Colorado 80225). (7 p., 2 figs.)

Articles Complete in the August Issue of Part I

-
- Coal resources and reserves estimates: Some unresolved problems.

James E. Palmer, Woodward-Clyde Consultants, 901 Charleston Ave., P.O. Box 1035, Mattoon, Illinois 61938. (1 p.)

This introduction is included in a group of articles which were submitted to the *Bulletin* as part of the Coal Geology Symposium entitled "The Evaluation of North American Coal Resources," held in November 1979.

-
- Historical review of and current progress in coal-resource estimation in the United States.

Gordon H. Wood, Jr., U.S. Geological Survey, Reston, Virginia. (9 p., 7 figs.)

Nine estimates of the coal resources of the United States have been published in the past 71 years. Although many details of these estimates differ markedly, the 1913, 1922, and 1974 estimates are surprisingly similar. Some differences are due to increased geologic data, others reflect changes in terminology, definitions, criteria, guidelines, and methodologies used for estimating coal resources and reserves during the past 100 years. Because of the increased data and changes, many of the early estimates are not particularly useful in modern resource assessments.

Preliminary definitions that are being prepared in 1980 by the U.S. Geological Survey are compared with those published in 1976 and currently in use. Anticipated results of the new definitions are to lessen existing confusion about estimation procedures, to make such procedures easier and more precise, and to promote use of a commonly accepted terminology accompanied by standardized definitions, criteria, guidelines, and methodologies for estimating coal resources.

-
- Canadian coal-resource terminology and evaluation methodology.

John A. Irvine, Institute of Sedimentary and Petroleum Geology, 3303-33rd Street N.W., Calgary, Alberta (present address: Coal Exploration, BP Exploration Canada Limited, 333 Fifth Avenue S.W., Calgary, Alberta, 12P 3B6). (9 p., 11 figs., 8 tables)

Deposits of Canadian coal are found in varied geographic and geologic conditions. The coal-resource classification scheme adopted by Canada acknowledges the differing conditions affecting feasibility of exploration as well as parameters affecting assurance of existence. The classification scheme is described with particular reference to methods of categorizing deposits of relatively undisturbed coal in the Plains area of western Canada. Methods include acquisition and interpretation of drill-hole information, computer storage, and manipulation of data and computer output of coal quantities in accordance with accepted resource parameters. A preliminary geostatistical study of a Western Plains deposit indicates that borehole density parameters employed to determine the level of assurance of existence yield estimates of coal quantity that are within $\pm 10\%$ for measured resources.

-
- A critical evaluation of published western coal resource estimates.

Gary B. Glass, Geological Survey of Wyoming, Box 3008, University Station, Laramie, Wyoming 82071. (4 p., 4 figs., 1 table)

What follows may not be new, but it is still pertinent. Unfortunate as it may seem, estimates of western coal resources, particularly those in Colorado, Wyoming, and Montana, are probably both inaccurate and inadequate.

These conclusions are derived from four major observations: (1) most western resource estimates are based on fairly old reports, (2) the existing estimates are generally very conservative, (3) reports used for the estimates are difficult to compare, and (4) the resource estimates are not attuned to modern needs. Recommendations for modernizing resource estimates and research needs are discussed.

- New maps of Federal coal.

Russell G. Wayland, U.S. Geological Survey, Reston, Virginia 22092. (9 p., 14 figs., 3 tables)

Compilation and analysis of publicly available data on Federal coal are resulting in voluminous map sets showing coal isopachs, structure contours, and overburden isopachs on each known minable coal bed. As of the spring of 1981, map sets are available from the U.S. Geological Survey Open-File Services Section in Denver at 1:24,000 scale or in microfiche sets covering approximately 470 of the ultimately 1,400 quadrangles in the program. Because Congress in 1976 mandated the prompt "inventorying" of all unleased Federal coal for Government land-use planning, and because dollars but not employee positions were provided for the work, the U.S. Geological Survey was obliged to contract for the compilations.

A typical map set has a short text and about 20 plates, including a data sheet, a Federal mineral ownership map, and correlation charts. For each coal bed, there are isopachs, structure contours, stripping limits, and mining ratios extending as far as the data will permit, regardless of coal ownership. Reserve base tonnages and relative development potentials are calculated, but only for unleased Federal coal areas.

Termed "minable" are coal beds at least 1.524 m (5 ft) thick and less than 914.4 m (3,000 ft) deep. For conventional underground mining methods, beds dipping more than 15° are excluded; also excluded are all but 3.66 m (12 ft) of thick beds. For *in situ* conversion methods, the minimum dip is 15° except for the deep thick beds in the Powder River Basin.

Arbitrary parameters classify the development potential of each unleased 16.19-hectare (40-acre) tract as high, moderate, low, unknown, or negative. The Secretary of the Interior has announced his intention to restrict leasing in general to tracts classified as having high to moderate potential for development.

- Geologic problems associated with coal resources and reserves determination in the Appalachian Coal Basin.

Russell A. Brant, Kentucky Geological Survey, University of Kentucky, Lexington, Kentucky 40506. (7 p., 4 figs.)

There are a variety of geologic conditions in the Appalachian coal field that bear on coal resources and reserves determinations. Sedimentary associations are the basic means of locating coal. An adequate measurement of coal thickness is still the primary consideration in the determination of coal-bed geometry. Strongly folded and thrust-faulted con-

ditions have direct and often drastic effects on coal beds, making estimation of resources difficult. The gentle structure of the wide basin obscures beds at depth. Sedimentary models are useful for explaining and analyzing conditions, but thus far they have added little toward establishing precise coal-bed margins. Quality of coal-resources maps is directly dependent on the amount of data and the competency of the geologic interpretation. Splits, benches, and coals mapped in zones cause difficulties. Primary data in notebooks or core logs are often lost, thus necessitating remeasuring where needed and possible.

- Effects of physical characteristics of coal occurrence and current mining methods on economic recoverability.

John P. Weir, James E. McNulty, Paul Weir Company, Chicago, Illinois 60606. (5 p., 2 tables)

A practical distinction between coal resources and coal reserves is that reserves are quantities that can be economically recovered at the time of determination using currently acceptable mining methods and available equipment.

There are limits to the flexibility of methods and equipment to adapt to variable physical conditions of coal occurrence beyond which mining becomes uneconomic.

In most instances, the two most important factors affecting recoverability of coal by either surface or underground methods are seam thickness and total depth of overburden. In some cases, shallow overburden depths and thick seams adversely affect over-all recoverability.

Other factors are strength and lithology of roof and floor strata, attitude of coal beds, prevalence of ground water, proximity of other coal beds or mine workings, access to seams, geometry of deposits, and topographic considerations.

Regulatory restrictions resulting from the occurrence of an adverse natural condition must be considered in evaluating the net effect of the condition on resource recoverability.

- The National Coal Resources Data System: A status report.

M. Devereux Carter, Antoinette L. Medlin, Kathleen K. Krohn, U.S. Geological Survey, Reston, Virginia 22092. (11 p., 17 figs., 1 table)

The National Coal Resources Data System (NCRDS) of the U.S. Geological Survey is an interactive computerized storage, retrieval, and display system to assess the quantity and quality of the nation's coal resources. It has been developed to provide geological coal-resource data currently available, to update those data, and to expand to new types of data.

To this end, the U.S. Geological Survey has initiated a 5- to 10-yr program to acquire point-source data for all coal-bearing regions through its own programs and cooperative projects with state agencies. Presently, files containing summary areal coal-tonnage estimates and proximate ultimate chemical analyses, as well as point-located major-, minor-, and trace-element analyses, and stratigraphic data are available. New resource assessments can be made with point-source data, including drill-hole records, field measurements, and so on. Data may be displayed in literal form or

graphically—for example, tables, isoline maps, and cross sections. The system software can calculate coal-resource estimates, generate overburden or interburden distribution, and delineate areas of coal with selected parameters (for example, <.3% sulfur, >28 in.) within specified boundaries (for example, quadrangle, county).

- Desirable characteristics of a state-wide evaluation of coal resources.

C. G. Treworgy, H. H. Damberger, J. E. Palmer, Illinois State Geological Survey, Urbana, Illinois 61801. (present address, Palmer: Woodward-Clyde Consultants, P.O. Box 1035, Mattoon, Illinois 61938). (4 p., 2 figs.)

The expected greater demand for coal requires improved information on the nation's coal resources. State and national programs for evaluating coal resources must incorporate not only basic information such as coal thickness, depth, reliability of data, and rank, but also a broad range of other characteristics such as quality, minability, and land use. Such information must be retrievable in different combinations to be useful to those who need new assessments of coal resources. Computers will become important tools for meeting these requirements. Sources of data and uncertainties in the estimates should be documented.

- Sedimentary framework of the Potomac River estuary, Maryland.

Harley J. Knebel, U.S. Geological Survey, Woods Hole, Massachusetts 02543; E. Ann Martin, U.S. Geological Survey, Corpus Christi, Texas 78411; J. L. Glenn, U.S. Geological Survey, Denver, Colorado 80255; Sally W. Needell, U.S. Geological Survey, Woods Hole, Massachusetts 02543. (12 p., 8 figs., 1 table)

Analyses of seismic-reflection profiles, sediment cores, grab samples, and side-scan sonar records, along with previously collected borehole data, reveal the characteristics, distribution, and geologic history of the shallow strata beneath the Potomac River estuary. The lowermost strata are sediments of the Chesapeake Group (lower Miocene to lower Pleistocene) that crop out on land near the shore but are buried as much as 40 m below the floor of the estuary. The top of these sediments is an erosional unconformity that outlines the Wisconsinan valley of the Potomac River. This valley has a sinuous trend, a flat bottom, a relief of 15 to 34 m, and axial depths of 34 to 54 m below present sea level. During the Holocene transgression of sea level, the ancestral valley was filled with as much as 40 m of sandy and silty, fluvial-to-shallow estuarine sediments. The fill became the substrate for oyster bars in the upper reach and now forms most marginal slopes of the estuary. Since sea level approached its present position (2,000 to 3,000 yr ago), the main channel has become the locus of deposition for watery, gray to black clay or silty clay, and waves and currents have eroded the heterogeneous Quaternary sediments along the

margins, leaving winnowed brown sand on shallow shoreline flats. Pb-210 analyses indicate that modern mud is accumulating at rates ranging from 0.16 to 1.80 cm/yr, being lowest near the mouth and increasing toward the head of the estuary. This trend reflects an increased accumulation of fine-grained fluvial sediments near the turbidity maximum, similar to that found in nearby Chesapeake Bay. The present annual accumulation of mud is about 1.54 million metric tons; the cumulative mass is 406 million metric tons.

- Origin and structural implications of upper Miocene rhyolites in Kingston Canyon, Piute County, Utah.

Peter D. Rowley, Thomas A. Steven, Harald H. Mehnert, U.S. Geological Survey, Federal Center, Denver, Colorado 80225. (13 p., 15 figs., 3 tables)

Kingston Canyon is one of the deepest antecedent canyons in the High Plateaus subprovince of the Colorado Plateaus. Here the East Fork of the Sevier River flows westward transversely across the gently east tilted Sevier Plateau, which is developed on a basin-range fault block uplifted more than 1,500 m along the Sevier fault zone on the west. Upper Tertiary rhyolites, uncommon in southwestern Utah, occur both on the northern rim and in the bottom of Kingston Canyon. Those on the northern rim consist of lava flows and volcanic domes of the rhyolite of Forshea Mountain, dated by K-Ar methods at 7.6 m.y. old. Those in the bottom of Kingston Canyon, the rhyolite of Phonolite Hill, are especially well exposed and provide spectacular examples of a pyroclastic cone whose base is about at river level and a steep-sided volcanic dome emplaced into and through these deposits. The pyroclastic deposits, formerly 500 or more metres thick, consist of airfall, mudflow, and ash-flow(?) material of rhyolite and foreign lithic fragments, especially olivine basalt. The dome consists of flow-banded, mostly devitrified rhyolite as much as 500 m. thick; it has been dated by K-Ar methods at 5.4 m.y. In addition to the rhyolites, a dome and lava-flow complex, the rhyodacite of Dry Lake, occurs near the northern rim and is considered to postdate the rhyolite of Forshea Mountain and predate the rhyolite of Phonolite Hill.

The rhyolite of Forshea Mountain was deposited near basin-range faults, before the uplift of the Sevier Plateau and before the cutting of Kingston Canyon. Before uplift, a river flowed across the site of the present Sevier Plateau toward the east-southeast and perhaps also across the Awapa and Aquarius Plateaus to the east. The rhyodacite of Dry Lake was deposited during uplift and perhaps before canyon cutting. During uplift, the river maintained itself and cut Kingston Canyon. The rhyolite of Phonolite Hill was deposited in this canyon, blocking the river flow, which probably formed new outlets to the east. The Awapa and Aquarius Plateaus later were uplifted along faults, disrupting the eastern part of the river segment. The topography then took on its present appearance, and drainage was re-established through Kingston Canyon. There has been little deepening since the reopening of Kingston Canyon.

SEPARATES PROGRAM DISCONTINUED FOR 1981

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Geological Society of America Special Paper 185

ROLE OF VOLCANISM IN CLIMATE AND EVOLUTION

By Daniel I. Axelrod

Although Late Cretaceous extinctions commenced as epeiric seas retreated, the pulses of sharply lowered temperature induced by explosive volcanism, together with wide-spread falls of volcanic ash, may have led to extinction of dinosaurs, ammonites, cycadeoids, and other Cretaceous taxa. Earlier, as Pangaea was assembled, Permian extinctions resulted not only from the elimination of oceans, epeiric seas, and shorelines, and the spread of more-continental climates, but also from the climatic effects of major pulses of global volcanism and Gondwana glaciation.

Thus ends the abstract of this new and exciting GSA Special Paper. Dr. Axelrod presents many aspects of volcanism: historic effects, volcanism during the Tertiary, Miocene forests and volcanism, Oligocene forests and volcanism, and volcanism's effects on Tertiary mammals, grassland, woodland, and on marine life. He also presents information on volcanism during the Cretaceous with emphasis on its effects not only on parts of the western U.S. and the Gulf Coast but in the West Indies, China, Japan, and India and the Himalayas. Fascinating and informative reading.

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