



# GSA news & information

VOLUME 1, NUMBER 6

JUNE 1979

## U.S. Geological Survey Celebrates Centennial

The U.S. Geological Survey celebrated its Centennial with ceremonies on March 2, 1979, at its National Center in Reston, Virginia, and Regional Centers in Denver, Colorado, and Menlo Park, California. The Survey also held open-house tours of its facilities and exhibits at Reston on March 2 and 3, and at Denver, Menlo Park, and Rolla, Missouri, on March 2. Speakers at the Centennial ceremonies reflected on the Survey's past accomplishments and looked toward greater contributions by the agency in the future.

Secretary of the Interior Cecil D. Andrus, who was the principal speaker in the ceremonies at Reston on March 2, first read a statement from Jimmy Carter, President of the United States, on the occasion of "the 100th Anniversary of the Founding of the Survey." President Carter noted that the Survey "grew from the necessity of our forebears to explore this vast and bountiful continent, to understand its geographical features, and to evaluate its natural resources. The Geological Survey has served the Nation well, providing vital information upon which we make critical decisions and important national policy [involving] our mineral resources, our land, and our water. It helps us avoid the risks of natural disasters and provides knowledge useful for our urban planning, for sound construction practices, and for resolving many environmental and health problems." President Carter described the Survey's international programs as making "it possible for us to share geological knowledge and its benefits with other countries of the world," and he noted that the Survey employed space-age science and technology to investigate "the geology of the Moon and the planets" and the Earth's features and natural resources by remote sensing from satellites and high-altitude aircraft. The President recognized "the Survey's century of valuable service to our Nation," applauded "its high standards of excellence in past accomplishments," and reaffirmed "the emphasis that this administration places upon the continuing importance of its scientific work."

In his own remarks, Interior Secretary Andrus congratulated the Survey on its century of accomplishments, its honored place in the world of science, and its distinguished service to the Department of the Interior and

the Nation. He expected the Survey's second century would "be even more illustrious" and that its work had "only just begun." Noting "some apprehension among the devoted employees of the Survey and its strong supporters concerning the future," Secretary Andrus emphasized that President Carter's plan of March 1, 1979, to create a Department of Natural Resources would not fragment the Survey. Instead, the proposed new department is expected to allow the current agencies of the Department of the Interior, as well as the U.S. Forest Service and the National Oceanic and Atmospheric Administration, to better share the information they collect "to improve our stewardship of natural resources." The Secretary emphasized the critical role of the Survey in providing the leadership required to derive maximum benefit from the new department, but provided no details as to how the proposed reorganization would actually affect the structure, missions, and operations of the Geological Survey.

Secretary Andrus stated that the expected economic growth of the United States in the remainder of the twentieth century and beyond must be carefully managed if Americans are to continue to enjoy their present standard of living. He emphasized that the collection of data on and the analysis of the Nation's energy, mineral, land, and water resources represent the Survey's crucial role in its next century, both for direct application in the earth sciences and as input to assist policy formulation by all levels of government. Andrus cited the issue of Alaska's national lands as one "in which the Survey has provided basic and important information" for decisions on conservation policy and resource-planning within the Department of the Interior. He emphasized the Survey's dual role as "scientific advisor and active superintendent of leased property"—oil, natural gas, coal, oil shale, and other resources of the Nation's lands. Andrus recalled that the Survey had been created 100 years ago to address similar demands.

Associate Director William A. Radlinski, who served as the master of ceremonies at Reston, introduced Director H. William Menard, who in his remarks read a portion of his Centennial message of March 1, em-

*(Continued on next page)*

## U.S.G.S. Centennial . . .

phasizing that "change has been a continuing condition with the Survey in its pursuit of knowledge," that "the Survey has thrived on change and challenge because the demand for its services has never ceased to grow," and that its members should "be ready to take on the new challenges and opportunities as they present themselves." Director Menard stressed that programs, organizational units, and the mix of professional skills within the Survey will be "transformed into the broader and more variegated arrangement that will be required to serve tomorrow's needs." In urging the Survey to honor its past achievements, Director Menard observed that "the great scientists of the past . . . were not merely equal to their predecessors, they were better. To be worthy of those who have gone before, we must surpass them."

Distinguished guests in the audience at the ceremonies at Reston represented federal, state, and local governments, state geological surveys, scientific societies, service organizations, and local clergy. Among the distinguished guests on the platform who were introduced by Associate Director Radlinski was Thomas B. Nolan, who served as the first Assistant Director (1944 to 1956) and the seventh Director (1956 to 1965) of the Survey. Radlinski introduced Nolan as "the man who, I deeply believe, has contributed more to the Survey than any other living person"; the audience responded with a standing ovation.

John W. Rold, State Geologist of Colorado, presented the commemorative address "The United States Geological Survey, The Second Century" at the Survey's ceremonies at its Central Region headquarters in Denver, Colorado, on March 2. He noted that many of the Survey's valuable, practical applications of its earth science data, evaluations, and interpretations were made possible by the basic research that preceded them. While praising the Survey's contributions "to the economic and social well-being of the Nation and human society," Rold said that "the USGS has also failed many times to educate the public, the politicians, and the decision makers on the value of its geological work and the worth and application of its accomplishments. Regrettably, failure in that important task must be accepted by most geologists and other scientists." The United States will require in the future, Rold believes, "an even greater role for geologic information, individual professional geologists, and a national agency like the USGS. Its role and its success in meeting those shifting political, economic, and societal challenges, in the future as in the past, will depend on the skill and dedication of the agency and the men and women who compose it. I am convinced that even though individual men and women will come to work, mature, retire and die, that missions will shift, organizational structure will metamorphose and even the label may change, the organism will continue to live, to thrive and to serve."

Representative Paul M. ("Pete") McCloskey, Republican, of the 12th District of California, presented the principal remarks at the Survey's ceremonies at its West-

ern Region headquarters in Menlo Park, California, on March 2. Representative McCloskey, long a strong proponent of the Survey, observed that he had decided to accept the invitation to speak "because I think among all agencies of the United States Government, the U.S. Geological Survey is the most professional and provides the greatest example to the people of the United States that a bureaucracy still can pursue excellence with courtesy and courage and grace." From his personal experience, McCloskey based his respect for the Survey on its excellent products and its staff's love and respect for the outdoors, concern for the future of the United States, courage in and dedication to quietly educating the public, and impartiality. He also cited that the Survey, with its reputation for excellence, was responsible with the other organizations and personnel of the Federal Service "at the present time to try to help restore the faith of the American people in our system of government, and in the concept that there can be a bureaucracy which is courteous, well-run, efficient, and effective." McCloskey hoped that the Survey would maintain its standards as an example to be emulated by other government agencies—one of stability and excellence, in which Americans can take pride and around which they can rally as a symbol.

In remarks prefacing those of Representative McCloskey, Vincent E. McKelvey, who served as the ninth Director of the Survey (1971 to 1978) suggested that "the Survey's Centennial has its greatest significance in marking the beginning of its second century, and that it is the problems and the challenges ahead that deserve most of our attention." He described as among the most immediate of the Survey's challenges, the need to improve the efficiency of its operations, to enlarge its problem-solving capabilities, and to acquire the information and carry out the work the public needs to make effective and efficient use of the Earth and its resources. McKelvey observed that problems involving resource adequacy, environmental strain, wise and efficient use of the land, and the mitigation of natural hazards were critical for the Nation. These problems and others not yet fully apparent require for their solution good (and better) knowledge of the Earth and its processes, much of which is not yet in hand and can be acquired only by imaginative applied and pure research by the Nation's earth science organizations, including its largest, the USGS. McKelvey emphasized that the USGS also must communicate its findings "to the Executive Branch, the Congress, and the public in ways in which they will be fully understood" and that broadened public education in the earth sciences is "an essential base for understanding the resource and environmental limitations within which we must live." Still another challenge "is that of responding to change brought upon us by changes in legislation, administrative directives, or other actions or events beyond our control . . . without losing our effectiveness in our basic missions and objectives." McKelvey noted that this challenge was not new to the

Survey and "we have been coping with it successfully throughout our history." The Geological Survey, he pointed out, has revered traditions, "but they run along the lines not of rigidity in procedure or internal structure but of excellence and objectivity in our work and flexibility in our approach." McKelvey believes these traditions largely explain the Survey's effectiveness, and he hoped that they would be preserved "in spite of whatever it is that may threaten them. And here also, this is a challenge to all of us, not just those at the top."

The U.S. Geological Survey will mark the remainder of its Centennial year with symposia and technical sessions treating current and planned USGS activities, to be held at the annual and regional meetings of professional organizations, including the Geological Society of America. The USGS International Symposium "Resources for the Twenty-first Century," to be held at Reston October 14 to 19, 1979, will examine the challenges being faced by the USGS and the geological surveys of other countries in meeting global requirements for resources for the coming century. The symposium will emphasize the interests and participation of earth science agencies in the developing nations. In the USGS Centennial Lecture Series, sponsored by the Society of the Sigma Xi, Survey personnel in each of its three regions will be available during 1979 to describe their current research to Sigma Xi chapters and clubs. Special publications include the first volume of a comprehensive four-volume history, *Minerals, Lands, and Geology for the*

*Common Defence and General Welfare*, which was published in February; a single-volume history of the USGS; and "Maps for America," covering the cartographic products of the USGS and other agencies. A joint program with the American Geological Institute features the preparation of an audio-visual presentation on the physiographic regions of the United States for use by secondary educational institutions. A special postal cancellation will be used during March 1 through August 31, 1979, in 15 major cities in the United States. USGS or jointly sponsored exhibits at Survey, federal, or other facilities in and outside the Washington, D.C., area will include displays at the Smithsonian Institution's Museum of History and Technology and its Museum of Natural History, the National Archives and Records Service, the Denver Federal Center and buildings in the Denver metropolitan area, the Colorado School of Mines at Golden, Geological Survey facilities at Menlo Park, California, and an exhibit relating to the San Andreas fault zone at San Juan Bautista, California.

The U.S. Geological Survey views its Centennial as the beginning of a second century of dedication to public service and the belief that sound, objective information about the Nation's lands and its resources is essential to success in meeting resource needs wisely and in the preservation and improvement of environmental quality. As the Survey faces the future, it is keenly aware that its past 100 years is a prelude to the accomplishment of more difficult tasks ahead.

Clifford M. Nelson  
U.S. Geological Survey  
Reston, Virginia

**CHANGE OF ADDRESS,\***

The Geological Society of America, 3300 Penrose Place, Boulder, CO 80301

NAME \_\_\_\_\_  
(Please print)

Member Number \_\_\_\_\_

New Address \_\_\_\_\_

Former Address—Attach Mailing Label

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

City State/Province Zip Code

Country

Effective Date of Change

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

# UPDATE

## Articles in *Bulletin*, Part II, June 1979

Articles in *Bulletin*, Part II are listed below. (Summaries only of these articles are in *Bulletin*, Part I.) Articles in Part II are not on the separate subscription.

Paper copies of Part II in its entirety are available at cost (\$6/month) as a special service to those users (members and nonmember subscribers) who request them. Any such order should be addressed to the Publication Sales Department and be accompanied by advance payment, and no discount can be offered for multiple orders or orders for a sequence of months.

1. Overthrust emplacement of Numidian Flysch Complex in the westernmost Mogod Mountains, Tunisia, by Michael D. Carr and Elizabeth L. Miller. Doc. no. M90601. (On microfiche: 38 p., 4 figs., 2 tables.)
2. Rock glacier morphometry, San Juan Mountains, Colorado, by P. Gary White. Doc. no. M90602. (On microfiche: 29 p., 5 figs., 4 tables.)
3. Thermal expansion of fluids and fracture initiation in compacting sediments, by P. A. Domenico and V. V. Palciauskas. Doc. no. M90603. (On microfiche: 27 p., 6 figs., 1 table.)

## In June *Geology*

1. A model for the origin of chert in limestone, by L. P. Knauth
2. Weathering products within microcracks in feldspars, by G. P. Rodgers and H. D. Holland
3. Landscape reduction by weathering in small Rhodanian watersheds, by L. B. Owens and J. P. Watson
4. Late Miocene glacial-eustatic lowering of sea level: Evidence from the Tamiami Formation of south Florida, by D. M. Peck, T. M. Missimer, D. H. Slater, S. W. Wise, Jr., T. H. O'donnell
5. Late Pleistocene and Holocene faulting in Lake Valencia basin, north-central Venezuela, by C. Schubert and M. Laredo
6. Mesothemic cyclicity in the mid-Carboniferous of the Ozark shelf region?, by W. B. Saunders, W.H.C. Ramsbottom, and W. L. Manger
7. Age of the Alleghenian folding in the Central Appalachians, by R. Van der Voo
8. Reef-growth model for Silurian pinnacle reefs, northern Michigan reef trend, by S. O. Sears and F. J. Lucia
9. Late Cretaceous trench-slope basins of central California, by G. W. Smith, D. G. Howell, and R. V. Ingersoll
10. Pribilof segment of the Bering Sea continental margin: A reinterpretation of Upper Cretaceous dredge samples, by H. McClean
11. Structural evolution of the Archean rocks in Ivisártoq and the neighboring inner Godthåbsfjord region,

southern West Greenland, by R. P. Hall and C.R.L. Friend

12. The Karmøy ophiolite, southwest Norway, by B. A. Sturt, A. Thon, and H. Furnes

## CONFERENCE ON COASTAL ENGINEERING

The American Society of Civil Engineers announces that the 17th International Conference on Coastal Engineering will be in Sydney, Australia, March 23 to 27, 1980. The conference will be held at the Hilton Hotel in Sydney under the sponsorship of the Institution of Engineers, Australia, and the American Society of Civil Engineers.

The principal objective of the meeting is to bring, from all over the world, engineers specializing in the field of coastal engineering to exchange information on case studies, design and construction experiences, technical advances, and applied research results.

Further information may be obtained from the Coastal Engineering Research Council, 412 O'Brien Hall, University of California, Berkeley, CA 94720.

## MEMORIAL PREPRINTS READY FOR FREE DISTRIBUTION

The following memorial preprints are now available for distribution, free of charge, by writing to GSA, 3300 Penrose Place, Boulder, Colorado 80301:

Judson Lowell Anderson	by Sam L. Agron
Wilbur Swett Burbank	by Robert G. Luedke
Philip Geoffrey Britton Gilbert	by Thomas L. Brock
Otto Heinrich Haas	by Joseph Lintz, Jr.
Norman David Watkins	by Tjeerd H. van Andel

## PALEONTOLOGICAL SOCIETY OFFERS SHORT COURSE IN ARTHROPODS

The Paleontological Society is offering a short course in Arthropods to be held at the GSA Annual Meeting in San Diego, November 4, 1979. The course will be from 0900-1700 hours at the Town & Country Hotel & Convention Center.

For a schedule of the program and information, write to Dr. Frederick Schram, San Diego Natural History Museum, P.O. Box 1390, San Diego, CA 92112.

## GSA News & Information

Vol. 1, no. 6

June 1979

GSA NEWS & INFORMATION (ISSN 0164-5854) is the monthly newsletter of The Geological Society of America, Inc., 3300 Penrose Place, 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; Jo Fogelberg, Publications Manager; and June Thomas, Judy Hall, and Barbara Patterson, Production Assistants.





The Second and Final Announcement about the 1979 Annual Meeting will appear in the August issue of *GSA News & Information*. In addition to preregistration forms, this second announcement will contain forms for making reservations for housing, field trips, society functions, and guest activities. If you anticipate that your address will change due to summer fieldwork or

for other reasons, you can be assured timely receipt of your copy of the second announcement by sending your temporary address change to the Annual Meeting Secretary, Geological Society of America, 3300 Penrose Place, Boulder CO 80301. Additional copies of the final announcement may be obtained by writing to the above address.

**SAN DIEGO**, often billed as America's finest city, will host the annual meeting of the Geological Society of America during November 5 to 8, 1979. San Diego is one of the fastest growing cities in the United States and contains a wide diversity of recreational activities along with excellent climate and great scenery. San Diego is truly a vacationer's paradise.

Highlights of the meeting will include recognition of the U.S. Geological Survey Centennial, and will focus as well on the international geological communities of Canada, the United States, Mexico, and Central America.

Headquarters for the annual meeting will be the Convention Center at the Town and Country Hotel located in San Diego's Hotel Circle. Seven associated societies will hold concurrent annual meetings with GSA: Cushman Foundation, Geochemical Society, Geoscience Information Society, Mineralogical Society of America, National Association of Geology Teachers, Paleontological Society, and Society of Economic Geologists.

Serving as general chairman for the 1979 meeting is **Richard L. Threet**, San Diego '79, Department of Geological Sciences, San Diego State University, San Diego, CA 92182. Telephone: (714) 286-5586.

San Diego's location allows for the planning of a wide variety of field trips. These will include ground and air trips of local and regional scope, as well as opportunities to visit regions in Mexico. Climatic conditions during early November are usually mild, with some morning fog and generally sunny days with little chance of rain.

Social events will include the welcoming party in the large foyer of the Town and Country Hotel Convention Center on Sunday, November 4; the annual GSA Banquet on Tuesday, November 6; and a special GSA private party at Sea World on Wednesday evening, November 7. This party will include a Polynesian luau dinner, admission to all scientific educational exhibits, rides on the Sea World Sky Tower and Skyride gondolas, and all five aquatic shows (climaxing with famous Shamu, the killer whale, and a special GSA fireworks display).

**REGISTRATION.** Take advantage of preregistration rates, which will be lower than on-site registration rates. Registration fees and forms will be included in the second announcement and will appear in the August issue of *GSA News & Information*. **MEETING AND FIELD TRIP PREREGISTRATIONS MUST BE RECEIVED BY GSA HEADQUARTERS NO LATER THAN SEPTEMBER 14, 1979.**

**HOUSING.** Room rates will start at approximately \$26 for singles and \$31 for doubles. Please use the official housing form which will appear in the August issue of *GSA News & Information*.

**TECHNICAL PROGRAM.** The technical sessions will consist of symposia and volunteered papers, and these will be presented orally or as poster sessions. Up to nine concurrent sessions will be held at the Town and Country Convention Center. Numerous other hotels and motels are located within short walking distance. Chairman for the technical program is **Richard W. Berry**, Department of Geological Sciences, San Diego State University, San Diego, CA 92182. Telephone: (714) 286-5586.

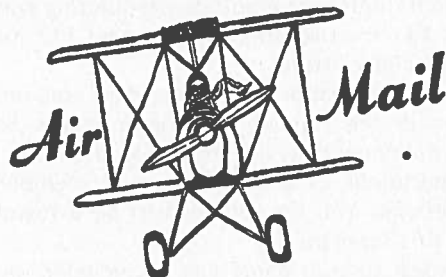
Speakers in the regular technical sessions will be allotted a total of 15 minutes and will be expected to leave time for questions and discussion at the end of their presentation. Projection facilities will consist of a single 35-mm projector in each room; dual projectors will not be available. Each poster session participant will be provided with one 4' x 8' tackboard for display, but no projection equipment, electrical outlets, or tables will be available.

Abstracts for the technical sessions (oral presentations and poster sessions) should be submitted on an abstract form available from the GSA Abstracts Coordinator (Boulder). **The abstract form will be used as camera-ready copy for publication in *Abstracts with Programs*, and a \$15 fee will be charged to the senior author if retyping is necessary.** There will be no opportunity for authors to review or revise the retyped abstract. Please note that, excluding symposia, no author may appear on more than two abstracts (senior or junior author) and may present only one abstract. Deadline for receipt of abstracts for technical and poster sessions at GSA headquarters is **June 15, 1979**. Mail abstracts to **Abstracts Coordinator**, Geological Society of America, 3300 Penrose Place, Boulder, CO 80301.

(continued, next page)

## NOTE:

All members living outside North America will probably receive *Abstracts with Programs* after the annual meeting unless they write to GSA headquarters and ask to have it sent



# ANNUAL MEETING . . .

**GUEST ACTIVITIES.** A wide variety of programs offer personalized tours of San Diego, including the elegant La Jolla residential areas, and Point Loma with its historic lighthouse and breathtaking views of San Diego Bay and the Pacific Ocean. One tour will end at the beautiful and unique Hotel del Coronado, with lunch amid luxurious surroundings; another tour will feature historic Old Town, with a Mexican lunch and serenading mariachis. More authentic Mexican emphasis is offered in an international shopping trip to the markets of Tijuana, with lunch at one of Tijuana's fine restaurants.

November usually has ideal weather to enjoy outdoor activity, with full-day and half-day tours to San Diego Wild Animal Park, 50 km north of San Diego, for a safari through Africa and Asia. Other open-air events are two-hour and one-hour narrated cruises on spectacular San Diego Bay.

Informal tours are recommended to Balboa Park and Zoo, Reuben Fleet Space Theater and Planetarium, Museum of Natural History, Museum of Man, and Art Museum.

**SPECIAL ACTIVITIES.** The Committee on Minorities in the Geosciences will sponsor a one-day program on career opportunities in the geosciences for secondary-school teachers, career counselors, and minority students from the San Diego area at the annual meeting in November. The program will consist of informal discussion groups led mainly by minority geoscientists rather than the formal sessions of previous years.

## GSA EMPLOYMENT SERVICE OPERATES THROUGHOUT THE YEAR

GSA maintains a computer file, updated continuously throughout the year, of persons seeking jobs. The information contained on this file includes the applicants' areas of interest, years of experience, and educational background. An interested employer with an opening submits the job requirements and receives a computer printout of all applicants whose qualifications match those requirements. It is then up to the employer to contact applicants in whom he or she is interested.

The minimum fee for employers requesting computer printouts is \$45 for two specialty listings; \$12 for each additional specialty listing.

Applicant registration is \$15 per year and includes participation in the Annual Meeting Interview Service. The GSA Employment Service is operated by the Membership Department as a benefit to our members and to the profession. You do not need to be a member of GSA to use this service.

Apply soon so your name can be included on printouts sent to employers who use the year-round service.

**SCIENCE THEATER.** The Science Theater will provide registrants with an opportunity to view, during technical session hours, an absorbing program of geologically oriented films. In charge is John S. Shelton, P.O. Box 48, La Jolla, CA 92038.

**EXHIBITS.** Exhibit space will be available in the Convention Center of the Town and Country Hotel. Companies, organizations, and universities interested in exhibiting should write or call Fred Handy, Annual Meeting Manager, Geological Society of America, 3300 Penrose Place, Boulder, CO 80301. Telephone: (303) 447-2020.

### NOW AVAILABLE Future Employment Opportunities for Earth Scientists Report

The Employment Service of the Geological Society of America sponsored a panel discussion on future employment opportunities in the Geological Sciences at the Toronto Annual Meeting in October 1978. The summary report of this panel discussion provides an overview of the employment situation for earth scientists in government, industrial, and academic fields. For a copy of the report, contact Charlene Bicknell at the address given below.

## CONSIDER JOINING US IN SAN DIEGO FOR THE 1979 ANNUAL MEETING EMPLOYMENT INTERVIEW SERVICE NEXT NOVEMBER

Each fall, GSA holds an Employment Interview Service during its annual meeting. Recruiters rent interview both space for a nominal charge, and staff is available to help schedule interviews. For those applicants attending the meeting, job descriptions are available and interviews may be arranged.

Additional information may be obtained by writing to:

Charlene Bicknell  
Membership Department  
Geological Society of America  
3300 Penrose Place  
Boulder, CO 80301  
(303) 447-2020

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



**THE  
GEOLOGICAL SOCIETY  
OF AMERICA**

3300 Penrose Place · Boulder, Colorado 80301

SEE REVERSE FOR EMPLOYER'S FORM.

**APPLICATION FOR EMPLOYMENT MATCHING SERVICE**

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

A \_\_\_\_\_ -1

Name \_\_\_\_\_ Date \_\_\_\_\_  
(last name first)

Mailing address \_\_\_\_\_

City \_\_\_\_\_ A \_\_\_\_\_ -2 Zip Telephone  
State \_\_\_\_\_ code \_\_\_\_\_ number ( )  
Area code Number

Date available \_\_\_\_\_ If not U.S. citizen, list visa \_\_\_\_\_

**TYPE OF POSITION DESIRED**

**Specialty Codes (see list below)**  
Choose as many as three that best describe  
your expertise in order of importance.

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_

**Interested in**

- Academic
- Government
- Industry
- Any

**Specific interest**

- Administrative
- Exploration/Production
- Field
- Research
- Teaching

**Seeking**

- Full-time
- Part-time
- Summer

**Will accept employment in**

- U.S. only
- U.S. with foreign assignments
- Either

A \_\_\_\_\_ -3

**EXPERIENCE**

Present specialty (see Specialty Code list) \_\_\_\_\_ Years of experience in this specialty \_\_\_\_\_

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 professional experience \_\_\_\_\_

Foreign languages \_\_\_\_\_ Spoken (fluency) \_\_\_\_\_ Written \_\_\_\_\_

**ACADEMIC TRAINING**

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

Postgraduate work 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. <b>Economic Geology</b>            | 221. organic              | 330. <b>Library</b>              | 454. paleobotany              | 622. photogrammetry            |
| 101. coal geology                       | 222. inorganic            | 350. <b>Mathematical Geology</b> | 455. paleoecology             | 630. <b>Science Editing</b>    |
| 102. energy resources                   | 223. stable isotopes      | 351. computer science            | 500. <b>Petroleum Geology</b> | 650. <b>Sedimentology</b>      |
| 103. metallic deposits                  | 224. unstable isotopes    | 352. statistical geology         | 501. exploration              | 700. <b>Seismology</b>         |
| 104. nonmetallic deposits               | 250. <b>Geomorphology</b> | 400. <b>Mineralogy</b>           | 502. subsurface stratigraphy  | 720. <b>Stratigraphy</b>       |
| 105. ore microscopy                     | 251. Pleistocene geology  | 401. crystallography             | 503. structural geology       | 721. Cenozoic                  |
| 120. <b>Engineering Geology</b>         | 300. <b>Geophysics</b>    | 410. <b>Museum (curator)</b>     | 520. <b>Petrology</b>         | 722. Mesozoic                  |
| 121. hard rock                          | 301. exploration          | 420. <b>Oceanography</b>         | 521. igneous                  | 723. Paleozoic                 |
| 122. soft rock                          | 302. paleomagnetism       | 421. marine geology              | 522. metamorphic              | 724. Precambrian               |
| 150. <b>Environmental Geology</b>       | 303. theoretical          | 422. coastal geology             | 523. sedimentary              | 750. <b>Structural Geology</b> |
| 151. public education and communication | 320. <b>Hydrogeology</b>  | 450. <b>Paleontology</b>         | 550. <b>Planetology</b>       | 751. tectonics                 |
| 200. <b>General Geology</b>             | 321. hydrochemistry       | 451. invertebrate                | 600. <b>Regional Geology</b>  | 752. tectonophysics            |
| 220. <b>Geochemistry</b>                | 322. ground water         | 452. vertebrate                  | 620. <b>Remote Sensing</b>    | 800. <b>Volcanology</b>        |
|   | 323. surface water        | 453. micropaleontology           | 621. photogeology             |                                |

**Résumé 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.

Signature (required) \_\_\_\_\_

This application will be active for 1 year.

SEE REVERSE FOR APPLICANT'S FORM.



**THE  
GEOLOGICAL SOCIETY  
OF AMERICA**

3300 Penrose Place • 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 best define the requirements of this position.

1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_ 4. \_\_\_\_\_ 5. \_\_\_\_\_ 6. \_\_\_\_\_

SPECIALTY CODES					
100. Economic Geology	221. organic	330. Library	454. paleobotany	622. photogrammetry	
101. coal geology	222. inorganic	350. Mathematical Geology	455. paleoecology	630. Science Editing	
102. energy resources	223. stable isotopes	351. computer science	500. Petroleum Geology	650. Sedimentology	
103. metallic deposits	224. unstable isotopes	352. statistical geology	501. exploration	700. Seismology	
104. nonmetallic deposits	250. Geomorphology	400. Mineralogy	502. subsurface stratigraphy	720. Stratigraphy	
105. ore microscopy	251. Pleistocene geology	401. crystallography	503. structural geology	721. Cenozoic	
120. Engineering Geology	300. Geophysics	410. Museum (curator)	520. Petrology	722. Mesozoic	
121. hard rock	301. exploration	420. Oceanography	521. igneous	723. Paleozoic	
122. soft rock	302. paleomagnetism	421. marine geology	522. metamorphic	724. Precambrian	
150. Environmental Geology	303. theoretical	422. coastal geology	523. sedimentary	750. Structural Geology	
151. public education and communication	320. Hydrogeology	450. Paleontology	550. Planetology	751. tectonics	
200. General Geology	321. hydrochemistry	451. invertebrate	600. Regional Geology	752. tectonophysics	
220. Geochemistry	322. ground water	452. vertebrate	620. Remote Sensing	800. Volcanology	
	323. surface water	453. micropaleontology	621. photogeology		

**Type of organization**

- Academic
- Government
- Industry
- Other \_\_\_\_\_

**Minimum degree required**

- None
- B.A. or B.S.
- M.A. or M.S.
- Ph.D.

**Minimum professional experience**

- None
- 1-5 yrs
- 6-10 yrs

**Experience desired (yrs)**

	None	1-5	Over 5
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exploration/Production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Field	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Amount for printout listing  
 \$45 for two specialty listings \$ \_\_\_\_\_  
 \$12 for each additional listing \$ \_\_\_\_\_  
 \$125 for entire applicant file \$ \_\_\_\_\_

- 1. I agree to use this service for valid recruiting purposes.
- 2. I agree that no placement charges will be assessed to any applicant participating in the GSA Employment Matching Service.

Total fee enclosed . . . . \$ \_\_\_\_\_  
 or invoice requested . . . . \$ \_\_\_\_\_

Signature (required)



## NEWS FROM GSA DIVISIONS

### *from the Coal Geologist*

#### COMMITTEE ACTIVITIES

We stirred up a greater surge of interest and excitement than expected by creating the Resources and Reserves Committee. This committee was to consider the desirability of the division assuming a leadership role or that of a coordinator for facts and problems of coal resources and reserves in North America, and in particular in the U.S.A. Special problems that we, who work in resources, live with daily are nomenclature, a diversity and inconsistency of standards or criteria, and often confusion and disagreement, not to mention out-of-date estimates. For example, the Government Accounting Office (GAO) has issued a report questioning the validity of certain USGS estimates of coal resources. A few of us have been called upon to give seminars and hold consultations with the GAO on determination of coal resources.

The function of the Exploration and Production Committee should be to give the division (and subsequently the nation) an update on the extent, scale, and scope of federal and private coal exploration in North America and the changing production scene, regionally (by coal province), by state, and by nation. We need to know how many geologists are engaged in exploration and where they are.

### *from the Quaternary Geologist and Geomorphologist*

#### MACKIN GRANT

Winner of the 1978 Mackin grant, announced at the Toronto annual luncheon, is Lisa Osterman, University of Colorado.

The deadline for receipt of applications for the Mackin grant for research in geomorphology or Quaternary geology is January 15. A stipend of not less than \$200 will be given as a cash grant to assist promising graduate student research. Announcement of the winner will be made early in the spring and funds made available prior to the 1979 summer field season.

Application forms may be obtained from the Division Secretary, Don J. Easterbrook, Department of Geology, Western Washington University, Bellingham, Washington 98225. Information required with the application includes (1) a resume of the applicant, (2) a statement of proposed research, and (3) a letter of reference from the thesis advisor. In the event of more than one application from a single department, the department will be asked to screen the applications and indicate priorities. Evaluation of the proposals will be made by the Division Management Board during winter quarter.

Recent and unusually substantial contributions to the Mackin Fund have been made by Michael Church and Dwight Schmidt.

Contributions to the fund may be made to J. Hoover Mackin Fund, Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301.

### *from the History of Geology Division*

#### STUDIES OF THE EARTH'S CORE SINCE 1900

Stephen J. Brush is preparing a history of investigations of the Earth's core since 1900, including the discovery of the Oldham-Gutenberg and Lehman discontinuities and the evidence for the physico-chemical states of the outer and inner cores. Interested persons, those wishing to exchange information, and investigators examining the historical aspects of this subject are encouraged to contact Dr. Brush at the Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742.

#### AMERICAN CHEMICAL SOCIETY

The symposium "A Century of Chemistry at the U.S. Geological Survey," was sponsored by the ACS Division of the History of Chemistry and the Division of Analytical Chemistry at the Society's annual meeting in Miami Beach during September 13-14, 1978. The sessions featured papers on the work of Frank Wigglesworth Clarke (by *Michael Fleischer*) and William Francis Hillebrand (one paper by *F. J. Flanagan* and a second by *Irving May*). Other presentations examined the history of USGS investigations in analytical chemistry (by *G. W. Ewing* and *H. A. Laitinen*), x-ray fluorescence analysis (*H. J. Rose, Jr.*), organic geochemistry (*I. A. Breger*), physical organic geochemistry (*D. S. and A. T. Tarbell*), isotopic geochemistry (one paper by *B. R. Doe* and a second by *Irving Friedman*), analytical atomic emission spectroscopy (*D. W. Golightly* and *C. S. Annell*), water-quality analysis (*W. H. Durum*) and data quality (*L. C. Friedman*).

### *from the Archaeological Geology Division*

#### THERA CONFERENCE

Three members of the Archaeological Geology Division, George (Rip) Rapp, Jr., and Charles and Dorothy Vitaliano, presented papers at "Thera and the Aegean World" (the second International Congress on the volcano of Thera), devoted to problems concerning the Krakatoa-like Bronze Age eruption of Thera (Santorini) and its possible impact on the Aegean world at that time. They write that:

"The congress convened in Athens on August 18, 1978. After the opening ceremony at the Greek Archaeological Society's headquarters the delegates and spouses, some 200 people in all, boarded the 'Apollon XI' at Piraeus, where the rest of the conference took place."

# Officers of GSA Associated Societies

## Cushman Foundation

President, *William V. Sliter*, E-501 U.S. National Museum of Natural History, Washington, D.C. 20560, (202) 381-5242, (202) 343-3206. Vice-President, *Martin A. Buzas*, Department of Paleobiology, E-206 National Museum of Natural History, Washington, D.C. 20560, (202) 381-5675. Secretary-Treasurer, *Frederick J. Collier*, E-501 U.S. National Museum of Natural History, Washington, D.C. 20560, (202) 381-5412. Past President, *Don L. Eicher*, Department of Geological Sciences, University of Colorado, Boulder, Colorado 80309, (303) 492-8141.

## The Geochemical Society

President, *Samuel Epstein*, Division of Geological Sciences, California Institute of Technology, Pasadena, California 91109, (213) 795-6811. Vice-President, *Wallace S. Broecker*, Department of Geochemistry, Lamont-Doherty Geological Observatory, Palisades, New York 10964, (914) 359-2900 X 550. Secretary, *Peter R. Buseck*, Department of Chemistry, Arizona State University, Tempe, Arizona 85281, (602) 965-3945. Treasurer, *David A. Hewitt*, Department of Geological Sciences, Virginia Polytechnic Institute, Blacksburg, Virginia 24061, (703) 951-6521. Past President, *Hugh J. Greenwood*, Department of Geology, University of British Columbia, Vancouver, British Columbia V6T 1W5, (602) 228-2449.

## Geoscience Information Society

President, *Julie H. Bichteler*, Graduate School of Library Science, University of Texas at Austin, Box 7576, University Station, Austin, Texas 78712, (512) 471-3821. Vice-President, *Rosalind Walcott*, Earth and Space Sciences Library, SUNY at Stony Brook, Stony Brook, New York 11794, (516) 246-3616. Secretary, *Caryl L. Shields*, 510 22nd Street, Boulder, Colorado 80302, (303) 234-6194 (work), (303) 449-9146 (home). Treasurer, *Robert A. Bier, Jr.*, U.S. Geological Survey Library, National Center, Mail Stop 950, 12201 Sunrise Valley Drive, Reston, Virginia 22092, (703) 860-6671. Past President, *Richard D. Walker*, Library School, University of Wisconsin-Madison, 600 North Park Street, Madison, Wisconsin 53706, (608) 263-2919, (608) 263-2900.

## Mineralogical Society of America

President, *David R. Wones*, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, (703) 961-6521. Vice-President, *W. Gary Ernst*, Department of Earth and Space Sciences, University of California-Los Angeles, Los Angeles, California 90024, (213) 825-1475. Secretary, *Larry W. Finger*, Geophysical Laboratory, 2801 Upton Street, N.W., Washington, D.C. 20008, (202) 966-0334. Treasurer, *Malcolm Ross*, U.S. Geological Survey, National Center, Mail Stop 959, Reston, Virginia 22092, (703) 860-6667. Past President, *Peter J. Wyllie*, Department of Geophysical Sciences, University of Chicago, Chicago, Illinois 60637, (312) 753-8108.

## National Association of Geology Teachers

President, *Robert W. Ridky*, Department of Geology, University of Maryland, College Park, Maryland 20742, (301) 454-2024. Vice-President, *O. T. Hayward*, Department of Geology, Baylor University, Waco, Texas 76703, (817) 755-2361. Secretary-Treasurer, *Alan R. Geyer*, Bureau of Topographical and Geological Survey, Department of Environmental Resources, Harrisburg, Pennsylvania 17120, (717) 787-5828. Past President, *Richard A. Paull*, Department of Geological Sciences, University of Wisconsin-Milwaukee, Milwaukee, Wisconsin 53201, (414) 963-4561.

## The Paleontological Society

President, *Richard E. Grant*, Paleobiology Department, E-206 Natural History Building, Washington, D.C. 20560, (202) 381-5412. President-Elect, *Warren O. Addicott*, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California 94025, (415) 323-8111 X 2370. Secretary, *Walter C. Sweet*, Department of Geology and Mineralogy, Ohio State University, 125 So. Oval Mall, Columbus, Ohio 43210, (614) 422-2326 (work), (614) 451-3555 (home). Treasurer, *John A. Fagerstrom*, Department of Geology, University of Nebraska, Lincoln, Nebraska 68508, (402) 472-2648 (work), (402) 464-1338 (home). Past President, *Francis G. Stehli*, Dean of Science and Engineering, Case Western Reserve University, Cleveland, Ohio 44106, (216) 368-4436, -4434, -4435, -4437.

## Society of Economic Geologists

(Term of office: April 1, 1979, through May 31, 1980; Vice-President does not automatically become President.) President, *Paul B. Barton, Jr.*, U.S. Geological Survey, National Center, Mail Stop 959, Reston, Virginia 22092, (703) 860-6601. Vice-President, *William C. Kelly*, Department of Geology and Mineralogy, University of Michigan, Ann Arbor, Michigan 48104, (313) 764-1435. Secretary, *Arnold L. Brokaw*, 185 Estes Street, Lakewood, Colorado 80226, (303) 233-7170. Treasurer, *Ralph W. Marsden*, University of Minnesota-Duluth, Duluth, Minnesota 55812, (218) 726-8219. Past President, *Siegfried Muessig*, Getty Oil Company, 3810 Wilshire Boulevard, Los Angeles, California 90010, (213) 381-7151.

## Society of Vertebrate Paleontology

President, *S. David Webb*, Florida State Museum, University of Florida, Gainesville, Florida 32611, (904) 392-1721. Vice-President, *Richard H. Tedford*, American Museum of Natural History, 79th and Central Park West, New York, New York 10024, (212) 873-1300 X 246. Secretary-Treasurer, *Ernest L. Lundelius, Jr.*, Texas Memorial Museum, Balcones Research Center, 10100 Burnet Road, Austin, Texas 78758, (512) 471-5257, (512) 836-0440 X 253. Past President, *Peter Robinson*, Director, University of Colorado Museum, Boulder, Colorado 80309, (303) 492-6165.

# Guidelines for preparing abstracts

Abstracts for GSA meetings serve (1) as a basis for selecting papers, (2) to aid people in deciding which papers they wish to hear at a meeting, and (3) as a published document for reference. Each abstract should, therefore, not only be well presented but also should be informative. Abstracts that contain such statements as "A new model will be presented," "the problem of . . . will be considered," ". . . will be discussed," or "the . . . is described," are inadequate. Such abstracts outline what papers are about, but do not tell what they contributed. They are not informative.

One dictionary (Webster's unabridged, 2nd ed.) defines an abstract as "That which comprises or concentrates in itself the essential qualities of a larger thing. . . ." Our abstracts must contain essential information, without added commentary or interpretation. An Abstract differs from a summary in that the latter is usually a restatement, generally at the end of a paper, only of salient findings and conclusions. The abstract, on the other hand, also includes other vital portions of a paper, such as purpose and methods.

The importance of the abstract is stated by K. K. Landes in "The Scrutiny of the Abstract, II" (in Cochran, W., and others, eds., 1973, *Geowriting*: Washington, D.C., Am. Geol. Inst., 80 p.):

"To many writers the preparation of an abstract is an unwanted chore required at the last minute by an editor or insisted upon even before the paper has been written by a deadline-bedeveled program chairman. However, in terms of market reached, the abstract is *the most important part of the paper*. For every individual who reads or listens to your entire paper, from 10 to 500 will read the abstract.

"If you are presenting a paper before a learned society, the abstract alone may appear in a pre-convention issue of the society journal as well as in the convention program; it may also be run by trade journals. The abstract which accompanies a published paper will most certainly reappear in abstract journals in various languages, and perhaps in company internal circulars as well. It is much better to please than to antagonize this great audience. Papers written for oral presentation should be *completed prior to the deadline for the abstract*, so that the abstract can be prepared from the written paper and not from raw ideas gestating in the writer's mind." [p. 34]

B. H. Weil, in "Standards for Writing Abstracts" (in Cochran and others), noted the following on the purpose and importance of abstracts:

"A well-prepared abstract enables readers to identify the basic content of a document quickly and accurately, to determine its relevance to their interests, and thus to decide whether they need to read the document in its entirety. Readers for whom the document is of fringe interest often obtain enough information from the abstract to make their reading of the whole document unnecessary. Therefore, every primary document should include a good abstract. Secondary publications and services that provide bibliographic citations of pertinent documents should also include good abstracts if at all possible." [p. 36]

"For various reasons, it is desirable that the author write an abstract that the secondary services can reproduce with little or no change. These reasons include the economic pressures on the secondary services caused by continuing increases in the volume of scholarly publication; the need for greater promptness on the part of the secondary services in publishing information about the primary literature; and the growing value of good authors' abstracts in computerized full-text searching for alerting and information retrieval." [p. 35]

Weil (ibid.) offers the following recommendations for writing good abstracts:

"Make the abstract as informative as the document will permit, so that readers may decide whether they need to read the entire document. State the purpose, methods, results, and conclusions presented in the document, either in that order or with initial emphasis on findings." [p. 35]

"For most papers and portions of monographs, an abstract of fewer than 250 words will be adequate. For notes and short communications, fewer than 100 words should suffice. Editorials and Letters to the Editor often will require only a single-sentence abstract. For long documents such as reports and theses, an abstract generally should not exceed 500 words and preferably should appear on a single page.

"Begin the abstract with a topic sentence that is a central statement of the document's major thesis, but avoid repeating the words of the document's title if that is nearby. . . .

"Write a short abstract as a single, unified paragraph, but use more than one paragraph for long abstracts, e.g., those in reports and theses. Write the abstract in complete sentences, and use transitional words and phrases for coherence.

"Use verbs in the active voice whenever possible; they contribute to clear, brief, forceful writing. The passive voice, however, may be used for indicative statements and even for informative statements in which the receiver of the action should be stressed.

"Avoid unfamiliar terms, acronyms, abbreviations, or symbols; or define them the first time they occur in the abstract.

"Include short tables, equations, structural formulas, and diagrams only when necessary for brevity and clarity." [p. 37]

Whereas an abstract should present the quantitative and (or) qualitative information in a paper, Weil (ibid.) points out that this is sometimes impractical.

"However, some discursive or lengthy texts, such as broad overviews, review papers, and entire monographs, may permit the preparation of an abstract that is only an *indicative* or *descriptive* guide to the type of document and what it is about. A combined *informative-indicative* abstract must often be prepared when limitations on the length of the abstract or the type and style of the document make it necessary to confine informative statements to the primary elements of the document and to relegate other aspects to indicative statements." [p. 35]

# MC-24

## Reconnaissance Geologic Map of the West-Central Part of the State of Nayarit, Mexico

Gordon Gastil and Daniel Krummenacher, 1978. In color (17½" x 23"), scale 1:200,000, with an eight-page text.

Available folded only ..... \$6.00

As shown on this multicolored map, the western part of the Trans-Mexican volcanic belt of Pliocene to Holocene age is underlain by strongly folded pre-Cenozoic rocks, the oldest of which is of Late Jurassic age. These older rocks are overlain sequentially by a rhyolitic sequence 20 to 80 m.y. old, a basalt sequence about 10 m.y. old, and then by the andesite-basalt sequence of the volcanic belt which is no more than 4.5 m.y. old. These rocks are intruded locally by small plutons of varied composition. The main underlying structure is that of an extensively faulted, northwest-trending graben.

The mapping in west-central Nayarit was undertaken in an effort to trace from the Gulf of California the southeastern extension of the transform fault and connecting segments of the East Pacific Rise and trench. Although no evidence for the extension of this major structure through the Nayarit area was found, the authors discuss the possibility and probable location of a major but largely concealed, northwest-trending fault with right-lateral offset.

Wallace A. Jensky II contributed to the writing of the explanatory eight-page text.



# Map and Chart Series

# MC-27

## Gravity Field of the Northwest Pacific Ocean Basin and Its Margin: Kuril Island Arc-Trench System

Anthony B. Watts, Mikhail G. Kogan, and John H. Bodine, 1978. A free-air gravity anomaly map,

contoured at 25-mgal intervals, 33" x 43", in color, with a four-page summary statement.

Folded: \$7.50; Rolled: \$8.50

The new free-air gravity anomaly map of the Kuril island arc-trench system shows a narrow belt, about 120 km wide, of large-amplitude *positive* gravity anomalies associated with the Kuril Ridge and a parallel narrow belt, about 150 km wide, of large-amplitude *negative* gravity anomalies associated with the Kuril Trench. The gravity "relief" between the low of the trench and the high of the ridge is about 570 mgal. The map also shows many smaller gravity features in the northwest Pacific Ocean, the northern part of the Japan Sea, and the Sea of Okhotsk.

The map is based on more than 13,700 gravity measurements obtained between 1955 and 1976. It is contoured and color shaded at 25-mgal intervals. An analysis of gravity values at the intersection of ships' tracks suggests that individual measurements used in making the map are accurate to about  $\pm 7$  mgal. The scale at lat 55°N is about 1:2,530,000.

This map is fourth of a series. The previous maps dealt with Hawaii and vicinity (MC-9), the Aleutian island arc-trench system (MC-10), and the Philippine Sea (MC-12).

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

### ORDER FORM

Date \_\_\_\_\_  
Please send to: \_\_\_\_\_ GSA member number \_\_\_\_\_  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State/Province \_\_\_\_\_ Zip Code \_\_\_\_\_

Address all orders to:  
Geological Society of America  
Publication Sales Department  
3300 Penrose Place  
Boulder, Colorado 80301

Qty.	Series and number (or other brief description)	Price each	TOTAL
	Colorado Residents add applicable sales tax	TAX	
		TOTAL	

• Payment in U.S. funds must accompany all orders for up to \$25 regardless of their point of origin. Postage and handling charges are waived on these orders.

• GSA member discount (see reverse side of membership card) allowed when claimed.

• Orders in excess of \$25 will be accepted on open account only when originating within North America or a U.S. possession. The Society reserves the right to limit credit to organizations and individuals with established lines of credit.

• Denver metro residents—add 3½% sales tax; Boulder residents—add 5½% sales tax; Colorado residents—add 3% sales tax.



## Tenth Underwater Mining Institute set for October 1-3, 1979, in Galveston

The 10th Annual Underwater Mining Institute is scheduled for October 1-3, 1979, at the Holiday Inn in Galveston, Texas. The Institute will be co-sponsored by the Sea Grant College Programs of the University of Wisconsin and Texas A&M University, the Marine Science Institute of the University of Texas, and in cooperation with the Association for Marine Mining.

Topics to be presented at the Institute will include such interests as:

Techniques for Locating Underwater Deposits  
Geochemistry and Marine Mineral Exploration  
New Prospects and New Discoveries  
Marine Minerals in the South Pacific  
Metals—A Global Picture  
Insurance, Liability, and Dollars at Sea  
Nodule Mining in the Pacific  
Pre-mining Environmental Surveys  
Processing Data—Marine Minerals Exploration  
Opportunities for New Marine Minerals Programs  
Generating Capital for Mining Ventures  
Law of the Sea Revisited.

Further information concerning the program and accommodations will be available *only* from the Institute Coordinator: Dr. Gregory D. Hedden, Director, Sea Grant Advisory Services, University of Wisconsin, 1815 University Avenue, Madison, Wisconsin 53706, Telephone (608) 262-0644.

## Fulbright awards in geology available for 1980-1981 programming

Among the approximately 500 Fulbright awards available in about 100 countries for 1980-81, a number have been programmed in geology.

*Australia*: thermoluminescence measurement; *France, Ivory Coast* (French required), *Norway*: applied geophysics in petroleum engineering, ore geology, paleontology; *Pakistan, USSR*: interests at several institutions.

Those desiring a copy of the 1980-81 announcement of Fulbright award opportunities for university teaching and advanced research abroad should send name, address, highest degree, specialization, and country interest to the Council for International Exchange of Scholars, Dept. N, Eleven Dupont Circle, Washington, D.C. 20036. Applications are due for the American Republics, Australia, and New Zealand by June 1, 1979, and for Africa, Asia, and Europe by July 1, 1979.

CIES will also assist in the administration of about 500 awards in 1980-81 for Fulbright scholars visiting the U.S. for lecturing and research. In many cases host institutions are expected to assist the scholar with full or partial maintenance; inquiries are welcome. A directory of scholars currently in the U.S. is available on request.

Among the 1978-79 grants, four awards in geology were made to American scholars for work in Afghanistan, Australia, Iceland, and India. Fourteen scholars from abroad are in the U.S.—half of them from Australia and New Zealand, and representatives also from Austria, Chile, Israel, Sri Lanka, Sudan, and the USSR.

# JUNE BULLETIN SEPARATES

## Summaries

*At the request of members, the Summaries section may be ordered as one separate by those who have purchased the separates option. To order, write "June Summaries" on coupon.*

• S90601—Overthrust emplacement of the Numidian Flysch Complex in the westernmost Mogod Mountains, Tunisia: Summary.

*Michael D. Carr, Elizabeth L. Miller, Department of Geology, Rice University, Houston, Texas 77001 (present addresses, Carr: Department of Geology and Geophysics, University of California, Berkeley, California 94720; Miller: Department of Geology, Stanford University, Stanford, California 94305).*

• S90602—Rock glacier morphometry, San Juan Mountains, Colorado: Summary.

*P. Gary White, Department of Earth Sciences, Western Carolina University, Cullowhee, North Carolina 28723.*

• S90603—Thermal expansion of fluids and fracture initiation in compacting sediments: Summary.

*P. A. Domenico, V. V. Palciauskas, Department of Geology, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801.*

## Bulletin Briefs

Titles and abstracts of conventional articles in the June 1979 GSA Bulletin, Part I are provided on the following pages to aid members who have purchased the separates

- 90604—Deglaciation events in the western Catskill Mountains, New York.

*James T. Kirkland, Department of Geology, University of Texas at Arlington, Arlington, Texas 76019. (4 p., 4 figs.)*

The upper Delaware River basin in New York is characterized by three widely different modes of deglaciation. Ice in the West Branch Delaware River basin stagnated in a series of six zones, each ranging in length from 16 to 24 km. Each zone contains three or four outwash-kame-moraine-kame terrace morphologic sequences. The location of the sequences within a zone was controlled by deposition from tributary streams. In contrast, the East Branch Delaware River was the site of three successive glacial-lake levels, each controlled by a till dam. Deposition into these lakes was in the form of kame deltas. Deglaciation to the south in the valleys of the Beaver Kill and Willowemoc Creek was by mass stagnation. These highly contrasting styles of deglaciation help to account for the problems in tracing ice margins across the Catskill Mountains.

- 90605—Similarities between the thick-skinned Blue Ridge anticlinorium and the thin-skinned Powell Valley anticline.

*Leonard D. Harris, U.S. Geological Survey, Reston, Virginia 22092. (15 p., 7 figs.)*

The Blue Ridge anticlinorium in northern Virginia is a part of an integrated deformational system spanning the area from the Piedmont to the Appalachian Plateaus. Deformation intensity within the system decreases from east to west. Differences of opinion have emerged concerning the central Appalachians as to whether the basement rocks exposed in the core of the Blue Ridge anticlinorium are rooted or are allochthonous. Available surface and subsurface stratigraphic and structural data suggest that the anticlinorium may be a rootless thick-skinned analogue to the rootless thin-skinned Powell Valley anticline in the Valley and Ridge. Both structures were produced during the Alleghenian orogeny by similar deformational processes. The form of the Powell Valley anticline is attributed to duplication of about 4,575 m (15,000 ft) of sedimentary rock during approximately 16 km (10 mi) of northwest movement above a subhorizontal décollement. Similarly, the form of the Blue Ridge anticlinorium is attributed to duplication of about 9,150 m (30,000 ft) of igneous, metamorphic, and sedimentary rock during a minimum of 59 km (37 mi) of northwest movement above an eastward continuation of a subhorizontal décollement within Cambrian sedimentary rocks beneath the Valley and Ridge. Thus, in northern Virginia there is a mixing of structural styles: the thick-skinned rootless Blue Ridge anticlinorium sits above a thin-skinned detachment. This relationship implies that thin- and thick-skinned styles are simply end members of a complex deformational process that

option to select Bulletin, Part I separates of their choice. See instructions for ordering on page 95.

. . . . .

includes a transition zone, where characteristics of both styles commingle.

- 90606—U-Pb geochronology of exposed basement rocks in Oklahoma.

*M. E. Bickford, Richard D. Lewis, Department of Geology, University of Kansas, Lawrence, Kansas 66045 (present address, Lewis: Department of Geosciences, Purdue University, West Lafayette, Indiana 47907). (5 p., 5 figs., 1 tbl.)*

U-Pb measurements on zircons separated from Precambrian basement rocks from Oklahoma yield the following: (1) the Spavinaw Granite, which appears in outcrops in Mayes County, northeastern Oklahoma, is  $1,370 \pm 20$  m.y. old; (2) the ages of rocks exposed in the eastern Arbuckle Mountains in southeastern Oklahoma are: Tishomingo Granite,  $1,374 \pm 15$  m.y.; Troy Granite,  $1,399 \pm 95$  m.y.; and Blue River Gneiss,  $1,396 \pm 40$  m.y. The granophyric Spavinaw Granite is associated with rhyolitic volcanic rocks and was clearly emplaced in the shallow crust; rocks of similar age and petrography occur in the subsurface in southeastern Kansas. The rocks exposed in the eastern Arbuckles, although of similar age, have textures suggesting emplacement at deeper crustal levels.

- 90607—Paleomagnetic data from the Alaska Peninsula.

*D. B. Stone, Geophysical Institute, University of Alaska, Fairbanks, Alaska 99701; D. R. Packer, Woodward Clyde Consultants, Suite 700, 3 Embarcadero Center, San Francisco, California 94111. (16 p., 6 figs., 5 tbls.)*

Recently collected paleomagnetic data, combined with earlier published data, tend to confirm earlier models for the tectonic development of southwestern Alaska. The models involve a basically northward migration and rotation of southwestern Alaska between Cretaceous time and the present, with an earlier southward motion. If the paleolongitudes of the reconstructions are constrained by always keeping southwestern Alaska in contact with North America, some geologic conflicts arise. These may possibly be resolved if large-scale en echelon movement can be proved along such features as the Bruin Bay and Border Ranges faults.

- 90608—Tectonic outlier of Great Valley sequence in Franciscan terrain, Diablo Range, California.

*Janet M. Bauder, J. G. Liou, Department of Geology, Stanford University, Stanford, California 94305 (present address, Bauder: Continental Oil Company, 555 17th Street, Denver, Colorado 80202). (8 p., 4 figs., 1 tbl.)*

A dismembered ophiolite, tectonically overlain by Great Valley strata, rests upon Franciscan rocks southeast of

Cedar Mountain in the northern Diablo Range. The klippe of sedimentary rocks is the first reported outlier of the Great Valley sequence in the interior of the range. The dismembered ophiolite is composed of serpentized ultramafic rocks, hornblende gabbro, diorite, and plagiogranite, and it is partially altered to greenschist facies assemblages containing chlorite + epidote + albite + actinolite.

The Franciscan Complex northeast of the ophiolite is characterized by lithologic heterogeneity, and it includes mélanges comprised of mixed rock fragments of varied metamorphic grade incorporated in a pervasively sheared shale matrix. The coherent Franciscan terrain southwest of the ophiolite may belong to a structural unit of Late Jurassic age which overlies younger Franciscan rocks in other parts of the Diablo Range. All Franciscan samples examined petrographically contain blueschist facies minerals such as lawsonite, pumpellyite, sodic amphibole, and jadeitic pyroxene.

The Great Valley strata consist of interbedded sandstone and shale. Arkoses of the Great Valley Klippe are generally calcareous and contain well-preserved detrital potassium feldspar and biotite. Locally, the sandstone contains megafossils of probable Valanginian and Cenomanian age, including *Linearia multicostata* (Gabb), *Pterotriconia oregana* (Packard), *Turritella bearni* Anderson, *Trigonia* sp., *Panope* sp., and small ammonite scraps similar to *Thurmanniceras* (?) sp. Incipient low-grade metamorphism is indicated by alteration of calcic plagioclase to albite + calcite + white mica and by partial chloritization of biotite. The lithology and the age, structural, and metamorphic relationships indicate that the Great Valley outlier and its underlying dismembered ophiolite are erosional remnants of the Coast Range thrust which once extended across the Diablo Range.

• 90609—Alpine magmatic and metamorphic processes and plate tectonics in the Zagros Range, Iran.

J. Pamić, G. Sestini, D. Adib, *Geology Department, College of Arts and Sciences, Pahlavi University, Shiraz, Iran* (present addresses, Pamić: *Institut za Geologiju, 71210 Ilidža, Yugoslavia*; Sestini, *Oil Service Company, OSCO, Tehran, Iran*; Adib, *Geology Department, Faculty of Science, University of Kerman, Kerman, Iran*). (8 p., 3 figs.)

A new plate tectonic interpretation of the Zagros Range is presented on the basis of the available geophysical data and the distribution of the main lithofacies associations, particularly of igneous and metamorphic rocks, which are found along the ancient plate margins. Ophiolites, the remnants

of the Mesozoic oceanic crust and upper mantle, are included within the imbricated zone. To the southwest they are in direct contact with the carbonate shelf sequence of almost the same age. The shelf sequence represents a north-eastern margin of the African-Arabian plate. The ophiolite complex includes pelagic sediments, mostly radiolarites, with volcanic rocks and peridotite associated with gabbro and eclogite-amphibolite. The complex has partly a mélange character, and in some places it includes glaucophane schists. Low- to medium-pressure metamorphic rocks occur within the Sanandaj-Sirjan zone to the northeast. These rocks are commonly thrust slices transported from the northeast, and in many places they are intruded by Jurassic-Cretaceous and Paleogene granitic rocks. Andesites, with subordinate basalt, latite, and dacite, are included, together with the associated Paleogene sediments, within the volcanic belt; they are frequently accompanied by large masses of granodiorite, monzonite, and quartz diorite. The rocks of the andesite and granite associations define the ancient magmatic arc, probably of Andean type; to the southwest they are in contact with the ophiolites, and this contact line, now represented by the large Baft-Nain fault zone, is the relict subduction zone in front of the central-eastern Iranian microplate.

• 90610—Uranium-series dating of the Pleistocene reef tracts of Barbados, West Indies.

Michael L. Bender, *Graduate School of Oceanography, University of Rhode Island, Kingston, Rhode Island 02881*; Richard G. Fairbanks, F. W. Taylor, R. K. Matthews, *Department of Geological Sciences, Brown University, Providence, Rhode Island 02903* (present addresses, Fairbanks: *Lamont-Doherty Geological Observatory, Palisades, New York 10964*; Taylor: *Department of Geological Sciences, Cornell University, Ithaca, New York 14850*); John G. Goddard, Wallace S. Broecker, *Lamont-Doherty Geological Observatory, Palisades, New York 10964*. (18 p., 10 figs., 5 tbls.)

Detailed studies of reef-tract stratigraphy in the southwestern part of Barbados have revealed nine, seven, and ten reef tracts in the Christ Church, Clermont Nose, and Saint George's Valley sections, respectively. The reefs have been projected onto standard traverses, and present elevations are reported for each reef crest.

To date the reef crests by  $\text{Th}^{230}/\text{U}$  and  $\text{He}^4/\text{U}$  methods, the  $\text{U}^{234}/\text{U}^{238}$  and  $\text{Th}^{230}/\text{U}^{234}$  activity ratios and U and  $\text{He}^4$  concentrations were determined in about 35 unrecrystallized coral samples. Discordant  $\text{U}^{234}/\text{U}^{238}$ ,  $\text{Th}^{230}/\text{U}$ , and  $\text{He}^4/\text{U}$

## ORDERING SEPARATES FOR 1979

The system for ordering separates has changed. Those members who have purchased separates of conventional articles for 1979 have received, or will receive in the near future, 10 or 20 coupons and instructions for ordering separates in 1979.

It is not too late to purchase separates for 1979. The

price to members having paid their basic membership dues is \$5 for 10 separates and \$10 for 20 separates. All orders and inquiries should be addressed to **Bulletin Separates Division, Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301.**

ages for many samples indicate that both  $U^{234}$  and  $Th^{230}$  have been diagenetically added to the samples.  $He^4/U$  ages are corrected by subtracting the  $He^4$  added due to the presence of "open system" U-series nuclides; the correction ranges from 0% to 10%.

The reef-tract ages and present elevations as projected on the standard traverse show that prior to 125,000 B.P., the uplift rate of the Christ Church section was much greater than the rate after 125,000 B.P. Paleo-sea levels inferred from Saint George's Valley reef tract ages and elevations cluster about the present datum, which suggests that throughout the Brunhes epoch, minimum interglacial continental ice volume was comparable to the present value.

Within the uncertainty of the age and paleo-sea-level estimates, the Brunhes sea-level history inferred from Barbados reef-tract chronostratigraphy is consistent with that inferred by Shackleton and Opdyke from the oxygen isotope record of core V28-238.

• 90611—North American microtektites in Deep Sea Drilling Project cores from the Caribbean Sea and Gulf of Mexico.

*B. P. Glass, M. J. Zwart, Geology Department, University of Delaware, Newark, Delaware 19711. (8 p., 2 figs., 2 tbls.)*

Several thousand microtektites (125 to 1,000  $\mu m$  in diameter) have been found in cores from two Deep Sea Drilling Project sites: site 94 in the Gulf of Mexico and site 149 in the Caribbean Sea. The microtektites occur in upper Eocene

sediments associated with the last occurrence of at least five species of Radiolaria. X-ray diffraction data, energy dispersive X-ray analysis, and petrographic studies indicate the presence of inclusions of quartz, cristobalite, and lechatelierite. Major-element compositions were determined for 57 of the microtektites using energy-dispersive X-ray analysis. The geographical location, age, petrography, and chemistry of the microtektites indicate that they belong to the North American tektite strewn field (~34 m.y. old). Calculations indicate that there may be as much as  $10^9$  t (metric tons) of microtektites in this strewn field.

• 90612—Late Wisconsinan ice recession in east-central New York. (3 p.)

Discussion: *G. Gordon Connally, Ship Channel Farm, Box 65B, R.D. No. 2, Rock Hall, Maryland 21661.*

Reply: *Donald B. Krall, Kean College of New Jersey, Morris Avenue, Union, New Jersey 07083.*

• 90613—Stream network volume: An index of channel morphometry. (3 p., 2 figs.)

Discussion: *Rob Ferguson, Department of Earth and Environmental Science, University of Stirling, Stirling FK9 4LA, Scotland.*

Reply: *K. J. Gregory, Department of Geography, University of Southampton, Southampton SO9 5NH, England.*



THE  
GEOLOGICAL SOCIETY  
OF AMERICA

3300 Penrose Place • Boulder, Colorado 80301

SECOND CLASS  
Postage Paid  
at Boulder, Colorado  
and at additional mailing office