

# The Lattice

Vol. 7, No. 3, August 1991

## New York State Geologic Highway Map Available

The *New York State Geologic Highway Map*, published by the New York State Museum's Geological Survey, is a colorful and informative map sheet that provides information about the landscape and geology of New York State and surrounding areas. The map sheet will be of interest to teachers and students of earth science, as well as members of the general public. The relationships among landscapes, land use, and underlying bedrock are graphically portrayed. The diverse landscape features of the State are shown on a large (scale 1:1,000,000) winter scene obtained by NASA's Landsat satellite. Landscape diversity is also shown on a labeled physiographic diagram that covers much of the northeast, both onshore and offshore. The bedrock geology is shown in bright colors on a highway base map that is at the same scale as the satellite image. This pair of maps displays dramatically the control of geology on landform development. Accompanying the geologic map is a legend in the form of a correlation diagram for the sedimentary rocks of the State. It identifies rock units by both formation name and rock type. Another diagram shows the environments in which these rocks were deposited. A traditional legend of color-coded boxes is used for the metamorphic rocks of the Adirondack Mountains and Hudson Highlands. The complicated plate tectonic history of the northeastern United States during the past 1.3 billion years is summarized on a simplified tectonic map with explanatory text. Other features of the map sheet include discussions of physiographic provinces, common rock forming minerals, and the naming of igneous and metamorphic rocks.

Of additional interest to travelers and teachers are two additional maps. One shows locations of a combined total of 117 unique geological features, museums with geological exhibits, and State Parks with interesting geological features. The second map shows the routes of 79 geological field trips throughout the State and lists the sources of the guidebooks involved.

The map measures 4 1/2 by 2 feet and is printed on plastic stock that allows for repeated folding without tearing. The *New York State Geologic Highway Map* (Educational Leaflet 33) is available for \$6.75 per copy. To educational institutions and wholesale dealers the map is priced at \$4 per copy on orders of five or more copies. Shipping fees are \$1.50 per order for folded copies and \$2.50 per order for unfolded copies in a tube.

Discounts to educational institutions and wholesale dealers are available. To obtain a copy, send a check or money order payable to **New York State Museum** to Publications Sales, New York State Museum, 3140 Cultural Education Center, Albany, New York 12230, or call (518) 474-3505.

An accompanying book, *Geology of New York—A Simplified Account* (New York State Museum Educational Leaflet 28), is a profusely-illustrated 296-page volume that will be published in August 1991. It is intended for the same broad audience as the Geological Highway Map.

## Talking to Congress

Contributed by Kathleen K. Gohn,  
U.S. Geological Survey, Reston, VA 22092

The American Institute of Physics has just published a short brochure called "Communicating with Congress," containing a number of useful suggestions. The information that follows comes from the section "Writing to a Member of Congress"; there is also a section on meeting with Congress members.

Members of Congress pay close attention to the correspondence they receive. Responding to mail is crucial to reelection, and a great deal of congressional staff time is devoted to responding to letters from constituents. One of the most effective ways to inform Members of Congress of your opinion or to inform them about an issue is to write a letter.

The letter must be brief and legible. It should be limited to one page.

A typewritten letter is best but not essential. Some staffers feel that the less professional looking the letter, the more sincere the request.

The organizational format most likely to be read is a three paragraph letter. The first paragraph states your purpose for writing the letter and establishes your "credentials." Stick with one subject or issue.

The second paragraph goes into more detail regarding the issue of concern. Be factual and support your position with information about how the legislation will affect you and others. When possible, cite the specific bill number.

The final paragraph asks for some type of action. If you support or oppose an issue or piece of legislation, say so. If you would like to suggest a better approach, do so.

Suggested address style:

The Honorable \_\_\_\_\_ The Honorable \_\_\_\_\_  
United States Senate U.S. House of Representatives  
Washington, DC 20510 Washington, DC 20515

Dear Senator \_\_\_\_\_: Dear Mr./Ms. \_\_\_\_\_:  
(or Representative \_\_\_\_\_):

For further information, or to obtain a copy of the brochure, write to:

Richard Jones or Marguerite Mulhall  
Public Information Division  
American Institute of Physics  
2000 Florida Avenue, NW  
Washington, DC 20009  
(202) 234-7058; FAX (202) 328-3729



## FROM THE PRESIDENT

The MSA council met on May 30, 1991 during the AGU meeting in Baltimore, MD. A particularly important topic on the Council agenda was the financial state of the Society. In 1990 the Society's net worth decreased by \$75,701. Most of the shortfall was due to increased costs of editing and publishing the *American Mineralogist*. In late 1989, on the retirement of Jim Munoz as Editor, the Editorial Office was transferred from Boulder, Colorado to Ann Arbor, Michigan where it came under the direction of the newly appointed Editors Don Peacor and Steve Bohlen and Managing Editor Vicki Lawrence. This transfer of the editorial office required a significant increase in funding which included: the cost of moving files and equipment, the cost of new word processing hardware and software and other new office equipment, and the increased cost of travel incurred during the move. The very heavy work load experienced in the previous two years at the Boulder Editorial Office had amply demonstrated the need to increase the size of the editorial staff. To lighten the work load, a new position was added to the editorial staff in 1990—that of Assistant Managing Editor. Also, salaries had to be increased so that we could continue to employ a well qualified staff. Most of the deficit for 1990 can be accounted for by these necessary administrative adjustments.

In late 1990 and in 1991, additional factors led to a further increase in the cost of publishing the *American Mineralogist*. Over the last year the cost of mailing increased, income from page charges and reprint sales decreased, and the number of pages printed increased greatly; 1474 pages were published in 1990 and approximately 2000 pages are projected to be published in 1991. These factors, of course, greatly increased this year's cost of publication so that we now project a loss of over \$100,000 for 1991. The nearly 50 percent increase in the number of pages to be printed in 1991 was due in part to the large number of manuscripts submitted for publication in the Thompson issue. These manuscripts in turn caused a large increase in the backlog of papers accepted for the regular 1991 issues (a similar backlog occurred in 1986 when the Jahns special issue was published). Also, during the 1990–1991 period, there was a significant increase in the number and quality of papers submitted and accepted for publication and this further contributed to the backlog. To reduce this manuscript backlog and concomitantly decrease the publication time, the MSA Council, with the concurrence of the Editors and the Chairman of the Management Committee, voted to go ahead and publish a much larger volume in 1991, understanding that we would have to use some of our endowment fund to cover the increased costs.

At the May 1991 Council meeting we had to face the fact that, although the endowment fund is presently valued at over \$900,000, we could not continue to incur deficits such as appeared in 1990 and 1991. To balance the MSA books in 1992, the Council took the following actions: (1) a dues increase from \$40 to \$50 for members and from \$20 to \$30 for student members, (2) an increase of commercial subscription rates from \$175 to \$200, (3) a surcharge of \$10 for mailing to foreign commercial subscribers (\$5 for subscribers residing in Canada or Mexico), (4) a 3 percent surcharge on member credit card orders to the Business Office, and (5) and, most importantly, a limit of 1440 pages for the 1992 volume of the *American Mineralogist*. In addition to the above actions, the Editors and the Publications Committee are looking into other ways of reducing publication costs. With these newly instituted changes, I am confident that the MSA will be in a very good financial position in 1992. Other actions taken at the last council meeting included: (1) voting to eliminate the publication of special issues of the *American Mineralogist* because of the great disruption of the publishing schedules and high costs, and (2) approving the nomination by the MSA Lecture Committee of Barb Dutrow (University of Iowa) and Dave Veblen (Johns Hopkins University) to be the 1991–1992 MSA Lecturers. Congratulations, Barb and Dave. Here, it would be appropriate to express for the MSA membership our thanks to Darby Dyar and Hap McSween, the 1990–1991 Lecturers, for presenting an outstanding series of talks to 15 different Universities and Colleges.

Darby spoke on the subjects geothermometry, biotite chemistry, and mantle metasomatism; Hap discussed the origin of the planets, chondritic meteorites, and hornblende barometry.

I received a letter from Dr. Marcello Mellini, Secretary of the Program Committee for the 1994 IMA meeting, asking for suggestions for meeting symposia. This meeting will be held in Pisa, Italy in September. MSA members who have suggestions for topics for the 1994 IMA meeting symposia can contact either Marcello Mellini or Charles Prewitt (their addresses are in the 1991 MSA Directory).

The next MSA Council meeting will be held on October 20, 1991 at the annual GSA/MSA meeting in San Diego, California. I hope many of you can come to San Diego to attend the many MSA sponsored sessions and the MSA symposium on Contact Metamorphism. Prior to this meeting, the MSA will sponsor a Short Course, convened by Derrill Kerrick, on Contact Metamorphism that is to be held at the Pala Mesa Resort, San Diego, October 17–20, 1991 (see the notice in this issue of *The Lattice*). The MSA will join with the AGU and the Canadian Geophysical Union to sponsor the 1992 Spring Meeting to be held in Montreal, Canada, May 11–15. In 1993 and 1994 the spring AGU-MSA meeting will again be held in Baltimore, Maryland.

Malcolm Ross



President

## MSA DIRECTORY OF MEMBERS

Several members have notified the Business Office of corrections that need to be made to the 1991–1994 Directory of Members and Fellows that was mailed in May. If your name or address is incorrect, if you were not listed or if you did not receive a copy of the Directory, please contact the Business Office as soon as possible. Corrections and additions will be printed in the November issue of the *Lattice*.





*The Lattice* is published quarterly (February, May, August, November) by the Mineralogical Society of America. This newsletter is distributed to MSA members as a service. Articles and letters from readers are welcome.

The Mineralogical Society of America is composed of individuals interested in mineralogy, crystallography, and petrology. Founded in 1919, the Society promotes, through education and research, the understanding and application of mineralogy by industry, universities, government and the public.

Membership benefits include: the *American Mineralogist*, published bi-monthly; 30% discount on volumes in the *Reviews in Mineralogy* series; *The Lattice*; Membership Directory; special subscription rates for *Mineralogical Abstracts*, *Physics and Chemistry of Minerals*, *Journal of Petrology*, and *Journal of Metamorphic Geology*; reduced registration fees at MSA short courses; member rates for the MSA/Geological Society of America annual meeting and member rates at MSA's spring meeting with the American Geophysical Union; participation in a Society that supports the many facets of mineralogy.

Dues for 1991 are \$40 for professional members; \$20 for students. Membership is on a calendar year basis. Individuals who join after January 1, 1991 will be sent all back issues of the journal for volume 76, 1991.

For additional membership information and an application, and/or to receive a price list of the Society's publications, contact the Business Office.

Institutions may subscribe to the 1991 volume of the *American Mineralogist* for the annual rate of \$175. The subscription price includes any new volumes of the *Reviews in Mineralogy* series published during the calendar year of the subscription. Payment must be received in full before a subscription will be started.

**1991 President:** Malcolm Ross,  
U.S. Geological Survey

**Past-President:** Peter Robinson,  
University of Massachusetts

**Vice-President:** Michael Holdaway,  
Southern Methodist University

**Secretary:** Maryellen Cameron,  
Miami University of Ohio

**Treasurer:** James A. Whitney,  
University of Georgia

**Editor of *The Lattice*:** Marta Flohr  
U.S. Geological Survey  
MS959, National Center  
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Susan L. Myers

**Mineralogical Society of America**  
1130 Seventeenth Street, N.W.,  
Suite 330  
Washington, D.C. 20036  
**Telephone:** (202)775-4344  
**FAX:** (202)775-0018

## Members in the News

Professor A. E. (Ted) Ringwood, head of the Petrochemistry Group, Research School of Earth Sciences, Australian National University, has been awarded the 1991 Antonio Feltrinelli International Prize (150 million Italian Lire; approximately \$125,000) by the Italian National Academy (the "Lincei"). Bruno Sander (1956) and Harry H. Hess (1966) were the only previous recipients for Earth Science. After the award to Hess, the prize was suspended or diverted to other branches of science. This year, the Academy acknowledged Professor Ringwood's contribution to the theory of plate tectonics by establishing a firm experimental basis to the accepted theories about the Moho, the structure of the Earth's mantle and core, and of the Moon as well. The Academy also pointed out the ability of Professor Ringwood to extract environmental and industrial application from his fundamental research, particularly the importance of SYNROC to nuclear waste disposal and making diamond composites. The prize will be awarded by the President of the Italian Republic in November during a formal ceremony in the Royal Hall of the Academy in Rome.

Frank C. Hawthorne, Geological Sciences, University of Manitoba, received the Past Presidents' Medal of the Geological Association of Canada. The award recognized work on the topological characteristics of mineral structures and their application to mineral paragenesis, and the application of structural and spectroscopic techniques to the solution of complex problems in rock-forming minerals.

Owen P. Bricker received the Meritorious Service Award, the second highest honor given by the Interior Department. Bricker, a hydrologist with the U.S. Geological Survey in Reston, Va., was cited for his exceptional contribution to water-resources research programs of the USGS, including studies of rock weathering, acid precipitation, and the geochemistry of water. He was among the first geochemists to produce research results on nutrient recycling in estuaries, a key environmental problem in the Chesapeake Bay. He is responsible for the development of a network of small watershed sites sensitive to acid deposition that serves as a natural laboratory for scientists from around the world to study the effects of acid precipitation.

## Software Handbook Available

*Public Domain Software for Earth Scientists, a Handbook of Public Domain and Inexpensive Software* is a comprehensive summary of PC software programs that are available from government agencies (U.S. and Canada), universities, and individuals, as well as the most popular inexpensive commercial programs. The handbook is divided into over 30 categories, including: economic evaluation, environmental sciences, geology, mapping, geochemistry, coal, geophysics, statistics, mining, surveying, hydrology, earth science bulletin boards, and GIS.

The handbook may be ordered from Gibbs Associates, Energy and Minerals Information Specialists, P.O. Box 706, Boulder, Colorado 80306-0706; (303) 444-6032. The cost is \$25 or \$35 outside North America.

## Maps Available

The Geological Survey of Wyoming recently released two new 1:24,000 geologic maps for the southern Bighorn Mountains, the Beartrap Meadows and Monument Hill quadrangles. *Preliminary geologic map of the Beartrap Meadows Quadrangle, Johnson County, Wyoming* (Open File Report 91-4) and *Preliminary geological map of the Monument Hill Quadrangle, Washakie and Johnson Counties, Wyoming* (Open File Report 91-5) are by Alan J. Ver Ploeg and Phillip L. Greer. A new 1:24,000 map of the Seminole gold and iron district, *Precambrian geology of the Seminole Mountains (iron-gold) mining district, Bradley Peak Quadrangle, Carbon County, Wyoming* (Open File Report 91-3) by W. Dan Hausel, is also available. The cost of each map is \$3.50 prepaid (Wyoming addresses only add 5% sales tax). The maps may be ordered from: Geological Survey of Wyoming, Box 3008, University Station, Laramie, Wyoming 82071; (307) 766-2286.

## DEADLINE FOR NOVEMBER LATTICE

The deadline for submitting material for the November issue of *The Lattice* is October 31.



# Registration Form

## Contact Metamorphism Short Course October 17-20, 1991

Return this registration form, completed, to the MSA Business Office, 1130 17th Street N.W., Suite 330, Washington, D.C. 20036. FAX: (202)775-0018. Payment must accompany this form. Registration is limited to 125 individuals on a first-come, first-served basis.

Please type or print.

Name \_\_\_\_\_  
(first) (middle initial) (last)

Address \_\_\_\_\_

\_\_\_\_\_  
(city) (state) (zip/postal code) (province) (country)

Telephone numbers \_\_\_\_\_ (office) \_\_\_\_\_ (home)

Please check appropriate registration category.

### PRICES INCLUDE ALL LODGING AND MEALS

	Member	Non-Member
Professional: in double room	\$530	\$570*
in single room	\$680	\$720*
Student: in double room	\$340	\$360*

\*includes MSA dues for 1992.

Please check method of payment:

- Enclosed is a check or money order in the amount of \$ \_\_\_\_\_.
- Please charge my  Visa  Mastercard  Diner's Club
- American Express card in the amount of \$ \_\_\_\_\_.

(Your credit card will be charged when the registration form is received. Should a refund be required, a credit will be applied to your charge card.)

\_\_\_\_\_  
(card number) (name on card—please print)

\_\_\_\_\_  
(exp. date) (signature)

Please check items as appropriate:

I wish to share accommodations with (your name must appear on the registration form of the individual listed below):

\_\_\_\_\_  
(please print full name and affiliation or city/state)

Please assign me to a room. I am a  smoker  non-smoker.

Please list any special requirements regarding lodging or meals. \_\_\_\_\_



## CONTACT METAMORPHISM

# Mineralogical Society of America Short Course

October 17–20, 1991

Pala Mesa Resort, San Diego, CA

This course, convened by Derrill M. Kerrick of the Pennsylvania State University, will utilize theoretical, experimental and field information to elucidate the processes and controls of contact metamorphism. Speakers will review current knowledge and will explore avenues for future research. Particular emphasis is given to a multidisciplinary analysis of contact metamorphism (igneous & metamorphic petrology, geochemistry, thermal modeling, structural geology).

### Speakers and specific topics include:

Derrill Kerrick & Mark Barton: Overview

George Bergantz & Mark Barton: Intrusives

David Pattison & Robert Tracy: Contact Metamorphism of Pelites: Phase Equilibria, Thermobarometry and Fluids

Robert Tracy, Ronald Frost & David Pattison: Contact Metamorphism of Calcareous Rocks, Metabasites and Other Non-Pelitic Rocks: Phase Equilibria, Thermobarometry and Fluids

Theodore Labotka: Physical and Chemical Properties of Fluids and Mass Transport in Contact Metamorphic Aureoles

John Ferry & Mark Barton: Mineralogical and Geochemical Effects of Fluid-Rock Interaction during Contact Metamorphism

Peter Nabelek: Stable Isotope Monitors of Contact Metamorphism

Kevin Furlong, James Bowers & Brooks Hanson: Thermal Modeling

Ray Joesten, Tony Lasaga & Derrill Kerrick: Kinetics of Contact Metamorphic Processes

Scott Paterson & Ron Vernon: Aureole Tectonics

Mark Barton, Derrill Kerrick & Brooks Hanson: Aureole Systematics

The course will take place on Thursday, October 17 through noon on Sunday, October 20. This is just prior to the MSA/GSA Annual Meeting. The short course will be held at the Pala Mesa Resort in Fallbrook, California, approximately 50 miles from the San Diego airport. The course will begin with a welcoming reception on Thursday evening and continue until noon on Sunday. Transportation will be provided from the San Diego airport at two separate times to be determined at a later date. Buses will return participants to the main GSA hotels in San Diego at approximately 2:00 on Sunday. In addition, registration fees include Volume 26 of the *Reviews in Mineralogy* series, lodging Thursday, Friday and Saturday nights and all meals beginning with the reception and light buffet dinner on Thursday through lunch on Sunday.

The resort is located on Interstate 15 between Los Angeles and San Diego. In nearby Fallbrook visitors are welcomed by an unpretentious old West charm and quaint antique shops amid modern shopping centers and theme restaurants. Among the recreational facilities that the Pala Mesa has to offer are: lighted tennis courts, whirlpool spa, swimming pools, and an 18-hole championship golf course. Seaworld, the San Diego Zoo and Wild Animal Park, Mount Palomar Observatory, and many local wineries are but a leisurely drive from the resort. So that participants can take advantage of these facilities and the surrounding area, and to promote an informal atmosphere, the convenor has decided on a schedule of talks during the morning on Friday, Saturday and Sunday and talks during the evening on Friday and Saturday. This allows participants to have their afternoons free to enjoy the resort and visit with friends and colleagues.

Write to the MSA Business Office for details and an application for student scholarship. Preference will be given to support students actively involved in thesis research on or related to contact metamorphism.

## MEETING CALENDAR 1991–1992

### September

- 2–4 International Conference on Applied Mineralogy in Johannesburg, South Africa. Details: The Conference Coordinators, C.133, P.O. Box 395, 0001 Pretoria, South Africa. Telephone: +27 12 841-3188/4513.
- 16–21 15th International Meeting on Organic Geochemistry in Manchester, United Kingdom. Details: Dr. D.A.C. Manning, Dept. of Geol., The University, Manchester, United Kingdom, M13 9PL. FAX: (44) 61 275 3947.
- 18–21 Geotechnica — Trade Fair and Congress in Cologne, Germany. Details: C.C.M. Cologne Congress Management GmbH Postfach 180180 D-5000 Kohn 1, Germany. Telephone: (0221)23 64 13. Telefax: (0221)24 94 47.

### October

- 5–10 28th Annual Meeting of the Clay Minerals Society, Houston, TX. Details: David Pevear (General chairman) P.O. Box 2189, Houston, TX 77001. Telephone: (713)965-4452; Joe Dixon (Program chairman) Telephone: (409)845-8323.
- 6–18 Preventative Conservation for Geological Collections in Kingston, Ontario. The course is designed for those who have the responsibility for the maintenance of mineralogical, paleontological or petrological collections. Details: Director, Art Conservation Dept., Queen's University, Kingston, Ontario K7L 3N5 Canada.
- 17–20 MSA Short Course on Contact Metamorphism in San Diego, CA. Details: See elsewhere in this newsletter.
- 21–24 GSA/MSA Annual Meeting in San Diego, CA. Details: GSA, Meetings Dept., P.O. Box 9140, Boulder, CO 80301. Telephone: (303)447-2020; FAX: (303)447-1133.
- 21–24 Denver GeoTech/Geochautauqua '91, A Geocomputing Conference, Denver, CO. Details: Mark Cramer, GeoTech, 11100 E. Dartmouth Ave., #190, Aurora, CO 80014. Telephone: (303)752-4951; FAX: (303)752-4979.

### December

- 2–6 Annual Fall Meeting of the Materials Research Society, Boston, MA. Details: Materials Research Society, 9800 McKnight Road, Pittsburgh, PA 15237. Telephone: (412)367-3003; FAX: (412)367-4373.
- 9–13 Fall Meeting of the American Geophysical Union, San Francisco, CA. Abstract deadline: September 12, 1991. Details: AGU, 2000 Florida Ave., N.W., Washington, D.C. 20009. Telephone: (202) 462-6900.
- 16–18 Mineralogical Society of Great Britain Winter Conference on "Industrial and Environmental Mineralogy", to be held in the National Museum of Wales and University of Wales College of Cardiff. Details: Professor D.T. Rickard, Dept. of Geology, University of Wales College of Cardiff CF1 3YE, Great Britain. Telephone: 0222-874284; FAX: 0222-874326.

### 1992

#### May

- 11–15 Joint AGU/MSA Spring Meeting, Toronto, Canada. Details: AGU, 2000 Florida Ave., N.W., Washington, D.C. 20009. Telephone: (202) 462-6900.
- 22–24 Pan-American Current Research on Fluid Inclusions (PACROFI IV), Lake Arrowhead, CA. Details: Michael A. McKibben, Dept. of Earth Sciences, University of California, Riverside, CA 92521-0423. Telephone: (714) 787-3444; FAX: (714) 787-4324.
- 25–27 Annual meeting of the Geological Association of Canada and Mineralogical Association of Canada, Wolfville, Nova Scotia. Details: Aubrey Fricker, Atlantic Geoscience Centre, Bedford Institute of Oceanography, Box 1006, Dartmouth, Nova Scotia, B2Y 4A2 Canada. Telephone: (902)426-6759.

### September

- 9–15 Symposium "The Transition from Basalt to Metabasalt: Environments, Processes, and Petrogenesis," September 9-15, 1992, Davis, California. Details: Peter Schiffman, Dept. of Geology, University of California, Davis, CA 95616. Telephone: (916) 752-3669; E-mail: P Schiffman@UCDavis.edu.



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## Special rates for *Geotimes*

*Geotimes*, the American Geological Institute's monthly magazine of geoscience and trends, is now available at the special annual subscription rate of \$14.95 for all members of AGI's member societies, which includes MSA. Any geoscience student will qualify for the reduced rate but other individuals, libraries, and institutions will pay the full subscription price, which is currently \$24.95 per year. The new price represents one of the many efforts on the part of AGI headquarters staff and officers to provide increasing benefits to member societies.

Chip Groat, AGI's executive director, noted that the magazine's staff has refined and expanded the editorial approach to give readers the best possible coverage on the issues and topics important now in all geosciences. He added that AGI is eager to share the improvements in *Geotimes* with members.

Upcoming issues will focus on the rapidly expanding field of environmental geology; science, stewardship and water resources; what geoscience editors are doing about the crisis in science education; international efforts in the earth sciences; applications of computer technology in the earth sciences; and what is happening in the oil, gas, and mining industries.

In addition to feature articles and news notes on the above-mentioned topics and other topics, *Geotimes* will continue to offer departments such as book, map, and software reviews, a letter-to-the editor section, a comprehensive calendar that lists meetings, field trips, workshops, and other events in geoscience, and an extensive classified-advertising section.

To order or renew at the new price, members should contact Johanna Wertz, *Geotimes* Circulation, AGI, 4220 King Street, Alexandria, VA 22302. (See form, this page)

## IN MEMORIAM

We are saddened to report the deaths of the following members. Our condolences are extended to the families and friends of these scientists.

George W. Bain, Life Fellow, 1936

Douglas G. Brookins, Fellow, 1975

Charles F. Park, Life Fellow, 1946



# MSA ACTIVITIES AT GSA

Each year MSA and the other associated societies of the Geological Society of America (GSA) work together prior to the annual meeting to review and select abstracts and schedule symposia and poster sessions. It is the combined efforts of these individuals that consistently produce a quality meeting. Special thanks are due this year to MSA representative Mark S. Ghiorso, University of Washington, conferee David L. Bish, Los Alamos National Laboratory and abstractor John E. Grover, University of Cincinnati.

In addition to handling the review of abstracts and scheduling technical sessions, the MSA representative coordinates with the Business Office to schedule the Society's social activities. This cooperation, in conjunction with GSA staff, keeps Society activities from overlapping technical sessions and attempts to put these activities in conveniently located meeting rooms.

While this scheduling involves many individuals, its purpose is to benefit the members of MSA. To this end, you are encouraged to participate in the MSA sponsored activities and to express your suggestions and needs to the Business Office and GSA.

## Third Meeting, 1991 Council

*Sunday, October 20*

San Diego Marriott, Rancho Las Palmas  
7:30 a.m. – 5:30 p.m.

The 1991 Council will act on recommendations from the Nominating Committee for Officers, the Nominating Committee for Fellows, the Roebling Medal Committee, the MSA Award Committee, and the Research Grant (Crystallography) Committee at its final meeting. The report of the Tellers Committee will also be certified. Council actions will be announced at the Business Meeting on Tuesday, October 22.

## MSA Symposium

Contact Metamorphism

*Monday, October 21*

San Diego Convention Center

1:30 – 5:00 p.m.

Convenors: Maria Luisa Crawford,  
Bryn Mawr College,  
Derrill Kerrick, Penn State  
University and Robert J.  
Tracy, VPI

## MSA Reception

*Tuesday, October 22*

San Diego Marriott, Marina Ballroom D

5:30 – 7:30 p.m.

All members and scientists interested in mineralogy, petrology and crystallography are invited to attend and enjoy a drink with colleagues. Again this year the reception is being held jointly with the Geochemical Society.

## First Meeting, 1992 Council

*Tuesday, October 22*

San Diego Marriott, Del Mar

7:45 – 11:00 p.m.

Members of the 1992 Council will hold a dinner meeting to set goals and priorities for the coming year. This is the first opportunity for new Council members to participate in the ongoing activities of Council.

## MSA Booth, #632-634

*Monday, October 21*

9:00 a.m. – 6:00 p.m.

*Tuesday, October 22*

9:00 a.m. – 5:30 p.m.

*Wednesday, October 23*

8:00 a.m. – 5:30 p.m.

Be sure you visit the MSA booth at the San Diego Convention Center. The newest volume in the Reviews in Mineralogy series, Contact Metamorphism, will be available, as will the other books in the series. Stop by and talk to other members, meet Society officers, the MSA Business Office staff and the managing editor of *American Mineralogist*. Bring a friend who should be a member of the Society and we'll help you sign up him or her!

## Presidential Address and Annual Business Meeting

*Tuesday, October 22*

San Diego Convention Center

MSA President Malcolm Ross will give his presidential address, "Crystalline Solution Series and Order Disorder Within the Natrolite Mineral Group." The address will be followed by an open business meeting. MSA bylaws require that such a meeting be held annually whereby the membership is provided reports by the officers to familiarize themselves with Society activities. All members are encouraged to attend.

## Annual Awards Luncheon

*Tuesday, October 22*

San Diego Marriott, Marriott Hall 4

12:15 – 2:00 p.m.

E-an Zen, recipient of the 1991 Roebling Medal, Mark D. Barton, recipient of the MSA Award for 1991 and H. Catherine Skinner, recipient of the second Public Service Medal, will be honored at this annual luncheon. Following these presentations, 1991 President Malcolm Ross will pass the gavel to the 1992 President and a new Council will take office. The Annual Luncheon provides members with an opportunity to meet colleagues and to recognize outstanding contributors to the science.

## Special rates available for the *European Journal of Mineralogy*

The *European Journal of Mineralogy* is published by the Deutsche Mineralogische Gesellschaft, the Società Italiana di Mineralogia e Petrologia, and the Société Française de Minéralogie et de Cristallographie, in cooperation with the European Mineralogical Union.

A special subscription rate of 80 DM (approximately \$44) per year (6 issues) for the *European Journal of Mineralogy* is available to individuals who are members of any society of the European Mineralogical Union (i.e., Austria, Belgium, Bulgaria, Denmark, France, Germany, Great Britain and Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland). Persons may order through the individual societies or directly from the publisher (address given below).

Information regarding membership in the publishing societies may be obtained directly from the societies:

Deutsche Mineralogische Gesellschaft — H. Kroll, Institut für Mineralogie, Westfälische Wilhelms-Universität, Corrensstr. 24, D-4400 Münster, Germany.

Società Italiana di Mineralogia e Petrologia — Via Botticelli 23, I-20133 Milano, Italy.

Société Française de Minéralogie et de Cristallographie — Tour 16, Case 115, 4 place Jussieu, 75252 Paris Cedex 05, France.

The subscription rate for institutions (volume 3, 1991) is 340 DM plus postage. Orders should be sent through your book-seller, subscription agency or directly to the publisher:

E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u. Obermiller), Johannesstr. 3A, D-7000 Stuttgart 1, Germany.



# 1991 ANNUAL MEETING

San Diego, California • October 21–24, 1991

Marriott Hotel & Marina • San Diego Convention Center

## TECHNICAL PROGRAM

Technical sessions consist of both invited and volunteered papers organized in one of three presentation formats: symposia, theme sessions, and discipline sessions. Abstracts were due on July 3 and selected and organized into symposia on August 2 and 3 by the Joint Technical Program Committee (JTPC). The JTPC consists of 30 geoscientists representing those associated societies and GSA divisions participating in the technical program. The JTPC chairmen, nominated by the Annual Meeting Committee and approved by the GSA Council, also serve a four-year term on GSA's ongoing Program Committee, which oversees all technical program activities.

Abstract notices mailed

August 14

Speaker information mailed


August 24

Technical Program Schedule  
(GSA Today) September 5

1991 Technical Program Chairmen  
Richard W. Berry and Gary H. Girty  
San Diego State University  
(619) 594-5586

### GLOBAL PERSPECTIVE THEME

Geologists have long approached their science with a global perspective, a recognition recently reaffirmed by plate tectonics. Our meeting theme not only reminds us of the global character of earth processes and natural phenomena, but calls attention to the global extent of environmental deterioration, the global dependence of our natural resource inventory, and the need for scientists, especially earth scientists, to address these concerns from a global perspective.

Within this theme several programs have been initiated by the San Diego Annual Meeting Committee. These are called Global Challenge sessions, identified by the symbol . There will be four Global Challenge theme sessions, a Monday evening open forum, and a Thursday afternoon wrap-up session. The meeting schedule lists a number of other sessions initiated by other organizations which address closely related topics.

Leading off the Global Perspective theme on Monday morning will be a special Keynote Symposium, organized by Patrick L. Abbott and R. Gordon Gastil, San Diego State University.

### The Global Challenge: Our Environment, Our Resources, Our Responsibilities

Monday, October 21, 8:45 a.m. to 12:00 noon  
San Diego Convention Center, Room 6A

1991 Annual Meeting Honorary Chairman, Roger R. Revelle, University of San Diego  
"The Global Challenge"

Digby J. McLaren,  
Royal Society of Canada  
"Events and Their Causes—  
Uncertainty in the Ecosphere?"

Frank Press,  
National Academy of Sciences  
"Natural Hazards: Science Instead of Fatalism"

Lynn Margulis,  
University of Massachusetts  
"Gaia for Geologists: Darwinian Time and Vernadskian Space"

Michael B. McElroy,  
Harvard University  
"Change in Global Environment:  
Perspectives on Human Influence"

Brian J. Skinner,  
Yale University  
"A Kilometer and Deeper: Will  
Geologists Be Ready for the Tough  
Prospecting Challenges Ahead?"

M. Gordon Wolman,  
Johns Hopkins University  
"Water Quantity and Quality:  
Changes in the Hydrologic Cycle"

### Global Challenge Roundup

Monday, October 21, 5:00 to 6:45 p.m.  
San Diego Convention Center

Focusing on the Global Challenge, U.S. Congressman George E. Brown, Jr., Chairman of the House Sub-Committee on Science, Space and Technology, will address the audience from 5:00 to 5:30 p.m. This will be followed by a panel discussion with the morning's keynote speakers and several international guests.

### Global Perspective Rapporteur Session

Thursday, October 24, 1:30 to 3:30 p.m.  
San Diego Convention Center

Rapporteurs for the Global Challenge theme sessions will summarize and discuss the evidence and ideas presented earlier in the respective sessions. (See Theme List: T1–T4.) This will be followed by a prominent speaker who will bring together the various threads of the global theme and provide a focus for the conclusion of our meeting.

### INVITED PAPERS (SYMPOSIA)

This format includes only abstracts that have been invited by the convener of a symposium. The dates indicated are tentative and may be changed by the JTPC. Full descriptions appeared in the June issue of *GSA Today*.

S1. **Archaeological Geology of the Archaic Period (8–3 ka) in North America.** *Archaeological Geology Division.* E. Arthur Bettis III, Iowa Dept. of Natural Resources, Iowa City. Tuesday, October 22, afternoon.

S2. **Coalbed Methane: Geology, Recovery Technology, and Resources.** *Coal Geology Division.* Walter B. Ayers, Jr., Taurus Exploration USA, Inc., Birmingham, Alabama; Jeffrey R. Levine, University of Alabama. Monday, October 21, morning.

S3. **GeoRisk Assessment.** *Engineering Geology Division.* Charles Welby, North Carolina State University; Rhea Lydia Graham, Science Applications International Corp., Albuquerque, New Mexico. Tuesday, October 22, morning.

S4. **Depositional Environments and the Development of Aquifers.** *Hydrogeology Division.* Robert L. Laney, U.S. Geological Survey, Reston, Virginia. Wednesday, October 23, morning.

S5. **Geology of the Pacific Rim.** *International Division.* Tadashi Sato, Hyogo University, Hyogo, Japan; Bruce Hanshaw, Consulting Geologist, McLean, Virginia. Tuesday, October 22, afternoon.

S6. **Quaternary Climatic Change in Arid and Semiarid Western North America: Evidence from the Great Basin, Desert Southwest, and Great Plains.** *Quaternary Geology and Geomorphology Division.* Richard F. Madole and Daniel R. Muhs, U.S. Geological Survey, Denver, Colorado. Wednesday, October 23, morning.

S7. **Fluvial Response to Base-level Changes: Eustatics vs. Tectonics—Part I.** *Sedimentary Geology Division.* Paul L. Heller, University of Wyoming; Christopher Paola, University of Minnesota, Minneapolis; Henry Posamentier, ESSO Resources Canada, Calgary, Alberta. Tuesday, October 22, morning.

S8. **Strike-Slip Faulting: Geological and Geophysical Perspectives.** *Geophysics and Structural Geology and Tectonics Divisions.* Art Sylvester, University of California, Santa Barbara; Kristian Meisling, ARCO Oil & Gas Co., Plano, Texas; Eugene Humphries, University of Oregon; Matt Golombek, Jet Propulsion Laboratory, Pasadena, California. Wednesday, October 23, all day.

S9. **The Global Climate Transition from the Late Paleocene to Early Eocene.** *Cushman Foundation.* Kenneth G. Miller, Rutgers University; Lowell Stott, University of Southern California. Tuesday, October 22, morning.

S10. **MASHing and Smashing: Geochemical Evidence for Long-term Crust-mantle Interaction along a Cratonic Margin, Northwest U.S.** *Geochemical Society.* Paul A. Mueller, University of Florida; Joseph L. Wooden, U.S. Geological Survey, Menlo Park, California. Tuesday, October 22, afternoon.

S11. **International Initiatives in Geoscience Information—A Global Perspective.** *Geoscience Information Society.* Dena Fracoli, Information Consultant, Fort Worth, Texas. Monday, October 21, morning.

S12. **Contact Metamorphism.** *Mineralogical Society of America.* Maria Luisa Crawford, Bryn Mawr College; Robert J. Tracy, Virginia Polytechnic Institute and State University; Derrill M. Kerrick, Pennsylvania State University, University Park. Monday, October 21, morning.

S13. **New Approaches to Introductory Geology Courses.** *National Association of Geology Teachers.* Noel Potter, Jr., Dickinson College, Carlisle, Pennsylvania. Monday, October 21, afternoon.

S14. **Biotic Turnover Examined in a Phylogenetic Context.** *Paleontological Society and Society of Vertebrate Paleontologists.* J. David Archibald, San Diego State University; Sandra J. Carlson, University of California, Davis. Wednesday, October 23, morning.

S15. **Applications of Micro-analytical Techniques to Economic Geology.** *Society of Economic Geologists.* C. Stewart Eldridge, Australian National University, Canberra. Monday, October 21, afternoon.

S16. **Crustal-scale Controls on Ore Deposits.** *Society of Economic Geologists.* Robert J. Bodnar, Virginia Polytechnic Institute and State University. Sunday, October 20, all day.

S17. **Survivability of Organic Matter at High Temperature: Implications for Life.** *Organic Geochemistry Division of the Geochemical Society.* Stephen A. Macko, University of Virginia; Everett L. Shock, Washington University; Michael H. Engel, University of Oklahoma. Sunday, October 20, all day.

S19. **Continental Drift, Plate Tectonics, and Biogeography: The History of a Synthesis of Two Cultures.** *History of Geology Division.* Alan E. Leviton, California Academy of Sciences, San Francisco; Michele L. Aldrich, American Association for the Advancement of Science, Washington, D.C. Monday, October 21, morning.

S20. **Venus and Earth: Tectonic and Volcanic Evolution.** *Planetary Geology Division.* Baerbel K. Lucchitta, U.S. Geological Survey, Flagstaff, Arizona. Tuesday, October 22, morning.

S21. **Geophysics of the Southwestern Cordillera—USA and Mexico.** George R. Jiracek, San Diego State University; Mario Martinez, Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California, Mexico. Sunday, October 20, afternoon.

S22. **PANGEA: Ice-house Processes, Climates, and Events on a Supercontinent.** *Sedimentary Geology Division and Global Sedimentary Geology Program.* George deV. Klein, University of Illinois, Urbana. Sunday, October 20, afternoon.

(S18. Withdrawn)



## VOLUNTEERED PAPERS

This format includes all abstracts that are not specifically invited for a symposium. Two types of sessions are available:

### 1. Discipline sessions

The JTPC selects and organizes papers in sessions that focus on one scientific discipline, e.g., hydrogeology or structural geology. Each paper receives three reviews. The papers are organized with topical coherence whenever possible, and sessions may be given an appropriate title by the JTPC representative.

### 2. Theme sessions

Papers are submitted to a specific, preannounced topic and to one scientific category. Theme sessions are interdisciplinary; each theme may have as many as three disciplines (categories) associated with it. Each theme has one or more advocates who proposed the idea as well as encouraged submission of papers. The advocates, however, are not able to guarantee acceptance of papers, since this is the responsibility of the reviewers and the JTPC representatives. Full theme descriptions appeared in the April issue of *GSA Today*.

#### T1/2. The Global Challenge: Using Planetary Resources and Modeling the Future

William S. Fyfe, University of Western Ontario; Digby J. McLaren, Royal Society of Canada; Brian J. Skinner, Yale University; Carroll Ann Hodges, U.S. Geological Survey, Menlo Park, California. Environmental Geology, Global Geoscience, Quaternary Geology, Economic Geology, Petroleum Geology.

#### T3. Global Climate Changes—I: The Geologic Record of Climate Dynamics.

Tim Herbert, Scripps Institution of Oceanography; Jeff Park, Yale University. Marine Geology, Paleoceanography/Paleoclimatology, Paleontology/Paleobotany.

#### T4. Global Climate Changes—II: The Past, a Key to the Future.

Keith Kvendolen, U.S. Geological Survey, Menlo Park, California. Geochemistry, Global Geoscience, Paleoceanography/Paleoclimatology.

#### T5. Global Warming and Geologic Evidence of Aridification During Late Quaternary Time.

*Quaternary Geology and Geomorphology Division.* Dale F. Ritter and Nicholas Lancaster, Desert Research Institute, Reno, Nevada. Geomorphology, Hydrogeology, Quaternary Geology.

#### T6. Fluvial Response to Base-level Changes: Eustatics vs. Tectonics—Part II.

*Sedimentary Geology Division.* Paul L. Heller, University of Wyoming. Geomorphology, Sedimentology, Stratigraphy.

#### T7. Processes Controlling the Composition of Siliciclastic Sediments.

Mark J. Johnsson, U.S. Geological Survey, Menlo Park, California; Abhijit Basu, Indiana University. Sedimentary Petrology, Sedimentology.

#### T8. Global Sedimentary Geology of the Phanerozoic: A Theme Session in Honor of A. B. Ronov.

William W. Hay, University of Colorado; Bruce Wilkinson, University of Michigan. Geochemistry, Global Geoscience, Sedimentology.

#### T9. Approaches to Sequence Stratigraphic Analysis—Examples from the Tertiary.

Janet Coleman, Kansas Geological Survey. Global Geoscience, Sedimentology, Stratigraphy.

#### T10. The K-T Boundary—I: Late Cretaceous Extinctions: Catastrophes or Not?

Robert M. Sullivan, San Diego Natural History Museum; Spencer G. Lucas, New Mexico Museum of Natural History. Paleontology/Paleobotany, Stratigraphy.

#### T11. The K-T Boundary—II: Nonmarine Fossil Record at the Cretaceous-Tertiary Boundary.

*Paleontological Society.* R. Farley Fleming, University of Colorado at Denver; William A. Clemens, University of California, Berkeley. Paleontology/Paleobotany, Stratigraphy.

#### T12. Actinide-series Disequilibria in Igneous and Geothermal Processes.

Neil Sturchio, Argonne National Laboratory, Illinois; Michael Murrell, Los Alamos National Laboratory, New Mexico. Aqueous Geochemistry, Igneous Petrology, Volcanology.

#### T13. Solution Mass Transfer and Volume Strain in Crustal Rocks.

Mark Brandon and Jay J. Ague, Yale University. Hydrogeology, Metamorphic Petrology, Structural Geology.

#### T14. Site Characterization Studies Related to Ground-Water and Surface-Water Contamination at Sites Operated by the U.S. Department of Energy.

Stephen H. Stow and C. Stephen Haase, Oak Ridge National Laboratory, Tennessee. Engineering Geology, Environmental Geology, Hydrogeology.

#### T15. Geology, Hydrogeology, and Tectonics of Southern Nevada in Relation to the Potential Storage of High-Level Nuclear Waste.

Steven R. Mattson, Science Applications International Corp., Las Vegas, Nevada. Hydrogeology, Tectonics, Volcanology.

#### T16. Characterization and Monitoring of Ground-Water Contamination at Hazardous Waste Sites: Research and Case Histories.

*Hydrogeology Division.* Claudia Stone, S.S. Papadopoulos & Associates, Inc., Rockville, Maryland. Engineering Geology, Environmental Geology, Hydrogeology.

#### T17/18. Urban Geologic Hazards: Recognition and Remediation.

*Engineering Geology Division.* Daryl Streliff, Consulting Engineering Geologist, San Diego, California; Lyne Perry, Leighton and Associates, San Diego, California. Engineering Geology, Environmental Geology, Hydrogeology.

#### T21. Geophysical Exploration for Ground Water in Arid and Semi-Arid Regions.

*Hydrogeology Division.* William F. McCaffrey, U.S. Geological Survey, Sacramento, California. Engineering Geology, Geophysics, Hydrogeology.

#### T22. Multivariate Statistical Methods in the Geosciences.

*Hydrogeology Division.* Charles Brown, U.S. Geological Survey, Reston, Virginia. Computers, Global Geoscience, Hydrogeology.

#### T23. Failure Mechanisms of Megaslides.

*Engineering Geology Division.* Martin Stout, California State University, Los Angeles; Michael Hart, Geocon, Inc., San Diego, California. Engineering Geology, Quaternary Geology, Structural Geology.

#### T24. Active Margin of Antarctica—Proterozoic to Holocene.

David Kimbrough, San Diego State University; Bruce Luyendyk, University of California, Santa Barbara. Igneous Petrology, Structural Geology, Tectonics.

#### T25. Cenozoic Extension in the Cordillera: Geometry, Timing, Mechanisms, and Regional Controls.

William Dickinson and Jon Spencer, University of Arizona. Geophysics/Tectonogeophysics, Structural Geology, Tectonics.

#### T26. Mesozoic Stratigraphic and Structural Evolution of Northwestern Mexico.

Claudio Bartolini, Gold Fields Mining Corp., Yuma, Arizona; Mariano Morales M., Universidad de Sonora, Mexico. Stratigraphy, Structural Geology, Tectonics.

#### T27. Jurassic Magmatism and Tectonics of the North American Cordillera.

*Dedicated to Richard L. Armstrong.* David Miller, U.S. Geological Survey, Menlo Park, California; Cathy Busby-Spera, University of California, Santa Barbara; Steven Reynolds, Arizona Geological Survey; James Wright, Rice University. Igneous Petrology, Stratigraphy, Tectonics.

#### T28. Tectonics of Modern and Ancient Accretionary Prisms.

J. Casey Moore, University of California, Santa Cruz; Darrel Cowan, University of Washington; Daniel Karig, Cornell University; Michael B. Underwood, University of Missouri, Columbia. Marine Geology, Metamorphic Petrology, Tectonics.

#### T29. Landscapes of Tectonically Active Strike-Slip, Normal and Reverse Faults.

William Bull, University of Arizona; Thomas Rockwell, San Diego State University. Geomorphology, Quaternary Geology, Tectonics.

#### T30. New Views of the Moon: The Lunar Frontier Revisited.

Donald A. Morrison, Johnson Space Center, Houston, Texas. Geochemistry, Geophysics, Planetary Geology.

#### T31. Southern California Areal Mapping Project—Accomplishments, Work-in-Progress, Goals (POSTER SESSION).

Vickie Todd, University of California, Riverside. Igneous Petrology, Stratigraphy, Tectonics.

#### T32. Baja California: Geologic History of the Peninsula and Gulf of California.

Judy Terry Smith, Consulting Geologist, Palo Alto, California; Jose Luis Ferman and Jorge Ledesma, Universidad Autónoma de Baja California, Ensenada, Baja California, Mexico. Paleontology/Paleobotany, Stratigraphy, Structural Geology.

#### T33. Geology of the Future—Now (POSTER SESSION).

*Sigma Gamma Epsilon.* Daniel F. Merriam, Wichita State University; Charles J. Mankin, University of Oklahoma. Environmental Geology, Stratigraphy, Other.

#### T34. Earth Scientists and Science Educators: Common Ground.

*National Earth Science Teachers Association.* Leslie C. Gordon, U.S. Geological Survey, Menlo Park, California. Geology Education.

(T19. Withdrawn)

(T20. Withdrawn)

## PROFESSIONAL HORIZONS

### GSA-SPONSORED SHORT COURSES

Would you like to learn something new, brush-up on the latest, or refresh the basics? GSA short courses will be held immediately before and after the Annual Meeting in San Diego and are open to members and nonmembers. Registration for the meeting is not required. Preregistration is recommended; on-site is \$25 additional. You may register for GSA courses on the Annual Meeting Preregistration Form. Registration substitutions may be made at any time.

PREREGISTRATION  
DEADLINE: SEPTEMBER 20  
Cancellation Deadline: September 27  
FOR MORE INFORMATION  
CONTACT GSA COURSE REGISTRAR



# LODGING

Tight budget? We're on your side. We've gotten the best possible rates for October including discounts of 30% or more. GSA has blocked rooms at 12 downtown hotels that are offering special convention rates to GSA meeting attendees. These properties include a good cross section of lodging that should appeal to almost everyone's budget and taste. All meet GSA's standards for rate reliability, cleanliness, service, and location. The GSA shuttle will

not be servicing all 12 downtown hotels. Please refer to the shuttle information on page 179 or the individual hotel descriptions.

The most outstanding property in the resort class is GSA's headquarters, the Marriott Hotel & Marina, which is truly an impressive property. Immediately adjacent to the Convention Center and Seaport Village, it offers first-class services, dining, and a resort atmosphere right on San Diego Bay. A good value.

Over and above the 1000 rooms at the Marriott, there are 700 single rooms priced between \$70 and \$85, and 425 single rooms between \$50

and \$69. There is an excellent set of options within this group, including four-star properties and basic motels.

*Student Housing.* GSA has also negotiated convention rates with eight downtown and nearby Travelodge properties. These properties offer the least expensive rate in the GSA block. *They will not be serviced by the GSA shuttle service,* although some of these properties are near the GSA shuttle pick-ups or the San Diego trolley. You may need to provide your own transportation, but none of the properties are more than six miles from the convention center.

## TO MAKE YOUR HOTEL RESERVATION

Fill out the Official Housing Request Form and either (1) mail it, or (2) fax it to the San Diego Housing Bureau. Please refer to the address and fax number shown on the Housing Request Form. All reservations must be RECEIVED BY FRIDAY, SEPTEMBER 27. Do NOT send your Housing Form in after you have faxed it. This will result in a duplicate reservation.

AFTER FRIDAY, SEPTEMBER 27, you should contact the GSA hotel of your choice directly. Note that many hotels will be filled at this time, and hotels will only be able to offer the special GSA rate on an as-available basis. Under no circumstance should they be offering a room at a higher rate. If you are interested in a suite, please call the hotel of your choice directly. The San Diego Housing Bureau will NOT be handling suite arrangements.

## ASSIGNMENT

Hotel rooms will be assigned on a first-come, first-served basis as they are received by the Housing Bureau. Please list your top four choices in priority order. Remember to include the hotel code on the Housing Form with the hotel name. Once your request is received, the Bureau will send an acknowledgment to both you and to your assigned hotel.

You will then receive a confirmation from the hotel. This is a notice that the hotel received the information from the Bureau and that the reservation has been entered into their system. Please check it carefully.

## ROOM DEPOSITS/ GUARANTEES

All GSA hotels require a first night's room deposit. Deposits can be made by (1) providing credit card information on the housing form, or (2) sending payment directly to the hotel once you have received your confirmation. The deposit amount should be the cost of one night's stay plus 9% tax at your assigned hotel. Note that the Housing Bureau will accept ONLY credit cards (American Express, VISA, MasterCard, Carte Blanche, or Diners Club), not checks or cash. When making payment directly to the hotel, be sure to give your confirmed reservation number. Please note that the Marriott requires a credit card guarantee at the time you make your reservation.

Once the hotel receives your deposit, it automatically guarantees your reservation. The guarantee assures you that no matter what time you arrive on your scheduled arrival day, your room will be held until at least midnight.

## CHANGES AND CANCELLATIONS

Changes and cancellations BEFORE the SEPTEMBER 27 deadline should be communicated to the Housing Bureau, either by phone (619) 239-0271, fax 619-595-0216, or mail. Please supply your confirmed hotel reservation number for any change or cancellation. AFTER the SEPTEMBER 27 deadline, please contact the hotel directly with any changes.

## GSA OFFICIAL HOUSING REQUEST FORM

Your Housing Request Form must be received BY FRIDAY, SEPTEMBER 27. Please complete and either:

1) **Mail to:** GSA Convention Housing  
San Diego Convention & Visitors Bureau  
1200 Third Avenue, Suite 824  
San Diego, CA 92101

or

2) **Fax to:** San Diego Convention & Visitors Bureau/GSA Housing  
1-619-595-0216

For changes and information call the San Diego Housing Bureau at (619) 239-0271.

### HOTEL PREFERENCE: (Please print or type all information below)

Hotel Code #	Hotel Name
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____

### TYPE OF ACCOMMODATION NEEDED:

<input type="checkbox"/> Single (1 person, 1 bed)	<input type="checkbox"/> 1 additional person	(For suites, call the hotel)
<input type="checkbox"/> Double (2 persons, 1 bed)	<input type="checkbox"/> 2 additional persons	
<input type="checkbox"/> Double/Double (2 persons, 2 beds)	<input type="checkbox"/> Add rollaway	

Rate requested \$ \_\_\_\_\_ (NOTE: All rooms are subject to 9% tax)

ARRIVAL DAY/DATE \_\_\_\_\_ TIME \_\_\_\_\_ a.m./p.m.

DEPARTURE DAY/DATE \_\_\_\_\_ TIME \_\_\_\_\_ a.m./p.m.

### NAMES OF OCCUPANTS:

1. _____	3. _____
2. _____	4. _____

### MAIL CONFIRMATION TO:

Name \_\_\_\_\_ Telephone ( \_\_\_\_\_ ) \_\_\_\_\_  
Address \_\_\_\_\_ City \_\_\_\_\_  
State \_\_\_\_\_ ZIP \_\_\_\_\_ Country \_\_\_\_\_

### GUARANTEED ROOM RESERVATION AUTHORIZATION:

All GSA hotels require a first night's deposit to make a reservation. I understand that the hotel may bill me for one night's housing if I fail to properly cancel a guaranteed reservation. Please check one:

Credit card information is provided below to guarantee my reservation.

My guarantee will be made directly to the hotel after I receive my hotel confirmation.  
(This is not an option at the Marriott. The Marriott requires a guarantee when you make your reservation.)

Please guarantee my room reservation with the following:

American Express  MasterCard  VISA  Carte Blanche  Diners Club

NAME (as listed on credit card) \_\_\_\_\_

SIGNATURE \_\_\_\_\_

CARD NUMBER \_\_\_\_\_ EXP. DATE \_\_\_\_\_

\*\*\* PLEASE DO NOT SEND CHECKS OR CASH WITH THIS FORM \*\*\*



Please note that a cancellation notice must be received AT LEAST 48 HOURS in advance to receive a full refund on your first night's room deposit. Please show courtesy as a professional by notifying the hotel if your plans change.

**ALTERNATIVE HOUSING**

Beating the high cost of housing is a priority of GSA staff and the 1991 Local Committee. Here are some alternatives:

- Check your library copy of the Hotel and Motel Redbook, which lists metro properties. Because of the hundreds of properties in the area (some good, some bad), GSA does not provide a general list.

- Call 1-800-555-1212 or check the Yellow Pages to learn the 800 number for your favorite hotel chains, such as Motel 8 or Comfort Inns, which have properties outside the downtown area.
- Consider camping or taking the trolley to/from nearby El Cajon. The Annual Meeting Committee has researched low-cost alternatives, including camping or other motels south of San Diego. Tent and RV campgrounds are available near the San Diego County foothills or on Mission Bay. Advance reservations are required, and nightly fees range from \$16 to \$30. For additional information, contact Vanessa George, GSA Meetings Coordinator.

**1991 GSA HOTEL CONVENTION RATES**

HOTEL NAME (HOTEL CODE)	1 person 1 bed	2 people 1 or 2 beds	3 people 2 beds	4 people 2 beds
SAN DIEGO MARRIOTT (117)* (1991 Headquarters)	\$125	\$139	\$159	\$179
RAMADA HOTEL DOWNTOWN (116)	\$ 80	\$ 80	\$ 80	\$ 80
HORTON GRAND HOTEL (108)	\$ 79	\$ 89	\$ 99	\$109
OMNI SAN DIEGO HOTEL (114)	\$ 95	\$115	\$125	\$135
KINGSTON HOTEL (105)	\$ 76	\$ 83	\$ 98	\$113
THE PAN PACIFIC HOTEL (104)	\$ 73	\$ 73	\$ 88	\$103
HOLIDAY INN ON THE BAY (106)*	\$ 85	\$ 95	\$105	\$115
BEST WESTERN BAYSIDE INN (101)	\$ 50	\$ 60	\$ 60	\$ 60
RADISSON HOTEL HARBOR VIEW (119)	\$ 69	\$ 69	\$ 69	\$ 69
HOLIDAY INN HARBOR VIEW (107)	\$ 65	\$ 75	\$ 75	\$ 75
HOWARD JOHNSON HOTEL (111)	\$ 61	\$ 61	\$ 66	\$ 71
COMFORT INN—DOWNTOWN (123)	\$ 50	\$ 50	\$ 55	\$ 60
TRAVELODGE (8 locations)	\$ 45	\$ 45	\$ 45	\$ 45

(\*Additional \$10 for a guaranteed bay view)

**DOWNTOWN SAN DIEGO**

**HOTELS (Hotel Code)**



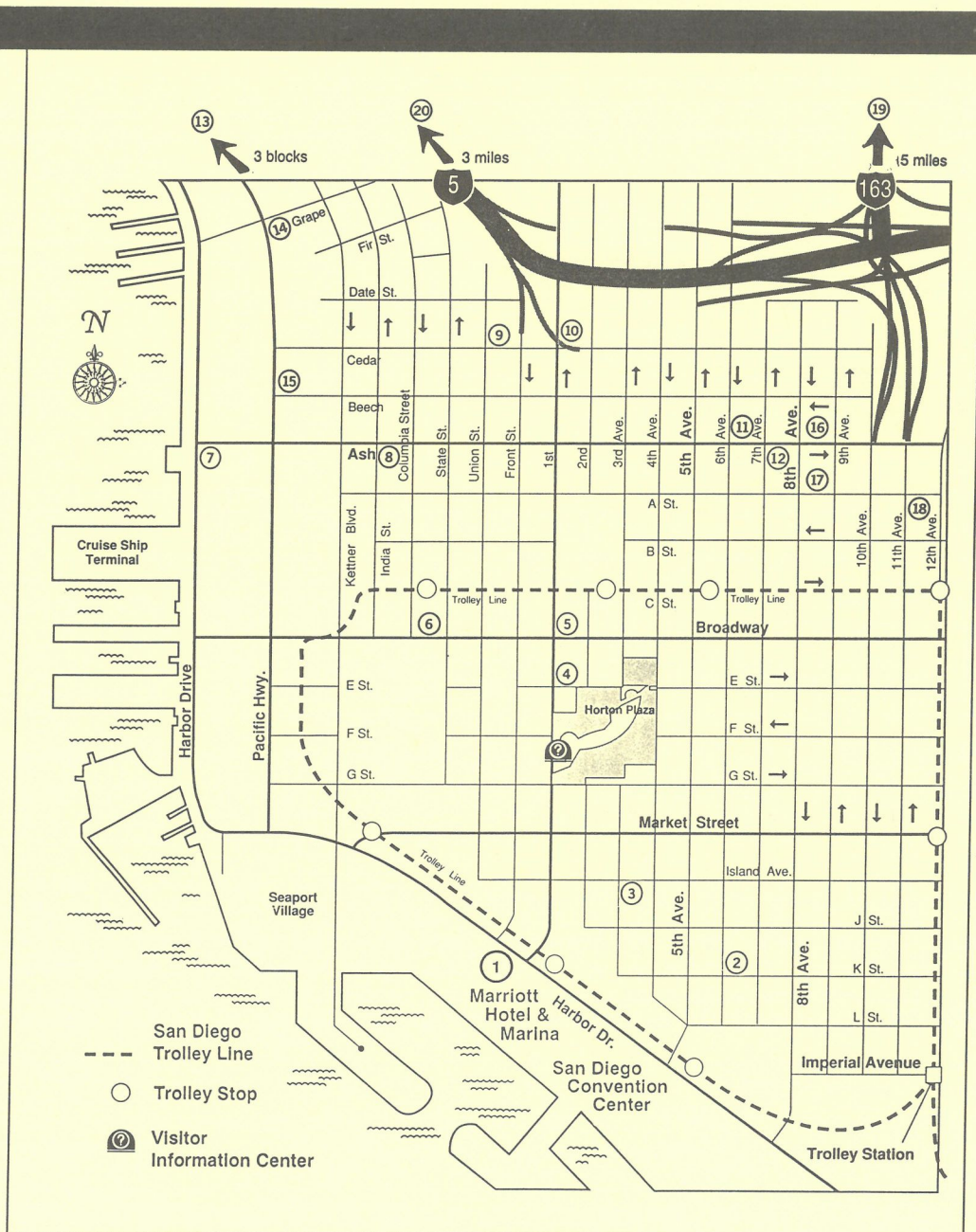
1. Marriott Hotel & Marina (117)
2. Ramada Hotel Downtown (116)
3. Horton Grand Hotel (108)
4. Omni San Diego Hotel (114)
5. Kingston Hotel (105)
6. The Pan Pacific Hotel (104)
7. Holiday Inn on the Bay (106)
8. Best Western Bayside Inn (101)
9. Radisson Hotel Harbor View (119)
10. Holiday Inn Harbor View (107)
11. Howard Johnson Hotel—Balboa Park (111)
12. Comfort Inn—Downtown (123)

**Travelodges—Student Properties**

13. San Diego Airport Travelodge (124)
14. San Diego Bayview Travelodge (125)
15. Civic Center Travelodge (126)
16. San Diego Balboa Park (127)
17. San Diego Cabrillo Central (128)
18. At the Zoo Travelodge (129)
19. Mission Valley Center (416)
20. Old Town Travelodge (428)

**PARKING**

Convention Center public parking is available on the Fifth Street side under the Convention Center. A special \$4 rate, with no in and out privileges, will be available during the meeting, Monday through Thursday. Other days the cost will be \$1 per hour. A special exhibitor rate of \$6 per day will allow in and out access during move in, move-out, and show days. Please identify yourself as an exhibitor at the gate to qualify for this rate.





## HOTEL LISTING

Please make your reservation with the San Diego Housing Bureau.

All hotel names are followed by a hotel code number. This code is required on the official housing form. Please note that all rooms are subject to 9% occupancy tax, and all hotels require a first night's deposit.



### GSA shuttle stop

- 1 SAN DIEGO MARRIOTT HOTEL & MARINA (117)**  
(1991 headquarters)  
333 W. Harbor Drive, San Diego, CA 92101  
(619) 234-1500 (1000-room block)  
0 blocks from the Convention Center

Besides being the most convenient hotel to the Convention Center, it is also the finest major hotel in downtown San Diego. Located on the bay, the hotel features four restaurants for casual to elegant dining, two lounges offering cocktails and a beautiful view, and 24-hour room service. Recreational facilities include a serpentine outdoor pool and spa with fountains, rooftop tennis courts, complete fitness center, and more. Concierge, laundry, valet service, and gift shops. Underground, valet and self-parking start at \$4 per day. A *guaranteed* spectacular bay view is \$10 more; otherwise, your chances are 50/50. For this hotel only, a *credit card guarantee is required at the time you send in your housing form.*

Check-in: 4 p.m. Check-out: 12 noon  
CC: AX,CB,D,DC,MC,V

- 2 RAMADA HOTEL DOWNTOWN (116)**  
660 "K" Street, San Diego, CA 92101  
(619) 696-0234 (150-room block)  
3 blocks from the Convention Center

Complimentary shuttle service to and from the airport. Parking for hotel guests is \$4 per day. Enjoy the rooftop fitness center, including a spa overlooking San Diego Bay and the scenic skyline. Dine in the full-service restaurant for breakfast, lunch, and dinner, or enjoy the lobby lounge as you listen to light jazz from the baby grand piano.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,DC,MC,V

- 3 HORTON GRAND HOTEL (108)**  
311 Island Avenue, San Diego, CA 92101  
(619) 544-1886 (100-room block)  
3 blocks from the Convention Center

A 114-room Victorian hotel, built in 1886 and restored in 1986, set in the heart of San Diego's Gaslamp Quarter. All rooms are individually decorated with antiques including draped, queen-sized beds; hand-carved armoires; lace curtains; and cozy gas fireplaces. English afternoon tea is served daily at 2:30 p.m. in the Palace Bar, award-winning Ida Bailey's serves breakfast and dinner with a sunny New Orleans-style courtyard view, and you can enjoy live jazz on weekends.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,CB,D,DC,E,MC,V

- 4 OMNI SAN DIEGO HOTEL (114)**  
910 Broadway Circle, San Diego, CA 92101  
(619) 239-2200 (275-room block)  
5 blocks from the Convention Center

Southwestern stucco, pastel hues, brass, and crystal combine to create a special hotel in the heart of downtown. Enjoy one of two restaurants, a quiet lounge, or nightclub, after using the outdoor pool, tennis, and exercise equipment. Immediately out the hotel door is Horton Plaza, a unique shopping, restaurant, and entertainment complex.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,DC,MC,V

- 5 KINGSTON HOTEL (105)**  
1055 First Avenue, San Diego, CA 92101  
(619) 232-6141 (50-room block)  
11 blocks from the Convention Center

With European corporate style, this hotel offers complimentary continental breakfast and use of a complete health club facility. The hotel is very proud of its intimate Kingston Playhouse Theater, one of San Diego's finest. Meals are served in Malcolm's, the hotel's restaurant and lounge. Enjoy the character in this graciously renovated property.

Check-in: 2 p.m. Check-out: 12 noon CC: AX,MC,V

Credit Card (CC) Codes: AX—American Express, CB—Carte Blanche, D—Discover, DC—Diners Club, E—Enroute, MC—MasterCard, V—VISA.

- 6 THE PAN PACIFIC HOTEL (104)**  
400 West Broadway, San Diego, CA 92101  
(619) 239-4500 (100-room block)  
9 blocks from the Convention Center

The newest property in downtown San Diego is a beautiful architectural landmark for the city skyline. All rooms feature marble bathroom, refreshment center, separate sitting area, and three phones for your convenience. Enjoy either of the two restaurants or the atrium lounge for cocktails and live music. Health center, complete with pool, spa, sundeck, sauna, massage, exercise equipment, and organized aerobics programs. Concierge service, same-day valet service, and complimentary airport shuttle.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,DC,D,E,MC,V

- 7 HOLIDAY INN ON THE BAY (106)**  
1355 North Harbor Drive, San Diego, CA 92101  
(619) 232-3861 (250-room block)  
14 blocks from the Convention Center

This is the only property besides the Marriott that is on San Diego Bay. Enjoy a stroll along the harbor and watch the cruise ships come and go. The hotel offers an outdoor pool and jacuzzi, lobby bakery, and lounge. The Holiday Inn has one restaurant that serves breakfast, lunch, and dinner at reasonable prices. You will enjoy the newly remodeled rooms, each having its own private balcony. A *guaranteed* bay view is \$10 more; otherwise you have a 50/50 chance.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,CB,D,DC,MC,V

- 8 BEST WESTERN BAYSIDE INN (101)**  
555 West Ash Street, San Diego, CA 92101  
(619) 233-7500 (75-room block)  
14 blocks from the Convention Center

This 14-story property has pleasant, comfortable rooms with private balconies to enjoy either a bay or city view. Complimentary features include parking, airport shuttle, local calls, HBO, and continental breakfast. Enjoy the pool and spa, full-service restaurant, cocktail lounge, and room service.

Check-in: 2 p.m. Check-out: 12 noon CC: AX,CB,D,DC,MC,V

- 9 RADISSON HOTEL HARBOR VIEW (119)**  
1646 Front Street, San Diego, CA 92101  
(619) 239-6800 (150-room block)  
14 blocks from the Convention Center

A new property to grace the San Diego skyline, it offers both harbor and city views to take your breath away. Rooms offer rich wood decor, clock radios, and remote cable TV. Enjoy the hotel restaurant, which serves breakfast, lunch and dinner at reasonable prices, or the cocktail lounge. The hotel offers an outdoor pool, jacuzzi, sauna, health club, and complimentary airport shuttle.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,CB,D,DC,MC,V

- 10 HOLIDAY INN HARBOR VIEW (107)**  
1617 First Avenue, San Diego, CA 92101  
(619) 239-6171 (75-room block)

14 blocks from the Convention Center. Pick up GSA shuttle at the Radisson.

Directly off Interstate 5, this 16-floor circular hotel affords stunning views of the San Diego harbor and skyline. Enjoy all meals in the casual rooftop restaurant. For relaxation, visit the quiet lounge or enjoy the outdoor pool. Each room has its own coffee maker. The hotel provides free parking to hotel guests.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,CB,D,DC,MC,V

- 11 HOWARD JOHNSON HOTEL—BALBOA PARK (111)**  
1430 Seventh Avenue, San Diego, CA 92101  
(619) 696-0911 (75-room block)  
12 blocks from the Convention Center

Located downtown, this hotel offers complimentary continental breakfast daily and free parking.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,CB,D,DC,E,MC,V

- 12 COMFORT INN—DOWNTOWN (123)**  
719 Ash Street, San Diego, CA 92101  
(619) 232-2525 (50-room block)

12 blocks from the Convention Center. Pick up GSA shuttle at Howard Johnson.

Located downtown, this hotel offers complimentary continental breakfast daily and free parking.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,CB,D,DC,E,MC,V

- 13-20 TRAVELODGE (8 locations)**  
(300-room block)

0-6 miles from the Convention Center

These properties are basic and vary in distance from the Convention Center. If transportation is not a concern, you might choose to enjoy one of the nicer properties indicated by ♦, on page 181. All locations offer complimentary parking, morning coffee, and newspaper in the lobby.

Check-in: 3 p.m. Check-out: 12 noon CC: AX,CB,D,DC,MC,V



Following are the Travelodge properties and their unique characteristics.

13. San Diego Airport Travelodge (124)  
2353 Pacific Highway  
(619) 232-8931  
2 miles from Convention Center  
60-room block  
Notes: free shuttle to airport, free full continental breakfast
14. San Diego Bayview Travelodge (125)  
1943 Pacific Highway  
(619) 232-7551  
1 mile from Convention Center  
18-room block
15. Civic Center Travelodge (126)  
1505 Pacific Highway  
(619) 239-9185  
1 mile from Convention Center  
12-room block
16. San Diego Balboa Park (127)  
840 Ash Street  
(619) 234-8277  
1 mile from Convention Center  
23-room block
17. San Diego Cabrillo Central (128)  
840 A Street  
(619) 234-8477  
1 mile from Convention Center  
22-room block
18. At the Zoo Travelodge (129)  
1267 Eleventh Avenue  
(619) 232-7601  
1 mile from Convention Center  
20-room block
19. Mission Valley Center (416) ♦  
1201 Hotel Circle South  
(619) 297-2271  
6 miles from Convention Center  
85-room block. Note: pool
20. Old Town Travelodge (428) ♦  
2380 Moore Street  
(619) 291-9100  
4 miles from Convention Center  
60-room block  
Notes: AAA rated, pool, jacuzzi, VCR in all rooms, movie rental, free full continental breakfast

## Employment Opportunities in the Geological Sciences Roundtable Discussions

Beginning with the San Diego meeting, the annual forum on employment opportunities in the geosciences is being changed to allow more one-on-one interaction between panel members and individuals or small groups. Each of the experts listed below will conduct his or her own "mini-roundtable discussion" designed to provide a better opportunity to field both general and specific questions on a more personal, individualized basis.

These roundtable discussions will be in the Employment Service area, San Diego Convention Center, Room 1A, on Sunday, October 20, from 12:00 noon to 2:00 p.m. This is during the interview registration time; however, YOU DO NOT HAVE TO BE SIGNED UP FOR EITHER THE EMPLOYMENT SERVICE OR THE

ANNUAL MEETING TO PARTICIPATE IN THESE DISCUSSIONS. Everyone is encouraged to attend, professionals and students, to talk with as many of the experts as you like and to pick up a free copy of the 1991 booklet on *Future Employment Opportunities in the Geological Sciences*.

Roundtable discussion leaders scheduled are:  
Dick Paull, University of Wisconsin-Madison  
Kathy Duckett, John Mathes & Associates, Columbia, Illinois  
Jon Price, Nevada Bureau of Mines & Geology, Reno  
Bill Greenwood, U.S. Geological Survey, Reston, Virginia  
Norm McIver, Shell Oil Company, Houston, Texas  
Steve Stow, Oak Ridge National Laboratory, Oak Ridge, Tennessee  
For further information contact T. Michael Moreland, Membership Services Manager at GSA headquarters.

## TRAVEL

### Getting to San Diego

By Air. San Diego International Airport—Lindbergh Field—is one of the few airports to be only 15 convenient minutes from the Convention Center. San Diego is currently served by Aero California, Air Resorts, Alaska Airlines, America West, American, Continental, Delta, Midwest Express, Northwest, Pan American, Sky West, Southwest, States West, Trans World, United, and USAir. Consider staying over Saturday night in San Diego for significant airfare savings.

GSA's official travel agent, Cain Travel Group, has negotiated excellent discounts with the major San Diego carriers. Cain can also assist you with the special discounts and coupon offerings in your area. Call today for the best availability.

To make a reservation, call Cain and identify yourself as a GSA traveler. Tickets can be paid for by check (payable to Cain Travel), by major credit card, or invoiced to your company. Final payment must reach Cain Travel no later than ten days prior to departure to allow for mailing time. All tickets will be mailed via certified mail upon receipt of payment unless requested otherwise. After tickets are issued, you are protected from fare increases; if a fare decreases, call Cain Travel for an adjustment.

As with all airline reservations, please use caution regarding change and cancellation penalties that accompany low-fare tickets. This especially applies to field trip participants whose trips may be canceled after the September 20 preregistration deadline. Be sure you understand the restrictions on the type of ticket you purchase.

Cain Travel will have an on-site Customer Service Desk at the San Diego Convention Center.

By Car. San Diego is about a 2-1/2-hour drive from downtown Los Angeles via freeway route Interstate 5, which stretches from Canada

to the Mexican border. Interstate 8 serves drivers from Yuma, Arizona, and beyond from the East Coast. Interstate 15 provides access from Nevada, Utah, Idaho, and Montana.

By Train and Bus. Amtrak passenger trains provide service to and from Los Angeles. Greyhound and Trailways provide bus service. Call the offices in your area to get the best rates.

### Getting to Your Hotel

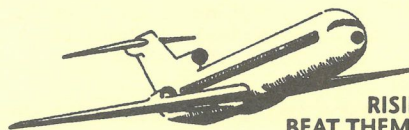
The San Diego International Airport—Lindbergh Field—is four miles from the San Diego Convention Center and the downtown area. Some GSA hotels have free shuttle pick-up, but other transportation options are as follows:

**SuperShuttle.** Operates 24 hours a day, seven days a week. To call SuperShuttle, dial 69 from the Ground Transportation Courtesy Board in the baggage claim area. A reservation agent will then give you instructions on where to board SuperShuttle. Look for the blue and yellow signs and vans. Cost: \$4 to the Marriott, \$6 to other downtown hotels.

From your hotel to the airport, call 24 hours in advance for reservations, (619) 278-8877. For your convenience, SuperShuttle vans are staged at the Marriott Hotel continuously throughout the day. SuperShuttle picks up at all hotels, but a reservation is necessary. Cost: \$4 from the Marriott, \$6 from other downtown hotels.

**Taxis.** Two hundred taxicab companies service the city of San Diego. This adds up to more than 1000 taxis, with the largest fleet belonging to Yellow Cab Company. All vehicles are metered and regulated. Charges are slightly higher from the airport than in the downtown area and range from \$1.20 to \$1.80 for the first mile. Approximate cost from the airport to downtown is \$8.

**Metro Transit System (MTS).** Board the Route 2 bus at the East Terminal of the San Diego Airport, request a transfer from the driver,



**RIISING AIRFARES?  
BEAT THEM WITH DISCOUNTS!**

## Call CAIN TRAVEL GROUP Today

(official travel agency for the San Diego meeting)

Cain offers up to 50% off coach, will meet or beat any fare quote, and will handle at no extra charge the special discount fares advertised in your area.

**1-800-346-4747 toll-free**  
(303) 443-2246 collect from outside U.S., 303-443-4485 fax  
8:30 a.m.—5:30 p.m. MDT, Monday—Friday

You can't lose. Book today. If airfares drop, Cain will automatically reissue your ticket at the lower rate!

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GREAT SERVICE**

and ride to Columbia and Broadway. Disembark and walk across Broadway to the north side of the street and to the bus stop. Here board a Route 7 bus to the Convention Center. In San Diego, call 233-3004 for information. The cost from the airport to downtown is \$1.25.

**Car Rental.** Alamo is the official car rental agency for the meeting. Identify yourself as a GSA delegate by giving Group Identification #85204 and Plan Code G4 to get guaranteed, discounted, daily/weekly rates as follows: economy \$24/\$89; compact \$26/\$109; midsize \$28/\$129; standard \$30/\$149; luxury \$34/\$189. Unlimited mileage. Add \$3 per day for four-door models. Advance reservations are recommended. Call Alamo at 1-800-732-3232.

### Getting Around in San Diego

An excellent freeway system makes travel by car or bus easy throughout the county. San Diego Transit Corporation buses serve the metro area. In San Diego, call the Transit Store, 233-3004, for schedule information.

**San Diego Trolley.** The modern San Diego Trolley provides an excellent, inexpensive service in the downtown area; between downtown and the Mexico border; and to San Diego's East County.

**GSA Shuttle.** GSA will operate a free shuttle service between the downtown GSA hotels and the San Diego Convention Center during meeting hours. (Reminder: the shuttle will not be servicing the student housing motels outside of the downtown area.) Shuttle service will be provided at frequent intervals each day (Sunday, October 20, through Thursday, October 24) beginning at 6:30 a.m. The shuttle will also operate on Sunday, Monday, and Tuesday evenings. Shuttle schedules will be posted in GSA hotel lobbies and in all registration packets.

### FUTURE GSA ANNUAL MEETING SITES

Cincinnati	October 26-29, 1992
Boston	October 25-28, 1993
Seattle	October 24-27, 1994
New Orleans	November 6-9, 1995
Denver	October 28-31, 1996



# 1991 ABSTRACTS WITH PROGRAMS

Volume 23, Number 5

Complete this form and return it by Friday, September 13 for advance-copy purchases of Annual Meeting *Abstracts with Programs*. No refunds for duplicate orders. Members and nonmembers in U.S., Canada, and Mexico only. Price of \$20 includes shipment by first-class (priority) mail. Please copy this form for your records.

SHIP TO: \_\_\_\_\_ Check here if GSA Member  
Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP \_\_\_\_\_ Business Phone \_\_\_\_\_  
Quantity \_\_\_\_\_ at \$20 net each (no additional discounts) Amount enclosed \$ \_\_\_\_\_  
Method of Payment (prepayment required):  Check  Credit Card (provide information and sign on authorization line)  
Credit Card \_\_\_\_\_ Card Number \_\_\_\_\_ Expiration Date \_\_\_\_\_  
Name of Cardholder (please print) \_\_\_\_\_ Signature of Cardholder \_\_\_\_\_

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**ADVANCE-COPY PURCHASE ORDERS MUST BE RECEIVED BY SEPTEMBER 13**

Only members and nonmembers residing in the U.S., Canada, and Mexico may take advantage of GSA's advance-copy purchase option of the Annual Meeting Issue of *Abstracts with Programs*. These advance copies will be mailed about three weeks

prior to the meeting. The price of \$20 includes shipment by first-class (priority) mail.

Members and nonmembers residing outside the U.S., Canada, and Mexico: Due to the prohibitive costs of airmail postage and postal

delays in overseas mailing, we regret that we are unable to make this special advance-copy purchase offer available to you. Copies may be purchased at the meeting.

*Refunds for duplicate orders will not be given.* Members, check your

records carefully to make sure that you have not previously purchased a copy of this publication on either your dues statement or through GSA Publication Sales.

## TO PLACE YOUR ORDER

### Prepayment is required.

Check, money order (in U.S. funds, payable on U.S. banks), or major credit cards are accepted for payment. Order directly from GSA Publication Sales by mail, phone, or fax. To assure receipt prior to the meeting, all orders must be received by Friday, September 13.

By mail ...

Use the form provided.

By phone or fax ...

Call us toll-free at 1-800-472-1988 (outside Colorado), or use our standard business phone (303) 447-2020 during office hours (8:00 to 4:30 MT). You may also fax your order to us at 303-447-1133 (24-hour line).

## ON-SITE PURCHASE

Meeting attendees may purchase copies of *Abstracts with Programs* on-site in the registration area of the Convention Center. Net price: \$20, while supply lasts.

## GRADUATE SCHOOL INTERVIEWS

Monday, October 21, through Thursday, October 24  
San Diego Convention Center

Shortcut your search for just the right graduate school program to suit your needs. Come to the San Diego Annual Meeting and meet with your favorite schools without spending the travel time and money to go to each school for interviews. Schedules will appear in the September issue of *GSA Today* and also the on-site *San Diego Program*.

If you would like to receive a complete list of schools with the contact persons and telephone numbers, so that you can set up an appointment individually or during the scheduled time in San Diego, please write or call Kathy Lynch, GSA Meetings Department.

## CONVENIENCE INFORMATION

### INFORMATION/MESSAGES

Friday, October 18, through Thursday, October 24

San Diego Convention Center  
(619) 525-6020  
San Diego Marriott Hotel & Marina  
(619) 234-1500

### NEWS ROOM

Sunday, October 20, through Thursday, October 24  
San Diego Convention Center

The News Room provides information on topics for release to the

news media. Please let us know of material that is noteworthy for the science or general press. Also, members of the press may receive complimentary registration with appropriate press credentials. In advance of the meeting, contact Sandra Rush, (303) 443-8489, c/o Communications Dept., GSA headquarters.

## CHILD CARE

Families should consider bringing their children to San Diego because of the variety of family activities in the area. Call Vanessa George, GSA Meetings Coordinator, if you are interested in the options provided:

- A private organization is interested in providing child care. They require a minimum of 12 children (6 weeks to 12 years old) at all times. Participants need to commit by paying in full in advance, with prices from \$8 to \$11 per hour, per child. Call GSA by September 15.
- GSA coordinates a cooperative service in which parents can share child care responsibilities. UNTIL OCTOBER 4, GSA will accept names, addresses, and phone numbers of interested parents. The information will be mailed to everyone who has responded. Participants should contact one another and make arrangements.
- San Diego has several excellent private child-care agencies. Although GSA cannot endorse any of these agencies, we are happy to give out the names and phone numbers.
- GSA will be providing a quiet room for children and parents to relax together at the Convention Center. Please provide your own stroller or playpen.

## CALIFORNIA/SAN DIEGO INFORMATION

State of California, Visitor Packet  
1-800-862-2543

San Diego Visitor Information Center  
11 Horton Plaza, San Diego,  
CA 92101, (619) 236-1212

## REGISTRATION

### JOIN GSA NOW AND SAVE!

If you're planning to attend this year's Annual Meeting—but are not yet a GSA member—now is the time to join! When you do, the \$40 basic dues you pay will equal the \$40 you'll save on the member registration fee for the meeting. It's like joining GSA for free. Even professional registrants who pay the *nonmember* registration fee and apply for membership by March 31, 1992, can take advantage of this opportunity. Simply attach a copy of your meeting registration form to your membership application and submit it to GSA headquarters.

Likewise, students who pay the basic membership dues of \$15 to become a Student Associate will receive a \$20 discount on their Annual Meeting registration. That's better than becoming a GSA Student Associate for free!

The \$40 registration discount for members applies to professional members of GSA or an Associated Society. The Associated Societies that qualify are on the registration form. Save time by joining *before* the meeting ... membership applications are available from GSA headquarters. During the meeting, they can be picked up at the Membership Booth in the registration area of the San Diego Convention Center.

## PREREGISTER TODAY! PREREGISTRATION DEADLINE: SEPTEMBER 20

1. There is a 14% savings in registration fees if you register before the preregistration deadline! Advance registration is suggested for many of the special activities because of participation limits. Use the preregistration form provided in this announcement.
2. Badges must be worn for access to ALL activities and shuttle 10:00 a.m. Sunday through 5:00 p.m. Thursday.
3. Registration discounts are given to GSA or Associated Society members. Associated Societies that qualify for this discount are indicated on the registration form. Please indicate your affiliation(s) and member number and register using the member rates.
4. Full payment MUST accompany registration. Unpaid purchase orders are NOT accepted as valid registration. Charge cards are accepted as indicated on preregistration form. Please recheck the charge card number given—errors will delay your registration. The confirmation card will be your receipt for charge card payments. No other receipt will be sent.
5. Register one professional or student per form. Copy the form for your records.
6. Guest registration is required for guests attending guest activities, technical sessions, or the exhibit hall. Guest registrants MUST be accompanied by either a registered professional or student.



7. CURRENT student ID is required to obtain student rates at both the on-site and preregistration counters. Students not carrying a current student ID when they arrive to pick up registration materials will be required to pay the professional fee.

**CANCELLATIONS, CHANGES, REFUNDS**

All requests for registration additions, changes, and cancellations must be made in writing and received by September 27. NO REFUNDS WILL BE MADE ON CANCELLATION NOTICES RECEIVED AFTER THIS DATE. Refunds will be mailed from GSA after the meeting. Refunds for fees paid by credit card will be credited according to the card number on the preregistration form. NO refunds for on-site registration and ticket sales.

**ON-SITE REGISTRATION SCHEDULE**

SAN DIEGO CONVENTION CENTER, HALL B

- Friday, October 18  
\* 1:00 p.m. to 5:00 p.m.
- Saturday, October 19  
\* 7:30 a.m. to 2:00 p.m.  
12:00 noon to 2:00 p.m.
- Sunday, October 20  
10:00 a.m. to 7:00 p.m.
- Monday, October 21  
7:30 a.m. to 5:00 p.m.
- Tuesday, October 22  
7:30 a.m. to 4:00 p.m.
- Wednesday, October 23  
7:30 a.m. to 2:00 p.m.
- Thursday, October 24  
7:30 a.m. to 11:30 a.m.

\* PREREGISTRANTS ONLY!

**REGISTRATION FEES**

	Advance (by Sept. 20)	On-Site	One-Day
Professional—Member	\$140	\$160	\$ 80
Professional—Nonmember	\$180	\$200	\$100
Student—Member	\$ 55	\$ 65	\$ 33
Student—Nonmember	\$ 75	\$ 85	\$ 43
Guest	\$ 60	\$ 70	N/A

**SPECIAL EVENTS**

**San Diego Welcoming Reception**

Sunday, October 20, 6:00 to 9:00 p.m.  
San Diego Convention Center,  
Outdoor Terrace

Ocean sunset, and later, night lights along the shoreline; salt-laden sea breeze; halyards clanging against masts; Latin jazz to fit the mood. Welcome to San Diego! This is the time and place to be with friends and colleagues. You're on your own for drinks and your choices of pizza, tacos, and fajitas made available for everyone, including those late arrivals from field trips. The Latin-Caribbean African band promises welcome sounds with a global perspective.

For your convenience, registration will be open until 7:00 p.m. Shuttle buses will be servicing the GSA hotels from the Convention Center until 9:30 p.m. If you plan to go out for dinner, we suggest you make reservations. A dining guide will be available with registration, or ask your hotel concierge.

**GSA Presidential Tribute and Awards Ceremony**

Tuesday, October 22, 5:45 to 7:00 p.m.  
San Diego Convention Center

The San Diego Meeting is dedicated to the memory of our friend and leader, Doris M. Curtis, who died on May 26. During the ceremonies, we will celebrate the life of this exceptional person. (Although E-an Zen has assumed the duties of President, there will not be a Presidential Address this year.)

Following the Tribute, 1991 medalists and awardees will be honored:

**Penrose Medal**

William R. Dickinson

**Day Medal**

Ian S. E. Carmichael

**Young Scientist Award (Donath Medal)**

Brian P. Wernicke

**GSA Distinguished Service Award**

Dorothy M. Palmer

Recognition will also be given to newly elected Honorary Fellows Dr. Valdar Jaanusson, Dr. Hans Laubscher, and Dr. Richard L. Stanton.

**PREREGISTRATION FORM**

1991 GSA Annual Meeting  
October 21-24

Please print • Copy for your records • Shaded areas are for your badge.

Name (Last) \_\_\_\_\_ (First) \_\_\_\_\_ Initial \_\_\_\_\_  
Employer/University/Affiliation (for badge) \_\_\_\_\_  
Mailing address of affiliation/employer indicated above \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ ZIP code \_\_\_\_\_  
Country \_\_\_\_\_ Business phone \_\_\_\_\_ Home phone \_\_\_\_\_  
Guest/Spouse Name (Last) \_\_\_\_\_ (First) \_\_\_\_\_  
City \_\_\_\_\_ State/Country \_\_\_\_\_

PERSONAL PROFILE (Optional) Please check all that apply:  Male  Female AGE  18-24  25-34  
EMPLOYED AS  01/Professor/Asst. Professor  02/Teacher/Instructor/TA  35-44  45-54  
 03/Manager/Administrator  04/Government Geologist  55-65  over 65  
 05/Corporate Geologist  06/Other

Circle member affiliations: (A) GSA (Member # \_\_\_\_\_) (B) CF (C) GS (D) GIS  
(E) MSA (F) NAGT (G) PS (H) SEG (I) AWG (J) SCE (K) AGID (L) SVP (M) NESTA

(Registration required for participation in all exhibits and technical sessions.) (PLEASE CHECK ONE):

	Full 5 Days	or	1 Day	Qty	Column A Amount
Professional Member	(1) \$140 <input type="checkbox"/>	(2) \$ 80 <input type="checkbox"/>	1	\$	
Professional Nonmember	(3) \$180 <input type="checkbox"/>	(4) \$100 <input type="checkbox"/>	1	\$	
Student Member	(5) \$ 55 <input type="checkbox"/>	(6) \$ 33 <input type="checkbox"/>	1	\$	
Student Nonmember	(7) \$ 75 <input type="checkbox"/>	(8) \$ 43 <input type="checkbox"/>	1	\$	
Guest (fill in name above for badge)	(9) \$ 60 <input type="checkbox"/>	N/A		\$	

**GUEST ACTIVITIES**

Wild Animal Park, Adult	Oct. 20	(20) \$ 33		\$
Wild Animal Park, Child	Oct. 20	(21) \$ 25		\$
Best of San Diego Tour and Harbor Cruise	Oct. 20	(22) \$ 23		\$
Tijuana, Mexico Shopping and Lunch	Oct. 21	(23) \$ 35		\$
Gaslamp Tour and High Tea	Oct. 21	(24) \$ 20		\$
Zoo Behind-the-Scenes Tour, Adult	Oct. 22	(25) \$ 35		\$
Zoo Behind-the-Scenes Tour, Child	Oct. 22	(26) \$ 25		\$
La Jolla Lunch and Shopping	Oct. 22	(27) \$ 37		\$
Presidio Park and Old Town Lunch, Adult	Oct. 23	(28) \$ 34		\$
Presidio Park and Old Town Lunch, Child	Oct. 23	(29) \$ 29		\$

**SPECIAL EVENTS**

Tennis Tournament	Oct. 20	(40) \$ 22		\$
Dinner Cruise	Oct. 22	(45) \$ 38		\$
Beach Party—Dance the Night Away	Oct. 22	(56) \$ 17		\$
SK Run (check T-Shirt Size <input type="checkbox"/> M <input type="checkbox"/> L <input type="checkbox"/> XL)	Oct. 23	(41) \$ 18		\$
Mexico Evening	Oct. 23	(46) \$ 37		\$

**TICKETED MEAL FUNCTIONS**

Assoc. Women Geoscientists Luncheon	Oct. 20	(60) \$ 19		\$
Engineering Geology Division Luncheon	Oct. 21	(61) \$ 19		\$
Geochemical Society Luncheon	Oct. 21	(62) \$ 19		\$
Geoscience Information Society Luncheon	Oct. 21	(63) \$ 19		\$
Geophysics Division Luncheon	Oct. 22	(64) \$ 19		\$
History of Geology Division Luncheon	Oct. 22	(65) \$ 19		\$
Hydrogeology Division Luncheon	Oct. 22	(66) \$ 19		\$
Mineralogical Society Luncheon	Oct. 22	(67) \$ 19		\$
National Association Geology Teachers Luncheon	Oct. 22	(68) \$ 19		\$
Paleontological Society Luncheon	Oct. 22	(69) \$ 19		\$
Sedimentary Geology Division Continental Breakfast	Oct. 22	(70) \$ 8		\$
Assoc. Women Geoscientists Annual Breakfast	Oct. 22	(71) \$ 13		\$
Coal Geology Division Luncheon	Oct. 23	(72) \$ 19		\$
Geoscience Education Division Luncheon	Oct. 23	(73) \$ 19		\$
Society of Economic Geologists Luncheon	Oct. 23	(74) \$ 19		\$

Total Column A \$

		Qty	Column B
1 Mesozoic and Cenozoic Evolution, Mojave	Oct. 16-20	(100) \$260	1 \$
2a Coal-Bearing Delta Complexes, SW US	Oct. 16-19	(101) \$290	1 \$
2b Coal-Bearing, Overflight only	Oct. 20	(102) \$750	1 \$
3 Miocene to Holocene, Recent Ext. Tectonics, Baja	Oct. 18-20	(103) \$190	1 \$
4 Plate Tectonic History, Central California	Oct. 18-20	(104) \$255	1 \$
5 Submarine-Fan Deposits	Oct. 19	(105) \$ 45	1 \$
6 Geologic Hazards	Oct. 20	(106) \$ 60	1 \$
7a Igneous Features, Smartville Complex	Oct. 18-20	(107) \$195	1 \$
7b Igneous Features w/air to San Diego	Oct. 18-20	(108) \$358	1 \$
8 Tectonic Evolution, Central Death Valley	Oct. 18-20	(109) \$240	1 \$
9 Gem-bearing Pegmatites	Oct. 18-20	(110) \$225	1 \$
10a Lower Cambrian Death Valley & Mojave Desert	Oct. 17-20	(111) \$260	1 \$
10b Lower Cambrian Death Valley w/air to San Diego	Oct. 17-20	(112) \$309	1 \$
11 Algodones Dune Field	Oct. 18-19	(113) \$250	1 \$
12 Active Folding and Faulting, Transverse Ranges	Oct. 18-20	(114) \$245	1 \$
13 Mesozoic Evolution, San Gabriel Mountains	Oct. 19-20	(115) \$150	1 \$
14 Quaternary Geomorphology, Owens Valley	Oct. 17-20	(116) \$255	1 \$
15a Active Faulting Volcanism in Trans-Mexican	Oct. 16-20	(117) \$265	1 \$
15b Active Faulting Volcanism w/air to San Diego	Oct. 16-20	(118) \$447	1 \$
16 Tectonics, Water, and Politics	Oct. 17-20	(119) \$280	1 \$
17 Archaeological Geology, Point Conception	Oct. 18-20	(120) \$160	1 \$
18 Geology of San Diego (check day/time below)	Oct. 22 or 23	\$ 10	1 \$
Tues. a.m. <input type="checkbox"/> (121) Tues. p.m. <input type="checkbox"/> (122) Wed. a.m. <input type="checkbox"/> (123) Wed. p.m. <input type="checkbox"/> (124)			
19 Downtown San Diego Blob	Oct. 23	(125) \$ 5	1 \$
20 Remote Sensing Planetology at JPL	Oct. 25	(126) \$ 25	1 \$
21 Catalina Schist	Oct. 25-27	(127) \$325	1 \$
22 Peninsular Ranges Batholith	Oct. 25-27	(128) \$260	1 \$
23a Zoned Plutons, E. Peninsular Ranges, Baja 2 days	Oct. 25-26	(129) \$145	1 \$
23b Zoned Plutons, E. Peninsular Ranges, 5 days	Oct. 25-29	(130) \$360	1 \$
24 Mesozoic Geology, Cedros Island, Baja, Mexico	Oct. 25-28	(131) \$510	1 \$
25 Eocene Depositional Systems, S. California	Oct. 25-26	(132) \$140	1 \$
26 Landslides, Peninsular Ranges, S. California	Oct. 25-26	(133) \$190	1 \$
27 Geologic Structure, Salton Trough	Oct. 24-26	(134) \$230	1 \$
28 Late Cenozoic Sedimentation, Salton Trough	Oct. 25-27	(135) \$275	1 \$
29a Hydrogeologic Overview, Yucca Mountain, Nevada	Oct. 25-27	(136) \$180	1 \$
29b Hydrogeologic Overview, Yucca Mountain, w/air to Nev.	Oct. 25-27	(137) \$258	1 \$
30 Detachment Faulting, Whipple Mountains	Oct. 24-27	(138) \$245	1 \$

**SHORT COURSES**

1 Practical 3-D Contaminant Transport Modeling	Oct. 18-20	(150) \$295	1 \$
2 SUPCRT91 Software Package	Oct. 18-19	(151) \$295	1 \$
3 Deformation & Kinematics, High Strain Zones	Oct. 19-20	(152) \$175	1 \$
4 Fractals and Their Use in Earth Sciences	Oct. 19-20	(153) \$255	1 \$
5 Quantitative Sedimentary Basin Modeling	Oct. 19-20	(154) \$615	1 \$
6 Thermochronology: Applications to Tectonics	Oct. 19-20	(155) \$215	1 \$
7 Assessing Mobility, Chemicals Vadose Zone	Oct. 20	(156) \$105	1 \$
8 Computer-aided Illustration in Geology	Oct. 20	(157) \$295	1 \$
9 Earthquakes and Earthquake Preparedness	Oct. 20	(158) \$105	1 \$
10 Hydrogeologic & Environmental Applications	Oct. 20	(159) \$120	1 \$
11 Applications, Radar Remote Sensing	Oct. 25	(160) \$135	1 \$
12 Contaminant Hydrogeology	Oct. 25-26	(161) \$195	1 \$
13 Sedimentary Basin Systems	Oct. 25-26	(162) \$145	1 \$

\*Meeting registration not required

Total Column B \$

Total Column A \$

Columns A & B = Total Remittance (full payment must be enclosed) \$

Remit in U.S. funds payable to: 1991 GSA Annual Meeting

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Preregistration Deadline: September 20, 1991

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## Meeting Announcements

### Call for Papers - 13th Mineralogical Symposium

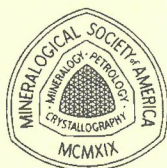
The thirteenth Mineralogical Symposium sponsored jointly by the Friends of Mineralogy, The Tucson Gem and Mineral Society, and the Mineralogical Society of America will be held in conjunction with the 38th Tucson Gem and Mineral Show *Saturday, February 15, 1992*. Pyromorphite is the show's theme mineral. Papers on the descriptive mineralogy, paragenesis, classic and new occurrences of pyromorphite or secondary lead minerals are invited. Papers on other subjects—new species, new occurrences, etc.—are also welcome. An audience of knowledgeable amateurs as well as professional mineralogists and geologists is expected.

If you wish to present a paper, please write or call Dr. Carl A. Francis, Chairman (Harvard Mineralogical Museum, 24 Oxford Street, Cambridge, MA 02138; 617-495-4758) with your topic, a few sentences describing the paper, and your address and telephone number. Presentations will be 15 minutes followed by a brief question period. Following acceptance of topics, authors are required to submit a 200-300 word abstract by *September 15, 1991*. Abstracts will be published in the January–February 1992 issue of *The Mineralogical Record*.

### The Transition from Basalt to Metabasalt . . .

An international symposium, "The Transition from Basalt to Metabasalt: Environments, Processes, and Petrogenesis," will be held September 9–15, 1992 in Davis, California. The sponsor of the symposium is IGCP Project 294. This meeting aims to bring together a wide variety of petrologists and geochemists studying the transition of fresh basalt into low-grade metabasalt (up to and including greenschist facies). Contributions reporting diverse approaches to understanding this transition are encouraged. Four broad themes for this meeting include: (1) the phase equilibria and crystal chemistry of low grade metabasites, (2) the geochemistry of the basalt to metabasalt transition, (3) hydrothermal metamorphism of basites, and (4) metabasites from contrasting geodynamic settings.

Technical sessions will be held September 10–12. On September 9th, a pre-symposium field excursion to the Franciscan Complex in the San Francisco Bay area is planned. A post-symposium field excursion (September 13–15) to examine a geologic and metamorphic transect across the island arc/ophiolite terrains of the northern Sierra Nevada is also scheduled. The abstract deadline is March 1, 1992 and the registration deadline is June 1, 1992. Information may be obtained from: Peter Schiffman, Dept. of Geology, University of California, Davis, CA 95616. Telephone: (916) 752-3669; FAX: (916) 752-0951.



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