



GSA
NEWS &
INFORMATION

Monthly Newsletter of
The Geological Society of America

ISSN 0164-5854

VOLUME 11, NUMBER 4, APRIL 1989

GSA 1989 Annual Meeting
November 6-9
St. Louis, Missouri
see p. 89



Penrose Conference on Eocene Tectonics of Northern Cordillera To Meet in September

A GSA Penrose conference "The Eocene tectonic transition: Oregon to Alaska" will be held September 4-10, 1989, in Penticton, British Columbia. Conveners are Randall R. Parrish, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8, Canada; Raymond A. Price, Department of Geological Sciences, Queen's University, Kingston, Ontario K7L 3N6, Canada; and Ralph A. Haugerud, U.S. Geological Survey, MS 975, 345 Middlefield Road, Menlo Park, California 94025, (415) 329-4910.

Throughout the northern Cordillera the Eocene was a time of tectonic transition, marking the end of the Sevier tectonic regime, characterized by fold-and-thrust deformation in the Rocky Mountains, and the onset of the modern regime, characterized (in the south) by the Cascade magmatic arc. During this transitional period much of the continental margin was translated northward, basaltic lavas of the Oregon-Washington Coast Ranges were erupted and accreted, large expanses of mid-crustal rock were rapidly unroofed, deep local sedimentary basins were developed and filled, and felsic to intermediate rocks of the Challis magmatic event were emplaced throughout much of the northern Cordillera.

The last few years have seen intense interest in the Eocene metamorphic core complexes of the northern Cordillera, as well as study of the Eocene basins, improved plate reconstructions for the northeast Pacific, several high-quality deep seismic reflection lines across parts of the northern Cordillera, and renewed interest in Eocene magmatic rocks of the Pacific Northwest. Our understanding of any of these phenomena is most likely to be furthered by considering them all. Accordingly, the objectives of this conference are (1) to encourage cross-specialty communication; (2) to air some

of the recent geological and geophysical discoveries and reinterpretations of the tectonics of the northern Cordillera; (3) to nourish the relatively neglected study of the Eocene sedimentary and magmatic rocks; and (4) to inspire a critical appraisal of the geodynamics of this transitional period: To what extent were they results of externally imposed changes in plate motions or consequences of the internal evolution of a thickened continental margin?

The conference will include a field trip from Vancouver to Penticton, a one-day field trip from Penticton to the Okanagan core complex and White Lake basin, poster displays of data, and three days of discussion on the following topics:

- Plate motions in the northeast Pacific
- Geophysical structure of the northern Cordillera
- Basaltic magmatism in the Coast Ranges
- Northward translation along the continental margin
- Unroofing of the middle crust, extension, and basin development in the orogenic hinterland
- Paleotopography
- Challis continental magmatic event
- Models and possible modern analogs

The conference will be limited to 50-60 participants. Interested persons should write to Ralph Haugerud at the above address, stating their reasons for wishing to attend and outlining past or present research relevant to the topic of the conference. Deadline for applications is **May 1, 1989**. The registration fee, which is not yet determined, will include food, lodging, field trips, and transportation from Vancouver, British Columbia, to Penticton and back. Limited support will be available for a few qualified graduate students.

1989 GSA ANNUAL MEETING
Frontiers in Geoscience
St. Louis, Missouri
November 6-9, 1989
Cervantes Convention Center



First Call for Papers and Theme Session Announcement <i>GSA News & Information</i>	April 1	Joint Technical Program Committee GSA division, associated society, and at-large representatives meet in Boulder	August 17-18
Short Course Listing and Registration <i>GSA News & Information</i>	May 1	Abstract Notices Mailed (First Class)	August 25
Group Event Requests Due to GSA Event Coordinator	May 1	Speaker Kits Mailed (First Class)	August 30
Abstracts Deadline Abstract forms available in geology departments, or contact GSA Abstracts Coordinator	July 19	Technical Program Schedule Available <i>GSA News & Information</i>	September 1
Preregistration and Housing Forms and Event Information <i>GSA News & Information</i>	August 1	Preregistration Deadline Information available from GSA Meetings Coordinator	October 6
		Abstracts Volume Mailed to Subscribers (First Class)	October 12

Call today for more information: GSA Meetings Coordinator (303) 447-2020, or write P.O. BOX 9140, BOULDER, CO 80301

If Your Campus Is Listed Here, You Need a GSA Rep

Every college and university that has a geology program needs a GSA campus representative who can provide information about GSA services to students.

The Campus Representative Program began in 1979 in GSA's Southeastern Section. Active GSA members in the section were recruited to serve as campus representatives, establishing a communications link between GSA headquarters and present and prospective Student Associates.

Campus representatives, with the aid of a notebook of information provided by GSA's Membership Department, explain to interested students the benefits of being a GSA Student Associate:

- *Bulletin, Geology, and GSA News & Information* every month
- 20% discount on GSA books, maps, and charts
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- \$10 discount for registration fees for Penrose Conferences
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- Reduced registration fees for many GSA section meetings
- Reduced dues for GSA spouse member
- 25% discount on Member Standing Order Plan
- Special discounts on Decade of North American Geology publications
- Group term life insurance plan at reduced member rates

- Opportunity to participate in GSA's specialized divisions and to receive their newsletters
- Opportunity to apply for student grants-in-aid in the Southeastern Section and the North-Central Section
- Discount for subscriptions to *Engineering Geology Abstracts* for Engineering Geology Division affiliates
- Discount for National car rentals
- 25% discount on many Geological Society of London publications
- Reduced subscription rate for publications of the American Institute of Physics
- Discount on subscriptions to *Geoarchaeology* or *Neotectonics* for GSA Division affiliates

All GSA sections participate in the program, and there are now 486 active campus representatives. We thank the current campus representatives now serving to keep the program growing. However, we need more volunteers. If you are a Member or Fellow (not Student Associate) and are interested in serving GSA as a campus representative for your college or university, please contact

T. Michael Moreland, Membership Services Manager
Geological Society of America
P.O. Box 9140
Boulder, CO 80301
(303) 447-2020

The following campuses need a GSA campus representative. If yours is on the list, won't you consider serving?

Campuses that **DO NOT** have GSA Campus Representatives:

Cordilleran Section

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Central Arizona College
Mesa Community College
Phoenix College
Prescott College
Yavapai College

California

Antelope Valley College
Bakersfield College
California Polytechnic State University—
San Luis Obispo
California State University—
Stanislaus
Chaffey College
Chapman College
Contra Costa Community College
College of the Desert
Diablo Valley College
East Los Angeles College
Fullerton College
Gavilan College
Glendale Community College
Golden West College
Los Angeles City College
Los Angeles Harbor College
Los Angeles Pierce College
Los Angeles Valley College
Merced College
Napa Valley College
Naval Postgraduate School
Ohlone College
Orange Coast College
College of the Redwoods
Riverside City College

Sacramento City College
Saddleback Community College
San Joaquin Delta College
San Jose City College
Santa Ana College
Santa Barbara City College
Shasta Community College
Southwestern College
Ventura College
West Valley College
Yuba Community College

Nevada

Wassuk College

Oregon

Central Oregon Community College
Clatsop Community College
Willamette University

Washington

Green River Community College
Lower Columbia College
Olympic College
Tacoma Community College
Whitworth College
Yakima Valley College

British Columbia

Capilano College
Cariboo College
Douglas College

Rocky Mountain Section

Colorado

Colorado Mountain College
Colorado Northwestern Community College
University of Denver
Metropolitan State College
Pikes Peak Community College
United States Air Force Academy
Western State College of Colorado

Idaho

Lewis-Clark State College
Ricks College
College of Southern Idaho

Montana

Eastern Montana College
Flathead Valley Community College
Northern Montana College
Rocky Mountain College

New Mexico

New Mexico Highlands University

North Dakota

Dickinson State College

South Dakota

Augustana College

Utah

Snow College

Wyoming

Casper College

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Campus Reps Needed (continued from p. 84)

Alberta

University of Lethbridge
Mount Royal College
Northern Alberta Institute of Technology
Southern Alberta Institute of Technology

Saskatchewan

University of Regina

North-Central Section

Illinois

Argonne National Laboratory—
University of Chicago
Bradley University
University of Chicago
Columbia University
Concordia College
Elgin Community College
Field Museum of Natural History
University of Illinois—Chicago
College of Lake County
Lincoln Land Community College
Monmouth College
Northwestern University
Oakton Community College
Principia College
Wabash Valley College
William Rainey Harper Community College

Indiana

Hanover College
Holy Cross Junior College
Indiana University/Purdue University—
Fort Wayne
Indiana University at Kokomo
Vincennes University Junior College

Iowa

Drake University
Grinnell College

Michigan

Adrian College
Central Michigan University
Charles Stewart Mott Community College
Concordia College
Gogebic Community College
Henry Ford Community College
Hope College
Muskegon Community College
Northern Michigan University
Schoolcraft College
St. Clair County Community College
Washtenaw Community College
Wayne State University

Minnesota

Anoka-Ramsey Community College
Concordia College

Gustavus Adolphus College
Itasca Community College
Southwest State University
St. Cloud State University
College of St. Thomas
Willmar Community College

Missouri

Central Methodist College
Meramec Community College
Missouri Western State College
Northeast Missouri State University
St. Louis Community College
at Florissant Valley
St. Louis Community College at Forest Park
St. Louis University
Stephens College
William Jewell College

Nebraska

Doane College
Kearney State College

Ohio

Ashland College
Central State University
Cleveland State University
University of Dayton
Kent State University—Stark Campus
Marietta College
Mount Union College
Muskingum College
Oberlin College
Ohio University—Lancaster

Wisconsin

Milwaukee Area Technical College
Mount Senario College
Northland College
University of Wisconsin—Extension—Madison
University of Wisconsin—Marathon County
University of Wisconsin—Platteville
University of Wisconsin—Stevens Point

Manitoba

Brandon University

South-Central Section

Arkansas

University of Arkansas—Fayetteville
University of Arkansas—Monticello
Arkansas Tech University
University of Central Arkansas
College of the Ozarks
Southern Arkansas University

Kansas

Cowley County Community College

Oklahoma

Northeastern State University
Phillips University
Southwestern Oklahoma State University

Texas

Amarillo Junior College
Angelo State University
Brookhaven College
Del Mar College
Hardin-Simmons University
Houston Community College System
Kilgore College
Lee College
Midwestern State University
Odessa College
Pan American University
San Antonio College
South Plains College
Tarleton State University
Tarrant County Junior College

Northeastern Section

Connecticut

Central Connecticut State University
Eastern Connecticut State University
Southern Connecticut State College
United States Coast Guard Academy

Delaware

University of Delaware—College of Marine
Studies

District of Columbia

University of the District of Columbia—
Van Ness Campus

Maine

Bowdoin College
Colby College
University of Maine—Orono at Walpole

Maryland

Catonsville Community College
Montgomery College
Towson State University
United States Naval Academy

Massachusetts

Berkshire Community College
Fitchburg State College
Greenfield Community College
Hampshire College
University of Massachusetts at Boston/
Harbor Campus
Massachusetts Institute of Technology
North Adams State College
Woods Hole Oceanographic Institution
Worcester State College

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Vol. 11, no. 4 GSA News & Information April 1989

GSA NEWS & INFORMATION (ISSN 0164-5854) is the monthly newsletter of The Geological Society of America, Inc., 3300 Penrose Place, Boulder, Colorado 80301. Second-class postage rates paid at Boulder, Colorado, and additional mailing office. GSA, a scholarly society, neither adopts nor supports positions of advocacy. We provide this and other forums for the presentation of diverse opinions and positions by scientists worldwide, regardless of their race, citizenship, gender, religion, or political viewpoint. Opinions presented in these publications do not reflect official positions of the Society. Postmaster: Send address changes to GSA News, Membership Coordinator, P.O. Box 9140, Boulder, CO 80301.

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Prepared from contributions from the staff and membership. Executive Director: F. Michael Wahl; Managing Editor: Faith Rogers; Associate Editor: Lee Gladish; Production and Advertising Manager: James R. Clark; Marketing/Advertising Assistant: Ann H. Crawford; Production Assistants: Mona T. Gonzales and Joan E. Manly.

Campus Reps Needed (continued from p. 85)

New Hampshire
New England College
Plymouth State College

New Jersey

Fairleigh Dickinson University
Glassboro State College
Stockton State College
Trenton State College
Union County College
Upsala College
William Paterson College

New York

Adelphi University
Adirondack Community College
Brooklyn College (CUNY)
Broome Community College
City College (CUNY)
Columbia University, Teachers College
Graduate School of the City University
of New York
Hamilton College
Hudson Valley Community College
Hunter College (CUNY)
Jefferson Community College
Lehman College (CUNY)
Long Island University, Brooklyn Campus
Long Island University, C. W. Post College
Manhattan College
Molloy College
Nassau Community College
Onondaga Community College
Roberts Wesleyan College
SUNY, College at Purchase
SUNY, Maritime College
SUNY at Albany
SUNY at Binghamton
United States Military Academy
Utica College of Syracuse University

Pennsylvania

Drexel University
Elizabethtown College
Gannon University
Juniata College
Lycoming College
Montgomery County Community College
Pennsylvania State University—Erie
Pennsylvania State University—McKeesport
Pennsylvania State University—Monaca
Susquehanna University

Thiel College
Waynesburg College
Wilkes College
York College of Pennsylvania

Rhode Island

Community College of Rhode Island
Providence College
Rhode Island College
Roger Williams College

Vermont

Castleton State College
Middlebury College
Norwich University
University of Vermont

New Brunswick

University of New Brunswick—Saint John

Newfoundland

Sir Wilfred Grenfell College

Nova Scotia

St. Mary's University
University College of Cape Breton

Ontario

University of Guelph
Laurentian University
University of Ottawa
Sir Sandford Fleming College
University of Toronto
University of Waterloo
University of Western Ontario

Quebec

Concordia University
Ecole Polytechnique
Université du Québec à Montréal
Université du Québec à Rimouski
Université du Québec—Ste-Foy
Université du Québec à Trois Rivières

Southeastern Section

Alabama

University of Alabama—Dauphin Island
Livingston University
University of Montevallo

Florida

Broward Community College
University of Central Florida

Edison Community College
Florida Atlantic University
Florida Institute of Technology
Florida Keys Community College
Gulf Coast Community College
Miami-Dade Community College (New World
Center)

Nova University
Okaloossa-Walton Junior College
Pensacola Junior College
St. Petersburg Junior College
St. Petersburg Junior College—Clearwater
Stetson University
Tallahassee Community College

Georgia

Emory University—Oxford College
Gainesville Junior College
Kennesaw College
Mercer University
Shorter College
Valdosta State College

Kentucky

Berea College
Henderson Community College
Morehead State University
Northern Kentucky University

Louisiana

Northwestern State University

North Carolina

Catawba College
University of North Carolina—Greensboro
North Carolina Agricultural & Tech
State University

South Carolina

Benedict College
Coker College
Wofford College

Tennessee

Rhodes College

Virginia

Emory & Henry College
Hampton Institute
J. Sargeant Reynolds Community College
Lynchburg College
Mary Washington College
Northern Virginia Community College
Tidewater Community College
Virginia Commonwealth University
Virginia State University
Virginia Western Community College

West Virginia

Glenville State College
Parkersburg Community College
Potomac State College

People

GSA Member **Konrad J. Banaszak** has joined Geraghty & Miller, Inc., as principal scientist and manager of its new office in Indianapolis, Indiana. The Association for Women Geoscientists has presented its annual Distinguished Service Award to Member **Jeanne E. Harris**, Denver, Colorado. Fellow **Walter D. Keller**, Columbia, Missouri, has been awarded an honorary doctor of engineering degree by the University of Missouri—Rolla. Fellow **John E. Moore**, Reston, Virginia, has been elected president of the American Institute of Hydrology; Member **John M. Sharp, Jr.**, was elected AIH vice president for academic affairs. Fellow **Isaac J. Winograd** received AIH's 1988 Charles V. Theis Award. Member **Guy A. Swenson III**, Marcellus, New York, has been named manager of the new earth sciences division of O'Brien & Gere Engineers, Inc. Fellow **Larry D. Woodfork**, Morgantown, West Virginia, is the new director of the West Virginia Geological and Economic Survey.

Memorial Preprints

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

Thomas W. Fluhr, by Robert H. Fakundiny
W. Ernest Hale, by Arnold L. McAllister
Gail Francis Moulton, by Willis, Gail, and Carolyn Moulton
Vernon Edward Scheid, by Joseph Lintz, Jr.
Quentin Dreyer Singewald, by Wallace D. and
Dorothea Wyckoff Lowry

1989 GSA Committees and Representatives

Committees are the key to GSA's accomplishments in promoting the science of geology. Committee members and representatives contribute their expertise and experience to all areas of GSA endeavor. Listed here are those currently serving the Society and the science as committee members and as GSA representatives to other scientific groups.

Executive Committee

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

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Committee on Committees

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Committee on the Arthur L. Day Medal Award

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Committee on Geology & Public Policy

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Sigmund Snelson, 1989-1990; Eric J. Barron, 1989-1991; John E. Repetski, 1989-1991

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Treatise on Invertebrate Paleontology Advisory Committee

Charles W. Pitrat—Chairman, 1987-1990; Richard Arnold Davis, 1989-1992; F. Michael Wahl, Continuing

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Ad Hoc Committee on Minorities in the Geosciences

Penelope M. Hanshaw—Chairman, 1987-1989; Charles A. Baskerville; Louis A. Fernandez; David A. Lopez; Elisabeth C. Schwarzman; Clement F. Shearer; Frederick A. Wilson

GSA Member of the AGI Member Society Council

M. Gordon Wolman (January 1, 1987-December 31, 1989)

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1989 GSA Committees (continued from p. 87)

GSA Representative to the AGI Education Advisory Committee

Albert W. Bally (October 28, 1987-1990)

GSA Representatives to American Association for the Advancement of Science (AAAS)

Section E—Geology & Geography

J. Thomas Dutro, Jr. (February 16, 1988-February 15, 1991)

Section W—Atmospheric & Hydrospheric Sciences

John G. Weihaupt (July 1988-February 15, 1991)

GSA Delegate to Circum-Pacific Council

Robert L. Fuchs (May 2, 1984—)

GSA Representatives to North American Commission on Stratigraphic Nomenclature (NACSN)

Robert F. Lundin, 1986-1989; Donald E. Hattin, 1987-1990;

Donald L. Baars, 1988-1991; Paul R. Seaber, 1989-1992 (representative-elect; term begins during NACSN meeting in St. Louis)

GSA Designees to Joint ASCE-GSA-AEG Committee on Engineering Geology (American Society of Civil Engineers)

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

GSA Representative to U.S. National Committee on Rock Mechanics (USNCORM)

Richard W. Galster, July 1, 1986-June 30, 1989

GSA Representative to U.S. National Committee on Tunneling Technology

Richard E. Gray, July 1, 1986-June 30, 1989

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Geology & Public Policy White Papers

white paper (n): a detailed or authoritative report

In past years the Committee on Geology & Public Policy has published reports—white papers—on various topics in the geological sciences that have, or ought to have, significance to important national public issues. At times these reports have been summaries of forums convened by the Geological Society of America at one of its annual meetings. The Committee on Geology & Public Policy is now looking for a few good ideas for white papers that would interest, educate, stimulate, and even challenge the general membership of GSA. Your suggestion should include a reasonably detailed description of the problem, the need for the issue to be publicized by GSA, and a list of suggested experts who might be willing to serve on an ad hoc task force to prepare the paper. Please submit your suggestions to Clement F. Shearer, U.S. Geological Survey, 106 National Center, Reston, VA 22092. A sampling of past white papers follows.

The Urbanized Desert: A Challenge for the Geosciences

A report on the forum held at the 1987 GSA Annual Meeting, this paper used Arizona as a case study for nine viewpoints on aspects of human interaction with an arid environment. The topics included ground-water and surface-water supply and quality, land subsidence and earth fissures, desertification and dust storms, drainage and flooding, urban planning, and the politics of water.

Perspectives on the Management and Disposal of Hazardous Wastes

Stemming from a 1985 forum cosponsored by the Committee on Geol-

ogy & Public Policy and the Hydrogeology Division, this paper presented the perspectives of the Congress, regulatory agencies, industry, contractors, consultants, academia, and citizen action groups.

Geological Information—Problems in Transfer from Scientist to Policy Maker

Published in 1979, this report contains condensed versions of papers presented at a symposium held at the 1978 GSA Annual Meeting. The papers were grouped into three categories: methods of presenting geological information, the role and experience of scientific advisory groups, and the decision maker's requirements for geological information.

Other titles include

Floods and People: A Geological Perspective (1978)

Impacts and Management of Off-Road Vehicles (1977)

Geologic Constraints in the Urban Environment (1975)

Impact of Barrier-Island Development—Geological Problems and Practical Solutions (1975)

Environmental Impact of Conversion from Gas or Oil to Coal for Fuel (1974)

Development of Oil Shale in the Green River Formation (1974).

GEOLOGICAL SOCIETY OF AMERICA

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FRONTIERS IN GEOSCIENCE



1989 ANNUAL MEETING

ST. LOUIS, MISSOURI NOVEMBER 6-9, 1989

ABSTRACTS DUE JULY 19
for abstracts forms (303) 447-8850

PREREGISTRATION DUE OCTOBER 6
for meeting information (303) 447-2020 or 1-800-GSA-1988

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Association of Geoscientists for International Development • Association for Women Geoscientists
Cushman Foundation • Geochemical Society • Geoscience Information Society • Mineralogical Society of America
National Association of Geology Teachers • National Earth Science Teachers Association • Paleontological Society
Sigma Gamma Epsilon • Society of Economic Geologists • Society of Vertebrate Paleontologists

REGISTRATION/FULL DETAILS: August *GSA News & Information*



ST
LOUIS

GATEWAY TO THE FUTURE:

Long known as the "Gateway to the West," St. Louis is the ideal site as GSA's gateway to its second century. St. Louis is a refreshing blend of the traditional and the state-of-the-art in both its social and financial environments. Its unique location has made St. Louis a center that reflects an inventive spirit.

More than one hundred Fortune 500 companies are located in St. Louis, including many that are leading the way in aerospace technologies. This community has a record of public-private cooperation that is the envy of other American cities. In spite of the dynamic influence of the business community, St. Louis remains reasonably priced. Centrally located, it is also easily accessible.

St. Louis made modern history with the spectacular Gateway Arch designed by Eero Saarinen, but it has also preserved the rich treasure of its older architecture. The ornate and authentic restoration of Union Station, a Victorian-era railroad station that was once the nation's busiest, has made this a remarkable place to visit, dine, or shop. Laclede's Landing, once a Mississippi riverbank warehouse district, is now a thriving stretch of eateries and nightclubs.

The city prides itself on being a home for traditional blues and jazz. St. Louis has been home to many musicians, including Scott Joplin, Bix Biederbecke, Miles Davis, Ike and Tina Turner, and Chuck Berry. After all, St. Louis is still the home of the St. Louis Blues.

St. Louis is a city that has combined a rich and varied past with a dynamic future. It is a perfect place to welcome GSA as it experiences its 101st year with a meeting highlighted by the theme "Frontiers in Geoscience."

TECHNICAL PROGRAM

CALL FOR PAPERS: ABSTRACTS DEADLINE FOR INVITED AND VOLUNTEERED PAPERS WEDNESDAY, JULY 19, 1989

Technical sessions consist of both volunteered and invited papers organized in one of four presentation formats: invited symposia, open symposia, theme sessions, and discipline sessions. The formats are distinguished by the mix of invited and volunteered papers. In addition, symposia are proposed by *conveners* whereas theme sessions are proposed by *advocates*.

In invited symposia, all speakers are invited by the conveners. *Open symposia* have both invited and volunteered papers; volunteer contributors must contact the convener about submitting an abstract. If a paper is not accepted for an open symposium, it will be considered for a discipline session along with regular volunteered abstracts if so desired by the author.

Theme sessions have no invited speakers but are organized around the specific (but diverse) topics appearing below. If an abstract is submitted to, but not accepted for, a theme session, it will continue through the evaluation process to be considered for the appropriate discipline session if so desired by the author. Authors will select ONE discipline in which the abstract will be reviewed.

Discipline sessions are organized from volunteered abstracts submitted to GSA on a general basis and assigned to ONE of 35 discipline classifications.

After review, selection of volunteered papers for presentation in theme or discipline sessions is made by members of the Joint Technical Program Committee (JTPC). Each discipline has a representative on the JTPC, appointed by either a GSA Division or by an Associated Society. Persons organizing abstracts submitted for theme sessions will be designated by the Technical Program Committee chairmen.

Symposia Abstracts Procedure (Invited and Open)

- All invited symposia abstracts are to be submitted directly to the convener.
- Authors interested in volunteering an abstract for an **open symposium** must contact the convener by May 15 to be sure that the abstract will be consistent with the mission of the symposium.
- If the convener agrees, the author will **submit the abstract directly to GSA by July 19**. The paper will then be reviewed with the other abstracts submitted for the symposium.
- After review, abstracts not selected by the convener for inclusion in the symposium will be automatically submitted for consideration as volunteered papers (if desired by the author).

Theme Session Procedure

To submit an abstract for consideration for a theme session, the author must write in the name and number of the theme in the space provided on the abstract form and must check ONE appropriate discipline box for purposes of technical review.

- Each theme advocate will evaluate abstracts initially only on the basis of topical relevance; eliminated abstracts will be automatically considered as volunteered papers (if desired by the author).
- All abstracts will be evaluated by three appropriate JTPC reviewers in the ONE discipline for which they are submitted; a fourth review will be provided by the theme advocate.
- During the August 17–18 meeting, the designated JTPC representative (in consultation with the theme advocate) will organize theme sessions from the abstracts approved for presentation.

Discipline Session Procedure

To submit an abstract for consideration for a discipline session, the author simply checks the appropriate discipline box for purposes of technical review.

- All such abstracts will be evaluated by three appropriate JTPC reviewers in the discipline for which they are submitted.
- During the August 17–18 meeting, the appropriate JTPC representatives will organize technical sessions from the abstracts approved for presentation.

Presentation Modes

Papers may be presented in either oral or poster mode:

Oral Presentation Mode. The normal length of an oral presentation is 15 minutes, including time for discussion. Projection equipment consists of TWO 35-mm (2" × 2" slide) projectors, one overhead projector, and two screens.

Poster Presentation Mode. Approximately 40% of volunteered papers are presented in poster mode. Each poster session speaker is provided with three horizontal, free-standing display boards approximately 8' wide and 4' high. Poster presentations are scheduled in four-hour intervals.

Abstracts Instructions

All abstracts must be submitted on the 1989 abstract form, available from the Abstracts Coordinator at GSA headquarters, from the conveners of symposia, and from the geoscience departments of most colleges and universities. The abstract form will be used as camera-ready copy for publication in *Abstracts with Programs*.

Senior authors will be charged a \$15 fee if retyping is necessary, and there will be no opportunity for authors to review or revise typed abstracts after they are submitted. Note: No more than one abstract from any person as sole or senior author will be accepted for publication and, due to scheduling difficulties, no author may present more than one volunteered paper. These restrictions do not apply to symposia, but they do apply to theme sessions.

1989 Technical Program Chairmen

Robert F. Dymek
Dept. of Earth & Planetary Sciences
Washington University
St. Louis, MO 63130
(314) 889-5344

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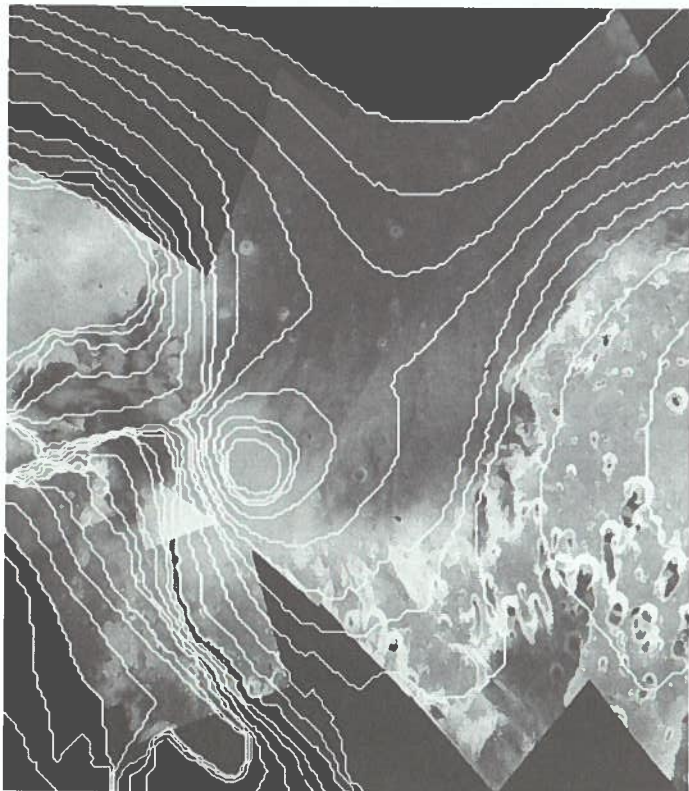
SYMPOSIA

Symposia consist of invited papers unless marked with an asterisk (*), which indicates an **open symposium**. Convener contact information is given for the open symposia only. The symposium schedule will be finalized in August, but a preliminary schedule will be available by May 15. Please call the GSA Meetings Department for information.

- S1. **Geoscience Research and Public Policy.** 1989 Annual Meeting Committee Frontiers Symposium. Brian J. Mitchell, St. Louis University.
- S2. **Cenozoic Deep-Sea Foraminifera: Distribution and Environments.** Cushman Foundation. Kenneth G. Miller, Rutgers University.
- S3. **Molecular Approaches to Paleoclimatic and Paleoenvironmental Reconstruction.** Geochemical Society—Organic Chemistry Division. Simon C. Brassell, Stanford University.
- S4. **Frontiers in Geoscience Information.** Geoscience Information Society. Mary B. Ansari, University of Nevada—Reno.
- S5. **Application of Modern Powder Diffraction Techniques to Problems in Mineralogy and Geology.** Mineralogical Society of America. Larry W. Finger, Geophysical Laboratory.
- S6. **Remote Sensing and Geographic Information Systems: Techniques on the Frontier of Change.** National Association of Geology Teachers. Richard C. Stenstrom, Beloit College.
- S7. **Radiations and Recoveries from Mass Extinctions.** Paleontological Society. Thor A. Hansen, Western Washington University.
- S8. **Potential for Olympic Dam-type Cu-Au-U-REE Deposits in the Proterozoic Granite-Rhyolite Terranes, Midcontinent, USA.** Society of Economic Geologists. Geza K. Kisvarsanyi, University of Missouri—Rolla.
- S9. **Mississippi Valley-type Deposits.** Society of Economic Geologists. Raymond M. Coveney, University of Missouri—Kansas City.
- S10. **Becker and Van Hise's Challenges: Geology and Geophysics Since 1904.** History of Geology Division. Clifford M. Nelson, USGS, Reston.
- S11. **Geological Exploration of the Solar System: Past, Present, and Future.** Planetary Geology Division. Ronald Greeley, Arizona State University.
- S12. **The Legacy of T. C. Chamberlin.** Quaternary Geology and Geomorphology Division. Allan F. Schneider, University of Wisconsin—Parkside.



- *S13. **Implications for the Geological Sciences from Recent Developments in Geochemical Techniques and Instrumentation.** Geochemical Society. J. Michael Rhodes, Dept. of Geology & Geography, University of Massachusetts, Amherst, MA 01003, (413) 545-2841; Alan Zindler, Lamont-Doherty Geological Observatory.
- *S14. **Sigma Gamma Epsilon Research Symposium.** Sigma Gamma Epsilon. Austin A. Sartin, Sigma Gamma Epsilon, Dept. of Geology, Centenary College, P.O. Box 41188, Shreveport, LA 71134-1188, (318) 869-5234; Charles Mankin, Sigma Gamma Epsilon.
- *S15. **Geological Controls on the Regional Distribution of Archaeological Sites.** Archaeological Geology Division. Robert M. Thorson, Dept. of Geology & Geophysics, University of Connecticut, Storrs, CT 06269, (203) 486-4434.
- *S16. **Modern and Ancient Environments of Coal Formation.** Coal Geology Division. James C. Cobb, Kentucky Geological Survey, University of Kentucky, 228 Mining and Mineral Resources Building, Lexington, KY 40506-0107, (606) 257-5500; C. Blaine Cecil, USGS, Reston.
- *S17. **Site Characterization for Conditions of Non-Darcian Flow.** Engineering Geology and Hydrogeology Divisions. Jeffrey R. Keaton, Sergent, Hauskins & Beckwith, 4030 South 500 West, Suite 90, Salt Lake City, UT 84123, (801) 266-0720; John F. Harsh, Roy F. Weston, Inc., West Chester, PA 19380.
- *S18. **Intraplate Seismicity and Deformation: Geological and Geophysical Constraints.** Geophysics Division. William V. Stauder, Dept. of Earth & Atmospheric Sciences, St. Louis University, 3507 Laclede Ave., St. Louis, MO 63130, (314) 658-3131; Archibald C. Johnson, Memphis State University.
- *S19. **Rates and Duration of Deformational Processes and Orogenic Events.** Structural Geology and Tectonics Division. Gregory A. Davis, Dept. of Geological Sciences, University of Southern California, Los Angeles, CA 90089-0740, (213) 743-6126; Randall R. Parrish, Geological Survey of Canada; Robert J. Twiss, University of California.



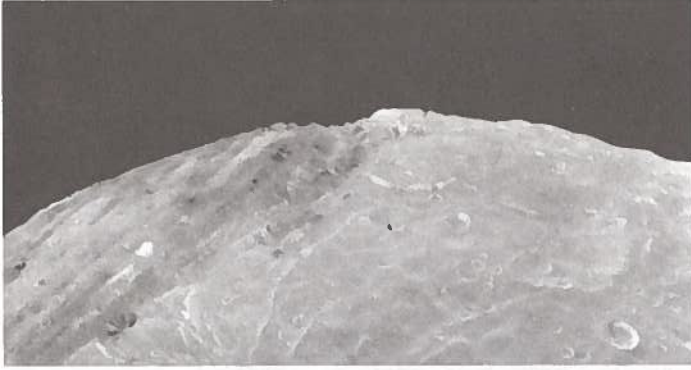
Digital mosaic of Viking Orbiter images of Mars acquired using a red filter. Contours represent elevations. Broad dark region is a basin, Utopia Planitia.

Courtesy of Washington University

THEME SESSIONS

Theme titles and focus are described below. Up to three disciplines to which the abstract may be submitted follow each description. The discipline number is a reference to the abstract form. Authors will select ONE of the disciplines. This will be the review category. **Theme abstracts must include the theme number (T1, T4, T20 . . .), the first five key words of the theme title, and ONE discipline.** Schedules for theme sessions will be provided after the JTPC meeting in August.

- T1. **Geological Mapping in the Next Several Decades.** New technologies are becoming available to facilitate geological mapping efforts, including advanced remote sensing and positional systems, as well as digital methods of data compilation and publication. Contributions are solicited from geoscientists having a broad overview of the importance of geological maps and mapping, and from individuals who are cognizant of new technologies that are being—or will be—brought to bear on facilitating geological mapping, together with archive and distribution processes. *Geoscience Information (11), Planetary Geology (25), Remote Sensing (28).*
- T2. **The Effects of Man on the Mississippi River and Its Delta.** From headwaters to delta, the ecosystem of the Mississippi has been modified extensively. Man has caused channel and floodplain changes, influenced sediment regimes, hydrology, chemistry, biota, and water quality. A system-wide model of the river is needed that incorporates information from diverse disciplines such as geography, civil engineering, geochemistry, biology, and statistics. Contributors are asked to address the dynamics of this system and its adjustments to the hand of man. They are encouraged to include predictions of future impacts and ways of dealing with them. *Engineering Geology (4), Environmental Geology (5), Geomorphology (9).*
- T3. **Correlation and Basin Analysis of Nonfossiliferous Sedimentary Rocks.** Many Precambrian orogenic belts and intracratonic and marginal basins contain thick sequences of nonfossiliferous sedimentary rocks. Correlation of strata both within and between individual orogenic belts and basins is problematic, especially in areas subjected to metamorphism, but essential for understanding the evolution of Precambrian shields. Contributions are solicited that discuss new methods of correlation in such terranes, including examples from physical stratigraphy and sedimentology, as well as applications of petrological, geochemical, and isotopic techniques. *Geochemistry (7), Precambrian Geology (26), Stratigraphy (30).*
- T4. **Magma Currents, Melt Migration, and Geochemical Transport in Mafic Igneous Complexes.** Our understanding of how mineralogical and compositional variations develop in mafic igneous complexes is undergoing rapid change. The traditional view of simple crystal accumulation is no longer adequate, and the importance of thermochemical diffusion processes in magma chambers is being emphasized. Contributions are solicited that present new results of field and laboratory studies, and theoretical treatments that might guide directions of future research, including the significance of hydrothermal processes in platinum-group element mineralization. *Economic Geology (3), Geochemistry (7), Petrology, Igneous (22).*
- T5. **The Effects of Greenhouse Warming on North American Deserts: Holocene Analogues.** At present rates of increase, the concentration of atmospheric CO₂ will double within the next century. Computer models have been used to predict the climatic effects of increased CO₂, but an alternative—and possibly preferable—way to predict the effects of greenhouse warming on natural systems is through study of past intervals when temperatures were higher than today. Contributions are solicited that explore the potential effects of increased temperature on biotic, fluvial, and aeolian systems, using



Voyager 2 image of Miranda, a satellite of Uranus. The various terrains may be a consequence of reaccrusion of darker silicate material after the break-up of proto-Miranda.

Courtesy of NASA

warm periods of the Holocene as analogues. Environmental Geology (5), Quaternary Geology (27).

T6. Trace Element and Isotopic Studies with the Ion Microprobe. Trace element and isotopic analyses that take advantage of the sensitivity and spatial resolution of secondary ion mass spectrometry (SIMS) are having an increasingly greater impact in a wide range of geoscience subdisciplines. Contributions are solicited that present applications of SIMS techniques to terrestrial and extraterrestrial materials. Geochemistry (7).

T7. Sub-Mediterranean "Giant Salt" as a Deep-Water Brine Precipitate: An Alternative to the Evaporite Hypothesis. Although the model for the "giant salt" as an *evaporite* (created by complete evaporation) has achieved considerable scientific currency, this deposit might actually be a *precipitate* that accumulated beneath a deep-water, semi-isolated brine basin. The Dead Sea, where a 4-cm-thick halite precipitate settled out between 1973 and 1975, may be a useful actualistic model. Contributions are solicited that address this alternative hypothesis, including those that establish criteria which distinguish between true evaporites and deposits representing precipitates. Geochemistry (7), Petrology, Sedimentary (24), Sedimentology (29).

T8. Quantitative Structural Geology: The Nature, Mechanism, and Implications of Natural Deformation. Interpretations of finite strains, incremental strains, and kinematic indicators are reaching a stage where rigorous quantitative constraints can be placed on the nature of mountain building, faulting, and the evolution of shear zones. Contributions are solicited that consider quantification of strain measurements; microstructural and model studies of deformation mechanisms and mineral microstructures; interpretation and model studies of kinematic indicators; analogue studies of deformation; and application of these studies to orogenic belts and fault zones. Mineralogy/Crystallography (17), Structural Geology (31), Tectonics/Geophysics (33).

T9. The First Half of Earth History. Studies of ancient rocks reveal the presence of highly evolved continental crust from the oldest times preserved in the geologic record. It appears that the processes leading to continent formation have changed little in the past 3.8 billion years, although rates and scales may have, due to the declining thermal budget of Earth. Contributions are solicited that provide geological, petrological, geochemical, and isotopic tests of current models contending that major differences in composition, areal extent, and tectonic style distinguish Archean from post-Archean crustal terranes. Precambrian Geology (26).

T10. Seismic Tomography and Mantle Dynamics. Recent advances in our ability to image velocity variations deep within the Earth have implications for several areas outside of seismology, including petrology and geochemistry, mineral physics, tectonophysics, gravity, geomagnetism, and geodesy.

Perhaps the most important immediate contribution of seismic imaging techniques is the determination of the scale of mantle convection. In addition to contributions of a purely seismological nature, papers are solicited that discuss mantle convection and physical and chemical properties in the vicinity of the core-mantle boundary. Geochemistry (7), Geophysics (10), Tectonics/Geophysics (33).

T11. Global Sedimentary Geology. There is an increasing interest in global-scale aspects of sedimentary geology, from both societal and scientific viewpoints. Among these are the Global Change Program, the greenhouse condition, paleoclimatology, paleoceanography, sequence stratigraphy, global distribution of resources, and paleogeography/biogeography. Contributions are solicited from researchers involved in studying sediments and sedimentary rocks utilizing a global-scale point of view. Oceanography (18), Petrology, Sedimentary (24), Sedimentology (29).

T12. A Growing Crisis in (Geo)Science Education. The substantial nationwide decline in geoscience students—especially undergraduate majors—over the past several years has reached crisis proportions. Contributing factors include the state of pre-college science education, the neglect of science-teacher training in our institutions, the negative public image of science and particularly earth science in the United States, and an overemphasis on research relative to teaching in our degree-granting institutions. Contributions are solicited from individuals who wish to propose realistic improvements in this system. Geology Education (8).

T13. The Lunar Science Frontier: Implications for Earth's Past and Future. Studies of the Moon allow us to better understand important aspects of Earth's earliest history (possible formation of the Moon from debris excavated from proto-Earth; differences in igneous rocks that bear on whether either planet produced magma oceans; the formation of lunar impact basins as an anomaly and not the last manifestation of a continuous flux, etc.). Topics affecting Earth's future include the potential use of lunar resources in space (e.g., construction materials) or on Earth (e.g., ³He in fusion reactors). Contributions are solicited in these areas of lunar science. Geochemistry (7), Petrology, Igneous (22), Planetary Geology (25).

T14. Tectonometamorphism. The study of metamorphic rocks in the context of overall tectonic framework is a key element in deducing how continental crust forms. Contributions are solicited that relate the timing of metamorphism to that of crustal thickening; the mechanism of exhumation of terranes that record high metamorphic pressures at relatively low temperatures; the mechanisms for heat generation and transfer in tectonically thickened crust, including the role of fluids and melts in deformation processes; and distinctions among uplift, exhumation, and erosion. Petrology, Metamorphic (23), Tectonics (32), Tectonics/Geophysics (33).

T15. Continental Dynamics. Continents are affected by processes that are not well accommodated by classic plate-tectonic concepts. Examples include mid-continent rifting, shortening, and vertical displacements; anorogenic magmatism; broadly distributed zones of shear; and vigorous continent collision. These involve a balance between stress and strength, and leave a distinctive accounting of their activity. Contributions are solicited that consider tectonics, magmatism, and possibly



For Meeting Information (303) 447-2020

fluid transport in the continental crust and subcontinental lithosphere pertinent to the above issues. Petrology, Igneous (22), Tectonics (32), Tectonics/Geophysics (33).

- T16. **Volcanism and Climate.** Improved techniques for monitoring volcanological and climatological phenomena have renewed interest in long-suspected links between the two. Contributions are solicited from atmospheric, earth, and ocean scientists which address the following: influence of magmatic volatile content, style of eruption, latitude of volcano and season of eruption on climatic perturbation; stratospheric reactions and rates by which volcanic H₂S and SO₂ are converted into stable sulfuric acid; mechanisms relating stratospheric volcanic aerosols to El Niño–Southern Oscillation behavior. Volcanology (34).
- T17. **Mantle Plumes and Mass Extinctions.** Popular hypotheses that meteoritic/cometary impact caused the Cretaceous–Tertiary (K-T) extinctions remain problematic. Alternative hypotheses have been advanced in which events in Earth's core and lower mantle are linked to increased mantle plume activity and changes in the frequency of geomagnetic reversals, leading ultimately to extinctions. Contributions are solicited that provide a multidisciplinary evaluation of this endogenous model for biological extinctions. Paleontology/Paleobotany (19), Tectonics/Geophysics (33).
- T18. **Geoscience and the Arts.** The arts have historically been influenced by the geosciences, which have provided materials, settings, and inspiration for painting, sculpture, music, and literature. Understanding the relation between art and geology potentially can contribute toward improved methods of geoscience education as well as furthering communication of geoscience to the public. Contributions are therefore solicited that explore past, present, and future interactions of the geosciences and the arts. Geology Education (8).
- T19. **New Concepts in Understanding Fluid-Rock Interactions at High Temperatures: Problems and Solutions.** Significant advances are being made in understanding the interactions of high-temperature fluids with crystalline rocks. Remaining problem areas include diverse approaches to calculating fluid/rock ratios, mechanistic aspects of fluid flow through crystalline rocks, the role of fluids in heat transfer in the crust, and the chemical effects of fluid-rock interaction. Contributions are solicited that address these issues, with the expectation that additional problem areas will be identified and new approaches considered. Geochemistry (7), Petrology, Igneous (22), Petrology, Metamorphic (23).
- T20. **Physical Properties of the Lower Continental Crust.** Information from high-resolution seismic surveys and detailed geochemical analyses reveal the complexity of processes that have taken place in the lower crust, whereas recent advances in instrumentation permit high-quality laboratory measurements of the physical properties of lower crustal rocks. Contributions are solicited that will integrate observations from diverse disciplines as a guide to our current understanding of the lower crust and that will evaluate new interdisciplinary approaches to mapping local and regional variations in lower crustal properties. Geophysics (10), Tectonics/Geophysics (33).
- T21. **Frontiers of Fluid-Inclusion Research.** Fluid inclusions correspond to trapped samples of the fluid phase present at some stage during igneous crystallization, metamorphism, ore formation, diagenesis, etc. As such, studies of fluid inclusions have wide applications to several important problems in petrogenesis. Contributions are solicited from researchers investigating natural occurrences of fluid inclusions. Presentations that consider new techniques in fluid-inclusion analysis, experimental phase equilibria of fluids, and nontraditional applications of fluid inclusions are especially encouraged. Geochemistry (7), Petrology, Experimental (21).



Precambrian diabase dike cutting older granite, Silver Mine State Park in southeast Missouri.

Courtesy of St. Louis University

- T22. **Application of Artificial Intelligence, Expert System, or Knowledge-Based System Methods in Geological Sciences.** Geological research has taken advantage of new advances in computer science and computing technology. Artificial intelligence (AI) research is one such technology that has gained maturity in recent years. AI techniques aid in both quantitative and qualitative situations where data are insufficient, evidence conflicts, or only partial information is available. These systems are capable of capturing the knowledge of experts and delivering it to nonexperts. Contributions are solicited that convey the usefulness of AI and related methods to solving geological problems. Other—Mathematical and Computer Geoscience (35).
- T23. **Determining the Relative Timing of Pluton Emplacement and Regional Deformation.** Many orogenic belts evolve through series of regional events of deformation, metamorphism, and pluton emplacement, so pre-tectonic, syntectonic, and post-tectonic plutons may be juxtaposed. In order to decipher the relative timing of such complex events, it is necessary to distinguish fabrics within plutons that are primary (developed during igneous crystallization) from those that are secondary (imposed by later deformation). Contributions are solicited that will evaluate criteria used to establish timing of pluton emplacement, address the behavior of plutons during subsequent deformation, and generally examine the use of plutons in establishing the ages of regional deformation and metamorphism in their wall rocks. Petrology, Igneous (22), Structural Geology (31), Tectonics/Geophysics (33).
- T24. **Geomorphic Processes and Landform Evolution.** Significant progress has been made in field, flume, and theoretical

studies of surficial processes, which relate these processes to landscape development. Such processes are complex, and modern processes are not necessarily responsible for current landforms. In addition, climatic change can affect our ability to extrapolate to the past from recent measurements. Contributions are solicited that formulate the study of processes within the larger framework of landform evolution and consider how to extend small-scale process studies to larger scales by using digital data bases. *Geomorphology* (9), *Hydrogeology* (14), *Remote Sensing* (28).

- T25. Late Eocene-Oligocene Climatic and Biotic Evolution.** The late Eocene and Oligocene were periods of dramatic climatic and biotic change; the tropical world of the Mesozoic was replaced by the modern, cool-temperate glacial world. New data about Antarctic glaciation, oceanic changes, and faunal/floral changes in both marine and terrestrial environments are now emerging. Contributions are solicited from the disciplines of paleontology, climatology, stratigraphy, and geochemistry that document the nature of change during the late Eocene-Oligocene, which will lead to a better understanding of this time interval. *Marine Geology* (15), *Paleontology/Paleobotany* (19), *Stratigraphy* (30).
- T26. Hydrothermal Organic Geochemistry.** Organic compounds are known to occur in Earth's crust at much higher temperatures than previously thought possible. Studies involving minerals and fluids can no longer be considered complete if the organic compounds are ignored. Contributions are solicited on organic compounds in sedimentary basin brines and basinal sources of petroleum, geothermal and submarine hydrothermal systems, and hydrothermal ore deposits, as well as experimental and theoretical methods establishing thermodynamic/kinetic properties of aqueous organic species at high temperatures and pressures. *Geochemistry* (7).
- T27. Cretaceous Record of the Eastern Margin of the Western Interior Seaway.** Cretaceous rocks along the eastern margin of the Western Interior Seaway (WIS) record global eustatic cycles; early "Vail curves" were calibrated in this area. In Minnesota, Iowa, Nebraska, and North and South Dakota, the Cretaceous thins and onlaps older rocks. Thickness and facies changes document marginal marine environments not commonly found in other parts of the WIS which also have an expression in geochemical and paleontological data. Contributions are solicited that document the extensive record of Cretaceous transgression, progradation, and paleotectonics in this region. *Paleontology/Paleobotany* (19), *Sedimentology* (29), *Stratigraphy* (30).
- T28. Hydrogeologic Challenges for the Next Decade.** Contributions are solicited that will describe likely scenarios for the thrust of hydrogeologic research endeavors for the next 10 years. In addition to policy statements and administrative outlooks, topics for consideration include problem areas such as radioactive-waste mismanagement, integrity of the domestic water supply, and the overall role of subsurface water (e.g., petroleum migration, ore deposition, crustal failure). *Hydrogeology* (14).
- T29. Thermal and Hydrologic Evolution of Accretionary Prisms: Modern and Ancient Examples.** Accretionary prisms provide a "natural experiment" illustrating how fluids affect the mechanical behavior of the sediment and rock during deformation. Contributions are solicited that address sea-floor manifestations of fluid flow; models for the dynamics and geometries of the flow regime; thermal structure; fluid chemistry and chemical evolution; diagenesis and metamorphism of inorganic phases; relations between fluids and the physical properties of rock and sediment bodies; and effects of fluids on geologic structures and the processes of deformation. *Geochemistry* (7), *Marine Geology* (15), *Tectonics* (32).

- T30. Origin of Brines in Earth's Crust.** The origin and chemistry of brines in Earth's crust have broad implications for sedimentary diagenesis, evaporite deposition and chemistry, ore and metamorphic petrology, and crust-sediment chemical exchange. Contributions are solicited that will address the origin of saline crustal fluids using recent advances in hydrodynamic modeling, integrated chemical and isotopic studies of brine compositions, chemical and isotopic studies of diagenetic mineral phases, fluid inclusions as examples of trapped brines, and the chemistry and mineralogy of associated evaporites. *Geochemistry* (7), *Hydrogeology* (14), *Petrology, Sedimentary* (24).
- T31. Geologic Causes of Natural Radionuclide Anomalies.** As a result of increased environmental concerns, including heightened public awareness of the hazards of radon, more research is being carried out on the causes and distribution of natural radionuclide anomalies. A knowledge of geologic factors affecting the distribution of natural radionuclides is the first step in risk assessment in any particular geographical region. Radionuclide distribution also has implications for mineral exploration. Contributions are solicited that relate to evaluation of radionuclide distribution within the present context. *Environmental Geology* (5), *Geochemistry* (7).
- T32. Rock-Water Interactions in Carbonate Rocks and Sediments.** The main purpose of this session, which has the formal endorsement of GSA's Sedimentary Geology Division, is to bring together researchers engaged in active study of rock-water interactions in carbonates. Contributions are solicited that include investigations of modern or ancient, marine or meteoric, and shelf or pelagic sediments and sedimentary rocks. *Petrology, Sedimentary* (24), *Sedimentology* (29), *Geochemistry* (7).

FIELD TRIPS

St. Louis, the Gateway City, provides an ideal starting place for field trips to see many aspects of U.S. midcontinent geology. The trips summarized below are coordinated, where possible, with the technical program to offer an opportunity to visit areas that are subjects of discussion at symposia and in targeted sessions.

Several trips will visit areas far from the Midwest, where the meeting theme "Frontiers in Geoscience" presents compelling opportunities to see significant geologic terranes.

All trips begin and end in St. Louis unless otherwise noted. Costs are preliminary estimates. Registration forms will appear in the August issue of *GSA News & Information*. Preregistration is suggested because attendance is limited and will be determined on a first-come, first-served basis. **Preregistration deadline is October 6.**

For further information, contact the 1989 Field Trip Chairman, Jerry D. Vineyard, Division of Geology and Land Survey, P.O. Box 250, Rolla, MO 65401-0250, (314) 364-1752, or the individual trip leaders.



PREMEETING

Engineering and Environmental Geology of the St. Louis Area, Missouri. Mimi Garstang, Missouri Division of Geology and Land Survey, P.O. Box 250, Rolla, MO 65401-0250, (314) 364-1752; David Hoffman, Peter Price, Michael J. Navin. November 5. Cost: \$40.

Archaeological Geology and Geomorphology in the Central Mississippi-Lower Illinois Valley Region, Illinois and Missouri. Edwin R. Hajic, Dept. of Geology, University of Illinois, Urbana, IL 61801, (217) 333-4389; Russell W. Graham, Michael D. Wiant. November 5. Cost: \$40.

Late Pennsylvanian and Early Permian Cycle Sedimentation, Paleogeography, Paleogeology, and Biostratigraphy in Kansas and Nebraska. Roger K. Pabian, Conservation and Survey Division, University of Nebraska, Lincoln, NE 68588-0517, (402) 472-3471; Robert F. Diffendal, Jr., Lynn Watney, Philip H. Heckel, Ron West, Royal H. Mapes, J. A. Fagerstrom. November 3-5. Trip begins and ends in Kansas City, Missouri. Cost: \$350.

Depositional Environments and Geology of Coals of the Lower Pennsylvanian of the Western Part of the Appalachian Basin and the Eastern Part of the Illinois Basin in Kentucky, Indiana, and Illinois. James C. Cobb, Kentucky Geological Survey, Mining and Mineral Resources Building, University of Kentucky, Lexington, KY 40506-0107, (606) 257-5500; Donald R. Chestnut, Stephen F. Greb, John Nelson, Joe Devera, C. Pius Weibel, Erik Kvale, Allen Archer. Sponsored by the Coal Geology Division. November 3-5. Trip begins in Lexington, Kentucky. Cost: \$300.

Geology of the Proposed Nuclear Waste Repository at Yucca Mountain, Nevada, and Surrounding Area. Steven R. Mattson, Science Applications International Corp., Suite 407, Valley Bank Center, 101 Convention Center Dr., Las Vegas, NV 89109, (702) 794-7615; Bruce M. Crowe, David E. Broxton, William Wilson, Paul P. Orkild. November 3-5. Trip begins and ends in Las Vegas, Nevada. Cost: \$300.

Regional Stratigraphy, Facies, and Paleoenvironments in the Cambrian of Southern Missouri. Vincent E. Kurtz, Southwest Missouri State University, Box 87, 901 S. National, Springfield, MO 65804-0089, (417) 836-5800; James R. Palmer. November 4-5. Cost: \$100.

Surface Effects of the 1811-1812 New Madrid Earthquake Sequence in Seismotectonics of the New Madrid Seismic Zone, Western Tennessee, Northeast Arkansas, and Southeast Missouri. Eugene S. Schweig III, Center for Earthquake Research and Information, Memphis State University, Memphis, TN 38152, (901) 678-2007; Randall W. Jibson. November 3 (evening)-5. Cost: \$100.

Hydrogeology of Shallow Karst Ground-water Systems in Southeastern Missouri. James E. Vandike, Missouri Division of Geology and Land Survey, P.O. Box 250, Rolla, MO 65401-0250, (314) 364-1752; Paul Blanchard, Cynthia Endicott. November 4-5. Cost: \$120.

HALF-DAY MINI-TRIPS (during the meeting)

Digital Cartography, Map Library, and Data Base Management System of Washington University's Department of Earth and Planetary Sciences. Raymond E. Arvidson, Dept. of Earth and Planetary Sciences, Washington University, Campus Box 1169, St. Louis, MO 63130, (314) 889-5610; Clara McCloud. November 8 (morning). Cost: \$10.

Engineering Geology and Industrial Minerals Aspects of the Greater St. Louis-Illinois Area. Paul B. Dumontelle, Illinois State Geological Survey, 615 E. Peabody Dr., Champaign, IL 61820, (217) 333-5114; James W. Baxter, Alan G. Goodfield. November 7 (morning). Cost: \$25.

The Geologic Story of the St. Louis Riverfront (A Walking Tour). Arthur W. Hebrank, Missouri Division of Geology and Land Survey, P.O. Box 250, Rolla, MO 65401-0250, (314) 364-1752. November 6 (morning). Cost: \$2.

Aerospace Center, U.S. Defense Mapping Agency. Ron Blouse, U.S. Defense Mapping Agency, Aerospace Center, DSGA, St. Louis AFS, MO 63118-3399, (314) 263-8410. November 7 (morning). Cost: \$8.

POSTMEETING

Transition from Passive Margin to Foreland Basin Sedimentation: The Atoka Formation of the Arkoma Basin, Arkansas and Oklahoma. David W. Houseknecht, Dept. of Geology, University of Missouri, Columbia, MO 65211, (314) 882-6285; Marvin O. Woods. November 10-12. Trip ends in Tulsa, Oklahoma. Cost: \$300.

Quaternary Loess and Glacial Record of Southwestern Illinois. Leon R. Follmer, Illinois Geological Survey, 615 E. Peabody Dr., Champaign, IL 61820, (217) 244-6945; E. D. McKay III, Edwin R. Hajic. November 10. Cost: \$30.

Cyclic Strata of the Late Pennsylvanian Outlier, East-Central Illinois. C. Pius Weibel, Illinois Geological Survey, 615 E. Peabody Dr., Champaign, IL 61802, (217) 244-2493; R. L. Langenheim, Jr. November 10-11. Cost: \$100.

Economic Geology of the Complexly Deformed Cambrian-Mississippian Strata of the Ouachita Mountains, Central Arkansas. J. Michael Howard, Arkansas Geological Commission, 3815 W. Roosevelt Rd., Little Rock, AR 72204, (501) 371-1488; Benjamin F. Clardy, Charles G. Stone. November 10-11. Trip begins and ends in Little Rock, Arkansas. Cost: \$90.

SEG-SPONSORED FIELD TRIPS

Precambrian Ore Deposits and Geology of Volcanic and Plutonic Rocks in the Southern St. Francois Mountains, Missouri. V. Max Brown, Dept. of Geology, University of Toledo, 2801 W. Bancroft St., Toledo, OH 43606, (419) 537-2009; Eva B. Kisvarsanyi, Richard D. Hagni. November 2-4. Cost: \$350.

Mississippi Valley-Type Mineralization of the Viburnum Trend, Missouri. Richard D. Hagni, Dept. of Geology, 125 McNutt Hall, University of Missouri, Rolla, MO 65401, (314) 341-4657; Raymond M. Coveney, Jr. November 9 (evening)-11. Cost: \$150.

PROFESSIONAL HORIZONS GSA-SPONSORED SHORT COURSES/ FORUM

For more information on any of the courses listed below, contact Edna Collis, Course Registrar, GSA headquarters.

Fees will be approximately \$75-\$100 for the first day, \$50-\$75 for the second day, and \$25-\$50 for the third day. Courses will be held in St. Louis, Missouri. *Actual fees, course details, and registration information will be published in the May issue of GSA News & Information.*

Contaminant Hydrogeology: Practical Monitoring, Protection, and Cleanup. November 4-5. Christopher M. Palmer, Jeffrey L. Peterson, Gettler-Ryan, Inc.



Courtesy of St. Louis Convention & Visitors Commission

NON-GSA-SPONSORED SHORT COURSES/ WORKSHOPS/FORUM

Advanced Powder Diffraction Techniques Short Course.

November 4-5, 8 a.m. to 5 p.m. Precourse reception on Friday evening, November 3. Sponsored by the Mineralogical Society of America. For information: MSA Business Office, 1625 I Street, N.W., Suite 414, Washington, DC 20006, (202) 775-4344.

The Age of Dinosaurs Short Course. November 5, 8:15 a.m. to 5:30 p.m. Cosponsored by the National Association of Geology Teachers, the Paleontological Society, and the Society of Vertebrate Paleontology. For information: K. Padian, Museum of Paleontology, University of California, Berkeley, CA 94720, (415) 642-7434.

GeoRef Beginners Workshop. November 7, 8 to 11 a.m. Sponsored by the Geoscience Information Society and GeoRef. For information: Phil Stoffer, University of Kentucky, Geological Sciences Library, 100 Bowman Hall, Lexington, KY 40506, (606) 257-8359.

GIS Geological Field Trip Workshop. November 7, 1:30 to 3:30 p.m. Sponsored by the Geoscience Information Society. For information: Claren M. Kidd, Geology Library, University of Oklahoma, 830 Van Vleet Oval, Room 103, Norman, OK 73019, (405) 325-6217.

GeoRef Advanced Workshop. November 8, 1:30 to 4:30 p.m. Sponsored by the Geoscience Information Society and GeoRef. For information: Margy Walsh, Texaco E & P Technology Division, P.O. Box 770070, Houston, TX 77215-0070, (713) 954-6000, ext. 6630.

GIS Database Forum. November 9, 9 to 11 a.m. Sponsored by the Geoscience Information Society. For information: Jim O'Donnell, Geology Library 170-25, California Institute of Technology, Pasadena, CA 91125, (818) 356-2199.

EXHIBITS

A 235-booth exhibit will be open from Sunday, November 5, through Wednesday, November 8, in Cervantes Convention Center, Hall C. Exhibitors will be on hand to display and demonstrate computer hardware and software, X-ray diffraction and measurement equipment, powder diffraction equipment, camera equipment, isotope ratio mass spectrometers, microanalysis equipment, publications, maps, mineral and fossil specimens, gems, jewelry, field supplies, and camping equipment. Many universities and educational organizations will have booths as well.

GSA welcomes those exhibitors who return to the exhibit hall each year. Their combined efforts have made the exhibits what they are today—a success. GSA also encourages participation by innovative companies, universities, and organizations with products and services appealing to geologists. If you are interested in participating or want to see a particular exhibitor in St. Louis, please contact Kathy Ohmie-Lynch, Exhibits Manager, GSA headquarters.

Creating Geological Applications with Macintosh HyperCard.

November 4-5. Cosponsored by the National Association of Geology Teachers. H. Robert Burger, Smith College.

Current Aspects of Basin Analysis and Sedimentary Geology:

A Two-Day Overview. November 4-5. Cosponsored by the Sedimentary Geology Division. George deV. Klein, University of Illinois at Urbana-Champaign.

*** Fission-Track Analysis: Theory and Applications.** November 4-5.

Kevin D. Crowley, Miami University at Oxford, Ohio; Charles W. Naeser, Nancy D. Naeser, USGS, Denver.

Geological Considerations in Hazardous-Waste Site

Characterization. November 4-5. John D. Rockaway, Allen W. Hatheway, University of Missouri; Gregory L. Hempen, U.S. Army Engineer District, St. Louis; Charles O. Riggs, Sverdrup Corporation; Christopher R. Ryan, Geo-Con, Inc.

Planning Hydrologic and Geologic Investigations and Reports.

November 4-5. Cosponsored by the Hydrogeology Division. John E. Moore, USGS, Reston; Terry L. Steinborn, Dames and Moore.

Quantitative Interpretation of Joints and Faults. November 4-5.

Cosponsored by the Structural Geology and Tectonics Division. Terry Engelder, Pennsylvania State University; Richard W. Allmendinger, Cornell University; Atilla Aydin, Purdue University; David D. Pollard, Stanford University.

Fabric of Cements in Paleozoic Limestones. November 5.

Cosponsored by the Sedimentary Geology Division. Kenneth R. Walker, James L. Foreman, D. Mark Steinhaff, Keith E. Roberson, University of Tennessee; Stephen O. Moshier, University of Kentucky; D. Gregory Jernigan, Oak Ridge National Laboratory; Robert E. Johnson, Resource Applications, Inc.; Lawrence J. Weber, Jr., Mobil Oil Production Company.

Glaciotectonic Structures and Landforms. November 5.

Cosponsored by the Quaternary Geology and Geomorphology Division. James S. Aber, Emporia State University.

*** Quaternary Climates: The Ocean Sedimentary Record.**

November 5. David K. Rea, University of Michigan; Margaret Leinen, University of Rhode Island.

*** Courses featured as part of the 1989 theme, Frontiers in Geoscience.**

FORUM

Geology and Public Policy Forum: Geology and Sustainable

Agriculture. Tuesday, November 7, 5 to 7:30 p.m. For information: Meetings Department, GSA headquarters.



For Meeting Information (303) 447-2020

EMPLOYMENT SERVICE

GSA will again be offering its employment interview service. At last year's meeting in Denver, 50 employers scheduled interviews with more than 300 applicants seeking employment.

As in the past, booths will be provided for employers to interview applicants registered with the service, and GSA staff will be available to assist in scheduling interviews.

See the March issue of *GSA News & Information* for forms and further information, or contact T. Michael Moreland, Employment Service Manager, GSA headquarters.

GUEST PROGRAM

Meet us in St. Louis! There is plenty to do and see in the city of the 1904 World's Fair. The Guest Committee is busy preparing for you to see and enjoy what we have to offer in St. Louis: the mighty Mississippi River, the Gateway Arch, fashionable Central West End, historical downtown, Forest Park with its art museum, zoo, golf courses, jogging and bicycling trails, and tennis courts, the Missouri Botanical Garden offering world-class gardens, eclectic and unusual shops in Union Station, and much more. So come meet us in St. Louis—let us show you a good time in the "Show Me" state. More details and registration for tours will be published in the August issue of *GSA News & Information*.

HIGHLIGHTS

The **St. Louis Welcoming Party** will be on Sunday evening, November 5, 6 to 9 p.m. in Cervantes Convention Center in conjunction with the opening of the 1989 exhibits. Exhibitors will be hosting the reception, which will also feature Dixieland and blues music.

1989 Photography Salon will be a juried show open to all geologists. Black-and-white and color entries will be accepted in both science and nonscience categories. Entry guidelines will be available in the May and June issues of *GSA News & Information* or from the Meetings Department, GSA headquarters.

Geoscience Research and Public Policy: 1989 Annual Meeting Committee Symposium. On Monday afternoon, a special session organized by the St. Louis local committee will be convened by General Chairman Brian Mitchell. The session will be held concurrently with other sessions, and will focus on the funding of the geosciences for the future. This symposium will explore the nature of government priorities and policies in science over the next decade. Because these priorities and policies are likely to be different at the end of the next decade, this symposium should be of broad interest to all researchers in the geosciences.

Alumni Receptions will offer a chance to meet friends on Monday evening, 7 to 9 p.m., at the Adam's Mark Hotel, pride of St. Louis. If you would like to schedule an alumni function, get in touch with your department chairman or contact Vanessa George, GSA headquarters.

Blues Cruise on the Mississippi River, Wednesday evening, will be an informal event featuring current styles of the music St. Louis is famous for. Aboard an old-time riverboat, hear local musicians combine elements of jazz, blues, and rhythm and blues for a fun and funky, down and dirty, low-budget affair.

Geo-Videos. Do you have an innovative, high-quality audio-visual presentation that would be of interest to geologists? If it is in either 35-mm, video, or slide format, we would be interested in having it as part of the Science Theater program. We need to know the basics: your name, address, phone, program content, type of format, running time, and type of audience. Contact Guy Smith, Dept. of Earth and Atmospheric Sciences, St. Louis University, St. Louis, MO 63156, (314) 658-3128. By June 30, please.

Geo-Run. Train now for one of GSA's most spectacular runs. Wednesday morning, November 8, when the sun rises over the Mississippi, the 5K/10K Fun Run will cover the pathways surrounding the Gateway Arch.

TRAVEL AND LODGING

TRANSPORTATION

The major carrier into St. Louis is TWA. Advance bookings are the best route to lowest fares, so check with your travel agent now or call GSA's official travel agent, Cain Travel Group, at 1-800-346-4747. In Colorado call 1-303-443-2246. Cain has negotiated discounted rates through several carriers. Please use caution regarding change and cancellation penalties that accompany low-fare tickets. An official rental car agency will be announced in the August issue of *GSA News & Information*.

ACCOMMODATIONS

GSA has selected seven official downtown hotels, which will offer special convention rates. A block of 750 rooms is reserved at the Adam's Mark hotel, which, as headquarters, will host most of our social and business events. Other participating hotels include Clarion, Days Inn, Holiday Inn Riverfront, Marriott, Radisson (to become the Holiday Inn Convention Center), and Sheraton.

The technical program, registration, and exhibits will be at Cervantes Convention Center. All hotels are within walking distance, although GSA will provide a convenient free shuttle.

The technical program schedule, hotel information and reservation form, and meeting registration form will be published in the August issue of *GSA News & Information*.

MISSOURI INFORMATION

Abundant information and friendly service are available at the following contact numbers:

Missouri Division of Tourism
P.O. Box 1055
Jefferson City, MO 65102
1-314-751-4133

St. Louis Convention & Visitors Commission
10 S. Broadway, Suite 300
St. Louis, MO 63102
1-800-247-9791





Rummaging through the Mailbag

As the recipient of contributions from the GSA membership, the Foundation office receives a large quantity of mail in the course of a year. Along with the checks, pledges, and requests for information, we receive interesting comments from members, a few of which we would like to share with *News & Information* readers.

Donors to the Foundation, January 1989

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From Page Twiss, secretary-treasurer of the South-Central Section, in requesting reimbursement of the Foundation's portion of matching student travel grants:

"From the enthusiastic response from the awardees and from members of the section this program was a great success and one which we hope can be continued in the future. Ike Smith, general chair of the sectional meetings, is in the process of awarding another \$4,000.00 for travel expenses to students who are presenting papers in March."

From John P. Lockwood, of the USGS Hawaiian Volcano Observatory, with his contribution to Century Challenge:

"Please tilt your (research) support towards classical geology—MAPPING . . . too many geologists don't know much about the field environment—where the buck stops! Aloha."

From Nathaniel M. Sage, Jr., responding to a sample geologic time scale bookmark we had sent, and writing from Scotland on a postcard showing the St. Andrews golf course and the *Chariots of Fire* beach:

"Thanks for your reply of 1/27. The enclosed was very much what I had in mind, and I thank you. Old Course at St. A. not much geologically, but Carboniferous of local terrane is super,

(continued on p. 100)

GSA Foundation
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Foundation News (continued from p. 99)

and of course a lot of fun." (This must be what John Lockwood meant about getting to know the field environment. The buck stops on the 18th green. Tough work, but someone has to do it.—RLF)

Finally, these provocative and challenging thoughts from William A. Hackett, assistant professor of geology at Idaho State University:

"I am still a relatively young scientist; I finished my doctoral studies in 1985, earned tenure this year, and have been doing major, externally funded research only for the past few years. I feel as though I am just beginning to 'settle in' as an educator and geoscientist. The years of scholarly labor are now beginning to bear fruit as I earn a comfortable living, see my publications appearing, and help my students to embark on their own professional careers.

"Only the most arrogant among us could believe that our professional accomplishments occur solely through individual effort and intellect. My success in teaching reflects the exemplary scholars who taught me. I am regularly reminded by the alumni associations of several universities that I bore only a

fraction of the total cost of my education. Someone else paid for the scholarships that put me through graduate school. My research and that of my students has been partially funded by philanthropic organizations, among them the Geological Society of America.

"All of us should try to put something back into the institutions that have fostered our professional development and have improved the quality of our lives: colleges, universities, and professional societies that fund or otherwise encourage research and scholarship.

Clearly, the Geological Society of America Foundation is such an institution. At the Centennial Celebration in Denver, I was impressed by the exhibits and presentations about the history of our Society. I now feel as though I am part of a tradition, and one that has blossomed through the labor and bequests of people who saw themselves as stewards of the Society. I am privileged to add my name to this century-old list, and it is my pleasure to help insure that future geoscientists have similar opportunities as were offered to me. I would invite my fellow geoscientists to do the same: it sure is a good feeling!"

MEETINGS

(Asterisk indicates new or changed information)

1989

Economic Geology and Geotechnics of Active Tectonic Regions, April 3-7, 1989, London, England. Information: Conference Manager, Economic Geology and Geotechnics Conference, Dept. of Geological Sciences, University College, Gower St., London WC1E 6BT, England.

Geological Society of America Southeastern Section Annual Meeting, April 6-7, Atlanta, Georgia. Information: Earl A. Shapiro, Georgia Geologic Survey, 19 MLK Jr. Dr., SW, Atlanta, GA 30334; (404) 656-3214.

South-Central Friends of the Pleistocene, April 7-9, 1989, Central Texas. Information: Stephen A. Hall, Dept. of Geography, University of Texas, Austin, Texas 78712; (512) 471-5116.

Shallow Gas and Leaky Reservoirs, April 10-11, 1989, Stavanger, Norway. Information: Norwegian Petroleum Society, P.O. Box 1897 - Vika, 0124 Oslo 1, Norway; phone 47-2-207025; Telex 77 322 nopet n.

National Fossil Exposition XI, April 14-16, 1989, Macomb, Illinois. Information: Karl A. Stuekerjuergen, Rte. 1, Box 28A, West Point, IA 52656; (319) 837-6690.

Geological Society of America North-Central Section Annual Meeting, April 20-21, 1989, Notre Dame, Indiana. Information: Michael J. Murphy, Dept. of Earth Sciences, University of Notre Dame, Notre Dame, IN 46556; (219) 239-7205.

American Association of Petroleum Geologists Annual Meeting, April 23-26, 1989, San Antonio, Texas. Information: AAPG, P.O. Box 979, Tulsa, OK 74101; (918) 584-2555.

Third Annual Conference on Undergraduate Research, April 27-29, 1989, Trinity University, San Antonio, Texas. Information:

Ann Knoebel, EUREKA, Trinity University, Holt Center, 106 Oakmont, San Antonio, TX 78212.

The Earth: Planet in Transition, University of Michigan Department of Geological Sciences Sesquicentennial Symposium, May 4-5, 1989, Ann Arbor, Michigan. Information: J.C.G. Walker, Dept. Geological Sciences, 1006 C. C. Little Building, University of Michigan, Ann Arbor, MI 48109-1063; (313) 764-2466; Telex 258 869 JCGW UR; GTE mail: JWALKER/KOSMOS/EDUNET.

Geological Society of America Cordilleran and Rocky Mountain Sections Annual Meeting, May 8-10, 1989, Spokane, Washington. Information: Ernest H. Gilmour, Eastern Washington University, Cheney, WA 99004; (509) 359-2406.

American Geophysical Union Spring Meeting, May 8-12, 1989, Baltimore, Maryland. Information: AGU, Convention Director, 2000 Florida Ave., N.W., Washington, DC 20009; (202) 462-6903.

Pacific Sections of American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, Society of Exploration Geophysicists, and Society of Professional Well Log Analysts Annual Meeting, May 10-12, 1989, Palm Springs, California. Information: 1989 AAPG/SEPM/SED/SPWLA Pacific Sections, AAPG Convention Dept., P.O. Box 979, Tulsa, OK 74101-0979.

12th Annual Spring Systematics Symposium, History and Evolution, May 13, 1989, Chicago, Illinois. Information: Kristine L. Bradof, Symposium Coordinator, Dept. of Geology, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605-2496; (312) 922-9410, ext. 298.

(continued on p. 101)

Meetings (continued from p. 100)

Geological Association of Canada-Mineralogical Association of Canada Joint Annual Meeting, May 14-17, 1989, Montreal, Quebec, Canada. Information: Colin Stearn, Rm. 238, 3450 University St., Montreal, Quebec H3A 2A7, Canada; (514) 398-4082.

40th Annual Highway Geology Symposium, May 17-19, 1989, Birmingham, Alabama. Information: Kathy Keller, Alabama Highway Department, Bureau of Materials and Tests, 1409 Coliseum Blvd., Montgomery, AL 36130; (205) 261-5788.

Gold '89 in Europe, May 23-25, 1989, Toulouse, France. Information: F. Tollon, Lab. de Minéralogie, Université Paul Sabatier, 39 Allées Jules Guesde, 31400 Toulouse, France.

Engineering Geology in Tropical Terrains, June 26-29, 1989, Selangor Darul Ehsan, Malaysia. Information: Organising Secretary, Conference on Engineering Geology in Tropical Terrains, Dept. of Geology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor Darul Ehsan, Malaysia.

IGCP Project 257, Mafic Dyke Swarms, Annual Meeting, July 1, 1989, Santa Fe, New Mexico. Information: John W. Geissman, Dept. of Geology, University of New Mexico, Albuquerque, NM 87131; (505) 277-2644 or (505) 277-0887 (lab).

28th International Geological Congress, July 9-19, 1989, Washington, D.C. Information: 28th International Geological Congress, P.O. Box 1001, Herndon, VA 22070-1001; (703) 648-6053; Telex 248418.

***Society for the Preservation of Natural History Collections 4th Annual Meeting**, July 23-28, 1989, Drumheller, Alberta. Information: SPNH Conference Secretary, Tyrrell Museum of Palaeontology, P.O. Box 7500, Drumheller, Alberta T0J 0Y0, Canada; (403) 823-7707.

6th International Symposium on Water-Rock Interaction, August 3-8, 1989, Malvern, England. Information: W. M. Edmunds, Hydrogeology Research Group, British Geological Survey, Wallingford, Oxon OX10 8BB, England; phone (0) 491-38800, ext. 2293; Telex 849365 HYDROL G; Fax (0) 491-32256.

12th Caribbean Geological Conference, August 7-11, 1989, Christiansted, St. Croix, Virgin Islands. Information: Frederick Nagle, 12th Caribbean Geological Conference, c/o Dept. of Geological Sciences, P.O. Box 249176, University of Miami, Coral Gables, FL 33124.

Dunes '89: Geomorphology and Ecology of Desert and Coastal Sand Dunes, August 14-17, 1989, Swakopmund, Namibia. Information: Dunes '89, c/o J. D. Ward, P.O. Box 2168, Windhoek 9000, Namibia.

14th International Cartographic Conference, August 17-24, 1989, Budapest, Hungary. Information: Conference Secretary, Institute of Geodesy, Cartography and Remote Sensing, POB 546, H-1373 Budapest, Hungary.

Second International Research Symposium on Clastic Tidal Deposits, August 22-25, 1989, Calgary, Alberta. Information: Ray Rahmani, Canadian Hunter Exploration Ltd., 435-4th Ave., S.W., Calgary, Alberta T2P 3A8, Canada; (403) 260-1818.

9th International Clay Conference, August 28-September 2, 1989, Strasbourg, France. Information: Hélène Paquet, Inst. de Géologie, 1, rue Blessig, 67084 Strasbourg, France.

Montana Geological Society Centennial Field Conference: Geologic Resources of Montana, August 31-September 3, 1989,

Bozeman, Montana. Information: MGS Field Symposium, P.O. Box 844, Billings, MT 59103; (406) 256-3034.

New Frontiers for Hazardous Waste Management Third International Conference, September 10-13, 1989, Pittsburgh, Pennsylvania. Information: NUS Corporation, Park West Two, Pittsburgh, PA 15275.

3rd International Conference on Palaeoceanography, September 10-16, 1989, Cambridge, England. Information: I. N. McCave or N. J. Shackleton, Dept. of Earth Sciences, University of Cambridge, Downing St., Cambridge CB2 3EQ, England; phone 223-333422/334876.

Focus '89, Nuclear Waste Isolation in the Unsaturated Zone, September 18-21, 1989, Las Vegas, Nevada. Information: D. Burton Slemmons, School of Mines, Center for Neotectonic Studies, University of Nevada, LME 400, Reno, NV 89557-0047.

SIAM Conference on Mathematics of Geophysical Sciences, September 18-21, 1989, Houston, Texas. Information: SIAM Conference Coordinator, 1400 Architects Bldg., 117 S. 17th St., Philadelphia, PA 19103-5052; (215) 564-2929.

14th International Conference of Organic Geochemistry, September 18-22, 1989, Paris, France. Information: Yolande Rondot, Institut Français du Pétrole, BP 311, 92506 Rueil-Malmaison cedex, France; phone 33(1) 47.49.02.14; Telex A 203050 F.

***SIAM Conference on Mathematical and Computational Issues in Geophysical Fluid and Solid Mechanics**, September 25-28, 1989, Houston, Texas. Information: SIAM Conference Coordinator, 117 S. 17th St., 14th Floor, Philadelphia, PA 19103-5052; (215) 564-2929. (Abstracts deadline: April 12, 1989.)

3rd Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, October 1-4, 1989, St. Petersburg, Florida. Information: 3rd Multidisciplinary Conference, Florida Sinkhole Research Institute, University of Central Florida, Orlando, FL 32816. (Abstracts deadline: April 17, 1989.)

Association of Engineering Geologists 32nd Annual Meeting, October 1-6, 1989, Vail, Colorado. Information: Michael W. West, Michael W. West & Associates, Inc., 290 Bank Western Bldg., 8906 West Bowles Ave., Littleton, CO 80123; (303) 972-1537. (Abstracts deadline: May 1, 1989.)

XIII International Geochemical Exploration Symposium and II Brazilian Geochemical Congress, October 1-6, 1989, Rio de Janeiro, Brazil. Information: RIO '89 (XIII IGES-II CBGq), A/C CPRM-LAMIN, Av. Pasteur, 404 - Urca, CEP 22292 - Rio de Janeiro, RJ, Brazil; phone (55-21) 295-5297; Telex (55-21) 22685.

Seventh Thematic Conference on Remote Sensing for Exploration Geology, October 2-6, 1989, Calgary, Alberta, Canada. Information: Robert H. Rogers, ERIM, P.O. Box 8618, Ann Arbor, MI 48107-8618; (313) 994-1200, ext. 3382.

***American Institute of Professional Geologists 26th Annual Meeting**, October 4-7, 1989, Hyatt Crystal City, Virginia. Information: Stan Johnson, 1016 Holmes Ave., Charlottesville, VA 22901; (804) 293-5121.

18th Geochautauqua: Mineral-Resource Assessment, October 13-14, 1989, Newark, Delaware. Information: J. H. Schuenemeyer, Dept. of Mathematical Sciences, University of Delaware, Newark, DE 19716; (302) 451-1883.

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Meetings (continued from p. 101)

New York State Geological Association 61st Annual Meeting and Field Trips, October 13-15, 1989, Middletown, New York. Information: Lawrence E. O'Brien, Orange County Community College, Middletown, NY 10940; (914) 343-6222, ext. 2570.

Structural and Tectonic Modelling and Its Application to Petroleum Geology, October 18-20, 1989, Stavanger, Norway. Information: Norwegian Petroleum Society, P.O. Box 1897 - Vika, 0124 Oslo 1, Norway; phone 47-2-207025; Telex 77 322 nopet n.

Supercomputing World conference and exposition, October 18-20, 1989, San Francisco, California. Information: Carol Y. Hurley, Meeting Brokers International, Inc., 5 Science Park, New Haven, CT 06511; (203) 786-5132.

20th Annual Geomorphology Symposium: Geomorphic Evolution of the Appalachians, October 20-22, 1989, Dickinson College, Carlisle, Pennsylvania. Information: W. D. Sevon, Pennsylvania Geological Survey, P.O. Box 2357, Harrisburg, PA 17120; (717) 787-6029.

Sociedad Española de Paleontología 5th Annual Meeting, November 2-3, 1989, Valencia, Spain. Information: Ana Márquez-Aliaga, Depto. Geología. Facultad de Ciencias Biológicas, 46100 Burjassot, Valencia, Spain.

World Gold '89, November 5-8, 1989, Reno, Nevada. Information: Meetings Dept., World Gold '89, Society of Mining Engineers, P.O. Box 625002, Littleton, CO 80162; (303) 973-9550; Telex 881988.

Geological Society of America Annual Meeting, November 6-9, 1989, St. Louis, Missouri. Information: Meetings Department, GSA, P.O. Box 9140, Boulder, CO 80301; (303) 447-2020.

Penrose Conferences

***Late Eocene-Oligocene Climatic and Biotic Evolution**, July 31-August 6, 1989, Rapid City, South Dakota. Information: Donald R. Prothero, Dept. of Geology, Occidental College, Los Angeles, CA 90041; (213) 259-2823; Philip R. Bjork, Museum of Geology, South Dakota School of Mines, Rapid City, SD 57701; (605) 394-2461.

The Eocene Tectonic Transition: Oregon to Alaska, September 4-10, 1989, Penticton, British Columbia. Information: Ralph A. Haugerud, U.S. Geological Survey, MS 975, 345 Middlefield Rd., Menlo Park, CA 94025; (415) 329-4910.

***Large Lake Systems and Their Stratigraphic Record**, September 1990, Lake Tahoe area. Information: Andrew S. Cohen, Dept. of Geosciences, University of Arizona, Tucson, AZ 85721; (602) 621-4691 (direct), (602) 621-6024 (dept.).

1990

***First PNG Petroleum Convention**, February 12-14, 1990, Port Moresby, Papua New Guinea. Information: Mick McWalter, First PNG Petroleum Convention, c/o PNG Chamber of Mines and Petroleum, P.O. Box 7059, Boroko, Port Moresby, Papua New Guinea; phone 675-25-2836; Fax 675-21-7107; Telex NE 23482.

***Society of Mining Engineers Annual Meeting**, February 26-March 1, 1990, Salt Lake City, Utah. Information: Meetings Department, Society of Mining Engineers, P.O. Box 625002, Littleton, CO 80162; (303) 973-9550; Fax 303-973-3845; Telex 881988.

***Symposium on Geology and Ore Deposits of the Great Basin**, April 1-5, 1990, Reno, Nevada. Information: Geological Society of Nevada, P.O. Box 12021, Reno, NV 89510.

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1990 GSA Annual Meeting—Dallas, Texas

October 29–November 1
Dallas Convention Center

General Chairman: David E. Dunn,
University of Texas at Dallas

Field Trips Deadline August 15, 1989
If you would like to lead a trip or have an idea for a trip, please contact one of the chairmen immediately.

By working with a division or associated society, you may be able to focus in depth on a topic by coordinating a technical session, short course, and field trip. Plans must be made early because theme session, symposia, and short course deadlines occur by the end of this year.

Field Trip Chairmen

Robert T. Clarke (Chairman), Mobil Research & Development Corp., DRD—P.O. Box 819047, Dallas, TX 75381, (214) 851-8481

Kent C. Nielsen (Co-Chairman), Program in Geosciences, University of Texas at Dallas, P.O. Box 830688, Richardson, TX 75083-6088, (214) 690-2401 (dept.), (214) 690-2448 (direct)

Short Course Deadline December 15, 1989
Proposals are encouraged from members and nonmembers. Proposals will be reviewed by GSA's Short Course Committee no later than January 31, 1990.

For short course proposal guidelines contact:
Short Course Coordinator
Edna Collis, GSA, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020

Theme Session and Symposia Deadline . . . January 2, 1990

For 1990 program specifics contact:
Technical Program Chairman
Richard M. Mitterer, Program in Geosciences, University of Texas at Dallas, P.O. Box 830688, Richardson, TX 75083-6088, (214) 690-2401 (dept.), (214) 690-2462 (direct)

For general information on program participation (1990 and future years) contact:
GSA Meetings Manager
Sue Beggs, GSA, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020

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LEATHER FIELD CASES. Free brochure. SHERER CUSTOM SADDLES, INC., P.O. Box 385, Dept. GN, Franktown, CO 80116.

Meetings (continued from p. 102)

***European Geophysical Society XV General Assembly**, April 23-27, 1990, Copenhagen, Denmark. Information: EGS Office, Postfach 49, D-3411 Katlenburg-Lindau, Federal Republic of Germany; phone 49-5556-1140; Fax 49-5556-4709; Telex 965564 zil d. (Abstracts deadline: January 31, 1990.)

***Geological Association of Canada-Mineralogical Association of Canada Joint Annual Meeting**, May 16-18, 1990, Vancouver, British Columbia. Information: R. I. Thompson, c/o GAC-MAC '90 Secretariat, 801 - 750 Jervis St., Vancouver, B.C. V6E 2A9, Canada; (604) 681-5226; Fax 604-681-2503; Telex 04-352848 VCR.

***International Association on the Genesis of Ore Deposits 8th Symposium**, August 12-18, 1990, Ottawa, Ontario. Information: L. M. Cumming, 8th IAGOD Symposium, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario K1A 0E8, Canada.

***International Conference on Water Resources in Mountainous Regions**, August 27-September 1, 1990, Lausanne, Switzerland. Information: Aurèle Parriaux, Laboratory of Geology

EPFL, 1015 Lausanne, Switzerland; phone 021-47-23-55; Telex 454478 EPFV CH.

***Seventh International Conference on Geochronology, Cosmochronology and Isotope Geology**, September 24-29, 1990, Canberra, Australia. Information: Organizing Committee, ICOG 7, Research School of Earth Sciences, Australian National University, G.P.O. Box 4, Canberra, A.C.T. 2601, Australia; phone 062-49-3406; Fax 062-47-4639; Telex 62693.

***Fifth Australasian Remote Sensing Conference**, October 8-12, 1990, Perth, Western Australia. Information: Golden West Conventions, P.O. Box 411, West Perth, W.A. 6005, Australia; phone 619-4814029; Telex AA 95380.

Future GSA Annual Meeting Sites

Dallas	October 29-November 1	1990
San Diego	October 21-24	1991
Cincinnati	October 26-29	1992
Boston	October 25-28	1993

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1989 GSA Annual Meeting
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Abstracts must be typed on 1989 abstract forms, available from Abstracts Coordinator, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, or call (303) 447-8850. Abstracts must be mailed to the same address in time to arrive on or before July 19, 1989. NOTE: Abstract forms will not be sent to anyone after July 14, 1989. The absolute deadline for receipt of abstracts is JULY 19. NO ABSTRACTS WILL BE ACCEPTED FOR PROCESSING AFTER THAT DATE.

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ISSN 0164-5854