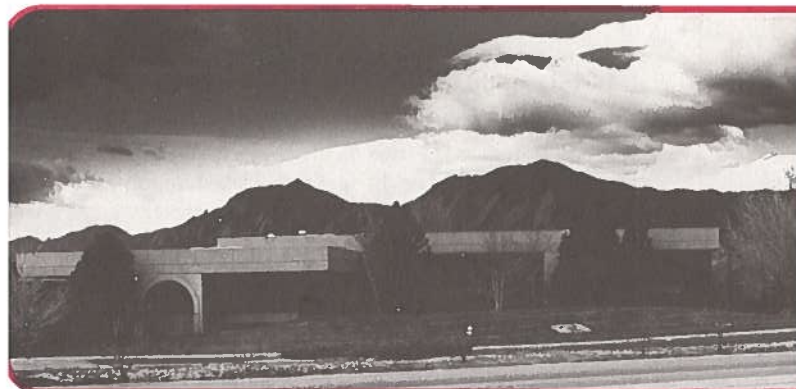


GSA NEWS & INFORMATION

Monthly Newsletter of
The Geological Society of America



VOLUME 8, NUMBER 2

FEBRUARY 1986

1988-1989: Great Years for Field Trips

1988

Geological Society of America
CENTENNIAL CELEBRATION
Denver, Colorado, October 31-November 3, 1988

1989

28th International Geological Congress
SPECIAL FIELD TRIPS
Washington, D.C., July 9-19, 1989

by **Harry A. Tourtelot and John C. Reed, Jr.**

The years 1988 and 1989 will be great years for field trips in the United States, offering all geoscientists the opportunity to design and conduct trips that will contribute much to the success of two important events. The first is the Centennial Celebration of the founding of the Geological Society of America in 1988. The second is the 28th International Geological Congress in 1989, the first time that the IGC has met in the United States since 1932. Field trips for both events should have special characteristics. None of us will see a second GSA Centennial, and only a few will see another International Geological Congress in the United States. It behooves us to make our contributions now!

Many geoscientists will want to be involved in the field trips of both meetings. This can be done best by having the field trips of the 1986, 1987, and 1988 GSA Annual Meetings and the 1989 IGC meeting integrated to the extent possible. As shown in the boxes on p. 26, trips for the two meetings will be somewhat different in geographic focus of attention, length, and some other characteristics. However, as an example, a GSA Centennial field trip in the Colorado Mineral Belt could be one segment of an International Geological Congress field trip that continued onward to include important mineral resource areas in Utah and perhaps even in Nevada. An IGC trip that starts in the Pacific Northwest

might tie in with a GSA Centennial trip called "Along Part of the 40th Parallel with King." A trip down the Colorado River would recall the early days of geology in the west for purposes of the Centennial and would also be of great geologic interest to IGC participants from abroad.

The field trips being planned and thought about now for the 1986 and 1987 GSA Annual Meetings should also be considered as potential legs in 1989 for the longer IGC field trips. In many ways the 1986 and 1987 GSA field trips are particularly useful to the IGC simply because these trips are in a more advanced stage of planning than those for 1988. The IGC needs to have preliminary outlines of field trips in March 1986 for purposes of the IGC First Circular. Obviously, field trips cannot be described in much detail at this time; what is wanted is broad outlines of possible trips. Final selections will be made by IGC coordinators after they have reviewed proposals received.

The IGC Field Trip Committee has prepared a pamphlet with information and a form for proposals for field trips. These forms will be distributed to organizations throughout the country and to all individuals requesting them. The form also includes information relating to 1986, 1987, and 1988 GSA Centennial field trips. This information will be shared with GSA Field Trip Committees so that maximum coordination can be achieved. For GSA field trips, get in touch with the Field Trip Chairman for the indicated years:

<u>1986</u>	<u>1987</u>	<u>1988</u>
Jerry Wermund	George H. Davis	Harry A. Tourtelot
Bureau of	Dept. Geosciences	U.S. Geological Survey
Economic Geology	University of Arizona	M.S. 911, Box 25046
10100 Burnet Road	Tucson, AZ 85721	Denver, CO 80225
Building 130		
Austin, TX 78712		

For proposal forms and other information about the IGC field trips, write to John C. Reed, Jr., U.S. Geological Survey, M.S. 913, Box 25046, Denver, CO 80225. Please plan to return proposal forms in March 1986.

(continued on p. 26)



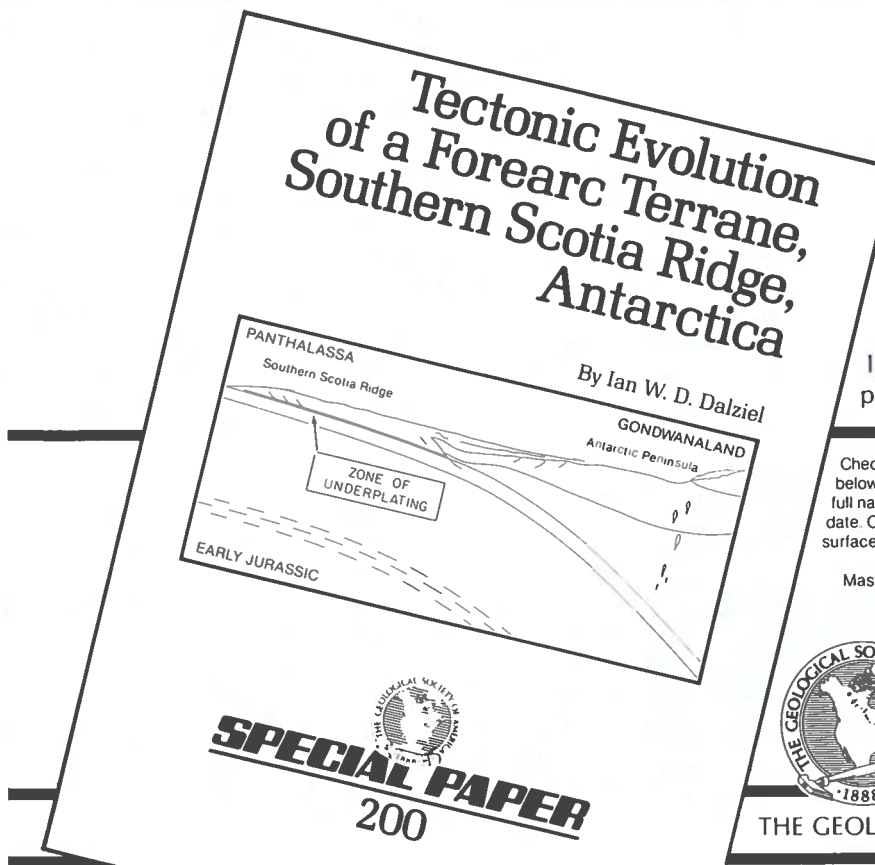
Field trip in 1895 with Sir William Dawson (front row, center). From *Geologists and Ideas: A History of North American Geology*, GSA Centennial Special Volume 1; photo courtesy of Photographic Archives, McCord Museum, McGill University, Montreal.

**Guidelines for Field Trips
GSA CENTENNIAL CELEBRATION 1988**

- Eighteen to perhaps as many as 24 field trips, about evenly divided before and after the meeting, should be offered.
- In keeping with the GSA Centennial theme, the focus of the trips should be on geologic problems or areas of classic geology about which our understanding now is much different from what it was 100 years ago. Flamboyant notions such as "Along Part of the 40th Parallel with King" would be welcome.
- Pre-Centennial trips may start and end at any point of convenient access, but travel to Denver at the conclusion of the trip should be included as part of the trip.
- Post-Centennial trips should start in Denver; travel to the initial point should be part of the field trip. The trip may end at any convenient point for dispersal.
- Length should be three days for most trips, but longer ones are possible.
- Although the trips will have a topical or areal orientation, as much information as possible should be included on development of geologic knowledge and the changes in concepts as our science has matured in the past 100 years.

**Guidelines for Field Trips
International Geological Congress 1989**

- About 80 pre-Congress and 40 post-Congress trips will be offered in the two weeks before and after the Congress. One-day field trips in the Washington area during the Congress will be organized separately.
- Field trips should be focused primarily on the geology of the United States, but excursions into Canada, Mexico, and the Antilles and other adjacent islands are acceptable as logical segments of appropriate trips.
- Pre-Congress trips should start at an easily accessible point of entry into the United States, generally a major international airport. The trip may end at any logical airport, but transportation from there to Washington should be an integral part of the trip.
- Post-Congress field trips should start in Washington; transportation to a logical beginning point should be an integral part of the trip. The post-Congress trips should end at a major point of easy international departure.
- In general, trips should be 3 to 10 days in duration, although exceptions are possible.
- Trips should have a scientific focus of international interest, but the focus may be topical or may be the general geology of a classic region.
- Inclusion of historical or cultural features is encouraged but should not involve major digressions from the scientific focus of the trips.



GSA Special Paper 200:
*Tectonic Evolution of a
Forearc Terrane, Southern
Scotia Ridge, Antarctica,*
by Ian W. D. Dalziel,
8½" × 11", paperback,
37 pages, illustrated.
ISBN 0-8137-2200-4, CIP,
paperback \$ 9.00.

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THE GEOLOGICAL SOCIETY OF AMERICA

Final Announcement

Rocky Mountain Section, GSA, Annual Meeting

Flagstaff, Arizona

April 30–May 2, 1986

The Department of Geology of Northern Arizona University, the U.S. Geological Survey Geology Division, Flagstaff, and the Museum of Northern Arizona will host the 39th Annual Meeting of the Rocky Mountain Section of the Geological Society of America on Wednesday, Thursday, and Friday, April 30 and May 1 and 2, 1986. The meetings will be held in Flagstaff at the Little America Hotel.

Local Committee: Chairman—Stanley Beus, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-4561; Vice-chairman—David Best, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-4561; Technical Program—Ivo Lucchitta, U.S. Geological Survey, 2255 N. Gemini Drive, Flagstaff, AZ 86001, (602) 527-7151; Treasurer—Michael Tyson, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-4561, (602) 527-7256; Registration—Grace Irby, Museum of Northern Arizona, Rt. 4, Box 720, Flagstaff, AZ 86001, (602) 774-5211; Field Trips—Ronald Blakey, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-2740; Housing—David Elliott, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-4561; Transportation—Richard Holm, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-4561; Symposia—David Brumbaugh, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-4561; Exhibits—Larry Middleton, Department of Geology, Box 6030, Northern Arizona University, Flagstaff, AZ 86011, (602) 523-2429.

REGISTRATION

All persons participating in any event of the meeting must be registered.

Preregistration: You are urged to preregister at the reduced rate to aid the local committee in making final plans. Preregistration forms, with payment, must be postmarked no later than **Friday, April 4, 1986**. Complete the registration form and return it with a check or money order in U.S. currency to Treasurer, Rocky Mountain Section GSA, Department of Geology, Box 6030, NAU, Flagstaff, AZ 86011.

Those planning to attend field trips must preregister. Refunds for canceled preregistration will be made in full until April 16, 1986. After this date no refunds will be made except for field trips that are canceled or oversubscribed.

On-Site Registration: The registration and information desk will be located in the main hall of the Convention Center at Little America. Name tags and other meeting materials may be picked

up from 6 to 10 p.m. on Tuesday, April 29, from 7 a.m. to 4 p.m. on Wednesday, April 30, and from 8 a.m. to 4 p.m. on Thursday and Friday, May 1 and 2.

TECHNICAL PROGRAM

Technical sessions will be scheduled as oral presentations and poster sessions on Wednesday, Thursday, and Friday, April 30 and May 1 and 2.

SYMPOSIA

1. **Late Quaternary Alluvial History of the Southwest: Toward a Process Paradigm.** Eric Karlstrom, (602) 523-2432; Thor Karlstrom, Richard Hereford, A. Wesley Ward.
2. **Pacific-Arizona Crustal Experiment (PACE).** Keith Howard, (415) 323-8111, ext. 2282.
3. **Geophysics of the Colorado Plateau.** John Sass, (602) 527-7226; David Brumbaugh, G. Randy Keller, I. G. Wong.
4. **Tertiary History of the Western Margin of the Craton.** A. Extensional Tectonism—Ivo Lucchitta, (602) 527-7151; George A. Thompson; B. Stratigraphy, Dale Nations, (602) 523-4561; H. Wesley Peirce.
5. **Early Proterozoic Orogenic History and Ore Deposits of the Southwest.** Karl Karlstrom, (602) 523-4561; Clay Conway, Paul Lindberg.
6. **Planetary Symposium: Terrestrial Planets and Satellites.** Elliott Morris, (602) 527-7194; Victor Baker.
7. **Sedimentologic, Stratigraphic, and Paleontologic Studies in the Grand Canyon and Southern Colorado Plateau.** Ron Blakey, (602) 523-2740; Stanley Beus, Larry Middleton.
8. **Mineralization of Breccia Pipes on the Colorado Plateau.** Karen Wenrich, (303) 236-1563; George Billingsley.
9. **Interaction of the Rocky Mountain Foreland and Cordilleran Thrust Belt.** Christopher Schmidt, (616) 383-0062; William Perry, Jr.

FIELD TRIPS

Field trip chairman is Ronald C. Blakey, Department of Geology, Box 6030, NAU, Flagstaff, AZ 86011, (602) 523-2470. *Field trip registrants must also register for the meeting.* Field trip registration is on a first-come basis. If a trip is oversubscribed or canceled, the field trip fee will be refunded. **Preregistration for field trips must be received by April 4, 1986, accompanied by full payment.** Trips may be canceled if registration is insufficient or for reasons beyond our control. No trip refunds will be made after April 16, 1986. All field trips will depart from Little America, Flagstaff.

The elevations of the field trips range from about 3000 to 7000 ft. The wind can be strong. Please be prepared for inclement

(continued on p. 28)

Vol. 8, no. 2 GSA News & Information February 1986

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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; Director of Communications: Nancy A. Reed; Production and Advertising Manager: James R. Clark; Marketing/Advertising Assistant: Ann H. Fogel; Assistant Production Manager: Meredith Larson; Production Assistants: Joan E. Manly and June E. Thomas.

*Advertising: Contact James R. Clark or Ann H. Fogel (303) 447-2020.

weather. A single-volume guidebook will include site descriptions for all the scheduled field trips.

Premeeting

1. Lithologies and Deformational Styles in an Early Proterozoic Orogenic Belt, Central Arizona. Karl Karlstrom, Northern Arizona University; Clay Conway, U.S. Geological Survey, Flagstaff. Two days, April 28 and 29. Departs from Little America in Flagstaff at 7:30 a.m. on April 28. Returns to Little America at 8 p.m. on April 29. **Limit: 28. Cost: \$75**, including transportation, one night lodging, two box lunches, and guidebook.

Participants will study two contrasting Proterozoic terranes in the Transition Zone of central Arizona. On the first day we will examine rocks of the Yavapai Supergroup in the Bradshaw Mountains, a 1750 Ma volcanic arc assemblage. Emphasis will be on deformational and metamorphic history, as seen in varying lithologies. On the second day, the trip will proceed southeast across a proposed geochronologic boundary into younger rocks (~1700 Ma) of the Mazatzal Mountains, which may have a different tectonic history. Emphasis here will be on examining lithologies, Proterozoic foreland foldbelt deformation in quartzites, and strain markers, plus possible melange zones in underlying slates and graywackes.

2. Geology of the Central San Francisco Volcanic Field.

Richard F. Holm, Northern Arizona University. One day, April 29. Departs from Little America in Flagstaff at 8 a.m. on April 29, returns at 6 p.m. **Limit: 27. Cost: \$30**, including lunch, transportation, and guidebook.

The central San Francisco volcanic field comprises a wide variety of late Cenozoic volcanic structures and deposits that range in composition from basalt to rhyolite. Emphasis will be on the volcanic history, volcanology, and petrology of San Francisco Mountain and its peripheral silicic centers. Rocks and features that will be examined include basalt, andesite, and dacite lava flows, San Francisco Mountain composite volcano, dacite and rhyolite lava domes, block and ash deposit, lahar breccias, base-surge deposits, air-fall pumice beds, intrusive dome and displaced Paleozoic strata, basalt shield volcano, and scoria cones. Origin of the Inner Basin (caldera) of San Francisco Mountain will be studied. Panoramas of the volcanic field, southern Colorado Plateau structures, and the Painted Desert are possible from several vantage points.

3. Breccia Pipes of Northern Arizona. Karen J. Wenrich, U.S. Geological Survey, Denver; George H. Billingsley, U.S. Geological Survey, Flagstaff. Two days, April 27 and 28. Departs from Little America in Flagstaff at 8 a.m. on April 27, returns at 5:30 p.m. on April 28. **Limit: 40. Cost: \$80**, including transportation, one night lodging, two box lunches, beverages, and guidebook.

The Paleozoic sedimentary rocks on the Colorado Plateau of northern Arizona are host to hundreds of breccia pipes. The uranium and copper deposits in these breccia pipes transgress formation boundaries from the Mississippian Redwall Limestone to the Triassic Chinle Formation. These breccia pipes are not classic breccia pipes in that there is no volcanic rock associated with them in time or space. They are the result of solution collapse within the Redwall Limestone and stoping of the overlying strata. The first day of this trip will be spent viewing breccia pipes and studying relevant stratigraphy along the Little Colorado Gorge and Gray Mountain. The Riverview Pipe, which had minor production in the 1960s and is currently being drilled, will also be

visited. The second day will be spent on the Marble Plateau at the 1-mile-diameter Shadow Mountain collapse and two other collapse features where Cu- and Ag-rich nodules can be observed and collected. (Dates of this field trip mandated by motel availability.)

4. Paleontology of the Petrified Forest National Park, Arizona. David D. Gillette, New Mexico Museum of Natural History, Albuquerque; Robert A. Long, University of California, Berkeley; Sidney R. Ash, Weber State College, Ogden, Utah. One day, Saturday May 3. Departs from Little America in Flagstaff at 8 a.m., returns at 6 p.m. **Limit: 12. Cost: \$30**, including transportation and guidebook. Lunch will be purchased at the park cafeteria.

Participants will examine and discuss vertebrate paleontology and paleobotany of the Upper and Lower Petrified Forest Members of the Chinle Formation in the Painted Desert and the Petrified Forest in eastern Arizona. Recent research conducted in the park and surrounding areas has substantially expanded the species lists for vertebrates and plants in the Chinle Formation, and a refined understanding of the paleoecology is emerging. Sites that have produced abundant remains of phytosaurs, metoposaurs, and an assortment of plants will be visited. In addition, we will view the site of the newly excavated (mid-1985) dinosaur and at least one site where the early Charles Camp expeditions established base camp. Participants should expect hiking over irregular terrain.

Postmeeting

5. Late Quaternary Alluvial Stratigraphy and Soils of the Black Mesa and Little Colorado River Areas, Northeastern Arizona. Eric Karlstrom, Thor Karlstrom, Northern Arizona University; Richard Hereford, U.S. Geological Survey, Flagstaff. Two days, May 3 and 4. Departs from Little America in Flagstaff at 8 a.m. on May 3, returns at 6 p.m. on May 4. **Limit: 50. Cost: \$75**, including transportation, one night lodging, two lunches, refreshments, and guidebook.

Late Quaternary alluvial deposits of the Black Mesa and Little Colorado River areas are subdivided on the basis of geomorphic relations and sedimentological characteristics of alluvial deposits and by identification of buried soils or diastems that demark point boundaries between depositional units. Clustering of tree-ring, C-14, and archaeological dates from point boundaries in many valleys suggests generally synchronous and cyclic episodes of erosion and deposition throughout the region; this points to a dominant extrinsic or climatic control of depositional and erosional processes. This relationship is reinforced by comparison of post-1900 alluvial history of the Little Colorado River with historic climatic data.

6. Triassic-Jurassic Continental systems, Northeastern Arizona. Ronald C. Blakey, Larry T. Middleton, Northern Arizona University. Two days, May 3 and 4. Departs from Little America in Flagstaff at 8 a.m. on May 3, returns to Flagstaff that evening; departs on May 4 at 8 a.m., returns to Flagstaff at 7 p.m. **Limit: 40. Cost: \$75**, including transportation, two lunches, refreshments, Saturday night meal, slide show, and guidebook.

The southern Colorado Plateau provides an opportunity to examine a diverse array of continental depositional styles, as well as facies sequences indicative of the interaction of fluvial, eolian, and lacustrine processes. Emphasis will be on channel and flood basin sedimentation and evolution, alluvial architecture and pedogenic deposits, eolian erg and erg margin assemblages, and sabkha complexes. Features to be studied include low- and high-sinuosity channel complexes, proximal channel deposits, paleosols, trace fossil assemblages, dune and drape types, sand sheet

Rocky Mountain Section Meeting (continued)

and wadi systems, and desert-lake environments. The first day will be spent examining Triassic fluvial systems in the Little Colorado River valley and Petrified Forest areas. The second day will be spent in the Painted Desert and Echo Cliffs region, where Jurassic eolian systems will be emphasized. Trip will return to Flagstaff each night.

7. The Tectonic and Paleogeographic Significance of Tertiary Strata of the Southern Colorado Plateau and Transition Zone Basins. Dale Nations, Northern Arizona University; H. Wesley Peirce, Arizona Bureau of Geology, Tucson. Two days, May 3 and 4. Departs from Little America in Flagstaff on May 3 at 8 a.m., returns on May 4 at 6 p.m. **Limit: 32. Cost: \$90**, including transportation, one night lodging, refreshments, and guidebook.

Tertiary strata on the southern margin of the Colorado Plateau, on the Mogollon Rim, and in extensional basins adjacent to the Rim provide evidence for the tectonic and paleogeographic evolution of the Transition Zone between the Colorado Plateau and Basin and Range provinces. The first day will be devoted to the examination of Eocene "Rim gravels" on the plateau, Oligocene sediments that were deposited at the base of the erosional escarpment (Mogollon Rim), and pre-Basin and Range extension Oligocene(?)–Miocene sediments and volcanics in the Verde Basin. The second day will be spent examining the stratigraphy, sedimentary facies, and interbedded lava flows within the Verde Formation, as an example of an extensional basin-fill sequence.

8. Early Proterozoic Massive Sulfide Deposits, Jerome and Bagdad Areas, Arizona. Paul Lindberg, Sedona, Arizona; Clay M. Conway, U.S. Geological Survey, Flagstaff. Two days, May 3 and 4. Departs from Little America in Flagstaff at 7:30 a.m. on May 3, returns on May 4 at 6 p.m. Overnight stop at Prescott, Arizona. Dinner at Prescott on second day en route to Flagstaff. **Limit: 30. Cost: \$82**, including transportation, one night lodging, two lunches, refreshments, and guidebook.

The United Verde mine at Jerome, Arizona, is a world-class massive sulfide deposit that was, for a time, the major copper-producing mine in the U.S. Detailed structural studies of the highly deformed strata have enabled reconstruction of the volcanic section and chlorite alteration pipe beneath the ore deposit. Ore deposits and host-rock geology at Jerome and vicinity will be the subjects of the first day of the trip. The bimodal volcanic section that hosts several small massive sulfide deposits at Bagdad is well preserved in spite of lower amphibolite grade metamorphism. Recent work has revealed a remarkable suite of alteration types, systematically distributed relative to the ore deposits and to a subvolcanic sill, from which a model for the hydrothermal system forming the exhalative ores has been constructed. Examination of altered and unaltered strata at Bagdad will be the primary objective of the second day of the trip.

9. Structural and Geomorphic Characteristics of the Western Colorado Plateau in the Grand Canyon—Lake Mead Region. Ivo Lucchitta, U.S. Geological Survey, Flagstaff; Richard A. Young, State University of New York at Geneseo. Two days, May 3 and 4. Departs from Little America in Flagstaff at 8 a.m. on May 3, returns late afternoon on May 4. Camping overnight near Lake Mead (elevation 1300 ft). Simple but hearty meals are available in a restaurant at nearby Meadview. Dinner is about \$5; breakfast is about \$3.50. Overnight accommodations at Meadview are limited; be prepared to camp. **Limit: 30. Cost: \$65** including transportation, two box lunches, refreshments, and guidebook.

Starting from Flagstaff, participants will examine in a general way the overall architecture of the Colorado Plateau in northwest Arizona. Near the western edge of the plateau, we will examine the stratigraphic, volcanic, structural, and geomorphic features that document the Tertiary history of the Colorado Plateau–Basin and Range boundary. Near the mouth of the Grand Canyon, the features of interest will be an unusually sharp structural transition from the Colorado Plateau to the Basin and Range province, the stratigraphy and environment of deposition of a classic interior-basin deposit, and data bearing on the history of the Colorado River. Return will be via the Aquarius Mountains.

SPECIAL EVENTS

Welcoming Party. An informal gathering will be held for all registrants from 7 to 10 p.m. Tuesday, April 29, at the headquarters motel, Little America. A cash bar will be available.

Annual Banquet. The annual banquet will be held at Little America on April 30, from 6 to 10 p.m. A cash bar will be available at 6 p.m.

Annual Business Meeting. The annual business meeting will be held at noon, Thursday, May 1, at Little America. Election of officers for 1986–1987, selection of future meeting sites, a brief review of Campus Representatives' activities, and other section business will be on the agenda.

Paleontological Society—Rocky Mountain Section. The section is cosponsoring the symposium on sedimentologic, stratigraphic, and paleontologic studies in the Grand Canyon region and a field trip to the Petrified Forest National Park. A meeting and social function are planned. For suggestions, please call Ernest Gilmour, (509) 359-2286, or Stanley S. Beus, (602) 523-4561.

GSA Campus Representatives Breakfast. Campus representatives from the Rocky Mountain Section, GSA, will have a breakfast meeting Thursday, May 1, at 7 a.m. at Little America.

Rocky Mountain Section Management Board Breakfast, May 2, at 7 a.m. at Little America.

Spouse/Guest Activities. Flagstaff is situated near a great variety of scenic and cultural sites. Bus tours are planned to nearby sites of Wupatki Indian ruins and Sunset Crater Volcano, Oak Creek Canyon, and Sedona, with shopping at Tlaquepaque. Lowell Observatory, Museum of Northern Arizona, and the San Domonique Winery in Camp Verde will be scheduled if there is sufficient interest. In addition, daily bus tours to the Grand Canyon depart from the Navajo-Hopi bus station in Flagstaff.

PUBLICATIONS

A copy of the Rocky Mountain Section *Abstracts with Programs* will be mailed to each member who has paid 1986 GSA dues and selected and paid for the Rocky Mountain Section *Abstracts with Programs* on the dues statement. Please bring this copy of the abstracts volume to the meeting. Additional copies will be available for purchase at the meeting.

Each field trip participant will receive a guidebook. Additional guidebooks will be for sale at the meeting and will be available after the meeting from the Geology Department at Northern Arizona University.

STUDENT TRAVEL GRANTS

Limited travel funds are available to student members of the Rocky Mountain Section, GSA. *Applications must be received by*

(continued on p. 32)

PREREGISTRATION FORM

Rocky Mountain Section, GSA, 39th Annual Meeting
 April 30, May 1, 2, 1986
 Flagstaff, Arizona

IMPORTANT

1. Full payment must accompany registration.
2. Your check is your receipt.
Copy this form for your records.
3. Preregistration deadline: **Must be postmarked no later than April 4, 1986.**
4. No refunds after April 16, 1986.

For Official Use Only

M.O.# _____ Personal check _____
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Name _____
Last First Middle

Registered as: Professional Student Spouse/Guest

Affiliation (abbreviate for badge): _____

Professional address: _____

City _____ State _____ Zip _____

Phone: Business _____ Residence _____

GSA Member Speaker GSA Student Associate Session Chairperson

Fees

Preregistration (must be postmarked by April 4, 1986)

Professional	\$30	\$ _____
Student	\$ 8	\$ _____

Registration (after April 4, 1986)

Professional	\$40	\$ _____
Student	\$12	\$ _____
Spouse/Guest Registration	\$ 8	\$ _____
Annual Banquet	\$14	\$ _____
Business Luncheon	\$ 7	\$ _____
One-day Registration	\$15	\$ _____

Field Trip Preregistration

All field trip participants must also preregister for the meeting.

Premeeting Trips

1. Lithologies and Deformation Styles, Early Proterozoic Orogenic Belt	\$75	\$ _____
2. Geology of Central San Francisco Volcanic Field	\$30	\$ _____
3. Breccia Pipes of Northern Arizona	\$80	\$ _____
4. Paleontology of Petrified Forest National Park, Arizona	\$30	\$ _____

Postmeeting Trips

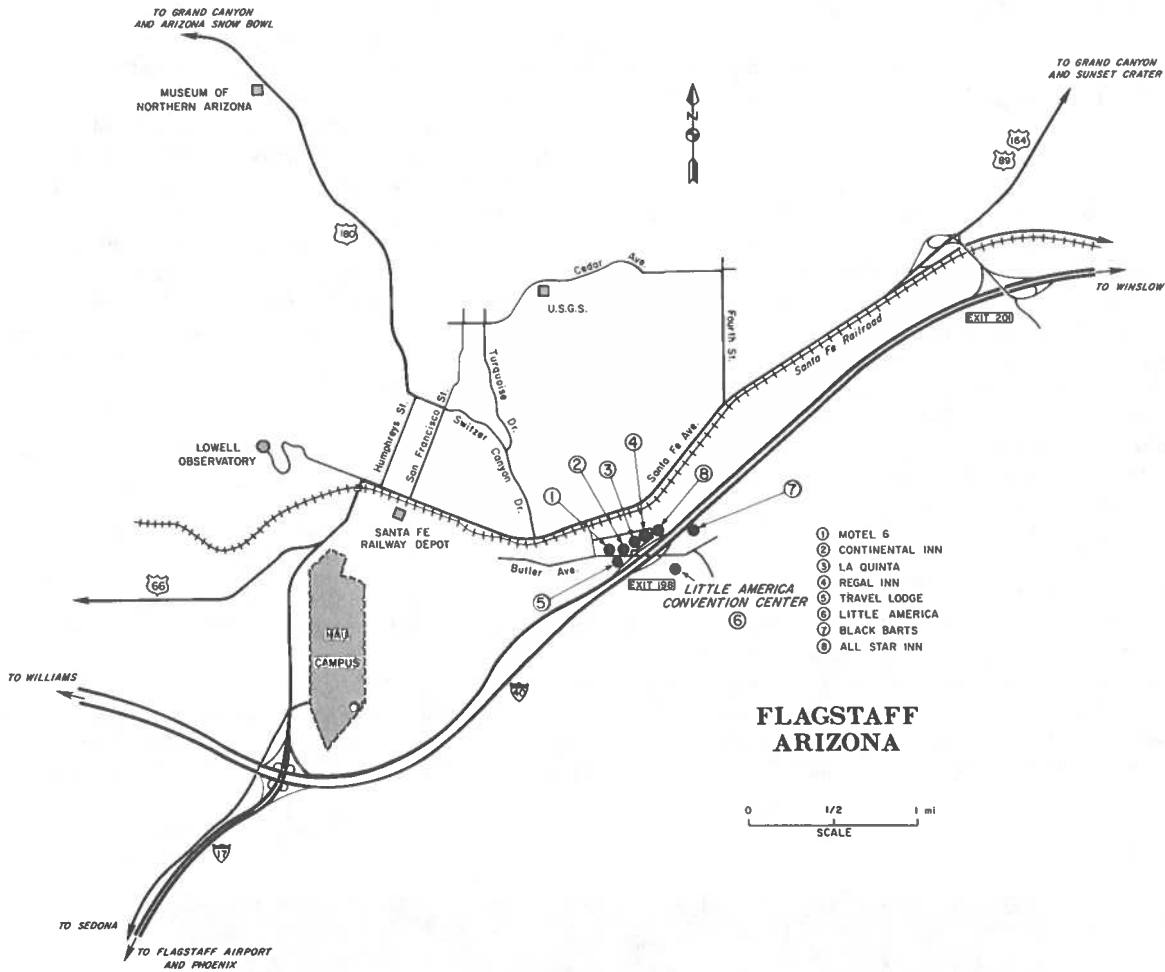
5. Late Quaternary Alluvial Stratigraphy and Soils, Black Mesa and Little Colorado River Areas	\$75	\$ _____
6. Triassic-Jurassic Continental Systems, Northeastern Arizona	\$75	\$ _____
7. Tectonic and Paleogeographic Significance of Tertiary Strata, Southern Colorado Plateau and Transition Zone Basins	\$90	\$ _____
8. Early Proterozoic Massive Sulfide Deposits, Jerome and Bagdad Areas	\$85	\$ _____
9. Structural and Geomorphic Characteristics of Western Colorado Plateau, Grand Canyon-Lake Mead region	\$65	\$ _____

Total Fees

Enclose check or money order, in U.S. funds, payable to
Rocky Mountain Section, Geological Society of America \$ _____

Mail completed form and payment to
 Treasurer
 Rocky Mountain Section GSA
 Dept. of Geology
 Box 6030
 NAU
 Flagstaff, AZ 86011

Deadline for preregistration is April 4, 1986



FLAGSTAFF ARIZONA

HOUSING FORM

GSA Rocky Mountain Section, April 30-May 2, 1986

Complete this form, cut out on dashed line, and mail to Little America P.O. Box 850 Flagstaff, AZ 86002

Copy this form for your records.



LITTLE AMERICA Flagstaff

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2 Persons	58.00 <input type="checkbox"/>	62.00 <input type="checkbox"/>
3 Persons	64.00 <input type="checkbox"/>	
4 Persons	70.00 <input type="checkbox"/>	

Organization _____
 Arrival Date _____
 Departure Date _____

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NO PETS PLEASE

RESERVATIONS PLEASE:

Name _____
 Address _____
 City _____ State _____ Zip _____

RESERVATIONS HELD UNTIL 6 PM UNLESS ACCOMPANIED BY DEPOSIT

Rocky Mountain Section Meeting (continued from p. 29)

March 20, 1986. Application forms are available from Kenneth Kolm, Department of Geology, Colorado School of Mines, Golden, CO 80401.

TRAVEL

Flagstaff is served by the commuter airline Sky West (602) 774-7907, with connections to major airlines in Phoenix, 140 miles distant. Free limousine service is available from the Flagstaff airport to Little America, and commercial taxi service is available. Arizona Central, (602) 526-1377, offers van shuttle services from the Phoenix airport to Flagstaff four times daily; cost is \$45 round trip, \$25 one way. Interstate 40 is the major east-west highway route to Flagstaff and provides direct access to Little America and nearby motels. Highway 89 reaches Flagstaff from the north and Interstate 17 from the south. In addition, Amtrak has daily rail services to Flagstaff east and west.

HOUSING

Rooms for participants are available at Little America, the headquarters motel and site of most of the technical sessions. One set of technical sessions daily will be held at Black Bart's, 0.4 mile from Little America. Six other motels are situated within about 0.5 mile of Little America. A coffee shop and dining room are available at Little America, and additional restaurants are open at the nearby Continental Inn and other motels.

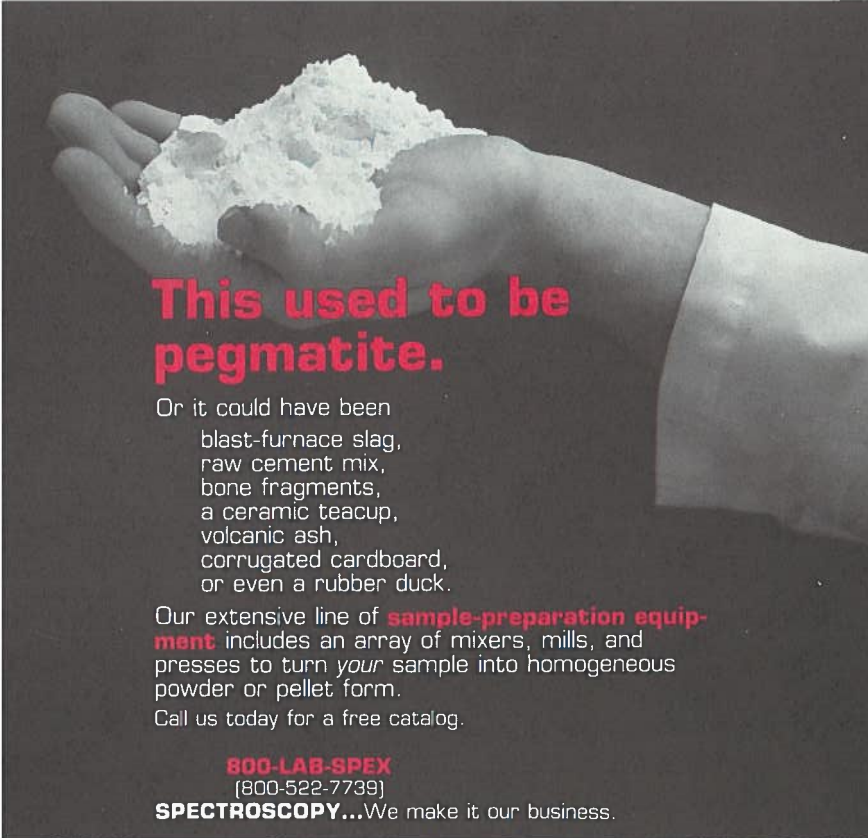
You can reserve rooms at Little America at reduced GSA rates by filling out the housing form and returning it to Little America, P.O. Box 850, Flagstaff, AZ 86002. Confirmation of your room reservation will be mailed to you by the motel. **Deadline for receipt of reservations is April 4, 1986.** Be sure to indicate that you are a GSA registrant to take advantage of the special GSA convention rate. Cancellations should be made in writing or by telephone directly to the motel.

The local committee **will not** coordinate housing reservations. The name, telephone number, and current rates of other motels that are within walking distance of the headquarters motel are given for your convenience. No rooms have been reserved at these motels, and you must contact them directly for reservations. All motel rooms in Flagstaff are subject to 5% tax.

	Phone	Distance from Little America	Single	Double	Triple/quad
Allstar Inn	(602) 779-6184	0.6 mi	\$27	\$31	\$34 or 37
Continental Inn	(602) 779-6944	0.3 mi	60	65	65
LaQuinta	(602) 779-3614	0.5 mi	39	43	46-51
Motel 6	(602) 774-3533	0.4 mi	17.95	21.95	29.95
Regal Inn	(602) 774-8756	0.5 mi	22	27	32
Travel Lodge	(602) 774-1821	0.3 mi	29	32-34	36-38

SHUTTLE SERVICE

Free shuttle service will be available between Little America, Black Bart's, and nearby motels during the technical sessions on Wednesday, Thursday, and Friday, April 30 and May 1 and 2.



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NACSN To Consider New Category

At the recent annual meeting of the North American Commission on Stratigraphic Nomenclature, held in conjunction with the Annual Meeting of GSA, Ashton F. Embry of the Geological Survey of Canada (3303-33rd Street N.W., Calgary, Alberta, Canada, T2L 2A7) and Susan A. Longacre of Texaco Research Center (3901 Briarpark, Houston, Texas 77042) were elected chairman and vice chairman, respectively. Over the next twelve months NACSN will be examining a proposal to establish a new category of stratigraphic units—hydrostratigraphic units—and a proposal to add the term submember to the lithostratigraphic hierarchy.

For further information on the work of NACSN and on the present North American Stratigraphic Code (published in the *AAPG Bulletin*, v. 67, no. 5), contact either Embry or Longacre at the addresses given.

Reminder: Nominations Deadline

The GSA Committee on Nominations requests your help in compiling a list of GSA members qualified for service as officers and councilors of the Society. The committee requests that each nomination be accompanied by basic data and a description of the qualifications of the person for the position recommended (vice-president, treasurer, councilor).

Nominations must be received at GSA headquarters no later than **FEBRUARY 17, 1986**.

Please send your nominations and the requested backup material to

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

PLANET EARTH Now on PBS

"It's fair to say there's been a revolution in the earth sciences," maintains Frank Press, president of the National Academy of Sciences. "Man has enhanced his knowledge of earth more in the past two decades than in all previous history. PLANET EARTH presents the most up-to-date overview of those spectacular achievements."

The world premiere of the public television series PLANET EARTH took place in the PLANET EARTH Science Theater at the GSA Annual Meeting in Orlando on Tuesday, October 29, 1985. Meeting participants crowded the theater; it was often standing room only. An additional viewing area with two monitors was set up outside the Science Theater to handle the overflow.

If you are one of the GSA members who has not seen the PLANET EARTH series, quickly consult your television guide for local PBS listings. The series began on Wednesday, January 22, 1986, at 9 p.m. Eastern Time. The seven-episode series will continue each Wednesday evening until the final show on March 5.

The prime-time series and its companion materials have already received considerable attention, not only from the scientific community, but also from the general public. PLANET EARTH, produced by WQED/Pittsburgh in association with the National Academy of Sciences, received major funding from The Annenberg/CPB Project with corporate funding from IBM. IBM funded tune-in advertising and promotion campaigns to draw attention to the appeal of the series for general audiences. The GSA 1985 Science Theater was underwritten by IBM as one of the PLANET EARTH promotions.

Before the series began to air in January, the hardbound book *Planet Earth* was chosen as the main selection of the Book of the Month Club for spring 1986. Author Jonathan Weiner took a leave of absence from the magazine *The Sciences* to write the companion volume for the PBS series. Explains WQED/Pittsburgh Vice President of Corporate Communications Russ Martz, "Everything possible was done to correlate the book with the film series. WQED/Pittsburgh Design Center Manager Mark Friedman designed the book and commissioned the new photography. We are very proud of the award and of the beautiful work by Weiner and Friedman."

Stunning special effects are a highlight of the series. Especially ingenious are the motorized latex models of the topography of Cyprus for the "Gifts of the Earth" episode, the fifth of the series. The same episode reveals an authentic view of the Bush-

veld Complex, located in the Transvaal Province of South Africa. The tabletop model of the Bushveld depicts the intricate layering of minerals beneath the earth surface.

PLANET EARTH is the only television series ever to be produced in collaboration with panels of scientific experts from the National Academy of Sciences. The Academy's Geophysics Film Committee has overall responsibility for authenticating the project's data, but each of the seven one-hour episodes also has its own expert panel of science advisors. Tune in and evaluate the series for yourself.

NASA PLANETARY BIOLOGY SUMMER INTERNSHIPS

The Marine Biological Laboratory, Woods Hole, Massachusetts, invites applications from graduate students and seniors accepted in graduate programs for \$1,800 awards to participate in research at NASA centers and collaborating institutions during the summer. Application deadline: 1 April 1986. For information and applications, contact: Michael Enzien, Planetary Biology Intern Program, Department of Biology, Boston University, 2 Cummington Street, Boston, Mass. 02215. An Equal Opportunity/Affirmative Action Institution.



GEOLOGICAL SOCIETY OF AMERICA

99th Annual Meeting & Exposition
November 10-13, 1986

EXHIBITOR INFORMATION

TRADITION IN EXCELLENCE

The Geological Society of America is dedicated to the advancement of the science of geology. For close to 100 years, the Society has served the professional geologic community. From its headquarters, located in Boulder, Colorado, with a membership of more than 16,000, GSA has held a unique place as both leader and sponsor for the geosciences. The Society's primary activities are publication of scientific literature, organization of scientific meetings, and support of geologic research.

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- Daily food and beverage service in the exhibit hall lounges starting at 8 a.m.
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General Information

Registrants for GSA meetings include all segments of the geologic professions. Most registrants are GSA members with overlapping affiliation of one of the seven societies that meet jointly with GSA, providing a broadly based audience.

On the average, registrants are 95% male and 38 years old. Over 50% are employed by 300 different corporations. The other 50% are employed at over 400 major universities, institutions, and government agencies.

GSA Annual Meeting History and Future Dates

1979 San Diego	4,685	1985 Orlando	4,409
1980 Atlanta	4,285	1986 San Antonio	November 10-13
1981 Cincinnati	4,670	1987 Phoenix	October 26-29
1982 New Orleans	4,793	1988 Denver	Oct. 31-Nov. 3
1983 Indianapolis	4,165	1989 St. Louis	November 9-12
1984 Reno	6,065	1990 San Diego	October 22-25

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Is Your Campus Listed Here?

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 News & Information* every month
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- \$10 reduction in student registration fees for GSA's annual meeting
- Reduced registration fees for many GSA section meetings
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- 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
- Discount for subscriptions to *Engineering Geology Abstracts* for Engineering Geology Division affiliates
- Discount for Avis car rentals
- 25% discount on many Geological Society of London publications
- Reduced subscription rate for publications of the American Institute of Physics

All GSA sections participate in the program, and there are now 404 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

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

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

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(continued on p. 38)

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(continued on p. 40)

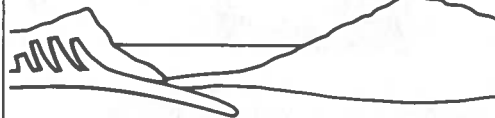
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195

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GSA SPECIAL PAPER 194

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Cady Memorial Fund Receives Gift

The Society has received an anonymous gift of stock, the cash proceeds of which have been donated to the Gilbert H. Cady Memorial Fund of GSA. The value of this generous gift is approximately \$9,500 and raises the principal of the fund to a level that guarantees the perpetuity of the Cady Award.

The Cady Award was established by the GSA Coal Division in 1971 and is made biennially to an individual for outstanding contributions to the field of coal geology. The award is named in honor of Gilbert H. Cady, one of North America's foremost authorities on the geology of coal.

Louise Hobbs Receives Meritorious Service Award

Louise K. Hobbs, who works with the GSA Ad Hoc Committee on Minorities in the Geosciences, has received the U.S. Department of Interior Meritorious Service Award for "major contributions to the Geological Survey through her activities relating to minority programs in the earth-sciences community." She contributed substantially to organization of the USGS Minority Participation in the Earth Sciences program and to the American Geological Institute Minority Participation Program. She organizes the GSA annual meeting Geoscience Day, a field trip for minority high school students.

MEETINGS

International Volcanological Congress, February 1-9, 1986, New Zealand. Information: John A. Gamble, Victoria University, Private Bag, Wellington, New Zealand.

Second Annual McKelvey Forum—USGS Research on Energy Resources, February 5-6, 1986, Denver, Colorado. Information: Pam Jackson, TRAC, P.O. Box 6100, Denver, CO 80206; (303) 393-7061.

Geotechnical and Geohydrological Aspects of Waste Management Symposium, February 5-7, 1986, Fort Collins, Colorado. Information: Eighth Annual Symposium on Geotechnical and Geohydrological Aspects of Waste Management, Geotechnical Engineering Program, Civil Engineering Dept., Colorado State University, Fort Collins, CO 80523; (303) 491-6081.

Eighth Australian Geological Convention, February 16-21, 1986, Adelaide, South Australia. Information: L. C. Barnes, P.O. Box 292, Eastwood, South Australia 5063, Australia; telephone 274 7580; Telex AA 88692.

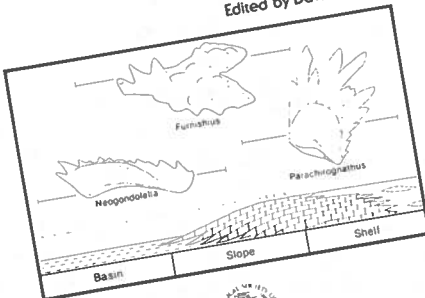
Symposium on Engineering Geology and Soils Engineering, February 26-28, 1986, Boise, Idaho. Information: Spencer H. Wood, Dept. of Geology and Geophysics, Boise State University, Boise, ID 83725; (208) 385-1631.

Prospectors and Developers Association 54th Annual Convention, March 9-12, 1986, Toronto, Ontario. Information: Prospectors and Developers Association, Suite 420, 74 Victoria St., Toronto, Ontario, Canada M5C 2A5; (416) 361-1969.

(continued on p. 44)

Conodont Biofacies and Provincialism

Edited by David L. Clark



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Meeting (continued from p. 43)

Symposium on Geochemistry of the Earth Surface and Processes of Mineral Formation, March 16-22, 1986, Granada, Spain. Information: R. Rodriguez Clemente, National Museum of Natural Sciences, c/o Jose Gutierrez Abascal, 2, 280006 Madrid, Spain; telephone (91) 2.62.25.13.

Fourth Federal Sedimentation Conference, March 24-27, 1986, Las Vegas, Nevada. Information: Doug Glysson, U.S. Geological Survey, 412 National Center, Reston, VA 22092; (703) 860-6834.

The Global Ocean: Its Chemistry and Resources, March 24-29, 1986, Woods Hole, Massachusetts. Information: P. A. Meyers, Oceanography Program, University of Michigan, 2455 Hayward Ave., Ann Arbor, MI 48109; (313) 764-0597.

Geochemistry and Mineralisation of Proterozoic Volcanic Suites, April 2-5, 1986, Nottingham, England. Information: Tim Pharaoh, Deep Geology Research Group, British Geological Survey, Keyworth, Nottingham NG12 5GG, England.

International Symposium on Coal and Coal-bearing Strata, April 8-11, 1986, London. Information: A. C. Scott, Geology Dept., Chelsea College, 552 King's Road, London SW10 0UA, England.

Experimental Mineralogy and Geochemistry: Applications to Petrology and Ore Deposits, April 17-19, 1986, Nancy, France. Information: A. Weisbrod, E.N.S.G., B.P. 452, 54001 Nancy Cedex, France.

Arizona-Nevada Academy of Science 30th Annual Meeting, April 19, 1986, Glendale, Arizona. Information: Jim Bales, 8643 E. Buena Terra, Scottsdale, AZ 85253; (602) 949-1549.

International Symposium on Environmental Geotechnology, April 21-24, 1986, Allentown, Pennsylvania. Information: H. Y. Fang, Geotechnical Engineering Div., Dept. of Civil Engineering, Lehigh University #13, Bethlehem, PA 18015; (215) 861-3549 or 3520.

32nd Institute on Lake Superior Geology, April 29-May 4, 1986, Wisconsin Rapids, Wisconsin. Information: Jeffrey K. Greenberg, Wisconsin Geological Survey, 3817 Mineral Point Rd., Madison, WI 53705; (608) 263-7385.

New Perspectives in Basin Analysis: A Symposium in Honor of Francis J. Pettijohn, May 8-9, 1986, Minneapolis, Minnesota. Information: Karen Kleinspehn or Chris Paola, Dept. of Geology and Geophysics, 310 Pillsbury Dr. SE, Minneapolis, MN 55455; (612) 373-4078.

IN MEMORIAM

Erich Dimroth
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July 1985

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November 1, 1985

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Haverford, Pennsylvania
October 16, 1985

Robert M. Lindvall
Denver, Colorado
October 27, 1985

William S. Pike, Jr.
Signal Mountain, Tennessee
February 1, 1985

George W. Pirtle
Tyler, Texas
August 29, 1985

Charles Richter
Whittier, California
September 1985

Geological Association of Canada-Mineralogical Association of Canada Annual Meeting, May 19-21, 1986, Ottawa, Ontario. Information: J. A. Donaldson, Dept. of Geology, Carlton University, Ottawa, Ontario K1S 5B6, Canada; (613) 231-2630.

49th Annual Northeastern Friends of the Pleistocene meeting and field trip, May 23-25, 1986, Fort Kent, Maine. Information: J. S. Kite, Dept. of Geology and Geography, University of West Virginia, Morgantown, WV 26506; (304) 293-5603.

American Association for the Advancement of Science National Meeting, May 25-30, 1986, Philadelphia, Pennsylvania. Information: AAAS Meetings Office, 1333 H St., NW, Washington, DC 20005; (202) 326-6400.

Third International Conference on Geoscience Information, June 1-5, 1986, Adelaide, Australia. Information: Secretary, Organising Committee 3ICGI, Australian Mineral Foundation, PB97, Glenside, South Australia 5065, Australia.

American Quaternary Association 9th Biennial Meeting, Environments at Glacier Margins—Past and Present, June 2-4, 1986, Champaign, Illinois. Information: Wayne M. Wendland, AMQUA Local Arrangements Committee, Illinois State Water Survey, 2204 Griffith Dr., Champaign, IL 61820; (217) 333-0729.

Geology of the Bahamas, Third Symposium, June 6-10, 1986, San Salvador, Bahamas. Information: H. Allen Curran, Dept. of Geology, Smith College, Northampton, MA 01063; (413) 584-2700, ext. 3943.

27th U.S. Symposium on Rock Mechanics, June 23-25, 1986, University, Alabama. Information: Howard L. Hartman, Dept. of Mineral Engineering, University of Alabama, P.O. Box 1468, University, AL 35486; (205) 348-6578.

6th International Conference on Geochronology, Cosmochronology and Isotope Geology, June 30-July 4, 1986, Cambridge, England. Information: Organising Committee, Sixth International Conference, Dept. of Earth Sciences, University of Cambridge, Downing St., Cambridge CB2 3EQ, England.

Geocongress '86, July 7-11, 1986, Johannesburg, South Africa. Information: Symposium Secretariat, S. 339, CSIR, P.O. Box 395, Pretoria, Republic of South Africa 0001.

International Field Conference on Proterozoic Geochemistry, July 13-19, 1986, central Colorado. Information: K. C. Condie, Dept. of Geoscience, New Mexico Institute of Mining and Technology, Socorro, NM 87801.

Deep Seismic Reflection Profiling of the Continental Lithosphere, July 15-17, 1986, Cambridge, England. Information: Bullard Laboratories, Madingley Rise, Madingley Rd., Cambridge CB3 0EZ, England.

International Symposium on Natural and Man-made Hazards, August 3-9, 1986, Rimouski, Quebec, Canada. Information: Mohammed El-Sabh, Dept. d'océanographie, Université du Québec à Rimouski, 310, avenue des Ursulines, Rimouski, Québec G5L 3A1, Canada; (418) 724-1755; Telex 051-31623.

Symposium on Intermontane Basins: Sedimentology, Tectonics, and Mineral Resources, August 4-7, 1986, Chiang Mai, & Thailand. Information: S. D. Nio, Comparative Sedimentology Div., State University of Utrecht, P.O. Box 80.021, 3508 TA Utrecht, Netherlands.

Third International Humic Substances Society Meeting, August 4-8, 1986, Oslo, Norway. Information: Egil Gjessing, Norwegian Institute for Water Research, P.O. Box 333, Blindern,

Oslo 3, Norway, or Wesley L. Campbell, IHSS Standards & Reference Committee, 5293 Ward Rd., Arvada, CO 80002; (303) 236-3615.

Fifth International Symposium on Water-Rock Interaction, August 8-17, 1986, Reykjavik, Iceland. Information: Halldor Armannsson, Orkustofnun — National Energy Authority Grensasvegur 9, 108 Reykjavik, Iceland.

Fourth International Kimberlite Conference, August 10-15, 1986, Perth, Western Australia. Information: J. D. Lewis, Geological Survey of Western Australia, Mineral House, 66 Adelaide Terrace, Perth, Western Australia.

Energy Resources in Asia, August 11-14, 1986, Hong Kong. Information: Asian Research Service, G.P.O. Box 2232, Hong Kong. (Abstracts due March 11, 1986.)

Basins of Eastern Canada and Worldwide Analogues, August 13-15, 1986, Halifax, Nova Scotia. Information: Secretary, Dept. of Oceanography, Dalhousie University, Halifax, Nova Scotia, Canada B3H 4J1.

Friends of the Pleistocene, Midwest Cell, August 15-17, 1986, Lawrence, Kansas. Information: W. C. Johnson, Dept. Geography, University of Kansas, Lawrence, KS 66045; (913) 864-5143.

Circum-Pacific Energy and Mineral Resources Conference, August 17-22, 1986, Singapore. Information: Allen G. Hatley, c/o Gaffney, Cline & Assoc., P.O. Box 76309, Dallas, TX 75379.

International Association on the Genesis of Ore Deposits Seventh Symposium, August 18-22, 1986, Lulea, Sweden. Information: Inger Wallin, Centek Conference, S-951 87 Lulea, Sweden.

37th Annual Highway Geology Symposium, August 20-22, 1986, Helena, Montana. Information: Joseph E. Armstrong, Montana Dept. of Highways, 2701 Prospect Ave., Helena, MT 59620; (406) 444-6280. (Abstracts due March 15, 1986.)

Third U.S. National Conference on Earthquake Engineering, August 24-28, 1986, Charleston, South Carolina. Information: James E. Beavers, Martin Marietta Energy Systems, Inc., Bldg. 9733-4, M/S 2, P.O. Box Y, Oak Ridge, TN 37831.

International Symposium on Large Rock Caverns, August 25-28, 1986, Helsinki, Finland. Information: International Symposium on Large Rock Caverns, Technical Research Center of Finland, Lehtisaarentie 2, SF-00340 Helsinki, Finland; telephone 358-0-4566172; Telex 122972 vttha sf.

International Symposium on Remote Sensing for Resources Development and Environmental Management, August 25-29, 1986, Enschede, Netherlands. Information: Secretariat Symposium Commission VII, ISPRS, c/o ITC, P.O. Box 6, 7500 AA Enschede, Netherlands; Telex 44525.

Iberian Terranes and Their Regional Correlation, September 1-6, 1986, Oviedo, Spain. Information: E. Martinez-Garcia, Dept. de Geotectónica, Facultad de Geología, Universidad de Oviedo, 33005 Oviedo, Spain.

International Conference on Landscapes of the Southern Hemisphere, September 2-7, 1986, Adelaide, South Australia. Information: Jon Firman, C/-S.A. Dept. of Mines and Energy, P.O. Box 151, Eastwood, S.A. 5063, Australia.

(continued on p. 46)

GSA
MEMOIR 162

The Caribbean- South American Plate Boundary and Regional Tectonics

The fact that the debate continues on the evolution of the Caribbean plate and its borderlands is reflected in the 28 papers included in this volume. Some authors postulate a distant Pacific source for Caribbean crust; others consider the geometry, timing, and effects of collision; still others view the process of evolution from the vantage point of the craton, from the time prior to collision, through the ensuing orogeny caused by collision, to the youngest phases of Plio-Pleistocene time.

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Meetings (continued from p. 45)

Second International Conference on Paleoceanography, September 7-12, 1986, Woods Hole, Massachusetts. Information: W. A. Berggren, Dept. of Geology & Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543.

1986 International Gas Research Conference, September 8-11, 1986, Toronto, Ontario. Information: 1986 International Gas Research Conference, c/o Gas Research Institute, 8600 West Bryn Mawr Ave., Chicago, IL 60631; (312) 399-8300, Telex 253812 or 503802.

International Association of Hydrogeologists Congress, September 8-15, 1986, Karlovy Vary, Czechoslovakia. Information: A. Zaporozec, AIH, 3817 Mineral Point, Rd., Madison, WI 53705.

Society of Economic Paleontologists and Mineralogists Third Annual Midyear Meeting, September 26-28, 1986, Raleigh, North Carolina. Information: Chuck Nittrouer, Dept. of Marine, Earth and Atmospheric Sciences, North Carolina State University, Raleigh, NC 27695. (*Abstracts due April 1, 1986.*)

17th Annual Binghamton Geomorphology Symposium on Aeolian Geomorphology, September 27-28, 1986, Guelph, Ontario. Information: William G. Nickling, Dept. of Geography, University of Guelph, Guelph, Ontario, Canada N1G 2W1; (519) 824-4120.

Geothermal Resources Council Annual Meeting, September 29-October 1, 1986, Palm Springs, California. Information: Geothermal Resources Council, P.O. Box 1350, Davis, CA 95617; (916) 758-2360.

American Association of Petroleum Geologists Eastern Section, October 2-4, 1986, Ann Arbor, Michigan. Information: Paul A. Catacosinos, Dept. of Geology, Delta College, University Center, MI 48710; (517) 686-9252. (*Abstracts due March 1, 1986.*)

American Association of Stratigraphic Palynologists Annual Meeting (with Congrès Internationale du Microflore Paléozoïque), October 29-31, 1986, New York, New York. Information: Dan Habib, Graduate School of City University of New York, 33 West 42nd St., New York, New York 10036; (212) 790-4218.

Society of Economic Paleontologists and Mineralogists Mid-Continent Section Annual Field Conference, October 30-November 1, 1986, Ponca City, Oklahoma. Information: William A. Morgan, Conoco, Inc., 1000 S. Pine, Ponca City, OK 74603; (405) 767-2853.

International Conference on Coastal Engineering, November 9-14, 1986, Taipei, Taiwan. Information: Billy L. Edge, Cubit Engineering Limited, 207 East Bay St., Suite 311, Charleston, SC 29401.

Geological Society of America Annual Meeting—November 10-13, 1986, San Antonio, Texas. Information: Meetings Dept., GSA, P.O. Box 9140, Boulder, CO 80301; (303) 447-2020.

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Penrose Conferences

Southern Oklahoma Aulacogen, March 23-28, 1986, Quartz Mountain State Park, Oklahoma. Information: M. Charles Gilbert, Dept. of Geology, Texas A&M University, College Station, TX 77843; (409) 845-2464 or 845-2451.

Reefal Development in a Terrigenous Province, May 17-21, 1986, Veracruz, Mexico. Information: Paul R. Krutak, ARCO

Exploration Co., P.O. Box 51408, Lafayette, LA 70505; (318) 264-4452.

Miocene Reconstruction of Southern California, May 30-June 4, 1986, Oxnard, California. Information: Peter W. Weigand, Dept. of Geological Sciences, California State University, Northridge, CA 91330; (818) 885-3541.

Migmatites and Crustal Melting, June 8-13, 1986, Amherst, Massachusetts. Information: Robert J. Tracy, Dept. of Geology and Geophysics, Yale University, New Haven, CT 06511; (203) 436-3539.

Mechanisms of Reservoir Diagenesis and their Geological Constraints, June 8-13, 1986, Cannes, France. Information: G. Michel Lafon, EXXON Production Research Company, P.O. Box 2189, Houston, TX 77252-2189; (713) 965-4688.

Exposed Cross Sections of the Continental Crust, late August or early September 1986, southeastern Ontario. Information: David M. Fountain, Dept. of Geology and Geophysics, University of Wyoming, Laramie, WY 82071; (307) 766-6299.

Sections

Northeastern, March 12-14, 1986, Kiamesha Lake, New York

Cordilleran, March 25-28, 1986, Los Angeles, California

South-Central/Southeastern, April 2-5, 1986, Memphis, Tennessee

North-Central, April 24-25, 1986, Kent, Ohio

Rocky Mountain, April 30-May 2, 1986, Flagstaff, Arizona

Annual Meeting, November 10-13, 1986, San Antonio, Texas.

1987

Hawaii Symposium on How Volcanoes Work, January 19-23, 1987, Hilo, Hawaii. Information: Robert Decker, U.S. Geological Survey, MS 910, 345 Middlefield Rd., Menlo Park, CA 94025.

International Symposium on Granites and Associated Mineralizations, January 21-31, 1987, Salvador, Brazil. Information: Augusto J. Pedreira, ISGAM, SME-CPM, Rua Ceara, 3-Pituba, 40.000, Salvador, Bahia, Brazil.

Canadian Reef Research Symposium, January 27-30, 1987, Banff, Alberta, Canada. Information: Canadian Reef Research Symposium, University of Calgary, Conference Office, 2500 University Dr. N.W., Calgary, Alberta T2N 1N4, Canada.

Coastal Sediments '87, May 12-14, 1987, New Orleans, Louisiana. Information: Nicholas C. Kraus, USAE Waterways Experiment Station, Coastal Engineering Research Center, P.O. Box 631, Attn. WESCR-P, Vicksburg, MS 39180-0631. (*Abstracts due April 30, 1986.*)

Second International Symposium on the Devonian System, August 17-20, 1987, Calgary, Alberta, Canada. Information: 2nd Int. Symp. on the Devonian System, Canadian Society of Petroleum Geologists, #505, 206 - 7 Ave. S.W., Calgary, Alberta T2P 0W7, Canada; (403) 264-5610.

Sixth International Congress on Rock Mechanics, August 31-September 3, 1987, Montreal, Quebec, Canada. Information: J. Franklin, Dept. of Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada.

XI International Congress of Carboniferous Stratigraphy and Geology, September 7-11, 1987, Beijing, China. Information: Yang Jingzhi, Nanjing Institute of Geology and Paleontology, Academia Sinica, Nanjing, China. (*Abstracts due March 15, 1986.*)

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