UAL REPORT ISSUE
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Powell Revisited: GSA's Centennial Trip into the Grand Canyon

by Sue Beggs

On the occasion of its Centennial Celebration, GSA provided an experience in the Grand Canyon for GSA members and their friends. As a happy circumstance, the trip also celebrated John Wesley Powell as an early GSA member and explorer/geologist in the grand old tradition.

In the first official event of GSA's Centennial year, 36 celebrants nt down the Colorado River aboard three motorized rafts. On the y they passed through 160 rapids (which, by the way, represent ly 9% of the river's distance), but rapids became almost inconse- ential as the wealth of geologic experience took precedence.

In the trip promotion we promised "enjoyment for geologists d their friends. Companionship with other geologists. Freedom m phones, deadlines, and other on-going stresses. Adventure for e adventuresome. Adventure for the scientific. Adventure for the rious. For anyone who wants to experience the grandeur of the nyon, the excitement and peacefulness of the river, and the joy of rning in a unique environment." This trip was a successful periment for GSA. It was available for GSA members and guests. vas R & R with geology as a focus. The quota filled quickly: we gan taking registrations at the end of October 1987, and the trip s closed by December 14. We turned away an additional 60 il-in registrations and phoned-in requests. There were approxi- ıtely 300 queries for more information.

Putting in on Friday, April 29, at Lee's Ferry (Mile 0) and taking t on Friday, May 6, at Separation Canyon (Mile 240), the rafts spent eight days on the river. The group faced changeable weather, but most of the days were warm-to-hot and sunny. We endured one cold day and, at the end, a long, long, windy day across Lake Mead. But neither variable weather nor rapids stayed the geologists from their rounds of noting, describing, and disagreeing about the ten major large-scale geologic events of the past 2 billion years. Some reveled in the revealed Precambrian, others in the travertines and Redwall Limestone. All were impressed by the volcanics, Vulcan's Throne, and a record of lava flows extending some 130 kilometres along the canyon. Havasu Creek took on new meaning for seventh-day rafters for whom clear travertine pools brought a fresh perspective. Eden was close at hand.

A typical trip to the Grand Canyon includes a mixture of people, many of them strangers to each other, boatmen, and "swampers" (those early-rising helpers who work so hard for the joy of one more trip on the river). GSA's trip had three unique features: (1) the concentration of experienced geologists and their guests, (2) the credentials of the geologist leaders, and (3) the six other canyon types, each a specialist in a different field, who enriched us with their

(*continued on p. 162*)

n Beus discusses Surprise Canyon Formation during a morning ture stop on day 2 of the GSA Grand Canyon trip.

Powell Revisited group pauses to pose on Precambrian sedimentary rocks during a hike between Carbon and Lava Canyons.

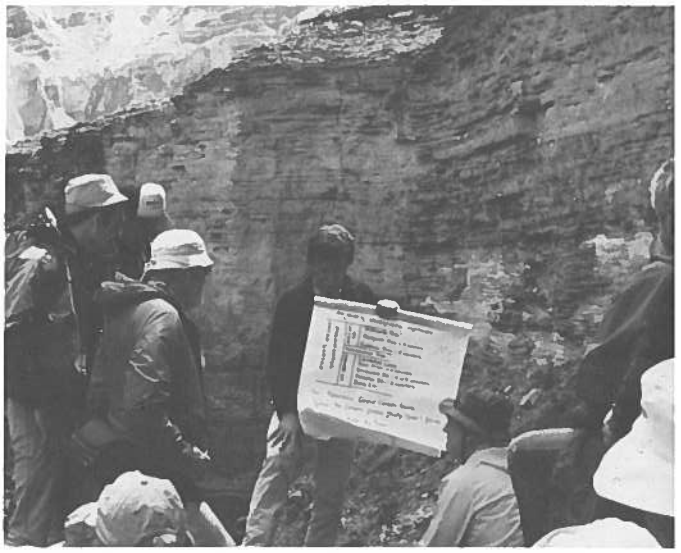
Photos by Pat Palmer.

Powell Revisited (*continued from p. 161*)

expertise in biology, archaeology, and park management. These people gave us their time, experience, and enthusiasm: Jan Balsom, Stan Beus, Bruce Blackerby, Nancy Brian, Marietta Davenport, Ken Hamblin, Ivo Lucchitta, Larry Stevens, Otis Willoughby; and the Arizona River Runners boatpeople: Owen Baynham, Bill Gloeckler, Tim Whitney, Kim Hunter, Gary Price, and Sherry Lee. It was a special experience. We all agreed it was worth repeating.

Because of International Geological Congress trips in the Grand Canyon in 1989, however, GSA will not repeat this trip until 1990. Other trips of similar quality are being discussed, though, including the volcanics of Hawaii, glaciation along the Alaskan coast, and a transect across the Canadian Rockies. Check September *GSA News & Information* for further information. If you have a 1990 calendar on hand, mark late April–early May for the next GSA "Powell Revisited" trip. A trip to New Zealand and Australia in January or February 1990 is also likely.

The Centennial trip in the Grand Canyon fulfilled the high expectations for it. Participants agreed that they had an experience to be remembered with pleasure.



Ivo Lucchitta describes Precambrian stratigraphy during a hike Carbon Canyon.

No Increase in 1989 Dues

Dues Statements Coming Next Month

The 1989 membership dues statements are now being prepared for mailing about the first part of August. Please note that all dues-paying Fellows, Members, and Student Associates receive three monthly publications, *The Geological Society of America Bulletin*, *Geology*, and *GSA News & Information* as part of their membership package.

The annual dues for a Fellow or Member for 1989 will be $70 (the same as 1987 and 1988) for the entire package, including membership and 12 issues each of the *Bulletin*, *Geology*, and *GSA News & Information*. The required dues for Student Associates for the same package will be $32 (the same as 1984, 1985, 1986, 1987, and 1988). Senior Members and Fellows may choose to receive the two journals for 1989 at a cost of $36 (they already receive *GSA News & Information*).

Married couples who are *both* current GSA members will be allowed a reduction in 1989 dues. Married couples will pay $70 for the first member ($32 for Student Associates) and $30 for the second. They will receive a single subscription to the *Bulletin* and *Geology*, but both members will continue to receive *GSA News Information*, ballots, and other GSA mailings. Please identify yo spouse and indicate in the spaces provided on the back of the du form who is requesting a reduction in dues. Please submit separa dues statements. *If a spouse is not currently a member*, do NC send dues payment without requesting and completing an applic tion for membership. The policy for married couples will apply on upon specific instructions from you.

Please inform us as soon as possible of any address change, it usually takes 6 to 8 weeks to correct the files. Meanwhil publications continue to be mailed to your former address. They a sent second class; therefore, the Post Office will not forward the without special instructions (and expense to you).

We must receive your 1989 dues payment *no later tha November 30, 1988*, to avoid a delay in receipt of your 1989 GS publications. If you have any questions or do not receive your 19 dues statement, please contact the GSA Membership Departmer P.O. Box 9140, Boulder, CO 80301; phone (303) 447-2020.

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Defense Waste Cleanup

by Jim Evans
GSA Congressional Science Fellow

Defense wastes are radioactive wastes and hazardous wastes at result from weapons production and disposal. Defense wastes se scientific, economic, and political problems. In some cases ere is need for technological advances, such as methods of safe cineration for old nerve-gas cannisters, or for disposing high-level dioactive waste from single-shell storage tanks. Political concerns e the need to clarify the authority of the laws that regulate civilian astes over defense wastes, the need for improved oversight and anagement, and the need to develop a method of funding defense aste cleanup.

ackground

Most of the recent attention about defense waste cleanup has cused on three Department of Energy (DOE) weapons production cilities: Hanford (Washington), Savannah River (South Carolina), d the National Engineering Laboratory (Idaho). These facilities oduce five types of waste: high-level radioactive waste (HLW), ansuranic waste (TRU), low-level radioactive waste (LLW), zardous waste, and "mixed waste" (mixtures of radioactive and zardous waste). Each type requires different handling procedures d ultimate disposal.

High-Level Waste. Weapons-grade plutonium is produced by posing uranium fuel elements to bombardment in a reactor over a ree-month period. The fuel elements are later dissolved, and the utonium and residual uranium extracted. The remaining liquid nstitutes high-level waste and contains abundant fission products g., ^{90}Sr, ^{137}Cs, ^{129}I) and some transuranic elements (e.g., U, Pu,). The fission products have short half-lives and produce the eatest amount of radioactivity initially; however, the smaller ounts of long-half-life transuranic elements pose the greatest ng-term health threat.

Past and present practice has been to store HLW in subsurface el tanks at Hanford and Savannah River, pending geologic posal. Tank storage was envisioned as a temporary solution, but er decades of storage, certain contamination problems have sulted. Between 1943 and 1980, HLW at Hanford was stored in 9 single-shell carbon-steel tanks. Corrosion of the tank liner used leakage from between 29 and 61 tanks, and an estimated 0,000 gallons of HLW were released into the soil. Since 1980 HLW s been stored in double-shell tanks, with improved monitoring ocedures.

HLW in liquid form can be vitrified into small pellets, which can en be handled relatively safely, and transported to the nation's ologic repository when it is completed. Vitrification plants, sting about $1 billion each, are under construction at Hanford and vannah River. The problem is that many of the older tanks have ecipitated sludge and encrusted salts. Safe handling and disposal this highly radioactive sludge and salt cake pose significant chnological challenges that will require the development of new mote-access machinery. Most of the anticipated cost of cleanup l come from disposal of these older, partly solidified forms of LW.

Transuranic Waste. Transuranic waste generally refers to carded materials (e.g., tools, filters, clothes, or glassware) and liquids that are contaminated with plutonium, uranium, neptunium, or other heavy elements. There are four categories of TRU waste at Hanford: solid TRU waste buried in the soil prior to 1970, retrievable solid TRU waste packaged since 1970, liquid TRU waste stored since 1973, and contaminated soil from the pre-1973 practice of dumping liquid TRU waste in surface trenches or pits. Five other federal facilities (Savannah River, Los Alamos, Oak Ridge, Nevada Test Site, and Idaho National Engineering Laboratory) store differing amounts of these four categories of transuranic wastes.

Since the early 1970s TRU waste has been packaged in a retrievable form for geologic disposal, and it has been proposed to ship these to the Waste Isolation Pilot Project (WIPP) near Carlsbad, New Mexico. The WIPP site is located in a 1000-m-thick bedded salt deposit about 270 m below the surface. WIPP was initially constructed as a research and development facility for the geologic repository, but it is being reevaluated as a potential geologic repository dedicated for TRU waste. The present plan calls for the first shipments of TRU waste in 1988–1989, followed by a five-year period of testing and evaluation.

Low-Level Waste. Low-level waste (LLW) includes liquids and solids that have relatively low levels of radioactivity but are produced in relatively high volumes. Defense LLW has been disposed of by dumping into the soil at thirteen different federal sites. Between 1943 and 1985, about 29 billion gallons of LLW were dumped into the soil at Hanford, and 11 million cubic feet of solid LLW were buried in soil trenches and pits.

Hazardous and Mixed Waste. Nonradioactive substances that are highly toxic, corrosive, reactive, or ignitable are classified as hazardous waste. More than 400 such substances are used or generated in defense production activities, including known toxic materials such as cadmium, lead, chromium, beryllium, and tetrachloroethylene (a degreasing solvent). In many cases, relatively small quantities of these materials have been disposed of on site, but one important exception is that approximately 10 tons of mercury have been buried at Savannah River. In many cases these hazardous materials are contaminated with radioactivity as part of normal plant operations, forming mixed waste. One of the legal issues that has ensued is whether mixed waste falls under the jurisdiction of federal hazardous waste laws (RCRA and CERCLA), or should be treated as a nuclear by-product, under the jurisdiction of the Atomic Energy Act.

Overview and Magnitude of Cleanup. A number of critical assumptions have governed the defense waste issue. It has been assumed that soil particles would adsorb routine or accidental discharge of radioactive materials. As a result, TRU- and LLW-contaminated solid materials were typically packaged in cardboard boxes and buried in shallow pits, while TRU and LLW liquids were

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Defense Waste Cleanup (*continued from p. 163*)

dumped in cribs or pits, to evaporate or slowly percolate. At Hanford, a plume of higher concentrations of tritium, iodine-129, and nitrates has been observed in the adjacent Columbia River, raising concerns about vertical transport of radioactive materials to the ground-water table, and lateral seepage into the river.

Many critical decisions made in the urgency of World War II have had long-lasting impact. It was assumed that HLW could be safely stored in tanks indefinitely, and plans for ultimate disposal were not devised until more than 20 years after initial tank leakage was documented. HLW is typically acidic, which would require storage in stainless steel tanks. Because of wartime shortages of stainless steel, it was decided to neutralize HLW, and store it in cheaper carbon-steel tanks. The ensuing formation of sludge was unforeseen, and the slower heat dispersion from sludge contributed to leaks and cracks in primary steel containers, and cooling-coil leaks and failures.

The magnitude of defense waste cleanup is staggering. The Environmental Protection Agency maintains a National Priority List (NPL) of commercial hazardous waste sites requiring cleanup efforts. At present, this list includes about 960 sites. Using the criteria of the NPL, the General Accounting Office recommends the addition of more than 750 sites at Hanford alone. The Department of Energy has estimated the cleanup of all of these contaminated sites at Hanford would cost approximately $17 billion.

Legislation

Defense waste cleanup has been a major issue in the 100th Congress. Nine bills attempt to resolve different aspects of the problem. The bills focus on three major areas: legal issues regarding application of federal hazardous waste management laws to federal facilities; DOE oversight and management; and funding for the defense waste cleanup effort.

Legal Issues. The two relevant federal hazardous waste management laws are the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, usually called the Superfund law), and the 1976 Resource Conservation and Recovery Act (RCRA). CERCLA regulates the cleanup of inactive or abandoned hazardous waste sites. RCRA regulates all hazardous waste, from production to actual disposal. A third law, the 1954 Atomic Energy Act, gives the Deparment of Energy authority over nuclear materials and their by-products.

The conflict between the Department of Energy and the Environmental Protection Agency stems from a provision in the original RCRA law that exempts DOE from RCRA whenever compliance would be "inconsistent" with the 1954 Atomic Energy Act. For many years, DOE maintained that the provision granted the agency the right of self-regulation. This eventually was cause for a 1984 lawsuit which held that DOE was subject to regulation through RCRA. In addition, RCRA was amended in 1984 to include authority over all underground storage tanks.

Congress is dissatisfied with the extent to which DOE has achieved compliance. Two reports by the General Accounting Office (GAO) (1986 and 1987) concluded that DOE has failed to identify Superfund sites, has failed to obtain needed RCRA permits, cannot account for expenditures on cleanup activities, has not maintained proper certification and records, continues to dispose of hazardous materials improperly, has not conducted adequate environmental monitoring, and has not fully cooperated with the Environmental Protection Agency and state agencies.

Pending legislation illustrates the depth of concern that Congress has about this issue. H.R. 3782 (Rep. Swift, D—Wash.) would establish an Office of Special Environmental Counsel to oversee the application of federal hazardous waste laws on feder facilities. The Special Counsel would have the authority to issu subpoenas as part of investigations of RCRA violation. The Spec Counsel would also have the authority to issue enforcement orde against the Department of Energy for failure to comply with RCR including assessment of civil penalties and commencement of leg actions against the department. This concept is also included H.R. 4193 (Rep. Bonker, D—Wash.) and its companion bill S. 21 (Sen. Adams, D—Wash.).

The legal definition of mixed waste and its handling is addresse in several bills. H.R. 3784 (Rep. Luken, D—Ohio), S. 1085 (Se Glenn, D—Ohio), H.R. 4193, and S. 1289 all define mixed waste as type of hazardous waste that is subject to provisions of RCRA.

In response to complaints by state agencies regarding enforc ment actions on federal facilities, H.R. 3785 (Rep. Eckart, D—Ohic H.R. 4193, and S. 2189 clarify that the federal government waiv their right of sovereign immunity at these facilities.

In response to concerns regarding DOE contractors and the liability, H.R. 3783 (Rep. Wyden, D—Ore.) would require feder contractors to obtain RCRA permits, would allow EPA to bloc contract awards to any parties with a record of repeated RCR violations, and would prohibit the use of federal funds by contracto to pay fines or penalties under RCRA.

DOE Oversight and Management. Several ideas have bee suggested to improve management or oversight of the DOE defen waste program. H.R. 3781 (Rep. Synar, D—Okla.) would establi an Office of Waste Management and Cleanup within DOE. Th office would be headed by a director who would be Senat confirmed, and it would have a separate, line-item budget within th DOE budget. There would be a mandatory annual GAO audit of th activities of this office.

H.R. 2047 (Rep. Dicks, D—Wash.) would establish a Defen Nuclear Facilities Safety Agency within the Executive Branch. Th agency would have a similar function relative to defense productio that the Nuclear Regulatory Agency has in regard to commerc nuclear materials. Unlike the NRC, however, the proposed agen would have a single director. It would have the authority to sh down any operating DOE nuclear facility for safety reasons, prevent the construction of nuclear facilities for failure to me safety standards.

S. 1085 (Sen. Glenn, D—Ohio) would establish a DOE Nucle Safety Board to evaluate safety standards and investigate acciden at federal facilities. It would provide for public comment and revie of these standards. The Secretary of Energy would be required implement recommendations from the board within one year. Th bill also requires that the Committee on Reactor Safeguards provi technical expertise to the board. The National Research Coun (National Academy of Sciences) would be authorized to conduct study comparing the difference between Nuclear Regulato Commission regulations and DOE orders governing nucle facilities.

Funding for Defense Waste Cleanup. H.R. 2625 (Re Morrison, R—Wash.) would raise funds for DOE cleanup activiti by placing a 0.5% "tax" on the Department of Defense budget a on the DOE defense production budget over a five-year perio Proponents estimate that over a five-year period, this bill would rai $7 billion dedicated for defense waste cleanup activities.

H.R. 4193 (Rep. Bonker, D—Wash.) and S. 2189 (Sen. Adam D—Wash.) would create a dedicated trust fund for defense was cleanup. Over the first three years, the trust would receive $1 billi annually. The trust would be replenished by additional appropr tions or by deposit of penalties from RCRA or CERCLA enforc ment activities at federal facilities.

1988 Centennial Celebration Symposia Highlights

This is the second in a series of three articles highlighting mposia to be presented in Denver at the 1988 GSA Centennial elebration. The first of this series appeared in the June issue of *SA News & Information* and the third will appear in the ptember issue. The August registration issue of *GSA News & ormation* will give a complete listing of symposia titles and authors.

Phanerozoic Tectonics of North America

onsored by the Structural Geology and Tectonics Division
onveners: Arthur W. Snoke, Gregory A. Davis
eakers: William R. Muehlberger, Harold Williams, Robert D. tcher, Jr., George W. Viele, James L. Pindell, Fernando Ortega-tierrez, Warren Hamilton, Hubert Gabrielse, George Plafker

The purpose of this symposium is to provide a state-of-the-art erview of the Phanerozoic tectonic evolution of North America. ie symposium is a bold attempt to provide a first-order tectonic nthesis of the past 600 million years of Earth history as recorded in e rocks of North America. This synthesis will allow a comparison the various tectonic events that have shaped the evolution of the ntinent. Furthermore, the symposium will provide an opportunity evaluate important problems that are still poorly understood. In s light, the symposium has the potential to highlight some new enues of research that may lead to breakthroughs in our derstanding of the Phanerozoic tectonic history of North America. particular, an accurate understanding of the tectonic history of e continent is fundamental in exploration for mineral deposits and ssil fuels.

Controls on the Distribution and Quality of Cretaceous oal

onsored by the Coal Geology Division
onveners: Peter J. McCabe, Judith Totman Parrish
eakers: List unavailable at this time

A significant proportion of the world's coal resources accumu-ed during the Cretaceous. They are found on every continent cept Antarctica. The symposium will bring together scientists of ferent disciplines to examine the major controls on the distribution d quality of these coals. This is an optimal time for such a mposium because of recent developments in several relevant lds. The majority of Cretaceous coals accumulated in foreland sins, and in the last few years there have been significant vances in our understanding of the evolution of these basins. In dition, Cretaceous sea-level changes and paleoclimate are much tter understood. The major controls of tectonism, sea-level ange, and climate are important in determining the morphology d evolution of peat-forming environments. There is an increasing /areness that we must understand these major controls in order build better predictive models of coal-bed thickness and quality.

nd 7. Modern Glaciomarine Deposits: Polar vs. Temperate nvironments
ncient Glaciomarine Deposits: Polar vs. Temperate nvironments

onsored by the Quaternary Geology and Geomorphology vision
M. Conveners: John B. Anderson, Gail M. Ashley
M. Conveners: Carolyn H. Eyles, Julia M.G. Miller
eakers: J. B. Anderson, P. J. Barrett, M. J. Hambrey, E. W. omack, B. F. Molnia, L. Bartek, E. A. Cowan, R. D. Powell, A. J. acpherson, D. Phillips, N. D. Smith, J. A. Dowdeswell, J. C. Crowell, J.N.J. Visser, J. Marmo, G. M. Young, V. A. Gostin, J. T. Andrews, J. C. Boothroyd, G. M. Ashley, H. W. Borns, Jr., M. B. Lagoe, C. H. Eyles, N. Eyles

The two symposia will integrate findings from modern glacial marine studies and ancient settings (i.e., the rock record) in order to examine the similarities and differences of polar and temperate depositional environments. Modern process studies provide data on cause and effect, whereas the rock record allows examination of thick sequences in three dimensions. An understanding of the depositional processes and products in polar and temperate glacial marine environments must be established to allow accurate paleo-environmental reconstructions to be made. Documentation of glacigenic deposits, particularly whether the glacial deposits represent polar (and subpolar) or temperate glaciation, provides important information for paleontologists, paleoclimatologists, and others studying earth history.

9. New World Geoarchaeology

Sponsored by the Archaeological Geology Division
Conveners: Fekri Hassan, C. Reid Ferring
Speakers: List unavailable at this time

Following the peopling of the New World during the terminal Pleistocene, a series of cultural transformations led to the emergence of a variety of cultures in a spectrum of habitats. This symposium focuses on the contributions from the earth sciences aimed at understanding the time, sequence, and paleoenvironmental setting of these cultural transformations from the period of Clovis hunters to the advent of agriculture and the emergence of complex societies. This symposium provides examples of the union of geological sciences with archaeological domains. It illustrates the importance of geology in understanding human history—the most recent chapter in the history of life on Earth. The symposium also underscores the utility of archaeological geology as a means for understanding the rate and effects of geological processes on a short-term time scale.

10. Use of Geophysical Methods for Hydrogeologic Characterization and Problems of Contaminant Transport

Sponsored by the Hydrogeology Division
Conveners: Stephen W. Wheatcraft, Mark Stewart
Speakers: List unavailable at this time

The purpose of this symposium will be to illustrate state-of-the-art geophysical techniques as they have evolved for application to contaminant transport problems. Traditionally, geophysical methods have been used in groundwater investigations for obtaining basic information such as groundwater levels, saturated-zone thickness, and delineation of water-bearing stratigraphic zones. The methods and interpretation techniques were directly borrowed from the mineral and petroleum industries. During the past several years, significant advances have been made in developing geophysical tools and interpretation strategies that are specifically designed to aid in the solution of groundwater contaminant transport problems. These developments have occurred primarily in response to the problem of groundwater contamination from hazardous waste. The papers for this symposium will be chosen to emphasize these new developments. Numerous studies have focused on the problem of "delineating the plume." However, many contaminant plumes do not have an electrical signature; moreover, plume location only provides initial (or current) conditions and does

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not help in the prediction of contaminant migration. This symposium will emphasize the theme of obtaining information that is necessary for the prediction of contaminant transport. This information includes aquifer geometry, hydraulic parameters, and spatial variation of parameters that provide necessary input for stochastic transport models.

14. Computer-Assisted Phylogeny Programs in Research and Teaching

Sponsored by the Paleontological Society and the Society of Vertebrate Paleontology

Conveners: Kevin Padian, David R. Lindberg

Speakers: Kevin Padian, Wayne Maddison, David Swofford, Joseph Felsenstein, Chris Meacham, Michael Donoghue, Tim Rowe, Dan Fisher, Sandra Carlson, David Lindberg, Thomas Waller, Richard Cowen, David Schindel

This symposium centers on the use of computer programs in reconstructing the evolutionary relation of organisms, and how to use these applications in research and teaching. The object of this symposium is to acquaint audience members directly with the most important and newest programs. We will have many of the people who developed these programs on hand to give brief explanations of them, and at the workshop following the talks, these people will demonstrate their use on Apple and IBM computers for the audience. We will also have for all audience members floppy diskettes of the programs and their documentation, and we will provide hard-copy handouts that briefly explain most of the programs covered in the symposium.

17. Last Interglaciation/Glaciation Transition (122–64 ka) in North America

Conveners: Peter U. Clark, Peter D. Lea

Speakers: Richard P. Goldthwait, William F. Ruddiman, Daniel R. Muhs, Brandon Curry, Leon Follmer, Aleksis Dreimanis, Nicholas Eyles, Michel LaMothe, Robert N. Oldale, Gifford H. Miller, John T. Andrews, Jean-Serge Vincent, L. Harvey Thorleifson, P. H. Wyatt, Erik Nielsen, Peter D. Lea, John J. Clague, John V. Matthews, Jr., Owen L. Hughes, Steven M. Colman, Kenneth L. Pierce, Alan R. Gillespie, John A. Westgate

This symposium will provide an interdisciplinary forum where scientists from geology, oceanography, and climatology who are interested in the problems associated with the record of the transition from the last interglaciation to the last glaciation in North America can explore the advances that have been made in our understanding of this critical period. The overall scope of the symposium addresses a question that is particularly relevant to the growing concern about the future of the present interglaciation. Only by fully understanding the consequences of climate change in the past can one make predictions of the future. Accurately identifying the geologic record of cryosphere response to climate change following the last interglaciation thus represents a critical step toward linking climate forcing functions with Earth systems response. This symposium will update the status of our understanding of the transition from the last interglaciation to the last glaciation and, more important, identify directions of future research.

18. The Role of Geology in the Superconducting Super Collider Site-Selection Process

Conveners: Kenneth V. Luza, Neil H. Suneson

Speakers: William P. Rogers, Jeffrey Reid, William T. Hill, Larry D. Fellows, Morris W. Leighton, R. Thomas Segal, Edward Bingler

Geotechnical factors are expected to play a leading role in the site-selection process for large-scale, government-funded construction projects. The Superconducting Super Collider (SSC) is one such project. The construction and operation of the facility is influenced to a large degree by the geologic characteristics of the site. The role geologists have had in the site-selection process is of great importance to the geological community. This symposium will explore how the different states chose their site(s), and how geologists in state surveys, consulting companies, and universities worked together with state legislators and the public to write a proposal that would convince DOE to build the SSC in their state. What is learned at this symposium may change the way geologists approach their next major construction-project proposal. The purpose of this symposium is not to herald the merits of any particular proposed site. Rather, it will document the role of geologists and geology in the site-selection process. What, if any geologic criteria were used to select the best site in an entire state for the 85-kilometre-circumference collider ring, how and why were large areas eliminated early in the selection process, and what geotechnical factors were considered the most and the least important in the final stages of the process? How did geologists interact not only with other geologists working on the project, but also with state legislators and/or local officials?

19. Andean Magmatism and Its Tectonic Setting

Conveners: Russell S. Harmon, Ian W.D. Dalziel, Suzanne M. Kay

Speakers: List unavailable at this time

The focus of this symposium is the Andean mountain chain of western South America, which extends some 9000 km from Colombia to Chile. The Andes have developed as a continental margin arc since early Mesozoic time and are considered the "classic" example of magmatism and tectonism associated with subduction of oceanic crust (the Nazca plate) beneath continental crust (the South American continent). During Middle Proterozoic to Paleozoic time the central Andean region developed through three successions of intracontinental, anorogenic tectonism and magmatism followed by compressional regimes and associated magmatism and metamorphism. South of latitude 30°S, true oceanic crust may have been present during the early Paleozoic.

The purpose of this symposium is to bring together geoscientists who are actively working on different aspects of Andean volcanism, magmatism and tectonics/crustal development or who have a general interest in Andean and Cordilleran geology. Much progress has been made in these areas over the past 10–15 years, but these results have not really been integrated and considered in the "big picture" context. This is one reason for convening the symposium. But the symposium is not only scientifically timely, it is also geopolitically timely. In the broadest sense, "America" includes both the North and South American continents, and the western margins of both share a common geologic history. U.S. scientists have been particularly active in Andean studies and have made major contributions to the current understanding of Andean magmatism and tectonics. Thus, it is appropriate to include in the GSA Centennial meeting such a symposium, which is an activity of the North American working group of IGCP Project 249, "Andean Magmatism and Its Tectonic Setting," and is of broad interest.

20. Siljan Ring Well, Sweden: Deep Drilling in Crystalline Rocks

Convener: John R. Castano

Speakers: List unavailable at this time

The Siljan Ring well has attracted a great deal of scientific interest since drilling began in July 1986. The well was suspended i

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entennial Symposia (*continued from p. 166*)

ptember 1987 at a depth of 6300 metres; it was exploring for iogenic gas in fractured granitic rocks of the largest meteor crater Europe. Although the well was drilled as a commercial venture, e scope of the investigations is very broad. These studies include ophysics, geochemistry, petrology, radiometric age dating, drology, rock mechanics, wire line logging, etc. Many of the vestigators are based in the United States; the remainder are in six ıropean countries, Canada, and Australia. For example, in ganic geochemistry we have studied hydrocarbon and inorganic ses and have obtained isotopic data on methane, ethane, propane, hydrogen, and helium. For dating, we have employed Pb/U, K/Ar, Ar/Ar, and fission-track analysis. The geophysical data are particularly impressive, because the correlation of the well and surface seismic data conclusively shows that the strong subhorizontal reflectors are diabase intrusive rock. This basic information about the crust is of fundamental importance to many geoscientists. Of course, there will be considerable discussion concerning Tommy Gold's abiogenic gas theory, and I expect that he will be one of the speakers. The symposium will be of interest to those interested in organic geochemistry, the geology and geophysics of the crust, and impact phenomena.

1988 Centennial Celebration Field Trips

Denver provides an ideal opportunity for many fine field trips, ıth in the local area and throughout the West. The trips, mmarized below, will provide a look at all aspects of western ology, with something of interest and value for each geoscience ecialty. Several trips, in keeping with the Centennial of GSA, ıphasize and revisit areas and topics covered by the great western rveys of the late 19th century and the early pioneer geologists who sembled the geological framework we now take for granted.

All trips begin and end in Denver unless otherwise noted. Costs e estimates. Registration forms will appear in the August issue of *SA News & Information*. Preregistration is suggested because tendance is limited and will be determined on a first-come, first-rved basis. **Preregistration deadline is October 7.**

For further information, contact the 1988 Field Trip Chairman, tegory S. Holden, Dept. of Geology and Geological Engineering, olorado School of Mines, Golden, CO 80401, (303) 273-3800 or the dividual trip leaders.

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. **Crust of a Young Earth—Guide to the Precambrian Continental Core of Southeast Wyoming.** George L. Snyder, USGS, Denver, Colorado, (303) 236-1233; B. Ronald Frost, James A. Grant. 3½ days, October 27 (afternoon) to October 30. Cost: $220. Limit: 50.

Well-exposed Precambrian basement rocks in southeast yoming preserve a long history of crustal formation and later velopment. This field trip will emphasize examination of metaorphosed fossiliferous Archean greenstone belt rocks and their mobilized granitic basement; Proterozoic intrusive rocks of the ıramie anorthosite complex; and contrasting Archean sedimentary matite ore and Proterozoic intrusive magnetite ore. Stops will be the Hartville uplift and central Laramie Mountains of southeast yoming.

. **Proterozoic Plutons and Pegmatites of the Pikes Peak Region, Colorado.** Reinhard A. Wobus, Williams College, Williamstown, Massachusetts, (413) 597-2470; Robert M. Hutchinson. 3 days, October 28 (morning) to October 30. Cost: $260. Limit: 36.

Examine three generations of Proterozoic granitic plutons alc-alkalic, peraluminous, and subalkalic) of the southern Front ınge, with emphasis on the petrology and structure of the 1.0 Ma orogenic composite Pikes Peak batholith and its associated sodic d potassic stocks and ring complexes. Collecting stops will be ade at amazonite- and smoky quartz–bearing pegmatites of the ake George (Crystal Peak) district. Weather permitting, the group ll go by van to the summit of Pikes Peak (4230 m) to view ceptional exposures of granite-tectonic structures and lithologic ning along the road above timberline.

3. **An Integrated View of Depositional Systems of the Early Tertiary Coal Measures, Powder River Basin, Montana and Wyoming.** Romeo Flores, Coal Geology Branch, USGS, Denver, Colorado, (303) 236-7774; Timothy Moore, Peter Warwick. Trip begins and ends in Casper, Wyoming. 3 days, October 28 (morning) to October 30. Cost: $310. Limit: 35.

This trip will focus on the depositional environments of clastic sediments as well as the petrology, geochemistry, palynology, and paleobotany of coal deposits of the Paleocene Tongue River Member of the Fort Union Formation and Eocene Wasatch Formation in the Powder River Basin, Montana and Wyoming. Economic coal beds, particularly the anomalously thick ones, are interpreted as deposits in swamps of fluvial systems that consisted of meandering and anastomosed streams in the basin proper and braided streams and alluvial fans in the basin margin. The nature of these systems and associated swamp environments will be examined in open-pit mines and outcrop.

4. **In Search of Hayden's Tertiary Lakes of the High Plains: The White River Formation Revisited.** Robert H. Blodgett, University of Texas, Austin, (512) 471-5762; Emmett Evanoff, Russell G. Shepherd. Trip begins in Casper, Wyoming. 3¼ days, October 27 (evening) to October 30. Cost: $180. Limit: 33.

This trip will focus on the Oligocene White River Formation that composes part of the classic "gangplank" shed eastward from the Laramie and Front Ranges of the Rocky Mountains. A traverse from Douglas, Wyoming, to northeastern Colorado examines excellent three-dimensional exposures of fluvial, colluvial, and eolian deposits. On the basis of mostly unpublished work by Evanoff, Blodgett, and Shepherd (Keota–Pawnee Buttes area, Colorado), this trip evaluates Oligocene sedimentation in the context of modern fluvial and eolian sedimentology, paleoecology, and paleopedology. Highlights include a major paleo-valley fill, diverse terrestrial molluscan fauna, the internal architecture of braided stream facies, calcareous paleosols and soil trace-fossils, and exhumed meandering-stream channels.

5. **Geology and Hydrogeology of the Nebraska Sandhills.** James B. Swinehart, University of Nebraska, Lincoln, (402) 472-7529; Thomas C. Winter, James Goeke. 3 days, October 28 (morning) to October 30. Cost: $235. Limit: 40.

Examine the geologic framework and hydraulic characteristics of the Nebraska Sandhills, the largest dune field in North America. The predune stratigraphic sequence and the interaction of modern and ancient fluvial systems with the dune field will be covered. Focus will be on the morphology, internal stratification, and chronology of the dune field, with a lengthy stop at Merritt Reservoir, where 1.5 km of lakeshore exposures allows inspection of the internal structure of

(*continued on p. 168*)

Centennial Field Trips (*continued from p. 167*)

50-m-high barchanoid ridge dunes. The hydrology of Crescent Lake National Wildlife Refuge will be emphasized. A variety of studies will be examined, including infiltration, groundwater recharge, and related flow systems in a dune-lake system.

6. **Paleohydrology and Hydrogeology of the Carbonate Rock Province of the Great Basin (East-Central Nevada to Southern Nevada).** M. D. Mifflin, Mifflin and Associates, Inc., Las Vegas, Nevada, (702) 798-0402; J. Quade. 3 days, October 28 (morning) to October 30. Trip begins in Elko, Nevada, and ends in Las Vegas, Nevada. Cost: $350. Limit: 40.

Compare pluvial climate (late Pleistocene–early Holocene) ground-water discharge deposits in southern Nevada (formerly considered lake beds) with modern analog environments of ground-water discharge associated with sedimentation and fauna in east-central Nevada. It will allow for comparison of basins with no ground-water discharge and local ground-water discharge with basins where regional discharge for large springs occurs, illustrating the evidence for local flow systems and regional flow systems with important interbasin flow. The trip will demonstrate the pluvial lake shorelines in several basins and the absence in several others, and it will follow the Pleistocene White River drainage channel throughout much of its length. Quaternary geologists, micropaleontologists, and hydrogeologists would find the trip of interest.

7. **From the Basin and Range to the Edge of the Plains in the Tracks of Wheeler, Powell, and Hayden.** R. L. Langenheim, Jr., University of Illinois, Urbana, (217) 333-3540; Pius Neibel. Trip begins in Las Vegas. 4 days, October 27 (morning) to October 30. Cost: $325. Limit: 40.

Primary emphasis will be on the stratigraphic and structural changes from the eastern Basin and Range across the Colorado Plateau and southern Rockies to the margin of the Great Plains. The trip will also concern how understanding of the geologic provinces has developed from and since the pioneering exploratory efforts of the Wheeler, Powell, and Hayden surveys. This trip will make stops at the Buffington Pocket (Muddy Mountain thrust), in the Virgin Gorge (Grand Wash fault), on the Hurricane fault scarp at Hurricane, in Zion, at Bryce (Sevier and Paunsagunt faults), on the Aquarius Plateau and in Waterpocket fold (Capitol Reef), at the Fisher Towers on the Colorado River north of the La Sal Mountains (laccolith and salt anticline), on the Uncompahgre Plateau at Colorado National Monument, at Palisade where the Colorado River breaches the Book Cliffs, at the Grand Hogback and in Glenwood Canyon, in Middle Park, and on the Front Range hogbacks.

8. **Pennsylvanian and Permian Depositional Systems and Cycles in Eagle Basin (Vail to Glenwood Springs), Northwest Colorado.** Samuel Y. Johnson, USGS, Denver, Colorado, (303) 236-1545; Christopher J. Schenk, John A. Karachewski. 2 days, October 29 (morning) to October 30. Cost: $120. Limit: 36.

This trip will focus on Pennsylvanian and Permian depositional systems and cycles in the Eagle Basin, northwest Colorado. Strata to be examined include the Minturn Formation, the Eagle Valley evaporite, the Maroon Formation, the Schoolhouse Tongue of the Weber Formation, and the sandstone of Frying Pan River. Facies of these units were deposited in an unusually broad spectrum of environments that include deep evaporite basins, carbonate reefs, fan deltas, terminal fluvial fans, and eolian sand sheets, loess fields, and local dune fields. Principal emphasis will be on (1) recognition of the distinctive sedimentologic characteristics of each facies, (2) recognition and correlation of eustatic, climatic, and tectonically controlled cycles, and (3) reconstruction of basin paleogeography.

9. **Archaeological Geology in the Colorado Piedmont an High Plains of Southeastern Wyoming.** Vance T. Holliday University of Wisconsin, Madison, (608) 262-6300; Adrienne E Anderson, George C. Frison. Trip begins in Cheyenne Wyoming. 2½ days, October 28 (evening) to October 3(Cost: $175. Limit: 40.

This trip will focus primarily on the late Quaternary stratigraph and geomorphology at several classic archaeological sites, including in Wyoming, the Hell Gap paleo-Indian site and some stone-to quarry sites in the same area and, in Colorado, the famou Lindemeier Folsom site and, along the South Platte River, th Jurgens, Frazier, and Dent sites. All were localities of pioneerin research in archaeological geology as well as being outstandin archaeological sites. This trip will be of interest to archaeologic geologists, Quaternary geologists, and geomorphologists.

10. **Northeastern Front Range Revisited: Compression an Crustal Wedging in a Classic Locality for Vertica Tectonics.** Eric Erslev, Colorado State University, Fort Collins (303) 491-5661. 1 day, October 31. Cost: $45. Limit: 28.

Plunging Laramide structures along the northeastern margin the Front Range expose characteristic changes in geometry an deformation mechanisms in basement-cored foreland uplifts. Partic pants will evaluate previous models involving vertical uplift b examining exposures of faults and folds at multiple structural level Geometric constraints of restorability of both cover and basemer will be illustrated with analog models and integrated with field dat into a regional model for the Front Range uplift.

11. **Geomorphology and Quaternary Geology of Canyon lands, Utah.** Deborah Harden, San Jose State University, Sa Jose, California, (408) 277-2385; Steven Colman. Trip begin and ends in Grand Junction, Colorado. 3 days, October 2 (noon) to October 30. Cost: $200. Limit: 40.

This trip will emphasize the spectacular erosional landscape the Canyonlands area and the Quaternary history of the regior Incised meanders and terraces of the Colorado River syster Quaternary salt deformation, calcic soils, and the pediment arches, cliffs, and canyons that characterize the region will b examined. Stops include Fisher Valley, Needles Overlook, Colorad River terraces, Spanish Valley, Arches National Park, and aban doned meanders of the Green River.

12. **In the Footsteps of G. K. Gilbert—Lake Bonneville an Neotectonics of the Eastern Basin and Range Province** Michael Machette, USGS, Denver, Colorado, (303) 236-124 Don Currey, Jack Oviatt, William McCoy, William Scott, Te Barnhard, Alan Nelson, Steve Personius, David Schwartz William Lund, Richard Van Horn. Trip begins and ends in Sa Lake City, Utah. 3 days, October 28 (morning) to October 3(Cost: $185 (Salt Lake City residents $95). Limit: 40.

In keeping with the 1988 Centennial theme, this field trip wi emphasize three topics studied by G. K. Gilbert 100 years ago: Lak Bonneville geomorphology (shorelines, bars, spits, deltas), stratig raphy of the Bonneville lacustrine cycles, and neotectonics of th eastern Basin and Range province, especially the Wasatch fau zone. Visit some of Gilbert's classic stratigraphic localities an photographic sites; mix in data from several new sites which hav modified his original work in the modern stratigraphic and tectoni framework. A considerable body of research has been generated i the past 35 years regarding Lake Bonneville and neotectonics of th eastern Basin and Range. Although the trip will draw from this bod of research, the main focus will be G. K. Gilbert, his pioneerin studies of 100 years ago, and his legacy to comtemporary eart scientists.

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:entennial Field Trips (*continued from p. 168*)

3. **Hydrogeology and Phytogeomorphology of the Mountains and Foothills near Denver, Colorado.** K. E. Kolm, Colorado School of Mines, Golden, (303) 273-3800; J. C. Emerick. 1 day, October 30. Cost: $40. Limit: 40.

Prepare to explore the geomorphic, botanical, and hydro-eologic aspects of the diverse ground-water and surface-water ystems of the mountains and foothills near Guanella Pass, west of enver, Colorado. The headwaters and ground-water systems of ieneva Creek, part of the North Fork of the South Platte River ystem, will be explored. Geomorphic systems will include weather-ıg, Holocene mass movements, and Pleistocene glacial and lolocene fluvial erosional and depositional features. Phytogeo-ıorphic systems will include the alpine, subalpine, montane, and parian.

4. **Geology and Vertebrate Paleontology of Western Colorado and Eastern Utah.** William L. Chenowith, Grand Junction, Colorado, (303) 242-9062; Robert G. Young, Harley J. Armstrong. 3 days, October 27 (morning) to October 29. Trip begins and ends in Grand Junction, Colorado. Cost: $200. Limit: 40.

The Dinosaur Triangle of western Colorado and northeastern Utah contains world-famous dinosaur museums and quarries. This ip will visit many of the most important and review the geology of ıis unique area. The itinerary will include the Rabbit Valley Quarry, an Rafael Swell, Lloyd Quarry, Book Cliffs, Utah Field House of latural History, Dinosaur National Monument, Douglas Creek .rch, and Dinosaur Hill and Riggs Hill quarries.

5. **Major Landslides and Geotechnical Construction Problems in the Mountains of Colorado.** William P. Rogers, Colorado Geological Survey, Denver, (303) 866-2611; Bruce Stover, Jim Soule. 2 days, October 28 (morning) to October 29. Cost: $150. Limit: 40.

This trip will examine geologic hazards and engineering eology of landslides, rockfall areas, debris flows, and highway onstruction in hazardous canyons of western Colorado. Highlight-ıg the trip will be stops at the Dowds Junction landslide complex ear Vail, Colorado, a tour of geotechnical aspects of interstate ighway construction through Glenwood Canyon, and a stop at the 80 million cubic metres Muddy Creek landslide complex that eactivated in spring 1986.

6. **Precious-Metal Telluride Deposits at Gold Hill, Boulder County, Colorado.** Bruce Geller, University of Colorado, Boulder, (303) 492-8141; W. W. Atkinson, Jr., Jeff Kurtz. 1 day, October 29. Cost: $50. Limit: 20.

This trip will examine epithermal precious-metal mineralization ı the Boulder telluride belt, northwest of Boulder, Colorado. The iold Hill, Jamestown, Magnolia, and Sugarloaf districts will be sited. Stops to examine Tertiary intrusive rocks, Precambrian asement, and several mines will give a general genetic picture of ıe belt. Underground tours will be possible at some mines.

ostmeeting

7. **The Earth Has a History.** A. R. (Pete) Palmer, Geological Society of America, Boulder, Colorado, (303) 447-2020. 1 day, November 4. Cost: $25. Limit: 24.

Boulder, Colorado, has a unique set of outcrops, including lolocene stream gravels, steeply dipping fluvial conglomeratic andstones at the base of a thick homoclinal sequence of varied edimentary rocks, and two angular unconformities (Pennsylvanian/ recambrian; Quaternary/Cretaceous), all within sight of each ther, that illustrate the basic principles of stratigraphy and help emonstrate to a lay audience how geologists know that Earth has a history. A one-day trip using these outcrops has been an effective way to begin a constructive dialog with creationists and others who have trouble with a universe that has infinite time dimensions as well as space dimensions.

18. **Styles and Deformation of the Cordilleran Orogenic Belt and the Mid-Tertiary Tectonic Overprinting, Southeast Arizona.** Harald Drewes, USGS, Denver, Colorado, (303) 236-5647; Steven Reynolds. Trip ends in Tucson, Arizona. 3½ days, November 3 (5:00 p.m.) to November 6. Cost: $320. Limit: 30.

Field evidence for the complex compressional styles of Cordilleran orogenic age (Late Cretaceous–Paleocene) in three key ranges. We will walk 4–5 hours each day, mainly on trails and jeep tracks. In the Dragoon Mountains, we will see two main thrust plates of metamorphosed, upended, oppositely facing thrust platelets, which are overlain by a third plate of unmetamorphosed gently dipping rocks. There is also evidence of telescoping of sedimentary facies between the top and bottom main plates. In the Santa Rita Mountains we will see evidence for closely dating two phases of Cordilleran thrust faulting. Movement on the younger phase, of a few kilometres, is associated with reactivation of older strike-slip faults. In the Rincon Mountains evidence will be shown for differences in age and style of deformation between deep Cordilleran thrust faults and shallow Miocene gravity faults. Fabric contrasts across the Rincon gneiss-cored dome suggest that the early phase of dome development overlapped with the last movement on thrust faults on which minimum movement was tens of kilometres.

19. **Glacial-Marine Sedimentation, Mineral Fork Formation (Proterozoic III), Utah.** Nicholas Christie-Blick, Lamont-Doherty Geological Observatory, Palisades, New York, (914) 359-2900; Paul Karl Link. 2½ days, November 3 (5:00 p.m.) to November 5. Trip ends in Salt Lake City, Utah. Cost: $190. Limit: 30.

Glacial-marine strata of the Mineral Fork Formation were deposited in erosional valleys as much as 850 m deep at the edge of an extensional intracratonic basin. This excursion will focus on the interpretation in a stratigraphic context of processes of sedimentation in a temperate glacial-marine environment at varying distances from the grounding line of the ice sheet, especially ice-rafting, suspension deposition, sediment gravity flow and sliding, and bottom-current activity. The trip will consist of two day-long traverses over spectacular exposures in the central Wasatch Range near Salt Lake City. Consult with the field trip leaders if you have any questions about the degree of physical difficulty.

20. **Upper Cretaceous Shannon, Frontier, and Haystack Mountains Formations Shelf Sandstones.** Roderick W. Tillman, Tulsa, Oklahoma, (918) 749-3184; Randi S. Martinsen, Marilyn Huff. 3½ days, November 3 (5:00 p.m.) to November 6. Cost: $380. Limit: 30.

This trip will emphasize interpretation of shelf sandstone facies, shelf-ridge geometry, and recognition of depositional processes. Wave, storm, and fair-weather-current–deposited sandstones will be observed in outcrops near Midwest and Rawlins, Wyoming. Differences in architecture of different shelf sand-body types will be stressed in outcrop subsurface examples.

21. **Dinosaur Trackways and Red Beds of the Purgatoire Valley: Early Mesozoic Depositional Environments and Paleoecology of Southeastern Colorado.** Nancy K. Prince, University of Colorado, Denver, (303) 556-3456; Martin G. Lockley, Kelly Conrad. 2½ days, November 3 (5:00 p.m.) to November 5. Cost: $220. Limit: 30.

Visit normally inaccessible outcrops of Triassic and Jurassic

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Centennial Field Trips (*continued from p. 169*)

"red beds" originally described by Lee in 1901. A highlight of the trip will be North America's largest dinosaur track site in the Morrison Formation. Emphasis will be on how paleoecologic studies have increased our knowledge of depositional environments of the lacustrine, fluvial flood plain, and eolian deposits exposed in spectacular canyons at the southern terminus of the Las Animas arch. An unconformity possibly equivalent to the J-5 of the Colorado Plateau will also be investigated.

22. **Cretaceous-Tertiary Boundary in the Raton Basin—Evidence of Asteroid Impact.** Charles L. Pillmore, USGS, Denver, Colorado, (303) 236-1240; Romeo Flores, R. Farley Fleming, Glen A. Izett. 2½ days, November 3 (5:00 p.m.) to November 5. Cost: $200. Limit: 36.

The Raton basin contains 20 known sites where a worldwide chronostratigraphic marker, the Ir-rich Cretaceous-Tertiary (K-T) boundary impact clay layer, can be observed in continental rocks, perhaps more than any other equivalent area on Earth. The boundary, which is defined by the abrupt disappearance of several fossil pollen taxa, occurs at the top of a thin (1–2 cm) kaolinitic clay bed. This K-T pollen break is exactly coincident with the K-T boundary impact clay layer (½ cm thick) that contains abundant shock-metamorphosed mineral grains and high Ir concentrations. The K-T boundary clay stone and its associated impact layer are preserved in a carbonaceous interval of rocks in a flood-plain sequence of mudstones and sandstones in the lower coal zone of the Raton Formation. The boundary clay stone closely resembles altered volcanic ash beds called tonsteins that occur in coal beds throughout the basin. This trip will visit nine representative sites. The stratigraphy and field characteristics of the K-T boundary interval will be discussed, and opportunities will be provided to compare tonsteins to the boundary clay and for sampling and detailed study.

23. **Geology and Mineral Resources of Central Colorado** Bruce Bryant, USGS, Denver, Colorado, (303) 236-1234; D. W. Beaty, T.L.T. Grose, W. W. Mallory, P. K. Sims, S. R. Wallace, J. C. Reed. 2 days, November 4 (morning) to November 5. Cost: $135. Limit: 40.

This trip, sponsored by the Colorado Scientific Society, will examine the Proterozoic through Neogene tectonic features of central Colorado which furnish the geologic setting of mining districts in the northeastern part of the Colorado Mineral Belt. Stops at the Central City–Idaho Springs, Georgetown–Silver Plume, Climax, Leadville, and Gilman mining districts and at Precambrian basement rock outcrops will integrate newly acquired data with previous studies, and stops on the flanks of the Front Range and Sawatch Range uplifts will give an overview of regional geology.

24. **Pleistocene and Recent Floods in the Big Thompson River Drainage, Northern Colorado Front Range.** William H. Hoyt, University of Northern Colorado, Greeley, (303) 351-2647; Robert D. Jarrett. 1 day, November 4. Cost: $30. Limit: 36.

Recent floods in the Big Thompson River drainage of the northern Colorado Front Range have provided excellent opportunities for the hydrologic and geomorphic study of life-threatening, catastrophic floods. Good evidence of floods starts just east of the canyon mouth at an elevation of about 1650 m and continues west to Horseshoe Park area in Rocky Mountain National Park at an elevation of about 2550 m. Of particular interest to sedimentologists, geomorphologists, and hydrologists is the debris fan deposited during the draining of Lawn Lake in the 1982 event. If time and weather conditions allow, we will run a transect across this interesting fan from the proximal to the distal ends.

SEG-Sponsored Field Trips

For further information on trips listed below, contact Richard Grauch, USGS, Federal Center, MS 973, Denver, CO 8022 (303) 236-5551.

Epithermal Precious-Metal and Base-Metal Systems, Sa Juan Mountains, Colorado. Robert M. Hutchinson, Colorad School of Mines, Golden, (303) 273-3813. Trip begins and ends i Montrose, Colorado. 3½ days, October 26 (evening) to October 2 Cost: $350. Limit: 25.

Participants will be introduced to the general geology of th Rocky Mountains and the evolution of the San Juan volcanic fiel Emphasis will be placed on the volcanogenic and structural settin of epithermal systems. Underground visits to the Camp Bird an Sunnyside–Gold King mines will be used to demonstrate the natur and distribution of ores. A one-day surface tour (weather permittin will examine the caldera setting, local structure, and alteration.

Deposits of the Colorado Mineral Belt: Leadville and Gilma Areas. Tommy Thompson, Colorado State University, Fort Collin (303) 491-5430; David W. Beaty. 2 days, October 29 to October 3 Cost: $150. Limit: 24.

A one-day visit to the Gilman area will serve to introduc participants to the Colorado Mineral Belt. An evening lecture an poster series on the Leadville District geology, ore deposits, stabl isotope geochemistry, and fission-track dating of igneous rocks an ore deposits will precede a half-day district tour and a half-da underground visit to the Black Cloud Mine.

Epithermal Precious-Metal Deposits Associated with a Island-Arc Environment: Japan. Shunso Ishihara, Governmer Industrial Research Institute, Tohoku, 2-1, 4-Chome, Nigatak Sendai 983 Japan; telephone (022) 237-5211; Richard W. Hutchi son. 10 days, November 4 to November 13. Cost: $3000. Limit: 2

The trip will include visits to low-grade, open-pit gold deposit of the Nansatsu type, the new high-grade gold veins of the Hishika Mine, the Fukasawa Mine, and the geothermal areas near Monok A joint meeting with the Society of Mining Geology of Japan will b held on the last day of the trip. The trip will proceed only if at least 1 persons express a preliminary interest.

The Ga, Ge, Cu, Pb, Ag, and U Deposits of Southwester Utah and the Arizona Strip. Erich Petersen, University of Uta Salt Lake City, (801) 581-7238; Jim Rasmussen. Trip begins an ends in Las Vegas, Nevada. 3 days, October 27 (7:00 a.m.) t October 29. Cost: $250. Limit: 30.

The trip will emphasize the geologic setting and genesis low-temperature, structurally controlled metal deposits. Participant will go underground at the Apex (Ga, Ge) Mine and at one of th northern Arizona uranium-producing breccia pipes. The Escalant Silver Mine and possibly the Goldstrike and Silver Reef areas w also be visited.

NACSN To Review Comments on Code

At the October 1987 Meeting of the North American Commi sion on Stratigraphic Nomenclature, held in conjunction with th GSA Annual Meeting, GSA Fellow Robert H. Fakundiny (New Yor State Geological Survey, 3136 Cultural Education Center, Alban NY 12230) was elected chairman, and GSA Fellow Robert F. Lundi (Department of Geology, Arizona State University, Temp AZ 85281) was elected vice-chairman.

Over the next year NACSN will review comments on the 198 North American Stratigraphic Code (published in the AAP Bulletin, v. 67, no. 5). For further information on the work NACSN, contact the executive officers or the commissione representing GSA, John M. Dennison and Donald E. Hatten.

OUNDATION NEWS

y Robert L. Fuchs

orporate Contributors—How Are They Doing?

When the Decade of North American Geology was conceived s the major scientific adjunct to GSA's 1988 Centennial, an ssential ingredient in this multi-million-dollar project was the nding. The GSA Foundation was formed in December 1980 and ssigned as its initial task the raising of sufficient money over a n-year period to see DNAG through to successful completion.

In 1981, a three-man team led by GSA President Howard ould, and including Foundation President Dwight Roberts and entennial Science Program Coordinator Pete Palmer, traveled to ıe offices of major natural resource companies whose business is ased on the earth sciences. Their efforts were supplemented by ıe work of the Foundation trustees and GSA officers and embers. The results: highly successful, to say the least! The oundation raised cash and pledges for $3,383,500 from a group of 5 oil companies, one mining company, and the Department of nergy.

The early 1980s were the halcyon days for the petroleum dustry, and companies were generous in responding to GSA's ppeal. However, seven years later, a lot of lower oil and gas prices ave flowed under the bridge, the phrase "corporate restructuring" as become a household term, and company survival has taken ecedence over grassroots exploration.

How has DNAG funding fared in the face of this corporate arnage? Not too badly, thank you. The original contributor group of 27 has shrunk to 22 as a result of acquisitions and mergers. However, in four out of the five combinations, the resulting company is honoring the full commitment. Half of the companies have now paid in full, and in 1988 it is expected that this completion figure will increase to 65%. Several companies have adopted a reduced payment schedule, reflecting overall cost-cutting programs. In summary, the current picture is

Original pledges	$3,383,500	100.00%
Cash received	2,804,004	82.90%
Balance receivable	424,496	12.50%
Estimated loss	155,000	4.60%

A word about the estimated loss. Last year at this time, we reported to you that the slippage in corporate contributions could amount to 6%. The trustees and others in GSA have worked diligently the past year to reduce this shortfall. A continuing dialogue with those recalcitrant donors has produced positive results. The jawboning goes on; perhaps one year from now a further decrease in the estimated loss can be reported to the membership.

LaMoreaux and Leighton Elected

At the spring meeting of the Foundation's Board of Trustees, held in Houston in conjunction with the annual AAPG meeting, Philip E. LaMoreaux was elected chairman, replacing Harrison C. Jamison, whose term on the Board has expired. LaMoreaux joined the Board in 1987 and has been its vice chairman. He is chairman of the board of P. E. LaMoreaux & Associates, Inc., a hydrology, geology, and environmental science consulting firm located in Tuscaloosa, Alabama.

Trustee F. Beach Leighton was chosen by the Board to be vice chairman. Leighton is chairman and CEO of Leighton and Associates, an engineering geology firm located in the Los Angeles area. A recent $10,000 gift to the Foundation by Leighton and Associates was the initial gift to the new GEOSTAR fund to support geologic research.

Century Challenge Report

At the end of April, there were 429 gifts and pledges to the Century Challenge, totaling $59,563. Challenge Partners, those giving $250 or more, now total 32. Don't miss out—send your birthday gift to GSA today.

GSA Foundation
3300 Penrose Place, P.O. Box 9140
Boulder, CO 80301

Please send me information about the following funds:

_____ Century Challenge
_____ GEOSTAR

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onors to the GSA Foundation, March–April, 1988

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Searching for a New Geoscientist?

When was the last time you hired a new employee? Do you remember how much time and effort you wasted in your search for a qualified geoscientist? Let the GSA computerized search file make your job easier.

How does it work? Complete the Employer's Request for Earth Science Applicants on the following page. Remember to specify educational and professional experience requirements as well as the specialty area or areas of expertise your applicant should have. The GSA computer will take it from there.

You will receive a printout that includes the applicants' names, addresses, phone numbers, areas of specialty, type of employment desired, degrees held, years of professional experience, and current employment status. In 1988, the cost of a printout for one or two specialty codes is $140. (For example, in a recent job search for an analyst of inorganic materials, the employer requested the specialty codes of geochemistry and petrology.) Each additional specialty is $55. A printout of the entire applicant listing in *all* specialties is available for $350. (Specialty codes printed in boldface type are considered major headings. If you select a specialty code printed in boldface type your listing will contain applicants within the related subspecialties as well. If you request a listing of one of the subspecialties, applicants coded under the major category will be included but not those coded under the other related subspecialties. Résumés for all applicants listed are included with the printout at no additional charge.) If you have any questions about your personalized computer search, GSA's Membership Department will assist you.

The GSA Employment Service is available year long. Now is an excellent time to use the service—in conjunction with the annual Employment *Interview* Service. The interview service is offered each fall at the Society's Annual Meeting. The 1988 Annual Meeting will be held in Denver, Colorado, October 30–November 3. You may rent interview space in half-day increments from GSA. Our staff will schedule all interviews with applicants for you, the recruiter. In addition, GSA offers a message service, complete listing of applicants, copies of résumés at no additional charge, and a posting of all vacancies.

You can attend the Annual Meeting and still have that new position filled before you return to work! See you in Denver.

Can You Interview in November?

Are you looking for a new position in the field of geology? Would you like to interview with potential employers in October–November? Take advantage of GSA's Employment Interview Service which is provided each fall in conjuction with the Society's Annual Meeting. The service brings potential employers and employees together for face-to-face interviews. Mark your calendar for October 30–November 3 for the 1988 GSA Annual Meeting in Denver, Colorado—GSA's Centennial Celebration.

NOTE: If you plan to interview at the GSA Annual Meeting GSA **must** receive your material **no later than August 12, 1988**. Complete the application on the following page and send it with a one- or two-page résumé and your check, money order, or charge information to the address on the form. A one-year listing for GSA Members and Student Associates costs $30; the cost for nonmembers is $60. If we receive your materials by August 12, your record will be included in the information that *employers* receive prior to the meeting. Submit your forms early to receive maximum exposure! Don't forget to indicate on your application form that you would like to interview in October–November.

Plan now for the annual Interview Service in Denver. See you there!

For additional information and submission of forms, please contact

Membership Department
Geological Society of America
P.O. Box 9140, Boulder, CO 80301
(303) 447-2020

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

IGCP Board Approves PROJECT 274 on Quaternary Coastal Evolution

The Board of the International Geological Correlation Programme (IGCP) has approved Project 274, "Quaternary Coastal Evolution: Case Studies, Models, and Regional Patterns" for the period 1988–1992. The primary objective of the new project, which will focus on the past 125,000 years of Quaternary history, is an effort to understand local to global variations in coastal and continental shelf evolution by incorporating knowledge of geologic processes and environments with geodynamic, climatic, oceanographic, and other data to produce local and regional models, ranging from descriptive to numerical. The information thus produced will aid in analysis of and correlation with lesser known areas. The project aims to prepare a program for integrated, interdisciplinary study of Quaternary coastal and shelf areas throughout the world, and to provide as a final result a multivolume publication that can serve as a basis of reference and comparison for geological and other research in coastal and shelf areas. The better understanding of coastal evolution thus achieved will result in improved strategies and techniques for managing the increasingly important coastal zone as well as developing coastal resources.

The inaugural meeting for Project 274 will be held in Amsterdam, the Netherlands, at the Trippenhuis of the Royal Netherlands Academy of Sciences, September 19–24, 1988. There will be an organizational meeting of the American Working Group during the Annual Meeting of the Geological Society of America in Denver in November. Researchers interested in participating in and contributing to the project are urged to contact John R. Suter, Louisiana Geological Survey, Box G, University Station, Baton Rouge, LA 70893, (504) 388-3481, for further information.

THE GEOLOGICAL SOCIETY OF AMERICA

3300 Penrose Place • P.O. Box 9140
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(303) 447-2020

EMPLOYER'S REQUEST FOR EARTH SCIENCE APPLICANTS

(Please type or print legibly)

ame _____ Date _____

rganization _____

ailing address _____

ity _____ State _____ Zip code _____ Telephone number _____ (Area code) Number

PECIALTY CODES (see list below)
st the specialty code numbers that you wish to order, or ☐ check here if you want entire file of applicants in ALL specialties.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____

OSITION DATA: What position(s) do you expect to fill? _____
In what area(s)? _____
Degree requirements _____ Number of positions available _____

SPECIALTY CODES

100. Economic Geology
101. coal geology
102. geothermal, etc.
103. metallic deposits
104. nonmetallic deposits
105. mining geology
120. Engineering Geology
150. Environmental Geology
160. Public Education & Communication
200. General Geology
220. Geochemistry
221. organic
222. high temperature
223. low temperature
224. stable isotopes
225. geochronology
250. Geomorphology
300. Geophysics
301. seismic
302. gravity/magnetics
303. seismicity
304. paleomagnetism
320. Hydrogeology
321. hydrochemistry
322. ground water
323. surface water
330. Library
350. Mathematical Geology
351. computer science
352. statistical geology
400. Mineralogy
401. crystallography
402. clay mineralogy
410. Museum (curator)
420. Oceanography
421. marine geology
422. coastal geology
450. Paleontology
451. invertebrate
452. vertebrate
453. micropaleontology
454. paleobotany
455. paleoecology
500. Petroleum Geology
501. exploration
502. subsurface stratigraphy
520. Petrology
521. igneous
522. metamorphic
523. sedimentary (clastic)
524. sedimentary (carbonate)
525. experimental
550. Planetology
575. Quaternary Geology
600. Regional Geology
620. Remote Sensing
621. photogeology
622. photogrammetry
630. Science Editing
650. Sedimentology
651. sedimentary processes
652. sedimentary environments
720. Stratigraphy
750. Structural Geology
751. tectonics
752. tectonophysics
753. rock mechanics
800. Volcanology

pplicants seeking employment in:	**Minimum degree required**	**Minimum professional experience**	**Experience desired (yrs.)**	**None**	**1–5**	**6–plus**
Academic	☐ None	☐ None	Administrative	☐	☐	☐
Government	☐ B.A. or B.S.	☐ 1–5 yrs.	Exploration/Production	☐	☐	☐
Industry	☐ M.A. or M.S.	☐ 6-plus	Field	☐	☐	☐
Other _____	☐ Ph.D.		Research	☐	☐	☐
			Teaching	☐	☐	☐

nployment in: ☐ U.S. only ☐ U.S. with foreign assignments ☐ Either
reign languages: ☐ French ☐ German ☐ Russian ☐ Other _____ ☐ Not required

ım interested in interviewing applicants through the SA Employment Service at the 19 _____ Annual eeting in _____.

See attached sheet for current fee schedule.

Total fee enclosed.....$_____
or invoice requested.....$_____

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

_____
ınature (required)

5/88

N&I 0788

FOR ACCTG. USE ONLY
Rec. $30 $60
Ck # _____
Ltr. _____
GSA _____
Add. _____

THE GEOLOGICAL SOCIETY OF AMERICA

3300 Penrose Place • P.O. Box 9140
Boulder, Colorado 80301
(303) 447-2020

APPLICATION FOR EMPLOYMENT MATCHING SERVICE (Please type or print legibly with **black ink**)

NAME (Mr. ☐) (Miss ☐) (Mrs. ☐) (Ms. ☐) (Dr. ☐) _____ (last name first) Date _____

Mailing Address _____

City _____ State _____ Zip Code _____

Date Available _____ Telephone ( ) _____ Visa _____
area code Business Home If not U.S. citizen, list visa

Members of GSA ONLY: Check here if you **DO NOT WISH** to have this number included in the Membership Directory ☐

EXPERIENCE

Must use specialty codes listed below. Choose three that best describe your expertise in order of importance.

* 1. _____ 2. _____ 3. _____

TYPE OF POSITION DESIRED

Interested in
- ☐ Academic
- ☐ Government
- ☐ Industry
- ☐ Other

Specific Interest
- ☐ Administration
- ☐ Exploration/Production
- ☐ Field
- ☐ Research
- ☐ Teaching

Will accept employment in
- ☐ U.S. only
- ☐ U.S. with foreign assignments
- ☐ Either

* **PRESENT SPECIALTY**
Choose one from codes listed below _____ **YEARS EXPERIENCE IN THIS SPECIALTY** _____

PRESENT EMPLOYER _____

Give number of years experience for any of the following that are applicable:

Administrative _____ Exploration/Production _____ Field _____ Research _____ Teaching _____ Total geological working experience _____

KNOWLEDGE OF FOREIGN LANGUAGES: French _____ ; German _____ ; Russian _____ ; Spanish _____ ; Other _____

ACADEMIC TRAINING

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

Postgraduate work beyond highest degree in (field) _____ **Number of years** _____

SPECIALTY CODES

Select those that best describe your ability. Use codes in bold face only when other breakdowns are inadequate.

100. Economic Geology
101. coal geology
102. geothermal, etc.
103. metallic deposits
104. nonmetallic deposits
105. mining geology
120. Engineering Geology
150. Environmental Geology
160. Public Education & Communication
200. General Geology
220. Geochemistry
221. organic
222. high temperature
223. low temperature
224. stable isotopes
225. geochronology
250. Geomorphology
300. Geophysics
301. seismic
302. gravity/magnetics
303. seismicity
304. paleomagnetism
320. Hydrogeology
321. hydrochemistry
322. ground water
323. surface water
330. Library
350. Mathematical Geology
351. computer science
352. statistical geology
400. Mineralogy
401. crystallography
402. clay mineralogy
410. Museum (curator)
420. Oceanography
421. marine geology
422. coastal geology
450. Paleontology
451. invertebrate
452. vertebrate
453. micropaleontology
454. paleobotany
455. paleoecology
500. Petroleum Geology
501. exploration
502. subsurface stratigraphy
520. Petrology
521. igneous
522. metamorphic
523. sedimentary (clastic)
524. sedimentary (carbonate)
525. experimental
550. Planetology
575. Quaternary Geology
600. Regional Geology
620. Remote Sensing
621. photogeology
622. photogrammetry
630. Science Editing
650. Sedimentology
651. sedimentary processes
652. sedimentary environments
720. Stratigraphy
750. Structural Geology
751. tectonics
752. tectonophysics
753. rock mechanics
800. Volcanology

* **Résumé must be attached, LIMITED TO TWO PAGES, typewritten on one side only, to be acceptable for reproduction to employers. Include your name address, and phone number; concise details of work experience; and majors/minors on degrees.**

* **Fee: $30 if you are a Member or Student Associate of GSA in good standing (Member # _____) $60 if you are not a member of GSA Payment in U.S. funds (check, money order, or charge information MUST ACCOMPANY FORM). MAKE CHECK PAYABLE TO THE GEOLOGICAL SOCIETY OF AMERICA.**

- ☐ Check or Money Order
- ☐ MasterCard ☐ VISA
- ☐ American Exp. ☐ Diners Club
- ☐ CHOICE ☐ Carte Bleue
- ☐ Barclay Card ☐ Access
- ☐ EuroCard ☐ Standard Bank Card

Card Expires Mo Yr

Card Number

Signature _____
(Required for credit card payment)

I agree to release GSA or their representatives from responsibility for errors that may occur in processing or distributing this data. I understand that GSA makes **no guarantees** contact by an employer in this service. I agree to notify the GSA Employment Service immediately of (1) change of address, (2) acceptance of a position.

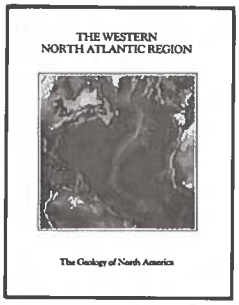
_____ I will attend the 19____ GSA Annual Meeting in _____

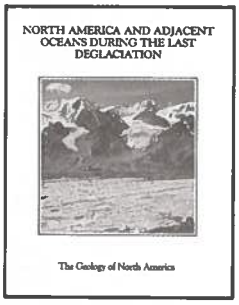
* **SIGNATURE (required)**

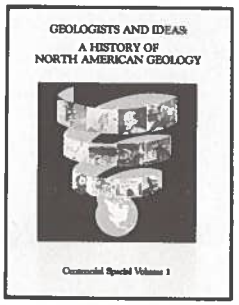
* **THESE ITEMS ARE ABSOLUTELY NECESSARY TO PROCESS THIS APPLICATION** **This application will be active for 1 year** 5/8

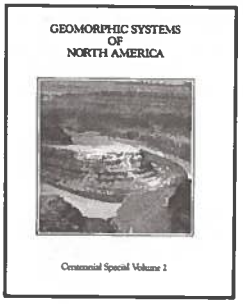
The Decade of North American Geology DNAG

VOLUMES









GEOLOGY OF NORTH AMERICA

The centerpiece of the DNAG project. When complete the series will contain 28 matched volumes, in two sets: 19 U.S. and Mexican volumes, and nine from Canada.

The Western North Atlantic

edited by P.R. Vogt and B. E. Tucholke, 1986

The award-winning first volume in this 28-volume series. Complete coverage of the geology and geophysics of the western North Atlantic Ocean basin in 41 chapters, organized into 8 sections: Introduction; Present Accretion Axis; Regional Geology and Geophysics; Plate Tectonic Evolution; Surficial Sedimentation; Biofacies; Paleoceanography; and Resources and Law of the Sea. The editors received the 1986 Alan Berman Research Publication Award for thisvolume. Includes 11 plates, several in color, in a separate, matching slipcase.

GNA-M, 720 p., 11 plates in slipcase, indexed, ISBN 0-8137-5202-7, CIP, hardbound, $47.50

North America and Adjacent Oceans during the Last Deglaciation

edited by W. F. Ruddiman and H. E. Wright, Jr., 1987

Most Quaternary sediments in North America north of 45°N postdate the last deglaciation. This volume looks at those extensive deposits from the standpoints of timing, cause, and mechanism of the wastage of North American ice during the last deglaciation and the accompanying environmental changes in the nonglaciated and deglaciated areas. It particularly examines the mechanisms by which a mass of ice equivalent to 100 m of global sea-level was returned to the the ocean within about 8,000 years. A truly comprehensive synthesis of marine and terrestrial information in 22 chapters grouped into five sections: Chronology of Disintegration of the North American Ice Sheets, Ice Core and Other Glaciological Data, the Nonglacial Physical Record on the Continent, Biological Record on the Continent, and Analysis and Summary. Includes two oversize pocket-plates in color showing time-series maps of pollen densities and vegetation changes since 18 ka.

GNA-K3, 509 p., 2 pocket plates, indexed, ISBN 0-8137-5203-5 hardbound, $43.50

The Atlantic Continental Margin: U.S.

edited by R.E. Sheridan and J.A. Grow, 1988

This synthesis covers stratigraphy, depositional processes, and geophysical interpretation of the major onshore and offshore marginal basins from Maine to the Bahamas, and includes an up-to-date review of thinking on regional tectonic history. Additional chapters discuss the theoretical aspects of thermal evolution, subsidence, and seismic stratigraphy as applied to this region. Geological resources including petroleum, water, sand and gravel, hard minerals, and heat flow are reviewed, and environmental hazards such as seismicity, coastal erosion, waste disposal and submarine instability as it relates to site of drilling platforms and mining are evaluated. A summary chapter reviews areas of controversy and suggests key topics for research.

GNA-I2, 632 p., 8 plates in slipcase, indexed, ISBN 0-8137-5204-3, hardbound, $49.50

CENTENNIAL SPECIAL VOLUMES

Four special, topical voumes prepared by four of GSA's Divisions as their contribution to the DNAG project.

Geologists and Ideas: A History of North American Geology

edited by Ellen T. Drake and William M. Jordan, 1985

An unusually coherent, well-written volume. Prepared for DNAG by the History of Geology Division of GSA. Spotlights events, ideas, and people, and sheds light on the history of North American geology as a whole. Thirty-four papers are organized into four categories: (1) The Evolution of Significant Ideas; (2) Contributions of Individuals; (3) Contributions of Organized Groups; and (4) Application of Significant Ideas. Excellent as a course-book or for additional reading for classed related to the history of geology or general science. Light blue spine.

CSV001, 520 p., indexed, ISBN 0-8137-5301-5, CIP, hardbound, $37.50

Geomorphic Systems of North America

edited by W. L. Graf, 1987

New ideas, new techniques, new data, even new access to extraterrestrial worlds—all these are in greater abundance now than ever, making this, the editor says, a marvelous time to be a geomorphologist! This 14-paper volume has been prepared by the Geomorphology Division of GSA as its contribution to DNAG. Subjects treated are Regional Geomorphology of N. America; Applachian Mountains and Plateaus; Atlantic and Gulf Coast Province; Central Lowlands; Canadian Shield; Great Plains; Rocky Mountains; Colorado Plateau; Basin and Range; Central America and the Caribbean; Columbia and Snake River Plains; Interior Mountains and Plateaus; Pacific Coast and Mountain Systems; and Arctic Lowlands. Yellow spine.

CSV002, 661 p., indexed, ISBN 0-8137-5302-3, CIP, hardbound, $48.50

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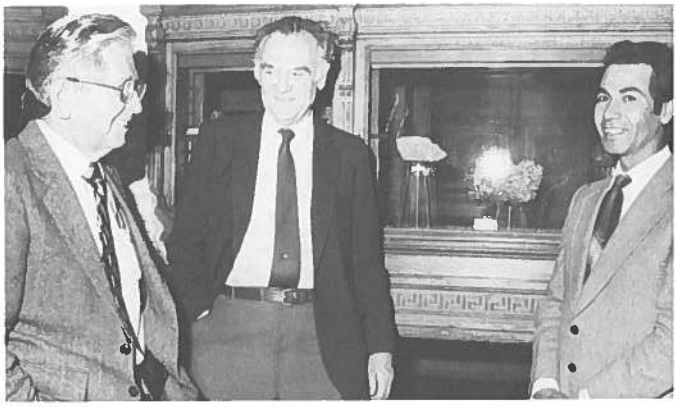
THE GEOLOGICAL SOCIETY OF AMERICA

President Bally Visits Mexico

by Zoltan de Cserna
GSA Councilor

GSA President Albert W. Bally, Rice University, spent February 27 to March 5 in Mexico City as guest professor at the Instituto de Geología, of the Universidad Nacional Autónoma de México. Bally, continuing an initiative of 1986 GSA President W. Gary Ernst, combined teaching duties and discussions with Mexican GSA members on Mexican participation in GSA activities and publication programs. He gave a short course–workshop on Regional Geology and Seismic Reflection Profiles to a group of 26 geologists and geophysicists employed by Petróleos Mexicanos (PEMEX), Instituto Mexicano del Petróleo (IMP), Facultad de la Tierra of the Universidad Autónoma de Nuevo León, Comisión Federal de Electricidad (CFE), and Instituto de Geología.



Bert Bally (center) with GSA members Teodoro Diaz-Gonzalez (lef retired PEMEX geologist, and Fernando Ortega-Gutierrez, director the Instituto de Geología, at the institute's geological museum.

1888 · Geological Society of America · 1988

OCTOBER 31–
NOVEMBER 3, 1988

DENVER,
COLORADO

CENTENNIAL MEETING & EXHIBIT

Important Deadlines

PREREGISTRATION DUE OCTOBER 7

for meeting information (303) 447-2020
or 1-800-GSA-1988

HOUSING FORMS DUE OCTOBER 7

Interested in Post-Centennial R&R?

Please fill out the questionnaire and return it to the GSA Meetings Department NO LATER THAN AUGUST 19, 1988.

Which location interests you most?

_____ Breckenridge/Keystone area
_____ Steamboat
_____ Vail
_____ None of the above.
I would go to _____.

I would prefer that the following be arranged for me:

_____ Transportation to/from Denver only.
_____ Transportation and lodging only.
_____ Transportation, lodging, and meals only.
_____ A complete package that would include transportation, lodging, meals, and planned activity.
_____ None of the above. I am not interested in a package. I would plan my trip independently.
_____ Please send me more information on the GSA R&R when a location has been selected. Send information to:

_____
_____
_____
_____

Send this form to GSA Meetings Department, P.O. Box 9140, Boulder, CO 80301.

AIR TRANSPORTATION

GSA has again designated The Cain Travel Group of Boulde Colorado, as the official airline reservation agent for the GS Centennial Celebration. Meeting participants are encouraged call Cain's toll-free number to take advantage of discounted fares selected airlines.

United and Delta airlines have been named the official carrie

Reduced rates are 5% off any available discount fare th generally has restrictions. If you do not meet the requirements f the discount fare, you will be offered 40% off the unrestrict coach fare.

To make a reservation:

- Call 1-800-346-4747 (toll-free outside Colorado) or 303-443-22 (inside Colorado or collect from Canada). Hours: Mond through Friday 8 a.m. to 5:30 p.m., Mountain Time.
- Call early for best availability and identify yourself as a GS traveler.
- Be sure that you understand the restrictions on the type of tick you request.
- Tickets can be paid for by check (payable to Cain Travel), maj credit card, or invoice to company. The final payment mu reach Cain Travel no later than seven days prior to departure allow for mailing time.
- All tickets will be mailed via certified mail upon receipt payment unless requested otherwise.
- After tickets are issued, you are protected from fare *increases* a fare *decreases*, call Cain Travel for an adjustment.
- Cain Travel will have an on-site Customer Service Desk at t Convention Center.

GSA
NEWS &
INFORMATION

Geological Society of America

1987 ANNUAL REPORT

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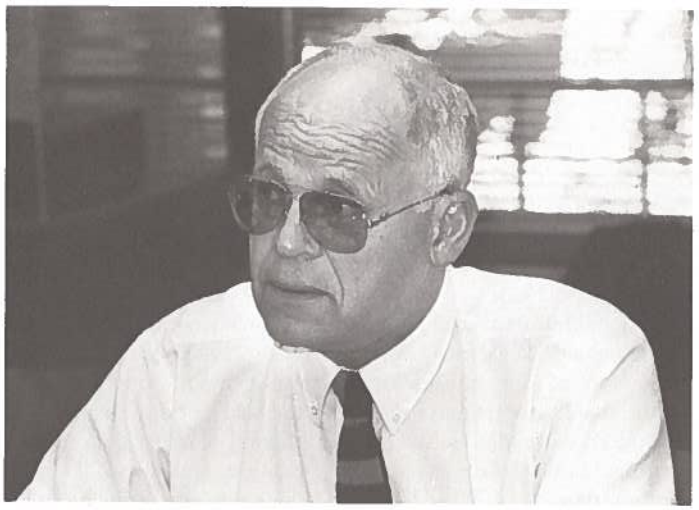
Gregory A. Davis ..... First Vice-Chairman
Arthur W. Snoke ..... Second Vice-Chairman
George H. Davis ..... Secretary-Treasurer
Winthrop D. Means ..... Past Chairman

Report of the President

by Jack Oliver



For GSA, 1987 was a year of emphasis on the future, for both ıe short and the long term. It was a year of final preparation for the ıSA Centennial in 1988, a year for bringing to fruition the idespread and all-encompassing efforts of the Decade of North merican Geology project, and a year for acceleration of prepara- ons for the International Geological Congress to be held in Vashington in 1989. The Centennial and the Congress, two major vents in, and about, the history of North American geology, will ırely act as stepping stones to greater achievements by earth ;ientists in the future. And so in 1987 GSA looked still further ıead and began to develop plans for activities by the Society during ıe remainder of the 20th century.

The Path to 2000 Committee, under the chairmanship of Brian kinner, was given the charge of providing to the GSA Council a list f possible new directions for the future. It responded with ;commendations for some major additions to GSA's repertoire. hey include (1) a project to build on and extend the success of NAG and to emphasize the global perspective, (2) a "megaprojects stitute" with professionals at GSA headquarters actively engaged enhancing GSA's contribution to global geology, (3) a new ıblication to supplant *GSA News & Information*, to communicate broader range of information of scientific and professional interest) GSA members, and to serve as a means and a stimulus for ·eater interaction among members, (4) continuation of efforts to ɔgrade the *Bulletin*, which has undergone recent revitalization,) increasing computerization of the publishing process, (6) joint ıeetings with other societies, (7) expansion of the short-course ·ogram, (8) an award for young earth scientists, (9) expansion of ıe research grants program to include more undergraduate ;search, and (10) a stronger role for GSA in education of the ;neral public in earth science. These items are currently being ɔnsidered by the Council, and preliminary investigations of cost ıd other factors are being investigated by the GSA staff. Decisions ı implementation will be forthcoming on an appropriate schedule. he Council continues to be open to suggestions from any member r other new efforts by GSA.

The suggestion by the Path to 2000 Committee that GSA ıhance its effort in global geology is timely and in keeping with ;commendations of a recent National Academy of Sciences– ɔard on Earth Sciences Report entitled *International Role of U.S. eoscience*, and with longer term developments, triggered by the scovery of plate tectonics, that have made many once-isolated cets of geology into interrelated parts of a global science.

It has occurred to me that a summary of scientific achievements in geoscience during 1987 would be appropriate for this report. Such a summary, however, has grown beyond one individual, and beyond a one-page report. Instead, I refer you to the 1666 pages of the *Bulletin* that were published in 1987, to the 1222 pages of *Geology*, to the 944 pages of *Abstracts with Programs*, and to the 3380 pages in 13 new GSA books. These figures are a measure of the vitality and productivity of our science.

My stint at the executive levels of GSA included the opportunity to attend a number of section, as well as annual, meetings. I would like to pass on one observation that may not be immediately evident to new section officers. It is that section meetings offer considerably more flexibility and much more opportunity for experimentation than does the annual meeting. Section meetings seem the ideal place to test innovative ideas for new symposia topics, new styles of communication, and new ways to stimulate the science. Section officers have the opportunity to encourage and experiment with bold new concepts. If some sections serve as leaders and as a proving ground, their more successful efforts can be integrated into the annual meetings, which have only limited opportunity for innovation, and also spread to other sections.

Like my predecessors, I have been favorably impressed, and have had my burden minimized, by the highly dedicated head-quarters staff. This organization makes the job of an executive in office for only a short term a pleasant one; far more important, it provides every member with a wide range of services in smoothly running fashion.

And I have been somewhat surprised and highly gratified to discover how very large are the numbers of GSA members who bring their talents, their expertise, and their energy to bear on matters of importance to GSA. Our members serve as editors, section officers, and division officers; as members of the Council, of the Foundation Board, and of committees of infinite variety; as reviewers, field-trip leaders, instructors, program chairmen, meeting chairmen, critics, etc. It is heart-warming and inspiring to observe this outpouring of volunteer support for GSA, and impossible to be anything but optimistic about the future of GSA in the face of it.

In closing, I wish to thank sincerely all members of GSA for according to me the honor of serving as President of this great scientific society during 1987.

Report of the Executive Director

by F. Michael Wahl

The year 1987 was again a good one for the Society. It was one in which we experienced an increased level of staff activity, not only in carrying on existing programs, but especially in planning for the Centennial in 1988.

Highlights of the year included maintaining membership rolls at a constant level while many other societies showed losses; continued expansion of our publication programs, most notably in the Centennial transects and the Centennial field guide series (DNAG products); expanded activity in the offering of short courses; an improved public relations effort; and finally, completion of the total computerization of all Society operations, including on-line computer registration at the annual meeting, and implementation of a computerized order-entry and inventory system.

In the fiscal category we finished the year slightly over budget in the operations section, primarily because of lower than anticipated revenue related to the sale of DNAG products. As in 1986, several volumes projected for completion during the year were not completed. In all other categories we were within budget. On the expenditure side, where we have control, total expenses were less than budgeted, thus offsetting the revenue shortfall.

Headquarters Staff

The performance of the headquarters staff during the year was at an extremely high level as we not only continued operations at the same pace for all ongoing programs, but also took on extra responsibilities required for the planning of the Centennial Celebration. The number of permanent GSA employees during 1987 was 43. In addition, the Society employed four persons on a part-time basis, plus proofreaders and other temporary editorial personnel who work on a contract basis. The Society is fortunate to have a dedicated group of professional individuals who do whatever is necessary to meet the needs of our membership.

Membership

Society membership remained essentially level during 1987 in spite of poor economic conditions that continued to exist in some employment sectors. Year-end membership was 16,585, compare with 16,568 one year earlier. The number of students who transferre to regular membership was 375 as compared with 298 for 1986, a increase of 25%. The number of Senior Members and Fellow reached 895, 6% of the total membership.

The GSA is an active Society with an involved membership During 1987 the GSA representative program continued to grow and we finished the year with 635 persons representing the Societ in their respective colleges and universities, companies, and govern mental agencies. In addition, more than 2,700 persons served th Society as committee members or volunteers in the many program and meetings of the Society. This represents an involvement o more than 20% of the total membership and is indeed indicative of concerned and involved membership. My sincere thanks to all of you

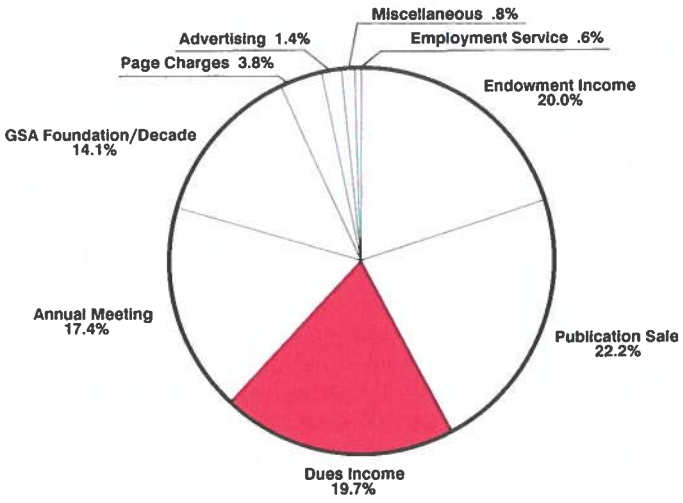
Sources of Revenue

Society dues in 1987 remained at $70 for Members and Fellows Of this amount, $42 per member (60%) was allocated to cover th yearly costs of the *Bulletin*, *Geology*, and *GSA News & Information* The actual production and distribution costs for these publication

MEMBERSHIP STATISTICS SINCE 1972

	Fellows	Members	Students	Honorary Fellows	Totals
1972	3293	5289	873	49	9504
1973	3332	5452	1871	46	10,701
1974	3327	5975	2917	44	12,263
1975	3347	6438	2224	45	12,054
1976	3334	6771	2377	45	12,527
1977	3282	6972	2095	42	12,391
1978	3251	7208	1903	42	12,404
1979	3237	7306	1874	42	12,459
1980	3229	7500	1834	40	12,603
1981	3214	7633	1828	43	12,718
1982	3199	7901	2243	43	13,386
1983	3164	7922	2871	44	14,001
1984	3182	8422	3713	45	15,362
1985	3143	9074	4001	49	16,267
1986	3108	9335	4076	49	16,568
1987	3074	9597	3864	50	16,585

REVENUE BY SOURCE
1987



as $71 per member for the year. The difference of $29 was paid om other publication revenue and through an endowment income ıbsidy. The remaining $28 of each member's dues was assigned as lembership Department income and used to maintain membership ecords and cover the cost of all membership services and activities, ıcluding the GSA representatives program. For the year, income om dues represented only 19.7% of the total revenue of the ociety. Publications sales continue to be the major revenue source, llowed closely by endowment income, which subsidizes member ublications and underwrites the cost of Council and committee ctivities. More than $1.94 million was spent on the publication rograms of the Society during 1987.

mployment Service Program

During 1987 the Employment Service program operated at a vel similar to that of 1986. A statistical comparison shows that the tal number of employers using the system was higher than in 1986; owever, the total number of positions available was substantially ss. The total number of applicants attending the annual meeting mained the same, but there was a slight decrease in the number of pplicants participating in the program throughout the year.

EMPLOYMENT SERVICE STATISTICS

	1981	1982	1983	1984	1985	1986	1987
mployers							
Year-round	57	43	32	27	27	15	20
Annual Meeting	77	41	42	39	33	31	30
Total	134	84	74	66	60	46	50
sitions							
From employers year-round	57	43	32	27	27	76	67
From employers at Annual Meeting	165	70	71	61	111	132	58
Total	222	113	103	88	138	208	125
pes of positions							
Academic							
Year-round	19	33	16	9	14	6	7
Annual Meeting	95	54	50	46	39	29	26
Industry							
Year-round	32	8	12	16	10	70	54
Annual Meeting	58	10	8	11	32	21	11
Government and other							
Year-round	6	2	4	2	3	–	6
Annual Meeting	12	6	13	4	40	82	21
tal applicants at Annual Meeting	309	263	231	218	218	270	273
tal applicants for year	474	527	422	404	352	385	348
tal applicant successes (joined year before)	41	22	8	20	19	15	20

eriodicals

The number of science pages published in the *Bulletin* during 87 totaled 1666, with two inserts. This was 66 more than the mber of pages published the previous year. For *Geology*, the mber of pages increased to 1222 from 1092 in 1986.

The number of manuscripts received for possible publication in e *Bulletin* was 282, essentially the same as in 1986. A total of 161 ticles and discussions were accepted for publication in 1987, compared with 134 for 1986. For *Geology*, 560 manuscripts were received and 294 were published. The average time interval from acceptance to publication remains approximately 6 months for the *Bulletin* and 3 months for *Geology*.

New Books, Maps, and Other Publications

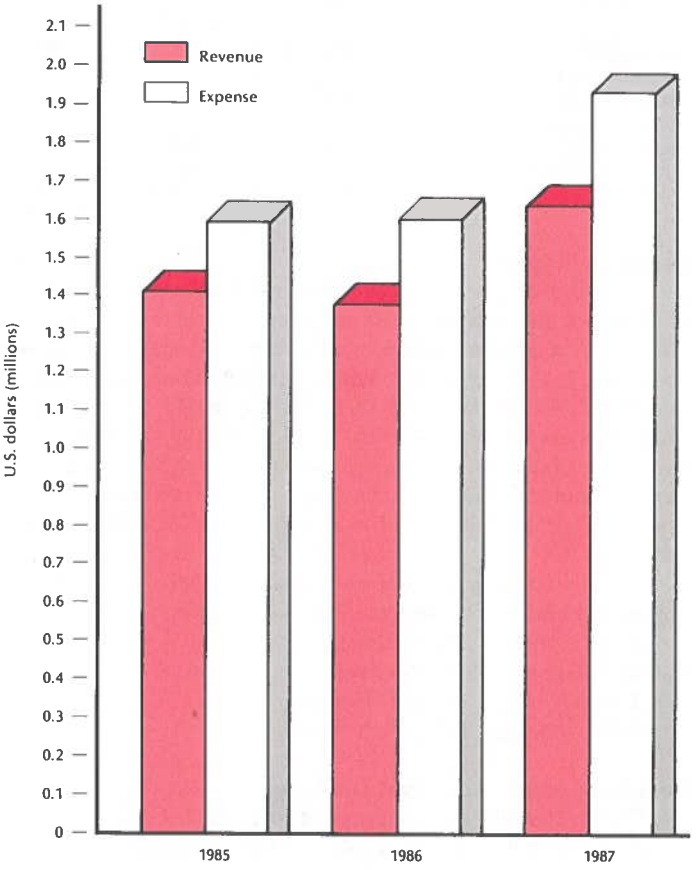
Thirteen new books were published in 1987 totaling 3380 pages. These included six Special Papers, two Memoirs, four volumes in the DNAG series, and one volume in the Engineering Geology series. Five new maps were published during the year, and four transects plus two maps were reprinted.

In the *Abstracts with Programs* series, six volumes were produced for the section meetings, and a single volume for the 1987 Annual Meeting. The total of pages for the series was 944, compared with 816 in 1986, a growth rate of 15%. The total number of abstracts processed has increased 70% since 1980.

Miscellaneous publications, including division newsletters and memorials, totaled 805 pages.

Revenue from Society publications in 1987 was nearly 18% more than in 1986. The expense increase was comparable. Revenue received from dues for member periodicals again fell short of actual costs, but revenue received from nonmember subscriptions showed a substantial increase. As in past years, the subsidy of member periodical costs from endowment investment income was used to balance the difference between publication revenue and expense. For 1987 this subsidy amounted to 20% of total *Bulletin* and *Geology* publication costs.

PUBLICATIONS REVENUE/EXPENSE COMPARISON
1985, 1986, 1987



Meetings

The 1987 Annual Meeting in Phoenix was, from all reports, one of our best. The technical program was excellent, and the field trip menu was outstanding. This meeting was a record breaker in many ways: the highest number of abstracts ever presented (1904), the highest number of field trips offered (34), the highest number of exhibitor booths filled (212), and the highest number of persons (474) participating in short courses. A total of 5201 persons attended the meeting. Nineteen premeeting and 15 postmeeting field trips provided in-depth study of a variety of geologic features for the 852 participants; 17% of the total registrants at the meeting participated in the field trips.

The public policy forum, "The Urbanized Desert—A Challenge for the Geosciences," generated much interest and was a highlight of the meeting. In addition to the 108 technical sessions in Phoenix, 183 business and social functions occurred during the meeting. William R. Dickinson and all members of "Team Phoenix" are to be congratulated for an excellent meeting.

Section meetings during the year had a combined registration of 4109 persons. A total of 1758 papers were presented in 198 sessions; 878 registrants, representing 21% of section meeting registrants, participated in 37 field trips.

1987 SECTION MEETING STATISTICS

Section and meeting location	Total registration	No. of papers presented	No. of half-day sessions
Cordilleran Hilo, Hawaii	804	476	49
Rocky Mountain Boulder, Colorado	715	362	36
North-Central St. Paul, Minnesota	745	276	30
Northeastern Pittsburgh, Pennsylvania	891	278	32
South-Central Waco, Texas	315	116	25
Southeastern Norfolk, Virginia	639	250	26

Research Grants

The Committee on Research Grants awarded a total of $176,200 for the support of research in 1987. This sum included $150,000 from Penrose Endowment income, $4500 from industrial donations, $15,766 from GSA member contributions, a gift of $2234 from the GSA Foundation, $3000 from the Harold T. Stearns Fund, and $700 from the Arthur L. Day Fund. In all, 199 proposals were selected for funding from the 587 received. Of those funded, 150 were for doctoral research and 49 were for master's research. The average grant was $885, and the award rate was 34% of proposals received.

Recipients of specialized Society awards in 1987 were as follows:

Robert K. Fahnestock Memorial Research Award

Robert Andrle, SUNY, Buffalo

Harold T. Stearns Fellowship Awards

James Hibbard, Cornell University

Andres Meglioli, Lehigh University

Decade of North American Geology

During 1987, the publication phase of the DNAG project began to move into full swing. Beginning in May, the publication rate approached nearly one major DNAG item per month. By the end of the year, five books and one North American map were published, two books were at the printer, and one book was in the final production stages. These included the remaining five volumes of the Centennial Field Guides, two more volumes of The Geology of North America, one more Centennial special volume, and the Magnetic Anomaly Map. The products are listed below, with their status at the end of December:

Published

Northeastern Section Centennial Field Guide—May
Cordilleran Section Centennial Field Guide—June
Geomorphic Systems of North America—July
Rocky Mountain Section Centennial Field Guide—August
Magnetic Anomaly Map of North America—September
North-Central Section Centennial Field Guide—December

In Press

North America and Adjacent Oceans during the Last Deglaciation
The Atlantic Continental Margin, U.S.
Southeastern Section Centennial Field Guide

The combined efforts of 950 geologists and geophysicists are represented so far in the books that are finished. Of these, 704 contributed to the Centennial Field Guides. During the year, 179 chapters were handled at least once by Centennial Science Program Coordinator A. R. Palmer, for reviews and responses to copy-editor queries; copy editors processed 135 chapters, 363 chapters were dummied, and 454 chapters were printed.

Fifteen volumes are still in various stages of production, and most require completion of chapters by very few persons to be finished. Seventy-eight percent (337) of all of the chapters needed to complete the U.S. volumes of The Geology of North America have been written, and 55% (241) have been reviewed and revised and are in various stages of production.

GSA Foundation Activities

The GSA Foundation underwent considerable change in 1987. Brian J. Skinner, F. Beach Leighton, and Philip E. LaMoreaux were appointed as new Foundation trustees, and Harrison C. Jamison assumed the position of chairman of the board upon the retirement of Caswell Silver. Several new fund-raising initiatives to support the programs and activities of the Society were started during the year, including the Century Challenge, a program through which the trustees challenged every member of the Society to pledge $10(to celebrate the GSA Centennial. The contribution results for 1987 reflect the success of this program as new records were set in both the number of contributors and the amount contributed. In this initial year more than 8% of all GSA members supported the Foundation, clearly an indication of the importance of their programs. The Foundation also dispersed $598,000 for DNAG publication costs and $22,500 to support the research grant program.

Penrose Conferences for 1987

The Society sponsored seven Penrose Conferences in 1987:

Geochemistry of Waters in Deep Sedimentary Basins, March 16–20, 1987, Oxnard, California; conveners: Yousif K. Kharaka, Jeffery S. Hanor, Lynton S. Land.

Late Quaternary Sea Level: The Marine and Terrestrial Record, April 6–12, 1987, Ferry Reach, Bermuda; conveners: James L. Carew, John E. Mylroie, Mark Boardman, John F. Wehmiller.

he Construction of Geological Cross Sections; Techniques, ıssumptions, and Methods, May 3–8, 1987, Rosendale, New York; onveners: Peter A. Geiser, Steven E. Boyer.

Glacial Facies Models, May 3–8, 1987, Scarborough, Ontario, anada; conveners: Nicholas Eyles, Carolyn H. Eyles, Andrew D. Iiall.

Geological Decisions for the 21st Century, July 12–17, 1987, teamboat Springs, Colorado; conveners: Allen F. Agnew, harles J. Mankin, Daniel N. Miller, Jr., David A. Stephenson.

aleoenvironmental Interpretation of Paleosols, September 11–17, 987, Warm Springs, Oregon; conveners: Gregory J. Retallack, atricia F. McDowell.

'ordilleran Metamorphic Core Complexes, Revisited: Implications ır Crustal Extension and Shortening in the North American 'ordillera, September 13–18, 1987, Elko, Nevada; conveners: rthur W. Snoke, Gordon S. Lister, Charles H. Thorman.

ledal and Award Winners for 1987

enrose Medal: *Marland P. Billings*

ay Medal: *Don L. Anderson*

rchaeological Geology Division Award: *John C. Kraft*

ilbert H. Cady Award (Coal Geology Division): *Aureal T. Cross*

B. Burwell Award (Engineering Geology Division): *Joseph I. Ziony*

eorge P. Woollard Award (Geophysics Division): *Neil D. Opdyke*

istory of Geology Award (History of Geology Division): *Martin J. S. Rudwick*

. E. Meinzer Award (Hydrogeology Division): *Lynn W. Gelhar*

. K. Gilbert Award (Planetary Geology Division): *Donald E. Gault*

irk Bryan Award (Quaternary Geology and Geomorphology Division): *Richard B. Waitt*

tructural Geology and Tectonics Division Best Paper Award: *Steven E. Boyer, David Elliott*

onorary Fellows Elected in 1987

'aria Bianca Cita
irector, Dipartimento di Scienze della Terra, Via Mangiagalli, 34, 20133 Milano, Italia

ervyn S. Paterson
Research School of Earth Sciences, Australian National University, G.P.O. Box 4, Canberra 2601, Australia

:o Y. Picard
Israel Academy of Sciences and Humanities, P.O. Box 4040, Jerusalem 91040, Israel

SA Committees, 1987

ıecutive Committee

ck E. Oliver, President and Chairman; Albert W. Bally, Vice-President; W. Gary Ernst, Past President; Robert L. Fuchs, Treasurer; Samuel S. Adams, Council Member-at-Large

ıdit Committee

muel S. Adams, Chairman; Mary Lou Zoback, William W. Hay; Ex Officio: Robert L. Fuchs

ɔmmittee on Committees

ıvid E. Dunn, Chairman; Priscilla C. Grew, James Helwig, David A. Stephenson, Bruce H. Wilkinson

ɔmmittee on the Arthur L. Day Medal Award

ary Lou Zoback, Chairman; Lewis B. Gustafson, Debra S. Stakes, Karl K. Turekian, Bruce R. Doe, Frederick A. Cook, Leigh H. Royden

Committee on Geology & Public Policy

John S. Scott, Chairman; Samuel S. Adams, George A. (Art) Barber, C. Edward Buchwald, MaryAnn L. Malinconico, Robert E. Riecker, Diana C. Dale, Robert C. Milici, Howard G. Wilshire

Headquarters Advisory Committee

William W. Hay, Chairman; Donald L. Everhart, Warren I. Finch, Frances W. Pierce, John G. Weihaupt

Committee on Honorary Fellows

Robert A. Berner, Chairman; C. Barry Raleigh, Judith A. McKenzie, Robert E. Wallace, Digby J. McLaren, Peter R. Vail

Committee on Investments

Anthony Reso, Chairman; William B. Heroy, Jr., Brian J. Skinner, Thomas W. Stern, Kelsey L. Boltz; Ex Officio: Robert L. Fuchs, Treasurer

Committee on Membership

Constance A. Sancetta, Chairman; Melvin C. Schroeder, Martin L. Stout, Stephen H. Stow, James D. Aitken, Penelope M. Hanshaw

Committee on Nominations

Arthur A. Socolow, Chairman; Maryellen Cameron, Clinton D.A. Dahlstrom, Roger W. Macqueen, Donald T. Secor, Jr.

Committee on Penrose Conferences

Daniel J. Stanley, Chairman; John L. Snyder, Paul D. Fullagar, James F. Tull

Committee on the Penrose Medal Award

E-an Zen, Chairman; Robert D. Hatcher, Jr., David B. Stewart, Robert H. Dott, Jr., Steven M. Stanley, Donald E. White, Laurie Brown

Program Review Committee

Lee J. Suttner, Chairman; John C. Maxwell, 1986 JTPC Chairman; Clement G. Chase, 1987 JTPC Chairman; William W. Hay, 1988 JTPC Chairman; Robert F. Dymek, 1989 JTPC Chairman

Committee on Publications

David L. Jones, Chairman; Henry Spall, Terry R. West, Robert D. Hatcher, Jr., Editor of the *Bulletin*; William A. Thomas, Editor of the *Bulletin*; Eldridge M. Moores, Editor of *Geology*; Campbell Craddock, Editor of Memoirs and Special Papers; Wallace R. Hansen, Editor of Maps and Charts; Conferee: F. Michael Wahl, Executive Director

Committee on Research Grants

Sharon Mosher, Chairman; George H. Brimhall, Jr., John A. Breyer, Edwin H. Brown, Thomas H. Anderson, Elaine R. Padovani; NSF Conferee: Ian D. MacGregor

Committee on Short Courses

Elwood R. Brooks, Chairman; David E. Dunn, Carroll Ann Hodges, George deVries Klein

Treatise on Invertebrate Paleontology Advisory Committee

Brian F. Glenister, Chairman; Charles W. Pitrat, F. Michael Wahl

GSA Steering Committee on Decade of North American Geology

W. Gary Ernst, Chairman; Albert W. Bally, Robert G. Blackadar, Gabriel Dengo, Charles L. Drake, Fernando Ortega-Gutierrez, James F. Hays, Digby J. McLaren, Raymond A. Price, John C. Reed, Jr., Guillermo P. Salas, Leon T. Silver, John O. Wheeler; Ex Officio: Jack E. Oliver, Albert W. Bally, Robert L. Fuchs, F. Michael Wahl, A.R. Palmer

Ad Hoc Committee on Minorities in the Geosciences

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

Report of the Treasurer

by Robert L. Fuchs

In 1987, GSA finances showed strong overall growth. The report of the Society's independent auditors, Touche Ross & Company, including financials for the six GSA sections, indicates total assets as of December 31, 1987, of $19,258,604, up 10.7% from 1986's $17,402,352. Liabilities and deferred revenues at the end of 1987 were $2,746,059, resulting in net worth of $16,512,545, an increase of 13.5% over 1986's net worth of $14,554,454. The Society was in a strongly liquid position at year end, with cash and cash equivalents of $8,791,401.

GSA benefited from the surging stock market during the first three quarters of 1987. Net investment gains during the year were $2,029,360. At year end the carrying value of cash and investments was $15,906,615. This was up 15.3% from 1986's $13,798,722.

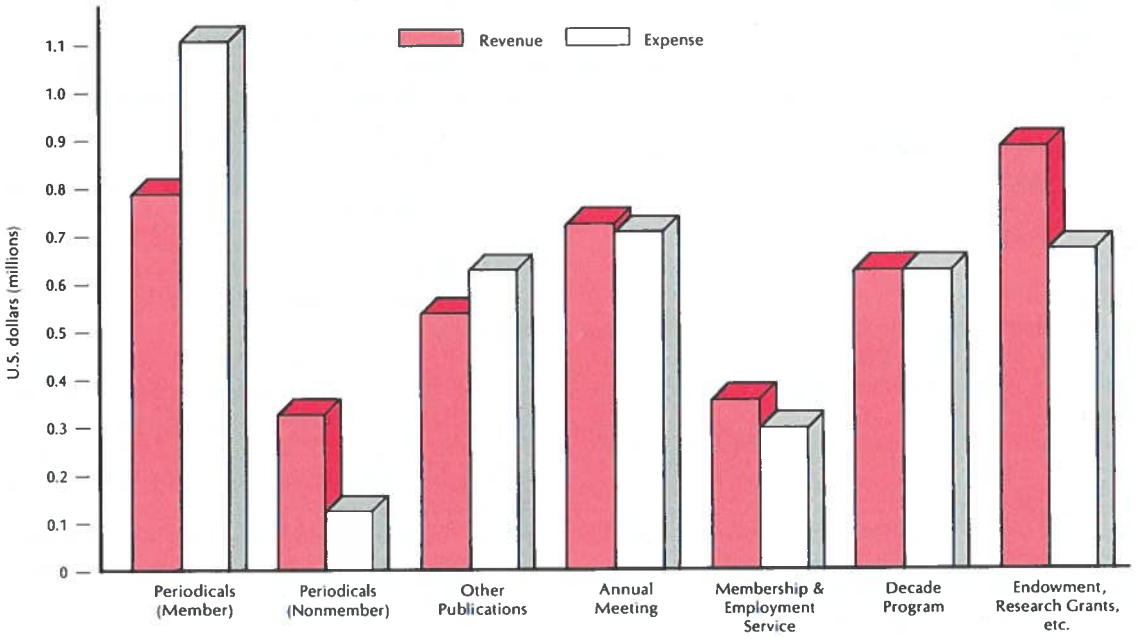
The Society's operating income statement showed a small deficit, as compared to 1986's small surplus. Revenue and support items totaling $4,206,752 failed to meet expenses by an amount of $88,139 (2.1%). Investment income (dividends and interest) decreased 10.9% to $799,337 due to generally lower interest rates, and this $98,000 reduction accounts for the operating deficit.

In the accompanying diagram, revenues and expenses are allocated into the appropriate major sectors of the Society's activities. Support was required in Member Periodicals and Other Publications. Support was provided by Nonmember Periodicals, Annual Meeting, Membership and Employment Service, and Endowment. Excess costs of the Decade program over sales are reimbursed by the GSA Foundation. In this analysis we have placed general and administrative costs in the Endowment category. The diagram clearly displays the important role played by the Penrose Endowment Fund and the Foundation in subsidizing GSA's publications.

The Society's real estate position stabilized after several years of construction and acquisition. Depreciated real estate value is $1,797,073; market value is believed to be twice that amount. GSA operations have rent-free use of a large amount of real property. This is another form of endowment support, less evident but equally important to the membership.

Because of events in October, 1987 was a terrifying year fo many investors. Fortunately, GSA's Investments Committee Executive Committee, Council, and money managers took action through the months prior to October that cushioned GSA' portfolio from the negative effects of the equity market collapse. I late spring, the entire position in Reich and Tang Equity Fund wa liquidated, and a gain of $2,138,400 was realized. Most of this mone was still held in cash and cash equivalents at year end, resulting in very liquid position. Three new money managers were selected b the Investments Committee—Weston Capital Management, Th Sosnowy Group, and Colorado Venture Management. The invest ment policy remains cautious, however; the portfolio is approx mately 50% in cash and 30% in bonds in mid-1988.

1987 REVENUES AND EXPENSES



GSA Council Actions—Spring 1988

At its May 13 meeting, in Boulder, Colorado, the GSA Council approved the following:

Council Nominations for 1988
or Councilor (1989–1990) and President (1989)
Randolph W. Bromery, Amherst, Massachusetts
or Councilor and Vice-President (1989)
Raymond A. Price, Ottawa, Ontario
or Councilor and Treasurer (1989)
Robert L. Fuchs, Denver, Colorado
or Councilors (1989–1991)
James F. Hays, Washington, D.C.
Eldridge M. Moores, Davis, California
David A. Stephenson, Phoenix, Arizona
James F. Tull, Tallahassee, Florida

lew Honorary Fellows
ısan Ketin
Department of Geological Engineering
Faculty of Mines
Istanbul Technical University
Tesvikiye, Istanbul
Turkey
ashid A. Khan Tahirkheli
National Centre of Excellence in Geology
University of Peshawar
Peshawar, NWFP, Pakistan
upert W. R. Rutland
Bureau of Mineral Resources, Geology, and Geophysics
Box 378
Canberra, A.C.T. 2601
Australia
abella Premoli-Silva
Istituto di Paleontologia
Universita di Milano
Via Mangialli 36
20133 Milano, Italy

ledal and Award Winners for 1988
enrose Medal
Robert S. Dietz
Department of Geology
Arizona State University
Tempe, Arizona 85287
ay Medal
Claude J. Allegre
Laboratoire de Geochimie et Cosmochimie
4, Place Jussieu, Tour 14/24
75230 Paris CEDEX 05
France
rchaeological Geology Division Award
Claude C. Albritton, Jr.
3436 University Boulevard
Dallas, Texas 75205
Glen L. Evans
9011 Fairway Hill Drive
Austin, Texas 78750
ilbert H. Cady Award (Coal Geology Division)
Ralph J. Gray
303 Drexel Drive
Monroeville, Pennsylvania 15146
E. B. Burwell, Jr. Award (Engineering Geology Division)
G. H. Eisbacher
Geologisches Institut
Universitat Karlsruhe
Kaiserstrasse 12
Karlsruhe 1, D-7500
Federal Republic of Germany
John J. Clague
3476 Quesnel Drive
Vancouver, British Columbia V6L 2W6
Canada
George P. Woollard Award (Geophysics Division)
Peter H. Molnar
Department of Earth, Atmospheric and Planetary Sciences, Room 54-726
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139
History of Geology Division Award
Stephen J. Gould
Department of Earth and Planetary Sciences
Harvard University
24 Oxford Street
Cambridge, Massachusetts 02138
O. E. Meinzer Award (Hydrogeology Division)
Isaac J. Winograd
U.S. Geological Survey
Water Resources Division
432 National Center
Reston, Virginia 22092
G. K. Gilbert Award (Planetary Geology Division)
Don E. Wilhelms
2027 Hyde Street, Apartment 6
San Francisco, California 94109
Kirk Bryan Award (Quaternary Geology & Geomorphology Division)
Peter W. Birkeland
Department of Geological Sciences
Campus Box 250
University of Colorado
Boulder, Colorado 80309-0250
Structural Geology & Tectonics Division
Career Contribution Award
John W. Handin
Center for Tectonophysics
College of Geosciences
Texas A&M University
College Station, Texas 77843-3113

Future GSA Annual Meetings

1989	November 6–9	St. Louis, Missouri
1990	October 29–November 1	Dallas, Texas
1991	October 21–24	San Diego, California
1992	October 26–29	Cincinnati, Ohio
1993	October 25–28	Boston, Massachusetts

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The following 627 Members have been elected to Membership by Council action during the period from September 1, 1987, through January 31, 1988 (* indicates transfer from Student Associate to Member).

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*William M. Boettger
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*Mimi A. Boxwell
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Kenn D. Cartier
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Thomas S. Chapin
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*Daniel E. Clements
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*Howard R. Feldman
*Greg Ferdock
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*Alan C. Ferner
*Daniel L. Feuerbach
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Paul G. Fitzgerald
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*Tim P. Flood
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*Richard J. Frizzell
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*Dru Germanoski
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Richard A. Levinson
Helen Lewis
Shirley A. Liss

(continued on p. 18

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Samuel J. Longiaru
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Christopher C. Loughman
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ames R. Lundy
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Carol Mankiewicz
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August C. Matthusen
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ill McCarthy
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. Scott McCleery
Cecelia McCloy
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Margaret H. McHugh
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eresa M. Mensing
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*Kimball Touysinhthiphonexay
*Yen Touysinhthiphonexay
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*James S. Walker
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*R. Scott Wallace
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*Scott D. Warner
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*C. Pius Weibel
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*Richard E. Zehner
*Robert W. Zei
*Ellen L. Ziegler
*Gregory A. Zielinski
Jan L. Zigler
James R. Zimbelman
Frederick P. Zoerner
*Elaine M. Zuk
Joseph D. Zund

NEW GSA STUDENT ASSOCIATES

Listed are the 568 Student Associates who became affiliated with the Society during the period from September 1, 1987, through January 31, 1988.

zar S. Abu-Jaber
H.M. Shah Alam
rl G. Albert
nes Alcock
seph L. Aldern
B. Andersson
Denise Apperson
illip A. Armstrong
mon Arrowsmith
moti M. Asher
dres Aslan
mane Asmerom
nal M. Assad
Vance D. Atkins
Judith E. Ausmus
Gary J. Axen
Allan G. Axon
William H. Babcock
Steve J. Baedke
Nathan L. Bangs
Paul W. Barbera
Robyn R. Barker
Patrick G. Barrese
Claudio A. Barrio
Penelope N. Bassett
Steven C. Beadle
L. Sue Beard
Cathleen M. Beaudoin
David Becker
Normand J. Begin
Raymond E. Beiersdorfer
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Philip C. Bennett
Steven W. Bennett
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Bonnie Bloeser
Paul A. Bodin
Stacy J. Bohannon
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Irene B. Boland
James C. Bolton
Mark K. Borucki
Michael A. Boubin
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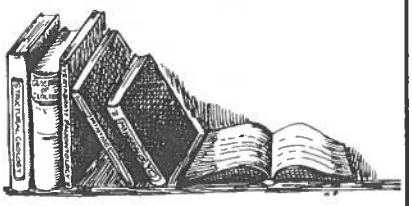
Kristine D. Bradshaw
Phyllis L. Breland
Sharon C. Brewster
Susan E. Brink
Craig W. Brougher
William J. Brown
James D. Bryant
Andrew M. Buddington
Roland Burgmann
Kelly J. Burke
(continued on p. 188)



WANTED:

Geoscience Journals

Do you have sets of geological journals that are not being used? Consider donating them to college or university libraries. Many geology departments are surprisingly deficient in reference materials and lack funds to purchase them. Most will reimburse donors for costs of packing and transportation.

A volunteer service in cooperation with the American Geological Institute will collect information on library needs and supply this information to prospective donors. Journals from all fields of geology are needed.

Prospective donors should state:

- titles and dates of publications available
- issues missing from sets
- telephone number and mailing address

Libraries or departments should state on school letterhead:

- specific data on journals desired
- brief reasons for need
- name, title, telephone number and address of an official to contact

Write to F.L. Klinger, c/o AGI Publications Department, 4220 King St., Alexandria, Va., 22302

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Cynthia A. Casby
Mitch V. Casteel
John D. Catalana
Corilane G. Cathyl-Bickford
Philip F. Cerveny III
Burton Chadwick
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Teresa A. Chaput
Helene Charrois
Robert F. Chenet
Peter P. Christiansen
Ernest Cisneros
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Marian B. Holness
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Keith L. Knudsen
Susan M. Koszalka
Jerome F. Kraus
David A. Kring
Joseph M. Kruger
David C. Kuentz

(continued on p. 18

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ırk E. Labrenz
:hard K. Landgraf
ıtthew K. Landon
bert A. Lane
ren M. Lange
:toria E. Langenheim
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NEW GSA FELLOWS

The following candidates were elected to Fellowship by Council action at the May 1988 meeting.

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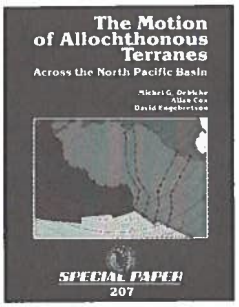
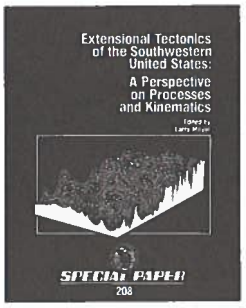
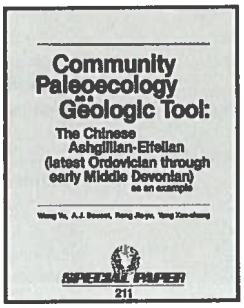
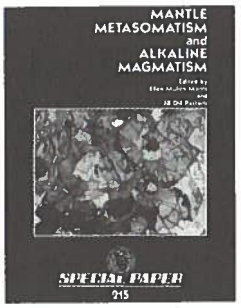
ɔert F. Butler
:hael J. Carr
ıglas S. Cherkauer
ın A. Cherry
ɔert L. Earhart
Karl W. Flessa
Eugene Edward Foord
David P. Gold
Steven M. Gorelick
Ralph J. Gray
Albert Lee Guber
Charles W. Hatten
John J. Hickey
Ian McKay Johnston
John Edward Kilkenny
James C. Knox
Bryon Kulander
Theodore C. Labotka
Gary G. Lash
Keenan Lee
David A. Lindsey
Kenneth H. Olsen
J. Frederick Sarg
A.M.C. Sengor
Ronald C. Surdam
James L. Whitford-Stark
Ian S. Williams

GSA SPECIAL PAPERS GSA









The Motion of Allochthonous Terranes Across the North Pacific Basin

by Michel G. Debiche, Allan Cox, David Engebretson, 1987

This report studies the trajectories of terrane movement across the Pacific basin and along the margin of North America and looks at possible points of origin of the terranes. More than 12 tables and 40 figures of unusually high quality. Special computer software was created to simulate terrane movement and plate age. Methods and results of Terrane Trajectories, Paleolatitude versus Time, and Coastwise Translation are presented. Models and data were compared, and trajectories were tested for internal consistency with paleomagnetic results.

SPE207, 56 p., ISBN 0-8137-2207-1, paperback, **$11.00**

Extensional Tectonics of the Southwestern United States: A Perspective on Processes and Kinematics

edited by Larry Mayer, 1986

What are the driving forces of rifting? How do initial lithospheric conditions affect subsequent rifting? What are the linkages between plate forces and regional stresses? What are the kinematics? Do different lithospheric thinning models generate unique geophysical signatures? How does rifting relate to regional topography? What about detachment structures? Seven papers in this volume will help you gain a better understanding of continental rifting processes in general and in the Basin and Range and Mojave Desert provinces in particular.

SPE208, 130 p., ISBN 0-8137-2208-X, paperback, **$17.50**

Community Paleoecology as a Geologic Tool: The Chinese Ashgillian-Eifelian (latest Ordovician through early Middle Devonian) as an example

by Wang Yu, A.J. Boucot, Ron Jia-yu, and Yang Xue-chang, 1987

This volume is part of an overall collaboration by A.J. Boucot and several members of the Nanjing Institute on varied problems of Silurian-Devonian community paleoecology, biogeography, and Silurian correlation—problems that are interrelated and that influence current basic taxonomic research. Chinese data are compared and contrasted with similar data from other parts of the world. Included are chapters that trace community evolution, name and list the communities, and illustrate brachiopod taxa in 20 plates.

SPE211, 106 p., ISBN 0-8137-2211-X, paperback, **$18.50**

Mantle Metasomatism and Alkaline Magmatism

edited by Ellen Mullen Morris and Jill Dill Pasteris, 1987

Contains 26 papers originally presented at the Symposium on Alkalic Rocks and Kimberlites, in April, 1985, a noteworthy outgrowth of which was a heightened awareness that alkaline magmatism is not restricted to any single scenario but may occur in virtually all tectonic and petrologic settings. The editors focus on mantle matasomatism and the origin of alkaline magmas, kimberlites, and related rocks; alkalic rocks in oceanic settings, and alkalic rocks in continental settings.

SPE215, 392 p., ISBN 0-8137-2215-2, sewn paperback, **$45.00**

Paleosols and Weathering through Geologic Time: Principles and Applications

edited by W.R. Sigleo and J. Reinhardt, 1987

A timely, unique volume. Earth scientists from many disciplines will be keenly interested because of growing recognition that paleosols (Ps) contain such a treasure of clues to tectonics, structural geology, erosional history, geography, geomorphology, and climate that they can no longer be ignored. Many believe the time is right to extend the use of Ps through the geologic time scale. This volume arose from the first symposium dedicated to Ps at a GSA Annual meeting. Ten papers deal with Recognition of Ps; Ps and the Evolution of the Atmosphere; Recognition and Chemical Characterization; Pedogenesis, Ground-water, Topographic, and Tectonic Controls; Interpretation for Profiles Exhibiting Subaerial Exposure Crusts from the Mississippian; Calcareous Ps in the Triassic Dolores Formation; Ps from Some Cretaceous Environments in the S.E. U.S.; Pedofacies Analysis, a New Approach to Reconstructing Ancient Fluvial Sequences; and Climatic Influences on Rates and Processes of Soil Development in Quaternary Deposits of S. Cal.

SPE216, 200 p., indexed, ISBN 0-8137-2216-0, paperback, **$22.50**

Early Permian Fusulinids from the Owens Valley Group, East-Central California

by R. T. Magginetti, C. H. Stevens, and P. Stone, 1987

Sixty fusulinid species from the Lower Permian part of the Owens Valley Group in east-central California, 17 of which are newly named, are described in this volume: 2 species of *Triticites*, 1 of *Leptotriticites*, 16 of *Schwagerina*, 1 of *Pseudofusulina*, 3 of *Chusenella*, 1 of *Paraschwagerina*, 9 of *Stewartina*, 6 of *Pseudoschwagerina*, 3 of *Chalaroschwagerina*, 6 of *Cuniculinella*, 3 of *Eoparafusulina*, and 6 of *Parafusulina*. In addition, a new genus, *Reticulosepta* (with three species), is described. Most of the fusulinids are from sediment-gravity-flow deposits, and they provide evidence for biostratigraphic subdivision of the Lower Permian part of the Owens Valley Group.

SPE217, 72 p., indexed, paperback, ISBN 0-8137-2217-9 **$11.25**

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Arlington, Texas
March 12–14, 1989

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October 24, 1988

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Dept. of Geology, Box 19049
University of Texas
Arlington, TX 76019
(817) 273-2987

Northeastern Section
Rutgers—The State University
New Brunswick, New Jersey
March 23–25, 1989

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Submit completed abstracts to
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Dept. of Geol. Sci., Busch Campus
Rutgers—The State University
New Brunswick, NJ 08903
(201) 932-2044

North-Central Section
University of Notre Dame
Notre Dame, Indiana
April 20–21, 1989

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December 1, 1988

Submit completed abstracts to
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Dept. of Earth Sciences
University of Notre Dame
Notre Dame, IN 46556
(219) 239-6686

Southeastern Section
Radisson Hotel
Atlanta, Georgia
April 6–7, 1989

Abstract deadline:
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Submit completed abstracts to
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(404) 542-2652

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Spokane Convention Center
Spokane, Washington
May 8–10, 1989

Abstract deadline:
December 12, 1988

Submit completed abstracts to
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Eastern Washington University
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(509) 359-7493

1989 ABSTRACT FORM REQUEST

: GSA Abstracts Coordinator
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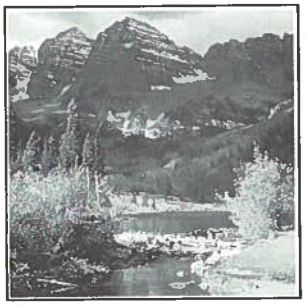

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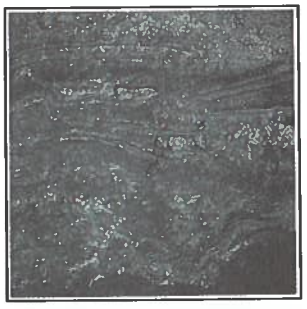

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Field guides with area maps to locations in AK, southern AZ, CA, HI, NV, OR, WA, and British Columbia. Indexed. Medium blue spine.

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Rocky Mountain Coal Scholarships Awarded

The Rocky Mountain Coal Scholarship Committee has selected ›o recipients for 1988 scholarships: Michelle N. Lamberson, ıiversity of British Columbia, Vancouver, and Henry C. Nowak, ɔlorado School of Mines, Golden. The scholarships are awarded ntly each year by the Symposium on the Geology of Rocky ountain Coal and the Coal Geology Division of GSA. This is the ɛth year that scholarships have been awarded.

Lamberson's dissertation is titled "Organic Sedimentology of e Lower Cretaceous Coal Measures, Northeastern British ɔlumbia." Nowak's thesis is titled "Geology of the Coal-bearing ıwer Williams Fork Formation of the Mesaverde Group, Southern ɛeance Creek Basin, Colorado."

ea of Study

The Rocky Mountain Coal Scholarship was established to ther interest in and research on coal within the Rocky Mountain d Northern Great Plains coal provinces by providing scholarship ıds for field and laboratory expenses, books, and tuition. Funding the program comes from surplus money accumulated by the mposium on the Geology of Rocky Mountain Coal. These funds ve been invested in the Geological Society of America Foundation, d the interest now forms the basis of the scholarship. There is, wever, no assurance of the amount of the funds or that funds will available every year.

Coal research pertaining to coal in the states or provinces of zona, Alberta, British Columbia, Colorado, Idaho, Montana, w Mexico, North Dakota, Utah, Saskatchewan, South Dakota, d Wyoming is considered for support. Applicants for the scholar-p must be currently enrolled in a graduate program (M.S. or .D.) at a private or state college or university. The main theme of applicant's research must be an aspect of coal research, and the earch must pertain to coal in the states or provinces listed above (the institution where the research is being conducted need not be in the listed states or provinces). Although the applicant must be involved in coal research, he or she need not be a geology major.

Application and Award

Scholarship applications can be obtained from the Geological Society of America, P.O. Box 9140, Boulder, CO 80301, or from Gary B. Glass, chairman of the Coal Scholarship Committee, c/o Geological Survey of Wyoming, Box 3008, University Station, Laramie, Wyoming 82071. *The deadline for applications for next year's scholarship is February 1, 1989.*

A committee composed of two ad hoc members of the Symposium on the Geology of Rocky Mountain Coal and two GSA Coal Geology Division members screens applications and selects the most appropriate proposal by May 1 each year. At the time of selection, scholarship monies are transferred directly to the grantee by the GSA Foundation. When the scholarship winner's research is complete, one copy of the dissertation or thesis is sent to the Chairman of the Rocky Mountain Coal Scholarship Committee.

Colorado Press Women Group Cites GSA Meeting Publicity

Colorado Press Women has announced the winners of the 1987–1988 Communications Contest winners. Joann Dennett of RDD Consultants in Boulder, Colorado, received the first place award in the public relations category for the GSA Annual Meeting publicity.

In presenting the award to Dennett, CPW noted that the GSA effort included a "handsome package of information and compilation for the media." The Tip Sheet, a short compilation of sessions interesting to the popular media, was cited as "a great idea."

Dennett and RDD Consultants are working with the GSA staff this year on public relations for the GSA Centennial Meeting.

The Colorado chapter of CPW is submitting the winning GSA entry to the national competition of the National Federation of Press Women.

1989 ANNUAL MEETING
November 6–9 St. Louis, Missouri
CALL FOR FIELD TRIP PROPOSALS

The theme for the 1989 meeting will be Frontiers in Geoscience. The emphasis of the field trips and the technical program will be on the future and on leading-edge technology. This is in keeping with St. Louis as the Gateway City site and with the beginning of GSA's second century.

The committee would like to structure field trips to complement the Frontiers in Geoscience theme and to coincide with topics of major symposia or theme sessions. Field trips that have this focus will be particularly welcomed.

Selection of trips will be made during July of 1988, leaving 15 months for preparing guidebooks and making arrangements.

To submit your proposal or for further information, contact the 1989 Field Trip Chairman

Jerry D. Vineyard
Dept. of Natural Resources
Div. of Geology and Land Survey
P.O. Box 250
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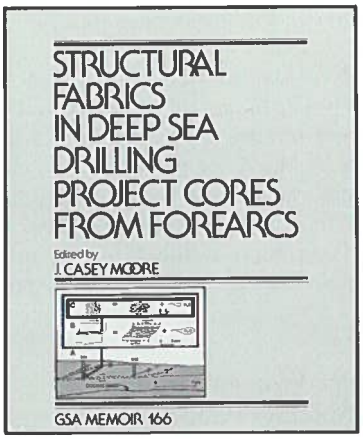
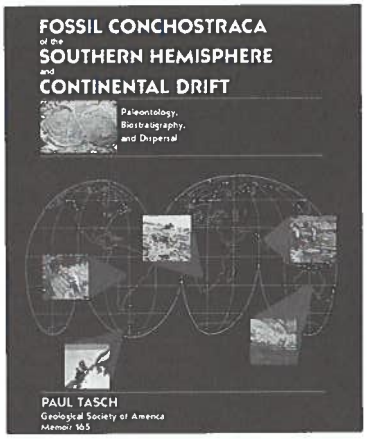


Structural Fabrics in Deep Sea Drilling Project Cores from Forearcs

edited by J. Casey Moore, 1987

DSDP cores from forearcs have a known tectonic setting and catch deformational and diagenetic-metamorphic processes while they are occurring. Analysis of the fabrics from these cores has great potential for furthering understanding of initial structural processes in accretionary wedges and for providing new insight into the evolution of ancient subduction complexes. Although studies of these cores, conducted in the context of each drilling leg, have elucidated the structural development of forearcs, those studies have lacked consistency between legs in terminology, approach, and detail. To bring this critical information to a broad geological audience in a uniform and condensed format, a group of geologists from several disciplines undertook the extensive structural study of all cores collected from forearcs during the DSDP. These ten papers summarize that work; each paper could stand alone as an important contribution.

MWR166, 168 p., 2 pocket plates, ISBN 0-8137-1166-5, hardbound, $18.00



Fossil Conchostraca of the Southern Hemisphere and Continental Drift: Paleontology, Biostratigraphy, and Dispersal

by Paul Tasch, 1987

Does the record of fossil conchostracan of the southern continents contain credible evidence of nonmarine dispersal between them during portions of Paleozoic and Mesozoic? The author presents results of field studies and biostratigraphic collections of fossil conchostrcans in pursuit of this question. His own fossil collections extended to Africa, Australia, Antarctica, India, and South America, and he supplemented his own with fossils from collections of colleagues and museums. The data, he claims, indicate a need for reexamination of pre-Drift placement of India and Africa. He describes several new taxa, and provides 49 outstanding plates, six appendices, and his personally prepared index.

MWR165, 304 p., indexed, ISBN 0-8137-1165-7, $55.00

PUBLICATIONS IN PREPARATIO

Geology of the Henry Mountains, Utah, As Recorded in the Notebooks of G. K. Gilbert, 1875-76

edited by Charles B. Hunt

Go back in time with this volume and experience the thrill of discovering brand new geologic concepts. Travel alongside one of America's greatest geologists, Grove Karl Gilbert, whose early discoveries and theories have now become fundamental principles of our science. These day-by-day field notes of Gilbert's trip into Utah's Henry Mountains in 1875-1876 are an exciting, firsthand record of new discoveries and new ideas. They became the guide for Charles Hunt's many seasons of work in the same area. Now he shares Gilbert's original entries and maps with us, adding asides and clarifications of his own to create a fascinating combination of geologic history and frontier Americana. An enjoyable book, and one you can use to aid your own exploration of this scenic section of the great American West.

MWR167, 325 p., ISBN 0-8137-1167-3, hardbound, $52.50

Watch For These ...

The Cretaceous System of Southern South America
by A.C. Riccardi

Geology and Paleontology of Seymour Island, Antarctic Peninsula
edited by R.M. Feldman and M.O. Woodburne

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THE GEOLOGICAL SOCIETY OF AMERICA

MEETINGS

(Asterisk indicates new or changed information)

)88

ismic Probing of the Continents and Their Margins International Symposium, July 6–8, 1988, Canberra, Australia. Information: Jim Leven, Bureau of Mineral Resources, P.O. Box 378, anberra, ACT 2601, Australia; phone (062) 499 111; Telex 62109.

ternational Working Meeting on Soil Micromorphology eeting of Subcommission B of the International Society of Soil ience), July 10–15, 1988, San Antonio, Texas. Information: L. P. lding, Dept. of Soil and Crop Sciences, Texas A&M University, llege Station, TX 77843-2474; (409) 845-3604.

rst International Conference on Radiolaria, July 18–20, 1988, rburg, Federal Republic of Germany. Information: Joyce R. ieford, U.S. Geological Survey, MS 144, 345 Middlefield Rd., nlo Park, CA 94025; (415) 329-4004, or R. Schmidt-Effing, Interrad nference, Dept. of Geosciences, Philipps-Universität, Lahnberge, 3550 Marburg, Federal Republic of Germany.

n International Symposium on Fossil Cnidaria, including chaeocyatha and spongiomorphs, July 25–29, 1988, Brisbane, stralia. Information: John Jell, Uniquest Ltd., University of eensland, St. Lucia, QLD 4067, Australia; phone (07) 344 2733.

il and Water Conservation Society Annual Meeting, July August 3, 1988, Columbus, Ohio. Information: Alan C. Epps, 5 NE Ankeny Rd., Ankeny, IA 50021-9764; (515) 289-2331.

rmafrost 5th International Conference, August 2–5, 1988, ndheim, Norway. Information: V International Conference on rmafrost, Norwegian Institute of Technology, Studies Administra-n, N-7034 Trondheim-NTH, Norway.

hth International Conference on Basement Tectonics, gust 8–12, 1988, Butte, Montana. Information: M. J. Bartholomew, ntana Bureau of Mines and Geology, Montana Tech, Butte, MT 01; (406) 496-4177.

th International Symposium on the Ordovician System, gust 9–12, 1988, St. John's, Newfoundland. Information: Chris R. nes, ISOS, Dept. of Earth Sciences, Memorial University, St. n's, Newfoundland A1B 3X5, Canada; (709) 737-8143.

neralogy of Precious Metal Deposits, August 12–15, 1988, den, Colorado. Information: James A. McGlasson, 7387 South wer St., Littleton, CO 80123; (303) 972-0376; or James F. lbut, 2240 So. Adams, Denver, CO 80401; (303) 279-7796.

eozoic Biogeography and Paleogeography, August 14–19, 8, Oxford, England. Information: C. R. Scotese, Shell Develnent Co., P.O. Box 481, Houston, TX 77001, (713) 663-2688, or S. McKerrow, Dept. Earth Sciences, Parks Rd., Oxford OX1 3PR, land.

h Annual Highway Geology Symposium, August 17–19, 8, Park City, Utah. Information: Highway Geology Symposium, eslie Youd, 368 Clyde Bldg., Dept. Civil Engineering, Brigham ng University, Provo, UT 84602; (801) 378-6327.

erican Association of Petroleum Geologists Rocky Mountain Section, August 21–24, 1988, Bismarck, North Dakota. rmation: Roger N. Borchert, Box 5006, Bismarck, ND 58501;) 223-3588.

iety of Economic Paleontologists and Mineralogists Fifth year Meeting, August 21–24, 1988, Columbus, Ohio. Information: SEPM, P.O. Box 4756, Tulsa, OK 74159-0756; (918) 743-9765.

Space '88, international conference on engineering, construction, and operation of facilities and bases in space, August 29–31, 1988, Albuquerque, New Mexico. Information: Specialty Conferences, American Society of Civil Engineers, 345 East 47th St., New York, NY 10017; (212) 705-7139.

6th International Fission Track Dating Workshop, September 5–9, 1988, Besançon, France. Information: J.-L. Janier-Dubry, Lab. de Microanalyses Nucléaires, U.F.R. des Sciences et Techniques, 16 Route de Gray, 25030 Besançon cedex, France; phone 81-53-81-22.

International Symposium on Geochemistry and Mineralization of Proterozoic Mobile Belts, September 6–10, 1988, Beijing, China. Information: Proterozoic Geochemistry Symposium, c/o Prof. Sun Dazhong, Tianjin Inst. Geology and Mineral Resources, CAGS No. 4, 8th Rd., Dazhigu, Tianjin 300170, People's Republic of China.

Wyoming Geological Association Annual Field Conference and Symposium: Eastern Powder River Basin–Black Hills, September 9–11, 1988, Casper, Wyoming. Information: Janet de Vries, Dwight's Hotline, P.O. Box 2934, Casper, WY 82602; (307) 237-1004.

International Symposium on Rock Mechanics and Power Plants, September 12–16, 1988, Madrid, Spain. Information: ISRM Symposium, Sociedad Española de Mecánica de las Rocas, Paseo Bajo de la Virgen del Puerto, 3, 28005 Madrid, Spain.

Clay Minerals Society Annual Meeting, September 18–21, 1988, Grand Rapids, Michigan. Information: T. J. Pinnavaia, Dept. of Chemistry, Michigan State University, East Lansing, MI 48824; (517) 353-4511.

ECORS Program: International Meeting on a Deep Seismic Line with Field Trip across the Pyrenees, September 19–22, 1988, Toulouse, France, to Balaguer, Spain. Information: Société Géologique de France, 77 rue Claude Bernard, 75005 Paris, France; phone 331-43-31-77-35.

International Symposium on Engineering Geology: Study, Preservation and Protection of Ancient Works, Monuments and Historical Sites, September 19–23, 1988, Athens, Greece. Information: Paul G. Marinos, Greek Committee of Engineering Geology, 1988 Symposium Secretariat, P.O. Box 19140, GR-117 10 Athens, Greece; Telex 45 4312 POLX.

International Conference on Disposal of Radioactive Waste in Seabed Sediments, September 20–21, 1988, Oxford, England. Information: Society for Underwater Technology, 1 Birdcage Walk, London SW1H 9JJ, England; phone 01-222 8658; Telex 917944.

Fourth International Tectonostratigraphic Terrane Conference, September 23–October 7, 1988, Nanjing University, Nanjing, People's Republic of China. Information: Tom Wiley, U.S. Geological Survey, MS 999, 345 Middlefield Road, Menlo Park, CA 94025; (415) 354-3067.

Mediterranean Basins Conference, September 25–28, 1988, Nice, France. Information: AAPG Convention Dept., P.O. Box 979, Tulsa, OK 74101-0979; (918) 584-2555.

(continued on p. 196)

MEETINGS (*continued from p. 195*)

Geographic Information Symposium, September 26-30, 1988, Denver, Colorado. Information: Thomas Usselman, GIS Symposium, National Academy of Sciences, 2101 Constitution Ave., Washington, DC 20418.

Environments and Physiology of Fossil Organisms Symposium, September 28-30, 1988, Edinburgh, Scotland. Information: Meetings Secretary, Royal Society of Edinburgh, 22, 24 George St., Edinburgh EH2 2PQ, Scotland.

***Denver GeoTech '88: Tools for Geocomputing**, October 1-4, 1988, Lakewood, Colorado. Information: Chuck Bierley, CB & Associates, 122 Zang Court, Lakewood, CO 80228; (303) 989-2989.

19th Annual Underwater Mining Institute, October 2-5, 1988, Woods Hole, Massachusetts. Information: Allen J. Miller, University of Wisconsin Sea Grant Institute, 1800 University Ave., Madison, WI 53705; (608) 262-0645.

***Nobel Conference XXIV, The Restless Earth**, October 4-5, 1988, Saint Peter, Minnesota. Information: Nobel Conference XXIV, Gustavus Adolphus College, Saint Peter, MN 56082.

Mars: Evolution of Volcanism, Tectonism and Volatiles, October 5-7, 1988, Washington, D.C. Information: Projects Office, Lunar and Planetary Institute, 3303 NASA Road 1, Houston, TX 77058-4399; (713) 486-2150.

53rd Annual Field Conference of Pennsylvania Geologists, October 6-8, 1988, Hazelton, Pennsylvania. Information: Donald M. Hoskins, Pennsylvania Geological Survey, P.O. Box 2357, Harrisburg, PA 17120; (717) 787-2169.

Ter-Qua '88, symposium and field conference on global climat and the future of the High Plains aquifers, October 6-9, 198 Lincoln and North Platte, Nebraska. Information: Institute fo Tertiary-Quaternary Studies, 2739 Centenary, Houston, TX 7700 (713) 661-4038.

***Geochautauqua '88: Computers for the Analysis of Geo chemical and Hydrogeochemical Data**, October 7-8, 198 Tucson, Arizona. Information: Donald E. Myers, Dept. o Mathematics, University of Arizona, Tucson, AZ 85721; (60 621-6859.

Geological Association of New Jersey Annual Meetin October 7-9, 1988, Lawrenceville, New Jersey. Informatio Jonathan Husch, Dept. of Geosciences, Rider College, 20 Lawrenceville Rd., Lawrenceville, NJ 08648; (609) 896-5330.

New York State Geological Association Annual Field Tri Meeting, October 7-9, 1988, Plattsburgh, New York. Informatio Tom Wolosz, Center for Earth and Environmental Science, SUN College, Plattsburgh, NY 12901; (518) 564-4031.

Geothermal Resources Council Annual Meeting, October 12, 1988, San Diego, California. Information: Geotherm Resources Council, P.O. Box 1350, Davis, CA 95617-1350; (91 758-2360; Fax (916) 758-2839.

***West Texas Geological Society Fall Field Seminar, Guad lupe Mountains**, October 13-16, 1988. Information: West Tex Geological Society, Inc. Office, P.O. Box 1595, Midland, TX 7970 (915) 683-1573.

(*continued on p. 19*

EETINGS (*continued from p. 196*)

ssociation of Engineering Geologists 31st Annual Meeting, ctober 16–21, 1988, Kansas City, Missouri. Information: William yson, Kansas Corporation Commission, 4th Floor, State Office dg., Topeka, KS 66612; (913) 296-5113.

lobal Catastrophes in Earth History: An Interdisciplinary nference on Impacts, Volcanism and Mass Mortality, October -23, 1988, Snowbird, Utah. Information: Global Catastrophes nference, Lunar and Planetary Institute, 3303 NASA Road 1, uston, TX 77058-4399; (713) 486-2150.

ternational Symposium on Remote Sensing of Environ-ent, October 20–26, 1988, Abidjan, Ivory Coast. Information: an K. Pakder, P.O. Box 8618, Ann Arbor, MI 48107-8618; (313) 4-1200, ext. 3886.

nerican Society of Civil Engineers Convention, October -27, 1988, St. Louis, Missouri. Information: ASCE Conventions d Exhibits Dept., 345 East 47th St., New York, NY 10017; (212) 5-7543.

GCP Project 254, Metalliferous Black Shales and Related e Deposits, Annual Meeting, October 29, 1988, Denver, lorado. Information: Richard I. Grauch, U.S. Geological Survey, S. 973, Federal Center, Denver, CO 80225; (303) 236-5551.

ological Society of America 100th Annual Meeting, October -November 3, 1988, Denver, Colorado. Information: Meetings partment, GSA, P.O. Box 9140, Boulder, CO 80301; (303) 7-2020.

cond International Gold Mining Conference, November 7-988, Vancouver, British Columbia. Information: C. O. Brawner, O. Box 91651, West Vancouver, B.C. V7V 3P3, Canada; (604) 2-3717.

nerican Association of Stratigraphic Palynologists Annual eting, November 10–12, 1988, Houston, Texas. Information: an A. Clendening, Amoco Production Company, P.O. Box 3092, uston, TX 77253; (713) 556-3549.

vances in Ground-Water Hydrology, November 16–18, 1988, npa, Florida. Information: American Institute of Hydrology, 3416 iversity Ave. S.E., Suite 200, Minneapolis, MN 55414; (612) 1-1030.

mposium on Hot Spots in the South Pacific, November 21, 8, Paris, France. Information: Société Géologique de France, 77 Claude Bernard, 75005 Paris, France; phone 331-43-31-77-35.

hird Symposium on Regional Geology of Mexico, November 30, 1988, Mexico City. Information: L. M. Mitre-Salazar, Instituto Geología, UNAM, Aptdo. Postal 70-296, Ciudad Universitaria, yoacán, 04510 México D. F., México; phone (905) 548-0772.

88 Eastern Oil Shale Symposium, November 30–December 988, Lexington, Kentucky. Information: Connie S. Willingham, /IMMR, 201 Porter Bldg., Lexington, KY 40506-0205; (606) -2841.

ochemistry of Gulf Coast Oils and Gases, December 4–7, 8, New Orleans, Louisiana. Information: Dietmar Schumacher, nzoil Co., P.O. Box 2967, Houston, TX 77252, (713) 546-4028, or hlon C. Kennicutt, Geochemical and Environmental Research oup, Texas A&M University, Ten South Graham Rd., College tion, TX 77840; (409) 690-0095.

erican Geophysical Union Fall Meeting, December 5–9, 8, San Francisco, California. Information: Ann E. Singer, American Geophysical Union, 2000 Florida Ave., N.W., Washington, DC 20009; (202) 462-6903.

ECORS Program: Deep Seismic Line across the Western Alps, joint meeting of French, Swiss, and Italian geological societies, December 12–13, 1988, Paris, France. Information: François Roure, Inst. Français du Pétrole, 1-4 ave. du Bois Préau, 92506 Rueil-Malmaison, France.

GSA 1988

Centennial Celebration, October 31–November 3, Denver, Colorado

PENROSE CONFERENCES

Origin of Massif Anorthosites and Related Rocks, August 14–19, 1988, Chugwater, Wyoming. Information: B. Ronald Frost, Dept. of Geology and Geophysics, University of Wyoming, Laramie, WY 82071; (307) 766-4290.

Marine Evaporites: Genesis, Alteration, Associated Deposits, August 28–September 2, 1988, Detroit, Michigan, and Windsor, Ontario. Information: Peter Sonnenfeld, Dept. of Geology, University of Windsor, Windsor, Ontario N9B 3P4, Canada; (313) 963-6112 or 6113, ext. 2490.

Volcanic Influences on Terrestrial Sedimentation, August 28–September 3, 1988, Crystal Mountain, Washington. Information: Gary A. Smith, Dept. of Geology, University of New Mexico, Albuquerque, NM 87131; (505) 277-4204.

Criteria for Establishing the Relative Timing of Pluton Emplacement and Regional Deformations, September 10–15, 1988, California. Information: Scott R. Paterson, Earth Science Board, University of California, Santa Cruz, CA 95064; (408) 429-3251.

1989

Australasian Tectonics, February 6–10, 1989, Kangaroo Island, Australia. Information: A. Grady, c/o Dept. of Earth Science, Flinders University, Bedford Park, SA 5042, Australia.

Society of Mining Engineers Annual Meeting, February 27–March 2, 1989, Las Vegas, Nevada. Information: Society of Mining Engineers, Meetings Dept., P.O. Box 625002, Littleton, CO 80162.

Symposium on Energy and Mineral Potential of the Central America–Caribbean Region, March 5–9, 1989, San Jose, Costa Rica. Information: Mary Stewart, Circum-Pacific Council for Energy and Mineral Resources, 5100 Westheimer Road, Houston, TX 77056.

***Second Symposium on the Application of Geophysics to Engineering and Environmental Problems**, March 13–16, 1989, Golden, Colorado. Information: Ron Bell, SEMEG, c/o BellWest Geoservices, P.O. Box 10845, Edgemont Branch, Golden, CO 80401.

European Geophysical Society XIV General Assembly, March 13–17, 1989, Barcelona, Spain. Information: EGS Office, c/o MPI für Aeronomie, D-3411 Katlenaburg-Lindau, Federal Republic of Germany. (*Abstracts deadline: December 15, 1988.*)

International Symposium on the Silurian System (Murchison Symposium), March 28–April 9, 1989, Keele, England. Information: M. G. Bassett, Dept. of Geology, National Museum of Wales, Cardiff CF1 3NP, Wales; phone 02222-397951.

(*continued on p. 198*)

MEETINGS (*continued from p. 197*)

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.

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.

***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.

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.

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.

***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.

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.

***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.

World Gold '89, October 22-25, 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.

People

The Association for Women Geoscientists 1988 national boar includes GSA Member **Suzanne Webel**, Boulder, Colorado, vic president, and Member **Marcia Keefer**, Albuquerque, New Mexic treasurer.

Society of Economic Paleontologists and Mineralogists office for 1988–1989 include Member **Peter A. Scholle**, Southern Met odist University, president; Fellow **Raymond L. Ethington**, Unive sity of Missouri, Columbia, president-elect; Fellow **Richard Davis, Jr.**, University of South Florida, secretary-treasurer; Memb **Allan A. Ekdale**, University of Utah, secretary-treasurer; Fellc **Norman D. Smith**, University of Illinois, Chicago, editor, *Journ of Sedimentary Petrology*; Fellow **Léo F. Laporte**, University California, Santa Cruz, editor, *Palaios*; Member **Barbara H. Lid** USGS, Fisher Island Station, Miami, editor, Special Publications

Fellow and 1988 Day Medal awardee **Don L. Anderso** California Institute of Technology, has been awarded the Roy Astronomical Society's Gold Medal.

Fellow **Bilal U. Haq**, Houston, has been appointed director the National Science Foundation Marine Geology and Geophysi Program.

Member **Thomas A. Markham**, Canyon Lake, Texas, h joined Petroleum Registry as chief geologist and head of t technical/service department.

Member **Kenneth R. Moser** has been appointed proje manager of Golder Associates' Mt. Laurel, New Jersey, office.

Fellow **Haydn H. Murray**, Indiana University, Bloomingtc has been elected 1988 president of the Society of Mining Engineer

Fellow **Anthony F. Randazzo** has been appointed chairm of the Department of Geology at the University of Florida.

Fellow **Peter A. Rona**, NOAA, Miami, has been awarded t U.S. Department of Commerce Gold Medal.

Member **Fred L. Troise**, Plainview, New York, has be promoted to vice-president—marketing of Geraghty & Miller, Ir

In Memoriam

Dion L. Gardner
Laguna Niguel, California

Robert M. Garrels
St. Petersburg, Florida

Deane F. Kent
Maryville, Tennessee
March 22, 1988

Victor C. Miller
Mesa, Arizona
April 1, 1988

Memorial Preprints

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

John P. Albers, by John H. Stewart
George Henry Crowl, by Richard P. Goldthwait
William L. Donn, by Stanley D. Gedzelman
Henry Florey Fowler, by Richard R. McCleod
Robert Whitcomb Karpinski, by David B. Walch
William Harold Stuart, by Robert F. Legget (revised and reprinte
William D. Thornbury, by Haydn H. Murray

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THE UNIVERSITY OF TEXAS AT EL PASO
ne Department of Geological Sciences at the ersity of Texas at El Paso has a tenure-track ning beginning either September 1, 1988 or uary 15, 1989. The field of specialization is geology of clastic sediments and sedimentary s. Applicants must have a strong commitment esearch and the ability to attract external ing. We seek an individual whose interests complement one or more of our existing research strengths: sedimentary geochemistry, geophysical basin studies, stratigraphy, biostratigraphy, and structure of southwestern North America. Ability to interface with industry and to utilize our new analytical facilities (Cameca SX automated electron microprobe, INAA, and DCP) is also desirable.

A doctorate is required and the position will probably be filled at the Assistant Professor level. However, more senior persons will be considered. Please send a resume, statement of research plans, and three letters of reference to: Chairman, Search Committee, Department of Geological Sciences, University of Texas at El Paso, El Paso, TX 79968-0555.

The closing date is August 1, 1988. However, this search will remain open until a suitable candidate is found.

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SENIOR GEOHYDROLOGIST to establish groundwater hydrology practice in a multidisciplinary engineering, planning and design firm. Candidate needs 5 to 10 years experience, M.S. in geohydrology or registered civil engineer preferred. Should have experience in siting studies for potable groundwater supplies; 3-D pollutant transport modelling; groundwater mounding analyses; modelling aquifer zones of contribution; development of commercial and residential projects.

Contact Richard Orton at Sasaki Associates, Inc., 64 Pleasant Street, Watertown, MA 02172. Phone (617) 926-3300.

HYDROGEOLOGIST
University of New Mexico

The Department of Geology at the University of New Mexico invites applications for a tenure-track position in hydrogeology at the assistant/associate-professor level beginning in January of 1989. Applicants should have a PhD in hydrogeology or geology with specialization in hydrogeology. Primary consideration will be given to applicants with interests in both theoretical and applied hydrogeology, such as the role of geology in ground-water processes and flow dynamics, environmental/geotechnical problems, process/systems models, and water-resource assessments. The successful candidate will be expected to assume an active role in the development of new academic programs, including a joint program in hydrogeology between the Geology and Civil Engineering departments and an interdisciplinary water-resources administration program. Requirements of the position also include teaching at the undergraduate and graduate level, advising and supporting graduate students, and establishing a strong research program.

The closing date for application is September 30, 1988. Applicants should submit a complete resume including a statement of teaching and research interests, list of relevant professional experience and publications, and names and addresses of three referees to Stephen G. Wells, Search Committee Chairman, Department of Geology, University of New Mexico, Albuquerque, NM 87131. Phone: 505-277-4204.

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Postdoctoral Research Associateships

e Center for Neotectonic Studies of the ıckay School of Mines, University of vada - Reno, seeks highly qualified apcants for Postdoctoral Research Assoteships in Neotectonics, Tectonics, sin Analysis, and Paleomagnetic Studto begin in August, 1988. Special nsideration will be given to apcants who have demonstrated the ility to design and conduct significant ıearch. Successful applicants will rticipate in research programs in the ıthern Great Basin related to seistectonic and geologic relationships, d evaluation of petroleum resource ential. Send a letter of applican, official transcripts, and three ers of recommendation to: Dr. David Slemmons, Director, Center for Neotecıic Studies, Mackay School of Mines, iversity of Nevada - Reno, NV 89557. plication deadline: August 15, 1988. additional information, contact R.A. weickert, D.B. Slemmons, P.H. Cashn, or J. Trexler. U.N.R. is an affirtive action, equal opportunity emyer, and employs only U.S. citizens d resident aliens lawfully authorized work in the USA.

enter for Neotectonic Studies
University of Nevada - Reno

Yucca Mountain Project Manager

Applications and nominations are invited for the position of Project Manager of the Yucca Mountain Project, which is contracted to the State of Nevada to review Department of Energy work and to conduct original research on the proposed high level nuclear waste repository at Yucca Mountain, Nevada. The project is administered by the Center for Neotectonic Studies, a research component of the Mackay School of Mines, University of Nevada - Reno. More than thirty project personnel are currently involved in basic and applied research in geology, geophysics, geological engineering, and geochemistry, in topics relevant to waste isolation. The annual budget is approximately 1.5 million dollars, although increased budgets and expanded programs have been included in a continuation proposal for the three-year period beginning July 1, 1988.

Candidates for Manager should have background and qualifications required to overview and coordinate work of this diverse group. The candidate should have the Ph.D. degree in earth science or equivalent experience and proven records in research and in supervising or managing research and/or engineering projects. Familiarity with siting, design of engineering structures, or radioactive waste problems is desirable. The candidate should also have experience that demonstrates an ability to work constructively with basic researchers. The manager would serve as a contact agent with State and Federal agencies. Rank and salary are competitive, and will be commensurate with the applicant's qualification and experience.

Applicants should submit a resume, comprehensive statement of interest, research and management qualifications, bibliography of scientific publications, pertinent technical reports, and names and addresses of at least three references, by August 1, 1988. Send to: Robert J. Watters, Chairman, Search Committee, Mackay School of Mines, University of Nevada - Reno, NV 89557-0047, (702) 784-6067. Further information may be obtained from David B. Slemmons, Director, Center for Neotectonic Studies.

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University of Nevada - Reno
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Center for Neotectonic Studies

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OCTOBER 31–
NOVEMBER 3, 1988

DENVER,
COLORADO

CENTENNIAL MEETING & EXHIBIT

Registration and all other meeting information
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INSIDE ---

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