

DDM-SVF: A Prototype Dynamic Digital Map of the Springerville Volcanic Field, Arizona

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ABSTRACT

Dynamic Digital Map-Springerville Volcanic Field (DDM-SVF) is a stand-alone "presentation-manager" program that contains and displays four thematic geologic maps of the Springerville volcanic field, Arizona, on the Macintosh computer. It is essentially a complete "geologic map on disk" (CD-ROM). Because of its digital format, the program contains far more data than even the most complete analog maps. This digital map offers several advantages over hard-copy maps in that it simplifies finding samples (or units), makes information on map features and associated digital photos instantly available, and allows sequential changes in thematic map type. The maps can be printed out in color on desktop printers, or saved as separate files, and all data can be saved from the program to tab-delimited ASCII format, making the data easily accessible and accurately transferable to other workers. Maps of this type offer a venue for producing high-quality color maps and associated data quickly and efficiently, and can be distributed electronically (for example, by Internet) or on disk (by either diskettes or CD-ROMs).

INTRODUCTION

Desktop computers today offer a new medium for presenting geologic maps, brought on by the development of "hypermedia" programming languages (or "environments"). One such program is SuperCard, which has been used to produce DDM-SVF, a prototype geologic map on disk soon to be available (see p. 88) on CD-ROM from the Geological Society of America (Condit, 1995). Hypermedia environments provide an efficient way to write software to link maps, data, or digital photos into an interactive framework, providing the geologist immediate access to both the map and its associated information. An example of such a link: a geologist looks at a map on the screen, sees a symbol for a chemical analysis or a map unit and, using a mouse, clicks on the symbol, immediately bringing up a window containing the chemical analysis or unit description. Maps and data can be easily inserted into such a program; an example is SuperMap 7/23/92 (Condit and Neutra, 1992), which is included on a CD-ROM. In essence, these programs present a geologic map in a digital format that stresses ease of use and accessibility.

This article describes DDM-SVF, a prototype dynamic digital map I developed for use on the Macintosh computer (a Windows "player" should be available from Allegiant, which publishes SuperCard, early in 1995 for use

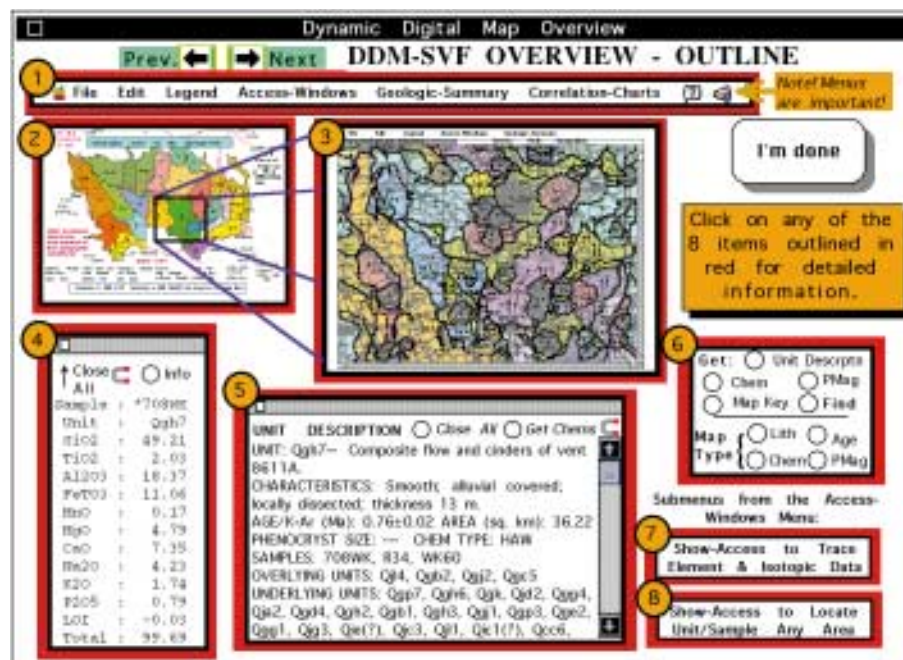


Figure 1. Page 1 of Dynamic Digital Map overview. Items numbered 2-6 show the major types of windows in the program. Item 2 is the index map; selecting (clicking on) the green area in this window displays the corresponding map segment (item 3). A click on a chemical sample site or on a unit symbol on that map segment displays the floating palette windows shown in items 4 and 5, respectively. The window of item 6 provides alternative means to display this information (see text), to search for and find units and samples on maps, and to transform a map from one thematic map type to another.

on DOS computers). DDM-SVF displays four thematic geologic maps of the Springerville volcanic field, a late Miocene to Pleistocene volcanic field in east-central Arizona; a hard-copy version of these maps will soon be published as a U.S. Geological Survey Miscellaneous Investigation Series map (Condit et al., 1995). DDM-SVF is a major expansion of both SuperMap 7/23/92, which included only a small part of the field, and of the four hard-copy thematic maps, because it

includes a large petrologic data base and digital photographs. I hope this article points the way toward what is possible in the development of digital maps and inspires others to produce such maps; DDM-SVF barely scratches the surface.

A demonstration version of DDM-SVFDemo-v.xx.xx.94 can be obtained through the Internet by anonymous FTP from eclogite.geo.umass.edu (IP address 128.119.45.20), in the directory "ccondit." The hardware needed to run

DDM-SVF is a Macintosh with 8 megabytes of random access memory, an eight-bit (256) color 13 inch monitor, a hard disk, and/or a CD-ROM reader. If a color printer is available, most figures and all maps can be printed in color.

ATTRIBUTES OF DDM-SVF

What DDM-SVF Is and Is Not

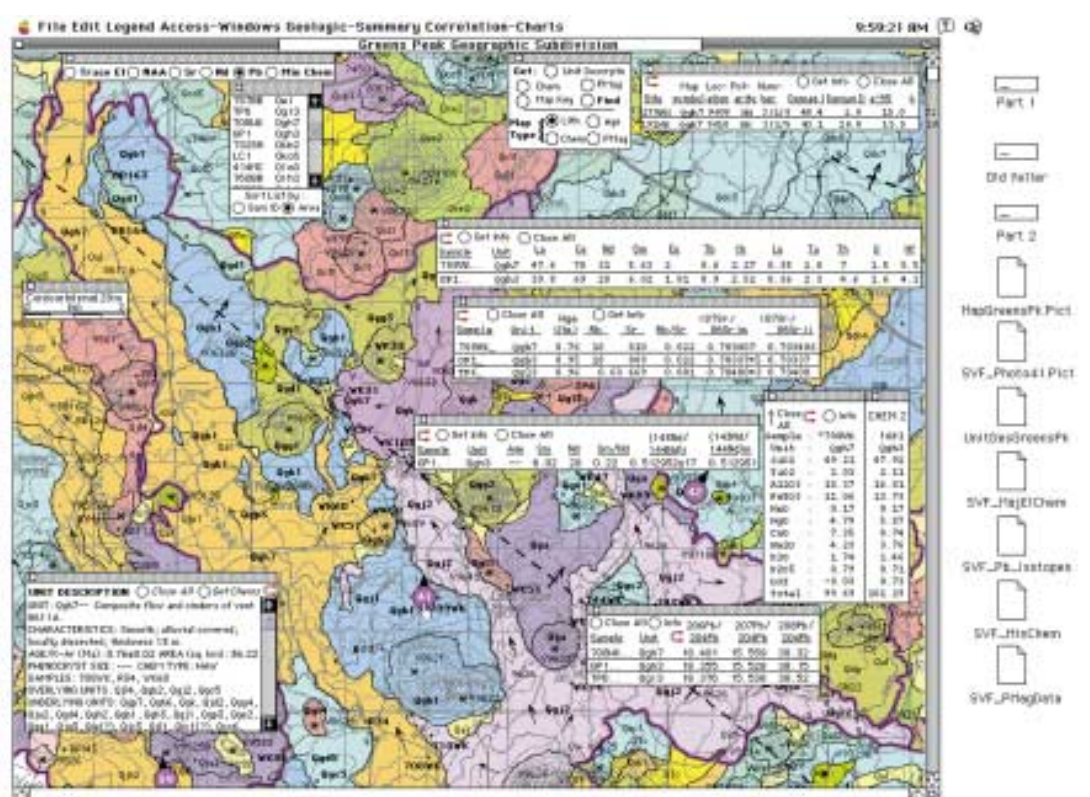
Several attributes differentiate DDM-SVF from map-making systems on desktop computers (for example, the Macintosh-based MiniCad maps developed by the Geological Survey of Canada (Peterson and Hanmer, 1992) and DOS-based systems, including GSMAP (Selner and Taylor, 1991) and those of Ambroziak and Cook (1993). First, it is a stand-alone application—that is, one needing no other software to run. Second, it was designed by a geologist with the intent of making the map and data as intuitively and easily accessible as possible; all maps, images, text, and data can be viewed, saved, or accessed by simple click or click-and-drag commands with the mouse. Third, this is not a map-making system. It is a map "presentation-manager"—that is, a program designed to take already completed digital maps and, with a minimum of reformatting, put them in a package that maximizes their accessibility to the user.

DDM-SVF Program vs. the Data in the Program

A clear distinction between the program that contains and presents the map (written using a hypermedia programming language) and the map and data within the program may

Map continued on p. 87

Figure 2. The Map window of DDM-SVF, showing a lithologic map of the northern part of the Greens Peak map segment. Pop-up windows (floating palettes) display information on units and samples within this map segment (see text for details). All palettes can be moved to see the map beneath them. On the right side, the page icons represent some of the files that can be saved from this program for use outside it. These include Pict-format files of the map segment and of a digital photo, and tab-delimited ASCII files of five different types of data that can be opened directly in spreadsheet programs or with word processors. The hand symbol below the magenta circle numbered 41 is the mouse cursor; a click on this circle brings up the digital photo shown in Figure 3.



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GSAF UPDATE

Robert L. Fuchs

Second Century Fund Leadership Gift from John Mann

In December 1994 the GSA Foundation was notified of the establishment of the John F. Mann, Jr. Charitable Remainder Unitrust. The grantor of the trust, GSA Senior Fellow John F. Mann, Jr. of La Habra, California, designated the GSA Foundation as the charitable remainderman of the trust—that is, the entity to which the principal of the trust will revert after the lives of the income beneficiaries, John Mann and his wife Carolyn V. Mann. This unitrust, the third largest gift ever received by GSA, is a highly important addition to GSA's capital campaign, the Second Century Fund for Earth • Education • Environment.

In a letter accompanying the gift, John Mann said that he had been searching for some time for a suitable means of giving the field of hydrogeology a nationwide boost. The future income from this gift can certainly accomplish this purpose; through scholarships, awards, research grants, and other forms of support, the endowment will have an important effect on the lives and careers of serious geology students. In discussing the gift, John said, "Students always need money, and I was no exception. When I look back at the shopping bag of jobs that I held during my school years—page boy for a Wall Street firm, the Colorado National Guard, bakery worker, cafeteria helper—I often wonder how the

course work ever got done. Colorado School of Mines summer field camp in 1942 was a real financial stickler, and I ended up instead on a geophysical crew in the ArkLaTex area. So when I started to think about the future and our estate, it didn't take long to remember the omnipresent financial shortfall that hindered me as a student. Carol and I are very happy that we can set up a fund that is going to make the lives of budding geologists of the future just a little less frantic."

John Mann's roots are in the British Isles, his grandfather having immigrated to the United States from Colchester in Essex County, England. It is distinctly possible that John's talents in hydrogeology may have stemmed from his grandfather's birthplace in Cistern Yard, where spring waters were collected in cisterns and distributed throughout the town. His mother's family can be traced back to Galway in Ireland. In the early 20th century, the Manns were a poor, hard-working family living in the New York-New Jersey area. When John was born in 1921, education beyond high school in his family was a rarity, as offspring were needed to support the family, even if that meant an early end to high school days. John was successful in breaking out of the mold. Early signs of determination and motivation can be detected, for after a two-year delay



John Mann

in starting elementary school due to medical problems, he compressed eight years into six. Being a Mann in Bayonne's Horace Mann Junior High School probably helped. The Boy Scouts aroused the necessary interest in the outdoors that is fundamental to a geological career; the wilds of Staten Island provided him with an appropriate fieldwork boot camp.

High school in Flushing, New York, produced two major milestones, a geological awakening through a stimulating course in physiography and a gold medal in math and science. A partial scholarship to Cornell University ensued, which John had to forego for

GSAF Update continued on p. 71

More GSA Representatives Needed

In the mid-1980's, GSA launched a new representative program, targeting companies, agencies, and consultants throughout the country. The purpose was to broaden GSA's representation to include all employment sectors. The program was modeled on the successful campus representative program that began in 1979 and now includes 552 representatives at colleges and universities throughout North America.

We now have 148 company, 93 agency, and 49 consultant GSA representatives. However, we need more volunteers. Our goal is to designate a representative at all major company offices and governmental agencies throughout the country. We want to develop a similar liaison with GSA members who are self-employed and serve as consultants. They would also represent major cities and geographic regions.

Representatives serve as liaisons between GSA headquarters and their

constituency in a particular city or region. They provide information on the programs and benefits of the Society to other members in the region and explain to prospective members the advantages of joining GSA. Each representative receives a notebook containing complete information on all GSA programs, activities, publications, meetings and other benefits that the Society provides its membership.

We need your help to continue this communication link between GSA headquarters and the membership of the Society. If you are a Member or Fellow (not Student Associate) and are interested in serving GSA as a representative for your company, agency, or group of the employment sector, please contact T. Michael Moreland, Manager, Membership Services, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020 or E-mail: tmorelan@geosociety.org. ■



GSA ON THE WEB

What's new on the GSA home page on the World Wide Web? If you haven't yet connected to the Web, the Universal Resource Locator (URL) is <http://www.aescon.com/geosociety/index.html>.

For current information on any of the GSA Section meetings, go to **Meetings** and choose the Section you want to know about. This month has all the information about the Cordilleran Section meeting in Alaska.

See the **Section and Division** area for newsletters, meetings, and other news.

If you want to know more about the GSA Employment Service or about becoming a GSA Campus Representative, check the **Membership** section, which also has information on nominating a member to fellowship and on obtaining forms for applying to become a GSA Member or Student Associate.

See the **Geoscience Calendar** section for a listing of meetings of general geological interest.

The **Publications** section has a monthly table of contents and abstracts of articles for the *GSA Bulletin* and *Geology*. Also in this section is a guide for authors preparing manuscripts for submission to GSA publications.

For Congressional Contact Information, see the **Administration** section.

In Memoriam

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February 16, 1994

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December 22, 1994

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October 4, 1994

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November 24, 1994

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Haverford, Pennsylvania
February 3, 1995

John H. Feth

Carmichael, California
January 23, 1995

Grayson Meade

Harrison, Nebraska

John H. Moses

Richmond, Virginia
October 25, 1994

Henry H. Neel

Los Angeles, California

Louis C. Raymond

Chappaqua, New York
December 19, 1994

Carl Tolman

St. Louis, Missouri
February 13, 1995

GSAF Update *continued from p. 70*

monetary reasons. He went to work on Wall Street for a year, saved diligently, and entered Colorado School of Mines in September 1938. Undergraduate years were crammed with part-time jobs and cross-country hitchhikes, but the outcome was top grades and a job offer from Ben Parker to go to work for the Frontier Refining Company. Here was financial heaven never before experienced. Loans were paid off while John mapped structures and sat oil wells in the Rockies.

This little piece of heaven came to an abrupt end in 1944 with the receipt of a draft notice. John Mann served in the Pacific, and through good fortune and adroit footwork ended up working under K. O. Emery on the USS *Bowditch*, surveying the Bikini lagoon prior to the first nuclear test. This association with Emery led to enrollment at the University of Southern California and part-time employment with the USGS, which subsequently published the Bikini bathymetry. Graduate degrees from USC were in the offing. Following up on his success in compressing grades K-8, John completed work for the M.S. in geology in nine months. Bikini bottom-mapping techniques were put to good use in Lake Elsinore; a Master's thesis resulted, and it was an easy evolution into Ph.D. course work and preliminary oral exam. True to form, John lost no time in completing his pre-thesis Ph.D. groundwork—one year from start to finish.

The summer and fall of 1948 was an eventful period that, looking back, figured prominently in shaping John Mann's future years. His developing interest in ground-water geology was solidified during summer employment with the USGS, which put him to work on sea-water intrusion problems at naval installations in the Oxnard, California, area. Returning to USC in the fall as an instructor, he began dissertation fieldwork on the Elsinore fault zone. Improved financial muscle was manifested in the purchase of a nearly new Ford, bringing a permanent end to hitchhiking. Over and above these geological mileposts, frequent time in the thesis area brought John into contact with Carol Culver, a USC graduate student and recent graduate of the University of Chicago. Carol was employed as a social worker for Riverside County, and she recognized immediately the importance of ministering to the needs of a lonely and hard-working field geol-

ogist. The two were married the following June, and soon thereafter left southern California for Champaign-Urbana and the Illinois State Geological Survey. Days and nights were filled—Carol had two jobs, and John worked on his dissertation after hours. Expenses were also closely watched: the Manns moved to the attic and sublet their bedroom to two University of Illinois students.

The lure of the west was strong, and when the dissertation was completed in 1951, John and Carol returned to southern California. USC awarded John the Ph.D. in geology, Carol returned to the Riverside County payroll, and John accepted a USC part-time teaching job at minimal wages. An important attribute of this job was intended to be a schedule that allowed for the development of a geological consulting practice. But teaching and preparation for it expanded to fill the available time. There was not a corresponding expansion of salary, so the early 1950s were again lean times. Subsequently, John Mann did advance to full-time employment, with commensurate titles of Associate Professor and, later, Acting Chairman. Although tenured, John decided that his future lay in the direction of ground-water consulting, so he resigned in 1958 to pursue that career. Regular teaching of a few courses continued for another 19 years, bringing with it great personal satisfaction and a cadre of former students in important positions throughout the southern California water-supply community.

John's career as a leading ground-water consultant began ignominiously in 1951 with a strong dose of negative cash flow. At least one client confessed that John was retained because he was "cheap." Better days were ahead. In 1952, the recently formed United Water Conservation District northwest of Los Angeles gave Mann an assignment; his activities for the district continued for 42 years and involved a significant amount of hydrogeologic pioneering. His 1959 report for United entitled "A Plan for Ground Water Management" came under terminological attack. This may have been the introduction of the concept of ground-water management, and the area farmers strongly disagreed that their water supplies needed "management." A bit of adroit maneuvering involving a report cover that had already been printed with that word in the title carried the day.

Enrollment Reminder— Section Workshops on Public Information and Education Techniques



The IEE-sponsored media-interface training workshops scheduled at the remaining 1995 Section Meetings are listed below. The workshops are free to interested geoscientists; however, enrollment is limited and an application form or inquiries should be submitted to IEE at GSA headquarters. See the January issue of *GSA Today*, p. 9, for more information, application forms, and a complete listing of the workshops.

Saturday, April 29, 1995—Lincoln, Nebraska
(North-Central and South-Central Sections)
Saturday, May 20, 1995—Bozeman, Montana (Rocky Mountain Section)

Since John Mann's decision to become a consulting geologist, 44 years have elapsed. He remains an active practitioner today at the age of 74. Those years have witnessed publication of 27 papers, articles, and reports, completion of 147 consulting assignments and projects, and technical participation in 72 court cases. While John's work has been heavily concentrated in the basins of southern California, there have been projects elsewhere in California, in coastal Oregon, and as far removed as the rainy plains of Spain and the barren sands surrounding Egypt's pyramids.

Litigation is the hallmark of ground water and a major occupier of the time of ground-water geologists. John Mann's career is an excellent example, and although he has been involved in an average of nearly two cases per year, one stands out from the pack. In 1955 the Los Angeles Department of Water and Power brought suit against San Fernando Valley communities to clarify water and withdrawal rights in the area. The case came to trial 11 years later, and after a series of appeals that ended in the California Supreme Court, a final verdict was rendered in January 1979. An important element of the ultimately successful decision was John Mann's innovative theory of overdraft that has since become law in California and has been applied in other jurisdictions. The testimonial record was a monster. At nearly 39,000 pages, the transcript was the most voluminous in L.A. Superior Court history up to then. John Mann's testimony alone exceeded 4000 pages and 40,000 questions!

While it is hard to see where the time came from, John Mann has enjoyed hobbies throughout his life, the origins of which may be traced in

part to his strong involvement in the Boy Scouts. Bird watching is at the top of the list, and because of years of travel his Life List is most extensive. Warblers have had a particular fascination for John, which may have led him early on into another hobby, singing with choral groups. The life and travels of Captain James Cook have also been of special interest to him. During their trips to many parts of the world, John and Carol have always tried to include locales visited by Captain Cook, such as Kealakekua Bay, where he was killed. Most of their travel itineraries have included elements of hydrogeologic interest—seawater incursion at a quarry on the Isle of Guernsey, a flooded mine in South Africa, water quality in the London basin. Wine quality in California, another avocation, has led John back to the judicial process, in this case as a wine judge at the L.A. County fair.

R. W. Bromery, Chair of the Second Century Fund Committee, in announcing the Mann Unitrust, pointed out the importance of this major gift to GSA's capital campaign. "In my experience with fund-raising at Johns Hopkins, Springfield College, and other educational institutions, the success of a campaign requires a leadership gift that will serve as an incentive and an example to others who are considering contributions. John and Carol Mann have given GSA this leadership gift, for which we are deeply thankful." GSA President Dave Stephenson, a hydrogeologist, noted the significance that this gift has to GSA's expanding mission. "Hydrogeology and the environmental sciences have assumed a large role in the Society's service to geology. I am personally very pleased that some of the future financial support needed for this role will come from John Mann, an eminent ground-water geologist." ■

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WASHINGTON REPORT

Bruce F. Molnia

Washington Report provides the GSA membership with a window on the activities of the federal agencies, Congress and the legislative process, and international interactions that could impact the geoscience community. In future issues, Washington Report will present summaries of agency and interagency programs, track legislation, and present insights into Washington, D.C., geopolitics as they pertain to the geosciences.

What's New in Washington— The Contract and the Earth Sciences

"On the first day of the 104th Congress, the new Republican majority will immediately pass the following major reforms, aimed at restoring the faith and trust of the American people in their government:

- FIRST, require that all laws that apply to the rest of the country also apply equally to the Congress;
- SECOND, select a major, independent auditing firm to conduct a comprehensive audit of Congress for waste, fraud or abuse;
- THIRD, cut the number of House committees, and cut committee staff by one-third;
- FOURTH, limit the terms of all committee chairs;
- FIFTH, ban the casting of proxy votes in committee;
- SIXTH, require committee meetings to be open to the public;
- SEVENTH, require a three-fifths majority to pass a tax increase;
- EIGHTH, guarantee an honest accounting of our Federal Budget by implementing zero base-line budgeting."

—House Republicans' Contract With America

If, by now, you haven't heard about the Contract with America, you've probably spent the last six months doing exploration geology in a very long, deep, dark cave. To implement the eight-point agenda presented above, the contract describes ten proposed pieces of legislation that the Republican majority have been presenting on the House floor during the first 100 days of the 104th Congress. These are (descriptions are repeated or paraphrased from the contract):

1. THE FISCAL RESPONSIBILITY ACT—A balanced budget–tax limitation amendment and a legislative line-item veto to restore fiscal responsibility to an out of control Congress, requiring it to live under the same budget constraints as families and businesses.

2. THE TAKING BACK OUR STREETS ACT—An anti-crime package including stronger truth-in-sentencing, "good faith" exclusionary rule exemptions, effective death penalty provisions, and cuts in social spending from the 1994 crime bill to fund prison construction and additional law enforcement to keep people secure in their neighborhoods and kids safe in their schools.

3. THE PERSONAL RESPONSIBILITY ACT—Discourage illegitimacy and teen pregnancy by prohibiting welfare to minor mothers and denying increased Aid to Families with Dependent Children (AFDC) for additional children while on welfare, cut spending

for welfare programs, and enact a tough two-year-and-out provision with work requirements to promote individual responsibility.

4. THE FAMILY REINFORCEMENT ACT—Child support enforcement, tax incentives for adoption, strengthening rights of parents in their children's education, stronger child pornography laws, and an elderly dependent care tax credit to reinforce the central role of families in American society.

5. THE AMERICAN DREAM RESTORATION ACT—A \$500 per child tax credit, begin repeal of the marriage tax penalty, and creation of American Dream savings accounts to provide middle class tax relief.

6. THE NATIONAL SECURITY RESTORATION ACT—No U.S. troops under U.N. command and restoration of the essential part of our national security funding to strengthen our national defense and maintain our credibility around the world.

7. THE SENIOR CITIZENS FAIRNESS ACT—Raise the Social Security earnings limit, which currently forces seniors out of the work force, repeal the 1993 tax hikes on Social Security benefits, and provide tax incentives for private long-term care insurance to let older Americans keep more of what they have earned over the years.

8. THE JOB CREATION AND WAGE ENHANCEMENT ACT—Small business incentives, capital gains cuts and indexation, neutral cost recovery,

risk assessment–cost-benefit analysis, strengthening the Regulatory Flexibility Act (RFA), and unfunded mandate reform to create jobs and raise worker wages. [The RFA determines whether a regulation has an impact on a significant number of small businesses.]

9. THE COMMON SENSE LEGAL REFORM ACT—"Loser pays" laws, reasonable limits on punitive damages, and reform of product liability laws to stem the endless tide of litigation.

10. THE CITIZEN LEGISLATURE ACT—A first-ever vote on term limits to replace career politicians with citizen legislators.

You may be wondering what any of this dialogue about the Contract with America has to do with the earth sciences. By now, except for the use of the word "tide" in the Common Sense Legal Reform Act, you probably have concluded that Molnia missed the boat completely. You should be aware that accompanying the contract is an attachment titled "Republicans Have a Proven Track Record of Cutting Spending," which contains 71 "Examples of Possible Offsets for Contract with America," each presented with anticipated budget savings for a five year period. The "examples" are each taken from "Republican FY 1994 & 1995 budgets." In the group of 61 "Discretionary Reductions (excl. overhead)" are the following "possible" cuts (ordered by savings in billions of dollars over five years): Abolish Geological Survey (\$3.261); Consolidate other agencies into Federal Land Management (\$3.226); Reduce funding for energy technology development (\$2.139); Reduce the overhead on Federally sponsored university research (\$1.620); Reduce spending for the High Performance Computing Program (\$1.230); Abolish Bureau of Mines (\$0.872); Freeze funding for National Oceanic and Atmospheric Administration (NOAA) (\$0.805); Reduce funding for Resource Conservation and Development (\$0.610); Reduce contributions to international organizations (\$0.573); Downsize Minerals Management Service (\$0.465); Restructure Bureau of Reclamation (\$0.427); Halt purchases of oil for Strategic Petroleum Reserves (\$0.362); Limit the growth of the National Science Foundation (\$0.346); Reduce funding for Cooperative State Research Service (\$0.331); Restructure the National Petroleum Reserves—Elk Hills (\$0.143); and Abolish National Biological Survey (\$0.139).

An examination of the list shows that with the exception of the National Aeronautics and Space Administration (NASA), virtually every agency in the federal government that deals with the earth sciences is included on the "possi-

ble offsets" list. The rationale for many of these proposed changes can be found in the "Major Program Reforms" section of the Fiscal Year 1995 Republican Budget Initiative prepared by the House Committee on the Budget—Republican Caucus.

Pages 48–50 of the initiative describe the restructuring of the Department of Interior. "Many features of the Department no longer make sense. In particular, the Department does many things that are properly state and local responsibilities or could be better done in the private sector." The following paragraphs examine how four bureaus might fare. With respect to the Bureau of Mines, the initiative states, "This proposal would abolish the Bureau of Mines. ... Many of the bureau's original functions have been taken over by other agencies. DOE, for example, collects data on minerals used for gathering energy. The BOM is limited to gathering information on hardrock minerals and conducting research on mining techniques. Opponents of this proposal would argue that BOM also gathers information about environmental and physical conditions at current and abandoned mining sites. To address these concerns, health and safety research that justifies a federal involvement would be undertaken by other agencies."

With respect to the Geological Survey, the initiative states "This proposal would abolish the Geological Survey. The basic research functions would be assumed by the National Science Foundation. Mapping would be eliminated, since that can be provided by either private operators or the Department of Defense when national security is involved. The federal-state cooperative program of water division would be eliminated, since state(s) can buy water studies from private consultants. EPA would assume any necessary role in stream monitoring."

With respect to the Minerals Management Service, the initiative states, "This proposal would sharply downsize the Minerals Management Service in light of the greatly reduced sale of Outer Continental Shelf (OCS) leasing. All OCS regional offices would be closed, except New Orleans. The future royalty streams of existing federal offshore leases would be sold, thereby getting rid of many problems and unnecessarily large expenses associated with federal collection of the royalties. The mineral development rights for OCS areas with marginal development prospects would be transferred to nearby states. The Federal Government would retain an overriding royalty on any development of these regions that might occur in later years."

With respect to the National Biological Survey, the initiative states, "This proposal would abolish the National Biological Survey, which has not been authorized and is not following the proposed guidelines of the Secretary. The essential funding and staffing that was removed from the Department of Interior land management agencies would be restored to the new Federal Land Management Agency. The basic research functions of inventorying and monitoring plants and animals would be transferred to the NSF, along with such staff and funding as were assigned to this agency at the Department prior to FY 1994."

Additional details about the Contract can be found in the new book, *Contract With America—The Bold Plan by Rep. Newt Gingrich, Rep. Dick Armey, and the House Republicans to Change the Nation*, edited by Ed Gillespie and Bob Schellhas. The book is published by Time Books—Random House. ■

GSA Supports USGS and U.S. Bureau of Mines

Donald M. Davidson, Jr.

Responding to the possible elimination of the U.S. Geological Survey and the U.S. Bureau of Mines through budget cuts specified as part of the amendments to the "Contract with America," GSA has actively supported these organizations. On January 12, a group of 13 geoscientists convened at American Geological Institute (AGI) headquarters to develop an action plan addressing these cuts. Included in that group were eight current or former officers of GSA, including President Dave Stephenson. The following day, small groups from this Congressional Action Committee visited the offices of 12 key legislators to discuss the proposed cuts.

Soon after those meetings GSA learned that the Senate Appropriations Committee would hold budget hearings that included consideration of USGS and USBM funding. Six such meetings were scheduled in far-flung places (Prescott, Arizona; Columbus, Ohio; Manville, New Jersey; Billings, Montana; Columbia, South Carolina). Following discussions with President Stephenson, the executive director personally wrote to over 30 GSA members alerting them to these committee hearings, and GSA members did, indeed, attend and speak at some of the hearings. Reports indicated that many of the hearings had "pre-

set" agendas; nevertheless, GSA made a direct effort to muster its membership to address these budget issues.

Meanwhile, we have been monitoring the progress of House appropriations hearings through Craig Schiffries (director, AGI Government Affairs) and Bruce Molnia (Forum editor, GSA Today), and a letter to Stephenson from USGS Director Gordon P. Eaton reports a somewhat brighter picture for the Survey: "The breadth and depth of support for the USGS [are] evident when principal members of the House and Senate (both Democrats and Republicans) utter, for the record, statements such as, 'The USGS will be eliminated over my dead body.' In no small measure, we owe these statements of support to concerned friends such as you who mounted an aggressive educational campaign to enlighten the Congress regarding the value of the USGS to society." As a continuation of this effort, the GSA Geology and Public Policy Committee and the executive director met in Washington, D.C., on March 23–24 and visited the Hill.

We will make every attempt to keep the membership informed on these matters in the future. If you are interested in contacting representatives or key congressional offices, check GSA's home page on the World Wide Web in the **Administration** section; the Universal Resource Locator (URL) is <http://www.aescon.com/geosociety/index.html>.

SAGE REMARKS

Edward E. (Dr. Ed) Geary, Coordinator for Educational Programs

SAGE TOMORROW: Virtual Reality and Some Thoughts on the Emerging National Science Education Standards

New Technology Training Center

SAGE is investigating virtual reality. In 1994 SAGE received funding from the Boettcher and El Pomar Foundations to establish a Technology Training Center (TTC). The TTC will be housed in an office building adjacent to GSA's main headquarters building. During the next 14 months, this building will be modified to accommodate the new center, and several new pieces of equipment will be purchased. The TTC will house several Power Macintosh 8100 computers with built in CD-ROMs and full multimedia capabilities. The TTC will also have a laser-disc player, VCR, 35-inch color monitor, several printers and scanners, and an extensive library of educational software.

Our purpose in establishing the TTC is to promote integration of earth science and technology in K-16 classrooms. Consequently, the center will be a place where scientists, teachers, and students will have the opportunity to explore the latest computer-based K-16 science education materials and programs. The center will have the initial capacity to serve up to 20 participants at a time. The TTC will emphasize the use of CD-ROM, laser disc, and multimedia products, as well as access to and training on the Internet. The TTC is targeted to open in the summer of 1996, pending the acquisition of program funding. We hope many of you will have a chance to tour and use the facility during GSA's 1996 Annual Meeting in Denver and in subsequent years.

In anticipation of the summer of 1996, we are in the process of accumulating outstanding earth science education computer software and multimedia products for the TTC resource room and lending library, so please let us know what elementary, secondary, or college level materials you feel should be included in the TTC. If you have copies of any materials you would like to donate to the TTC, we can accept them. In addition, if you are aware of or have participated in an outstanding earth or environmental science technology education program for educators or students, please send us information on the program. We hope that by the year 2000, the TTC will be a showcase for outstanding programs and materials that promote science literacy and support the wise use of Earth.

National Science Education Standards

In the February 1995 issue of *GSA Today*, Bruce Molnia's "Washington Report" summarized the "Earth Science Content Standards" and "Fundamental Concepts" found in the November 1994 draft of the National Science Education Standards (NSES). The NSES are being developed by the National Research Council to build a national consensus about what is important in science education and to enhance science literacy for all students.

In December 1994, GSA formed a focus group of its members to review and respond to the NSES. The group consisted of practicing earth scientists and engineering geologists, scientists and science educators from academia, and K-12 teachers. To put their task in perspective, the GSA focus group was

asked to review not only the earth science content standards summarized in the February issue of *GSA Today* but also the entire NSES document, which includes: Science Teaching Standards, Professional Development Standards for Teachers, Assessment Standards, Science Content Standards (Physical, Life, and Earth and Space), Program Standards, and System Standards. In total, the NSES draft is over 300 pages, almost entirely text.

Everyone from the GSA focus group who reviewed this document deserves the sincere thanks of GSA, the NRC, and the science education community.

In general, *the NSES represent a major victory for the earth science community*. For the first time, earth science is given equal time and equal billing with the physical and life sciences. For the first time, earth science is to be taught in all grades, not just in middle or high school, and for the first time, science education reform is being addressed holistically and systematically instead of haphazardly.

The current NSES draft does, however, have its flaws. Following is a sampling of the types of suggestions made by the GSA focus group to help the NRC improve the Earth and Space Science Content Standards:

General Suggestions

- Include earth science concepts related to resources and natural hazards in both the Earth and Space Science standards as well as in the Science in Personal and Social Perspectives standards.
- Add or strengthen statements pertaining to the need for all students to

know about earth processes, landforms, and resources in grades K-4, 5-8, and 9-12.

- Provide more illustrations and vignettes showing the connections between the sciences, and between the sciences and other disciplines such as mathematics, geography, and economics.
- Limit or delete assumptions that children of certain ages or developmental stages do not have the ability to develop higher order thinking skills.
- Adjust the balance between the Life, Physical, and Earth and Space science content standards to give equal emphasis to all three content areas. A general review of this document gives the impression that the Life Sciences are more important than the other content areas, particularly in grades 9-12.

Specific Suggestions:

- "Weather" is not an object in the sky (as listed under the K-4 Earth and Space Science Standards). Create a new section in K-4 entitled "Earth Processes and Features" and include weather in this section.
- Add statements that (1) Earth is approximately 4.6 billion years old and (2) Earth has evolved continuously since its formation (under the Earth History section, grades 5-8).
- Create an Earth Processes section in the Earth and Space Science Standards, grades 5-8. Develop bullets for: (1) severe storms (e.g., tornadoes, and hurricanes), (2) erosion and weathering, (3) volcanic eruptions and earthquakes, and (4) ocean waves and currents

These and several other GSA focus

group suggestions have been passed on to the NRC. We hope that they will help to improve the final standards document, but even if they do, it is not a foregone conclusion that the NSES will ever be implemented.

The resistance to change is great, and the NSES represent change. The NSES spell out a vision for what quality science learning should be like and what *all* students should know to be scientifically literate when they graduate from high school. The NSES are not just for students who will become scientists and engineers, but for students who will become doctors, secretaries, legislators, construction workers, and voters. The NSES encourage all students to learn about evolution, the environment, force, motion, populations, chemical reactions, plate tectonics, and a variety of other scientific concepts and processes. Are the standards perfect? No, but they are good, and they are definitely better than our present system of science education.

For the NSES to succeed, a fundamental shift must occur in this country's attitude toward education. Schools today do good things despite overcrowded classrooms, inadequate supplies, and outdated equipment and facilities. Visit a classroom and see for yourself. Schools can do better, but they can't do it without our support. We must provide our local K-12 teachers and schools with sufficient resources, time, and support to make the changes needed for NSES-based education to become a reality. The challenge that now faces GSA and other scientific and education organizations is to ensure that these standards are implemented in school districts and classrooms across the country. *If the NSES are not implemented, many children will never have the chance to learn about Earth's history, processes, and resources.* If you would like to learn more about the NSES, or help to implement the NSES in your community, please contact me at 303-447-2020. My Internet address is: 76260.2416@compuserve.com. ■

Pepping Up PEP

Barbara L. Mieras, Partners for Education Program Manager

Thanks to funding from a family foundation and from Exxon Corporation (summarized in GSAF Update, *GSA Today*, February 1995), SAGE's educational partnership efforts are being revitalized. PEP, formerly the Partners for Excellence Program, has become the Partners for Education Program (still PEP). The new name emphasizes our mission, which is to promote geoscience education and enhance scientific understanding for all citizens. Information gathered in the autumn 1994 PEP survey of partners is guiding our plans for changes to enhance PEP's effectiveness in fostering productive educational partnerships between geoscientists and K-12 educators.

One of our highest priorities is to improve communication with and among PEP partners. To this end, a variety of new and revised materials is being developed. Extensively revised PEP and SAGE brochures will be available this spring. A newly formatted PEP newsletter will provide a quarterly forum for partner communication and for sharing of partnering ideas, tips, and opportunities. Update cards accompanying partnership mailings will encourage partners to keep communicating their ideas, successes, and frustrations. Revised reprints of partnering pamphlets originally developed by the North Carolina Museum of Life and Science, with support from the National Science Foundation and the North Carolina Science and Mathematics Alliance, are now available through the cooperation of GSA and the Colorado School of Mines. Also currently under consideration are ways to help partners access frequently requested support materials, ranging from the specific, such as rock and mineral kits, to the general, such as alternative models for partnering.

In addition to communication, PEP plans to broaden its base of volunteers and to actively recruit geoscience students and retired members of the geoscience community to become Partners for Education. Another focus will be providing workshop opportunities for educators and geoscientists to build their repertoires of partnering skills and ideas. Results from the 1994 PEP survey suggest that both scientists and educators view regional meetings of science educators as optimal gatherings for offering this type of partnership workshop.

We're excited about the changes underway in PEP. Thank you to all of our current and future partners for your participation in PEP, and an extra thank you to all of you who relayed your opinions and experiences by responding to the 1994 PEP survey. Please continue to share your thoughts with us!

**PARTNERS
FOR
EDUCATION
PROGRAM**



Registration Card

Ms. Mr. Dr.

Name _____

Address _____

City/State/ZIP _____

Phone _____

FAX _____

I am a:

Teacher. Grade/subject: _____

Geoscientist. Specialty: _____

I want to join the FREE Partners for Education Program

Please send me more information about the Partners for Education Program

If you already have a Partner, your Partner's name and address _____

Return this coupon to GSA, Partners for Education Program, P.O. Box 9140, Boulder, CO 80301-9140.

1995 GEOVENTURES

GEOTRIP

Iceland—the unique scientific adventure that belongs on every geologist's life list!

Scientific Leaders:

Haraldur Sigurdsson, Graduate School of Oceanography, University of Rhode Island

Haukur Johannesson, Natural History Institute, Reykjavik, Iceland

A native of Iceland and professor of oceanography, **Haraldur Sigurdsson** is a leading volcanologist with an international reputation for his research on many aspects of volcanism in Iceland, Italy, Mexico, Colombia, the United States, and Indonesia, among others. **Haukur Johannesson** has devoted most of his career to the geologic mapping of the uncharted volcanic regions of Iceland. He is an expert in the tectonic structure and origin of the Iceland basalt plateau and is also very knowledgeable about the natural history of Iceland in general.

Fee and Deposit

Cost: GSA Member: \$2780. Nonmember: \$2880. \$250 deposit, due with your reservation; refundable until April 15, less \$50 processing fee. Total balance due: April 15. Minimum age: 21. Limit: 32 persons.

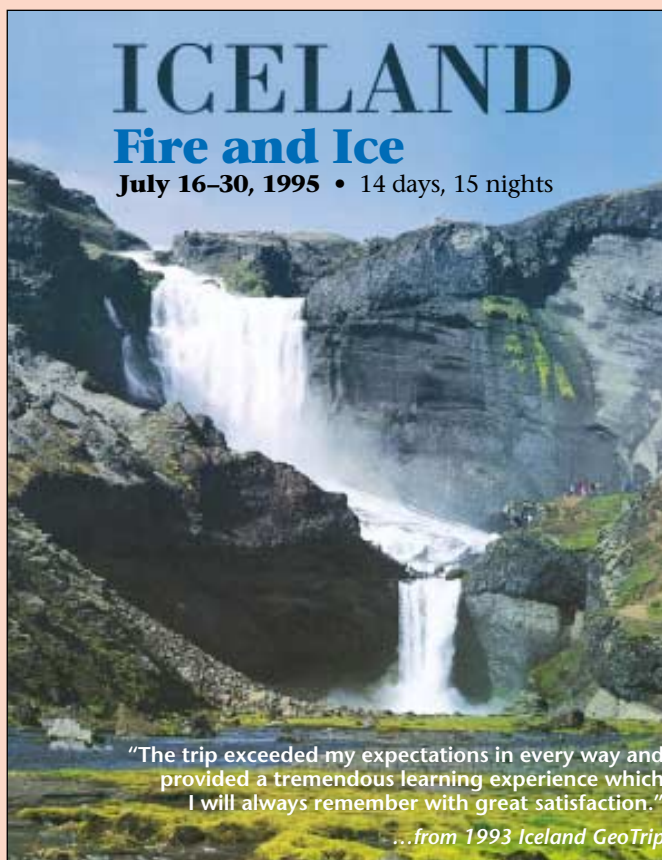
Schedule

July 16, Sunday—Travel day from Baltimore or New York to Reykjavik, evening departure on Icelandic Air

July 17–30, Mon.–Sun.—Iceland GeoTrip

July 30, Sunday—Open day and travel from Reykjavik to next gateway

This trip will reveal many unaltered and fresh geologic features that can be seen nowhere else on land. Expect to acquire a newly expanded understanding of



volcanoes, hotspots, and rifts. There will be great views of steep-walled and flat-topped hyaloclastite ridges derived from subglacial eruption, young hyaloclastite islands produced by submarine eruptions, great explosion craters, tephra cones, calderas, blocky obsidian flows, waterfalls descending into the rift valley, and, of course, extraordinary glacial panoramas.

Lodging, Meals, Transportation. During most of the trip, the group will stay in country hotels (Edda hotels), rural secondary and high schools operated as simple but comfortable summer hotels. Food will be provided at all lodging locations, plus picnics during the day. Travel will be by four-wheel-drive mountain trail bus and by car ferry to the volcanic Westmann Islands.

Air Transportation. The Baltimore gateway has the best connecting flights to most of North America. Round trip travel from Baltimore to Reykjavik will be on IcelandicAir. The current group round-trip fare is \$748. Trip participants are required to travel on the group flight so that everyone can benefit from the advantages of a group reservation. You may use air mile coupons for your domestic flights, however. Travel arrangements are being handled by Volcano Tours—TR Consultants, which can help you with plans for your entire itinerary (1-800-923-7422, fax 401-247-0270). They will also offer a brief post-trip option to Greenland.

Cost: GSA Member: \$2780. Nonmember: \$2880. Deposit \$250.

Fee includes all meals in Iceland; double-occupancy lodging; comfortable bus and ferry transportation; transfers and entrance fees; baggage handling; geologic road log; and field guidebook. **Not included** are airfare to and from Reykjavik, and hotel nights and meals, if any, in Baltimore. ♦

GEOHOSTEL

Geological History of Southwestern Montana

June 17–22, 1995 • 6 days, 6 nights • Western Montana College, Dillon, Montana

Scientific Leader: Robert Thomas, Dept. of Geosciences, Western Montana College

Itinerary—All trips begin and end in Dillon

Saturday, June 17

7:00 to 9:00 p.m.—Welcoming Reception

Sunday, June 18

8:00 a.m. to 12:00 noon—Introduction to the Geology of Southwestern Montana

Monday, June 19

8:00 a.m. to 5:00 p.m.—Geology of the Beaverhead Valley

Tuesday, June 20

8:00 a.m. to 5:00 p.m.—Geology of Yellowstone National Park

6:00 p.m. to 8:00 p.m.—Western Barbecue

Wednesday, June 21

8:00 a.m. to 1:00 p.m.—Crystal Park Mineral Collecting

1:00 p.m. to 5:00 p.m.—Optional afternoon field trip to the ghost town of Bannack

Thursday, June 22

8:00 a.m. to 5:00 p.m.—Fossil Insect Collecting—Ruby Valley

7:00 to 9:00 p.m.—Farewell Party

Fee and Deposit

Cost: GSA Member: \$500. Nonmember: \$550.

\$100 deposit, due with your reservation; refundable until April 15, less \$20 processing fee. Total balance due: April 15. Minimum age: 21. Limit: 32 persons.

Fee includes classroom programs and materials, field trip transportation, lodging for six nights at Western Montana College, Dillon, single-occupancy (or double for couples) dormitory-style rooms, welcoming reception, breakfast and sack lunch daily through Thursday, western barbecue, farewell party, and breakfast on Friday before check-out. **Not included** are air transportation to and from Dillon, Montana, transportation during hours outside class and field trips, meals and other expenses not specifically included. ♦

GEOHOSTEL

Scenic Geology of Northwestern Colorado and Dinosaur National Monument

June 24–29, 1995

SOLD OUT

GEOTRIP

Geology of the Grand Canyon—Lee's Ferry to Pierce Ferry

April 21–28, 1995

Another boat has been added to the Grand Canyon GeoTrip. Due to cancellation by another group, we can now accept more people on this previously sold out adventure. Please phone Edna Collis or Matt Ball today if you are interested at (800) 472-1988.

THERE ARE A FEW SPACES LEFT.

CALL TODAY TO REGISTER

1-800-472-1988 or (303) 447-2020, ext. 134 or 141
E-mail: ecollis@geosociety.org or mball@geosociety.org
fax 303-447-0648

CALL FOR NOMINATIONS

To reward and encourage teaching excellence in beginning professors of earth science at the college level, the Geological Society of America announces:

THE FOURTH ANNUAL BIGGS AWARD

For Excellence In Earth Science Teaching for Beginning Professors

ELIGIBILITY: All earth science instructors and faculty at 2- and 4-year colleges who have been teaching full-time for 10 years or less. (Part-time teaching is not counted in the 10 years.)

AWARD AMOUNT: An award of \$500 is made possible as a result of support from the Donald and Carolyn Biggs Fund.

NOMINATION PROCEDURE: For nomination forms write to Edward E. Geary, Coordinator for Educational Programs, Geological Society of America, P.O. Box 9140, Boulder, CO 80301.

DEADLINE: Nominations and support materials for the 1994 Biggs Earth Science Teaching Award must be received by June 30, 1995.



The Geological Society of America
1995 ANNUAL MEETING
NEW ORLEANS
BRIDGING THE GULF

NEW ORLEANS, LOUISIANA • NOVEMBER 6–9

ABSTRACTS: DUE JULY 12 For abstracts forms (303) 447-2020, ext. 161 or E-mail: ncarlson@geosociety.org

PREREGISTRATION: DUE SEPTEMBER 29

INFORMATION: (303) 447-2020 or 1-800-472-1988; fax 303-447-0648; E-mail: meetings@geosociety.org

ASSOCIATED SOCIETIES

Association for Women Geoscientists • Association of American State Geologists • Association of Geoscientists for International Development • Cushman Foundation • Geochemical Society • Geoscience Information Society • Mineralogical Society of America • National Association of Black Geologists and Geophysicists • National Association of Geology Teachers • National Earth Science Teachers Association • Paleontological Research Institution • Paleontological Society • Sigma Gamma Epsilon • Society of Economic Geologists • Society of Vertebrate Paleontology

REGISTRATION and FULL DETAILS: June issue GSA Today

CALL FOR PAPERS

Theme Statement for 1995 Annual Meeting


The theme for the 1995 Annual Meeting is *Bridging the Gulf*. This theme has several meanings. In particular, we will draw attention to the Gulf of Mexico–Caribbean, and the surrounding American continents, bridging the knowledge gap that exists across a region divided by political boundaries and language but sharing a common geologic framework. *Bridging the Gulf* also addresses the need to develop a closer link between technology and the science of geology and to educate the public on issues critical to the development of intelligent policies on the environment and geologic hazards. We also hope to bridge the gulf between the past and the future with both a retrospection on the past 25 years of plate tectonics and a look at the future as geologists respond to society's needs. Finally, we view the city of New Orleans, the Mississippi River and its delta, and the Gulf Coast as a laboratory where the long-term effects of humans on the environment can be examined.



GSA's Institute for Environmental Education

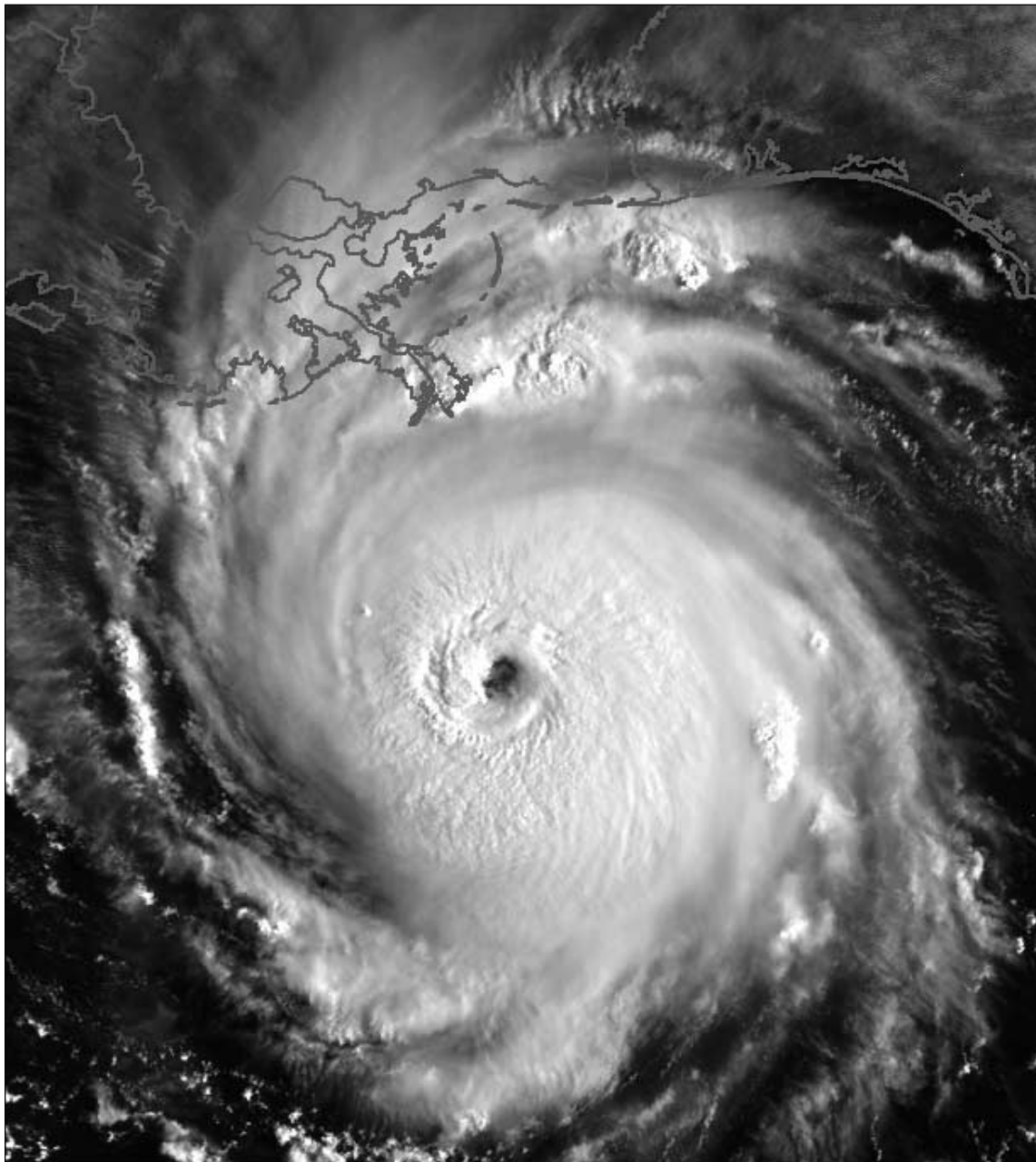
IEE will sponsor its fourth Annual Environmental Forum on Sunday, November 5. The forum is entitled *Politics and Economics: Geological Research Bridging the Gulf*. This session will examine how geology fits into the larger fabric of society, especially in light of recent societal changes. The interconnections between the geosciences and current political, economic, and environmental movements will be discussed. Many recent events such as the North American Free Trade Agreement, the

U.S. elections of both 1992 and 1994, fluctuations of various currencies such as the United States dollar, the Mexican peso, and the Japanese yen in the global economy, and the U.S. CERCLA (Superfund) reauthorization, have major implications about demands that will be placed on geoscientists over the next several years. The forum will explore some of these events and examine the changes with a view toward anticipating business market and educational changes our profession will need to face in the coming years.

In addition to the Forum, IEE will also sponsor or cosponsor with GSA divisions several theme sessions in the technical program. *These are identified with the global symbol* .

Daily technical session schedule:
September issue of GSA Today
and the World Wide Web:
<http://www.aescon.com/geosociety/index.html>

If you are not a GSA member,
please call, fax, or write us,
and we will gladly
send you the schedule.



Hurricane Andrew courtesy of LSU Earth Scanning Laboratory. Data from NOAA.

INVITED PAPERS (Symposia)

Abstracts are to be sent directly to the convener by July 12. The convener who extended the invitation to speakers is responsible for obtaining two independent reviews of each abstract, and for sending the reviews and the abstracts to GSA headquarters prior to the JTTPC meeting. A preliminary symposium schedule will be available from headquarters by May 15.

S1. GSA Keynote Symposium:

The Mississippi River—Control and Consequences.

1995 GSA Annual Meeting Committee.

Shea Penland, Louisiana State University.

Severe coastal land loss is destroying the Mississippi River delta plain at alarming rates; between the 1930s and 1990s more than 1500 square miles of wetlands were lost. Threatened is 40% of the coastal wetlands found in the United States. The coastal wetlands of the delta plain are extremely valuable to society due to fish and wildlife resources, storm protection, oil and gas production, environmental quality, and the lifestyle they afford. Coastal land loss is driven by natural and human processes. Submergence and erosion are important natural processes of change. Flood and river control has accelerated the process of coastal land loss resulting in a net loss of land. Recognized as an environmental problem of national significance, the Coastal Wetland Planning, Protection, and Restoration Act of 1990 established a multimillion dollar program to save Louisiana's wetlands. This symposium looks at the effects of human development on the natural processes of change within the delta plain. In particular, this session focuses on the balance between the desire for a lifestyle based on flood protection and an industry-based economy along the river and the environmental problems associated with river control.

S2. Building Bridges Over Troubled Waters: Identifying, Educating, Recruiting, and Retaining the Stakeholders in Earth Science—Environmental Justice Issues.

Association for Women Geoscientists, National Association of Black Geologists and Geophysicists, and GSA Committee on Minorities and Women in the Geosciences. Martha Garcia, U.S. Geological Survey, Denver; Patricia Hall, Amoco Production Company, New Orleans, Louisiana; Leuren Moret, University of California, Davis; Wes Ward, U.S. Geological Survey, Flagstaff.

S3. Plate Tectonics: From Wild Idea to Working Model in 25 Years.

1995 GSA Annual Meeting Committee.

Laura Serpa and Terry Pavlis, University of New Orleans.

S4. Geology and Tectonics of the Caribbean Region.

International Division. Hans Avé Lallemand and Virginia Sisson, Rice University; Grenville Draper, Florida International University.

S5. Products and Processes of Continental Extension.

Structural Geology and Tectonics Division.

John M. Bartley, University of Utah; John W. Geissman, University of New Mexico.

S6. Third International Symposium on the Cenozoic Tectonics and Volcanism of Mexico.

1995 GSA Annual Meeting Committee.

Jorge Nieto-Obregon, Universidad Nacional Autónoma de México.

JOINT TECHNICAL PROGRAM COMMITTEE: AUGUST 11-12

The JTTPC selects abstracts and determines the final session schedule. Speakers will be notified within 14 days following that meeting. The JTTPC consists of representatives from each of the associated societies and GSA divisions participating in the technical program. The JTTPC chairs, nominated by the New Orleans Annual Meeting Committee and approved by the GSA Council, also serve a four-year term on GSA's ongoing Program Committee, which oversees all technical program activities.

ABSTRACT SUBMITTAL GUIDELINES

Abstract Deadline: July 12

1995 Abstract Forms Availability

- Abstracts Coordinator at GSA headquarters
- Conveners of symposia
- Advocates of theme sessions
- Geoscience departments of most colleges and universities
- Main federal and state survey offices

The required 1995 Abstract Form will be used as camera-ready copy for publication. Abstracts are limited to 250 words with a minimum 10-point font size. Please read the instructions on the abstract form.

Presentation Formats

Format	Abstracts Procedure
• Symposia	Invited by the convener
• Theme Sessions	Volunteered for a topic announced before the abstracts deadline
• Discipline Sessions	Volunteered for a specific scientific discipline, and organized by topic during the JTTPC meeting

Only ONE Volunteered Abstract May Be Submitted

Please submit only one volunteered abstract as speaker or poster presenter of discipline and/or theme sessions. Multiple submissions as speaker-presenter for volunteered abstracts may result in rejection of *all* abstracts. Note that this limitation does not apply to, nor does it include, invited contributions to symposia.

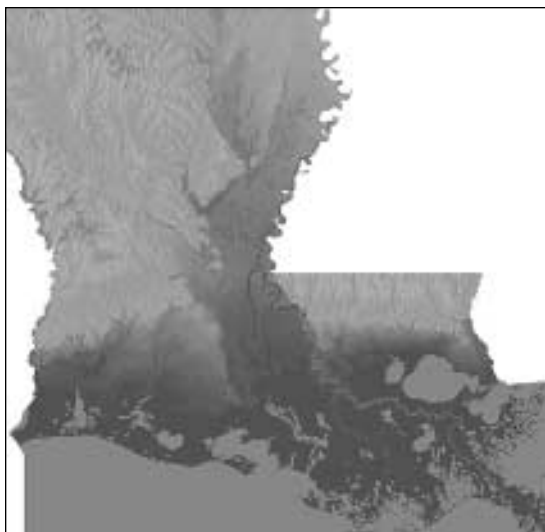
Presentation Modes

Oral Mode—This is a verbal presentation before a seated audience. The normal length of an oral presentation is 15 minutes, including time for discussion. Projection equipment consists of two 35 mm projectors, one overhead projector, and two screens.

Poster Mode—Each poster session speaker is provided with three horizontal, free-standing display boards approximately 8' wide and 4' high. Precise measurements will appear in the Speaker Kit. The speaker must be present for at least two of the four presentation hours.

Papers for discipline sessions may be submitted in either oral or poster mode. However, because of the homogeneous topic, *papers for theme sessions are to be submitted only in the mode noted in the theme description*. If the abstract is submitted in the incorrect mode, the abstract will NOT be considered for the theme session, but will automatically be considered for a discipline session instead.

- S7. **Quaternary Geologic Framework and Processes of Coastal Land Loss in Louisiana.**
Quaternary Geology and Geomorphology Division. S. Jeffress Williams, U.S. Geological Survey, Reston; Shea Penland, Louisiana State University.
- S8. **The Mississippi River as a Sedimentary System.**
Sedimentary Geology Division. Whitney J. Autin, Louisiana State; Andres Aslan, University of Colorado.
- S9. **Hydrology of Wetlands.**
Hydrogeology Division and 1995 GSA Annual Meeting Committee. Donald Siegel, Syracuse University; Karen Prestegaard, University of Maryland.
- S10. **Bredehoeft Symposium on Hydrogeology and Geologic Processes.**
Hydrogeology Division. Warren W. Wood and Leonard Konikow, U.S. Geological Survey, Reston; Kenneth Berlitz, Dartmouth College.
- S11. **Coastal Settings of Peat Formation and Their Stratigraphic Record: Ecosystems, Allocycles, and Sequences.**
Coal Geology Division. John H. Calder, Nova Scotia Department of Natural Resources.
- S12. **Environmental Lessons from Planetary Exploration.**
Planetary Geology Division. Larry S. Crumpler, Brown University.
- S13. **Duration of Hydrothermal Events.**
Society of Economic Geologists. Holly Stein, U.S. Geological Survey, Reston; Lawrence M. Cathles, Cornell University.
- S14. **Frontiers in Geochemistry.**
Geochemical Society. Tony Lasaga, Yale University; Ted Lobotka, University of Tennessee, Knoxville.
- S15. **Weathering Rates of Silicate Minerals.**
Mineralogical Society of America. Art F. White, U.S. Geological Survey, Menlo Park; Susan F. Brantley, Pennsylvania State University.
- S16. **The Dana Legacy, a Century Later.**
History of Geology Division. Robert N. Ginsburg, University of Miami, Rosenstiel School of Marine and Atmospheric Science; Ellis Yochelson, Smithsonian Institution.
- S17. **Recovery from Mass Extinctions.**
Paleontological Society. Steve D'Hondt, University of Rhode Island, School of Oceanography.
- S18. **Variability of Isotope Compositions in Modern and Fossil Organic Matter.**
Geochemical Society, Organic Geochemistry Division. Stephen A. Macko, University of Virginia; Michael H. Engel, University of Oklahoma; Kate Freeman, Pennsylvania State University.
- S19. **Taphonomy of Microfossils: Paleo-environmental Reconstruction and Environmental Assessment.**
Cushman Foundation. Ronald Martin, University of Delaware; Susan Goldstein, University of Georgia.
- S20. **Gulf and Atlantic Coast Vertebrate Paleontology, Including Multidisciplinary Approaches to Vertebrate Localities.**
Society of Vertebrate Paleontology. Judith A. Schiebout, Louisiana State University.
- S21. **High-Resolution Geophysics in Cultural Resource Management.**
Archaeological Geology Division. Edwin Hajic, Illinois State Museum; Margaret J. Guccione, University of Arkansas, Fayetteville.
- S22. **Annual Environmental Forum: Politics and Economics: Geological Research Bridging the Gulf.**
 *Institute for Environmental Education and Hydrogeology Division.* Douglas Gouzie, Agency for Toxic Substance and Disease Registry, Atlanta, Georgia.
- S23. **Crossing the Bridge to the Future: Managing Geoscience Information in the Next Decade: Archiving, Access, and Outreach.**
Geoscience Information Society. Nancy Blair, U.S. Geological Survey, Menlo Park.
- S24. **Scholarship in the Geosciences—Beyond Academia.**
Geoscience Education Division. Barbara M. Manner, Duquesne University, Pittsburgh, Pennsylvania.
- S25. **Assessing Teaching and Learning.**
National Association of Geology Teachers. R. Heather Macdonald, College of William and Mary.
- S26. **SGE Student Research.**
Sigma Gamma Epsilon. Charles J. Mankin, Oklahoma Geological Survey. POSTER.



Courtesy of RockWare. Digital translation of USGS digital elevation data provided by Chalk Butte, Inc.

VOLUNTEERED PAPERS

This format includes all abstracts that are not specifically invited for a symposium. Each paper will have a minimum of three reviews. Two types of sessions are available:

1. Discipline Sessions

Papers are submitted to ONE scientific discipline. The JTTPC representatives organize the papers in sessions focused on this discipline, for example, hydrogeology.

2. Theme Sessions

Papers are submitted to a specific *pre-announced* title and to ONE scientific category. Theme sessions are interdisciplinary; each theme may have as many as three categories from which authors may choose ONE. After each theme description below, the categories are identified by name and number as they appear on the 1995 Abstract Form.

Theme submissions must include:

Item	Example
• Theme number	T18
• Key words of the theme title	Methods for Quantifying Unsaturated Permeability
• One category	Environmental Geology—#6 on abstract form
• Mode for the session	Poster

Please submit only in the mode indicated in the description (oral or poster)

If the abstract is submitted in the incorrect mode, the abstract will NOT be considered for the theme session, but will automatically be considered for a discipline session instead.

Role of theme advocate

Each theme session has been proposed by an advocate. *Advocates may not invite speakers; however, advocates may encourage colleagues to submit abstracts, with the understanding that there is no guarantee of acceptance.*

All abstracts will be evaluated by three appropriate JTTPC reviewers in the discipline for which they are submitted; a fourth review will be provided by the theme advocate. During the August 11–12 JTTPC meeting, the designated JTTPC representative (in consultation with the theme advocate) will organize theme sessions from the abstracts approved for presentation.

Theme Topics



Please check the correct mode of the theme session—poster or oral. If the abstract is submitted inaccurately, the abstract will be transferred automatically to a discipline session.

T1. Plate Tectonics, the Next Generation. *1995 GSA Annual Meeting Committee.* Terry Pavlis and Laura Serpa, University of New Orleans.

An entire generation has now learned geology with plate tectonics at its foundation. Many worry that the next 25 years may not be as fruitful, given diminishing funds for basic research. We seek results of current studies that will include a presentation predicting where the great advances will be in the next generation of tectonic studies. ORAL.

Geophysics/Tectonophysics (10), Petrology, Igneous (21), Tectonics (31).

T2. Geology and Tectonics of the Caribbean Region.

International Division. Hans Avé Lallemant and Virginia Sisson, Rice University; Grenville Draper, Florida International University.

This session will consider the tectonic development of the Caribbean plate and associated regions to bridge research problems for many geologists and geophysicists. These problems include structural interactions at the mar-

gins, development of island arcs, recent plate motions, circulation and chemistry of sea water, and build-up of carbonate platforms. ORAL.

Marine Geology (14), Petrology, Igneous (21), Tectonics (31).

T3. Tectonic Geomorphology and Paleoseismology in Intraplate Tectonic Settings.

Dorothy Merritts, Franklin and Marshall College; Eugene Schweig, University of Memphis.

This session will examine recent advances in application of geomorphology and paleoseismology to the assessment of tectonic activity and seismic hazard analysis in low-relief, intraplate settings, where historic examples of large earthquakes are common but faults rarely rupture the surface (e.g., New Madrid, Missouri, USA, and Latur, India). ORAL.

Geophysics/Tectonophysics (10), Quaternary Geology/Geomorphology (25), Tectonics (31).

T4. Proterozoic Terranes of the Americas: Bridging the Gulf and Caribbean.

Geochemical Society. Paul A. Mueller and Ann Heatherington, University of Florida; Paul Fullagar, University of North Carolina; Joaquin Ruiz, University of Arizona.

This session will focus on recent results of geochronologic and stratigraphic studies of Proterozoic terranes of southern North America, Mesoamerica, and northern South America. Implications of these data for the reconstruction of Paleozoic orogens and the opening of the Gulf of Mexico and Caribbean Sea will be emphasized. ORAL.

Geochemistry, Other (8), Petrology, Igneous (21), Tectonics (31).

T5. Before the Gulf—Paleozoic Tectonics of the Southern Margin of Laurentia.

George W. Viele, University of Missouri.

Before the Mesozoic Gulf opened, a Paleozoic ocean closed, forming from its sediments the Ouachita orogenic belt along the southern margin of Laurentia. Papers are invited describing the deposition and deformation of Ouachita rocks and the tectonic relations of these rocks to rocks and structures of the craton. ORAL.

Sediments, Clastic (28), Structural Geology (30), Tectonics (31).

T6. Advances in the Geology of Mexico.

José F. Longoria, Florida International University; Dante Moran-Zenteno and Jaime Urritia, Universidad Nacional Autónoma de México; Rogelio Monreal, Centro de Estudios Superiores del Estado Sonora.

This session will group multidisciplinary talks related to the geology of Mexico. Participants from both sides of the border will have an opportunity to present results on their recent investigations of, for example, stratigraphy, paleontology and paleobotany, and tectonics of Mexico. ORAL.

Paleontology/Paleobotany (18), Stratigraphy (29), Tectonics (31).

T7. Paleooceanographic and Paleoclimatic Results from ODP Legs 151 and 152 to the North Atlantic.

Mary Anne Holmes, University of Nebraska; Lisa Osterman, Smithsonian Institution.

We propose to discuss drilling results from ODP Legs 151 and 152 to the North Atlantic, particularly new findings of a late Miocene initiation of Arctic water overflow into the Atlantic, and the subsequent glaciation of shelf regions off Svalbard (Yermak Plateau) and East Greenland. ORAL.

Marine Geology (14), Paleooceanography/Paleoclimatology (17).

T8. Subaqueous Sediment Gravity Flow Deposition: Scaling, Processes, and Applications.

John P. Grotzinger, Massachusetts Institute of Technology.

Despite the considerable attention given to turbidites and subaqueous debris flows over the past 50 years, many questions remain unanswered due to the difficulty in observing modern regions where such flows are active. This theme session will focus on general processes of subaqueous sediment gravity flows, emphasizing the latest theoretical, experimental, and field-based observational results. ORAL.

Engineering Geology (5), Marine Geology (14), Sediments, Clastic (28).

T9. Recognizing the Impact of Subtle Structures on the Stratigraphic Record.

John Holbrook, Southeast Missouri State University.

Minimal deformation on subtle structures can exert a profound impact on coeval sedimentary processes. Recognizing stratigraphic preservation of these effects has ramifications for both prediction of lithofacies distribution and constraint of location, style, and trend of otherwise elusively subtle deformation. This session strives to appraise this process. ORAL.

Sediments, Carbonates (27), Sediments, Clastic (28), Structural Geology (30).

T10. Recent Progress in Shale Research.

Juergen Schieber, University of Texas, Arlington.

The purpose of this session is to bring together scientists who study a broad range of aspects concerning the petrology, sedimentology, and diagenesis of shales. The session will include studies of modern muds, paleoclimatic applications, and contributions discussing factors that affect source rock potential. ORAL.

Geochemistry, Other (8), Paleooceanography/Paleoclimatology (17), Sediments, Clastic (28).

T11. Tectonic and Paleoclimatic Records from Rift Basin Sediments of East Africa and Siberia.

Douglas F. Williams, University of South Carolina; Thomas Johnson, University of Minnesota.

Thick synrift sediments of the East African and Baikal rifts, two of the world's foremost continental rift systems, are the object of multinational efforts to reconstruct the tectonic and paleoclimatic histories of the tropical-subtropical Africa and subarctic Siberia. The session's objective is to convene workers and results from these efforts. ORAL.

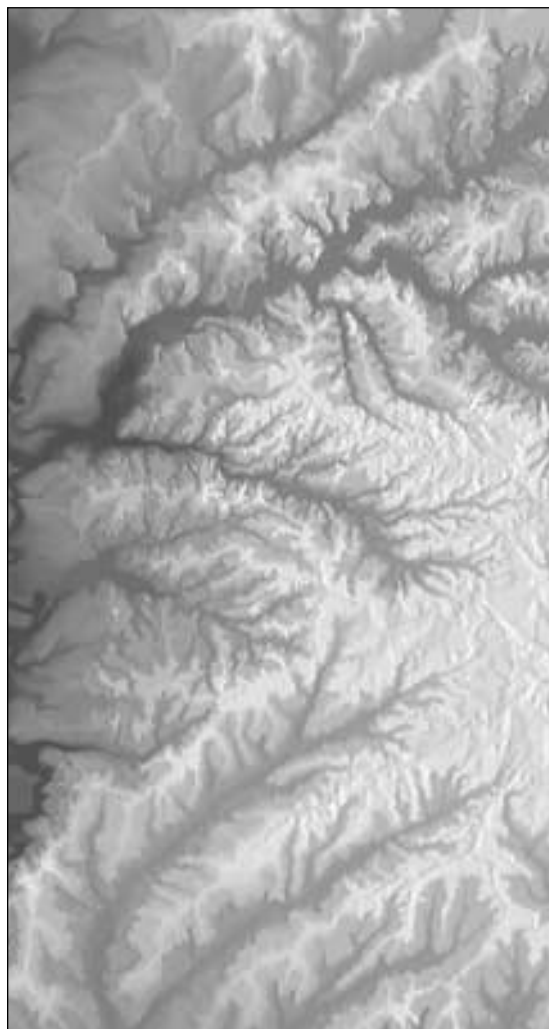
Paleooceanography/Paleoclimatology (17), Stratigraphy (29), Tectonics (31).

T12. Back to the Moon.

Planetary Geology Division. Odette B. James, U.S. Geological Survey, Reston; Cassandra Coombs, College of Charleston.

This session will present results of recent studies of the Moon and lunar materials. The recent Clementine mission mapped the Moon from polar orbit, and analysis of Clementine data is yielding exciting new information on lunar geology, petrology, topography, and internal structure. In addition, analysis of lunar samples continues to yield new insights. ORAL.

Geochemistry, Other (8), Geophysics/Tectonophysics (10), Planetary Geology (23).



Courtesy of RockWare. Digital translation of USGS digital elevation data provided by Chalk Butte, Inc.

T13. Coastal Wetland Dynamics in Response to Sea-level Rise: Erosion, Accretion, and Ultimately Transgression.

Robert S. Young, Duke University.

Wetlands are dynamic environments. Like barrier islands, they migrate landward with rising sea level. This theme session will focus on current models describing the nature of wetland dynamics (erosion, accretion, and transgression), emphasizing the physical processes that control and allow wetland transgression. ORAL.

Marine Geology (14), Quaternary Geology/Geomorphology (25), Sediments, Clastic (28).

T14. Quaternary Geologic Framework and Processes of Coastal Land Loss.

S. Jeffress Williams, U.S. Geological Survey, Reston; Shea Penland, Louisiana State University.

This theme session is a volunteered expansion of Symposium 7 of a similar title. Coastal erosion is due to a complex combination of natural processes and geologic conditions and human alterations of watersheds and shorelines affecting all 30 coastal states at annual rates up to 10 m/yr. Such widespread erosion is already having significant impacts on the nation's densely developed coastal plains and barrier islands, and threats from catastrophic storms, sea-level rise, and increasing development are likely to further impact society. This session will address the processes of geologic change in south-central Louisiana, the Gulf of Mexico, and other regions. ORAL.

Environmental Geology (6), Quaternary Geology/Geomorphology (25), Sediments, Clastic (28).

Please check the correct mode of the theme session—poster or oral. If the abstract is submitted inaccurately, the abstract will be transferred automatically to a discipline session.

T15. Processes Defining the Dynamics, Evolution, and Stratigraphy of Coastal Swamp and Marsh Environments.

Harold R. Wanless, University of Miami.

This session examines the roles of continuing and episodic (e.g., hurricane, tsunami, fire) processes in defining the character, stability, and evolution of coastal swamps and marshes and their stratigraphic record. These findings are critical for interpreting ancient sequences and projecting the evolution of modern coastal wetland systems with global change and anthropogenic stress. POSTER.

Environmental Geology (6), Quaternary Geology/Geomorphology (25), Stratigraphy (29).

T16. Effects of Geologic Framework on Shoreface Evolution.

E. Robert Thieler, Duke University.

The shoreface is a critical interface between the continental shelf and subaerial coastal environments. Processes in this environment determine how a shoreline will respond to storms, sea-level rise, and changes in sand supply over time scales from years to millennia. This theme session will focus on describing geologic controls on shoreface sedimentation and evolution. ORAL.

Marine Geology (14), Sediments, Clastic (28), Stratigraphy (29).

T17. Geologic Hazards in Mexico.

Jorge Nieto-Obregon, Facultad de Ingeniería, Universidad Nacional Autónoma de México.

Many recent research projects being conducted in Mexico by a wide variety of specialists have unraveled a picture of hitherto unknown situations of risk-related phenomena. This theme session is a great opportunity to bring together a wide variety of those experts to discuss the unique environmental problems of Mexico. ORAL.

Environmental Geology (6), Structural Geology (30), Volcanology (32).

T18. Environmental Geology: The Voice of Warning.



Institute for Environmental Education and GSA Committee on Geology and Public Policy. Monica E. Gowan, GeoLogic, Bellingham, Washington; Bret W. Leslie, Independent Consultant, Springfield, Virginia.

This session will explore geoscience approaches to informing citizens of the potential consequences of human-environment interactions. Particular emphasis will be placed on how outreach activities can both bridge the (information) gulf between scientists and the public and teach citizens how to access, evaluate, and use geoscience information. ORAL.

Engineering Geology (5), Environmental Geology (6), Geology Education (9).

T19. Environmental Geology: The Voice of Reason.



Institute for Environmental Education and GSA Committee on Geology and Public Policy. Monica E. Gowan, GeoLogic, Bellingham, Washington; Jeffrey R. Keaton, AGRA Earth & Environmental, Inc., Salt Lake City, Utah.

This session offers geoscientists a forum to discuss ways to advance sound environmental decision making. Presentations are encouraged on experiences and perceptions of geoscience information use and misuse, and how geoscience reasoning can help decision makers bridge the gulf between public confusion over risk and rational, intelligent environmental policies. ORAL.

Engineering Geology (5), Environmental Geology (6), Geology Education (9).

T20. Wetlands: Past, Present, and Future.

Richard Winston, Louisiana State University.

This session focuses on physical, chemical, and biological processes in wetlands, wetland creation, and the geologic record of wetlands including, but not limited to, peat and coal. Suitable topics might include field studies of existing wetlands, results of wetland creation demonstration projects, and environments of deposition in ancient wetlands. ORAL.

Coal Geology (2), Environmental Geology (6), Hydrogeology (13).

T21. Incorporating Research Results into Ground-Water Contamination Investigations and Remediation.

Hydrogeology Division. John H. Guswa, GeoTrans, Inc., Harvard, Massachusetts.

This session will address the question of how to effectively incorporate research related to the environmental fate and transport of chemicals into publicly accepted site characterization methodologies and remediation technologies for ground-water contamination. Discussions are welcomed on implementation of innovative vs. "tried and true" methodologies and technologies. ORAL.

Engineering Geology (5), Environmental Geology (6), Hydrogeology (13).

NEW ORLEANS

BRIDGING THE GULF

T22. The Watershed Approach to Water Resource Management.

Hydrogeology Division. Patrick A. Burkhart, Heidelberg College, Tiffin, Ohio.

Historical precedent and crisis-driven legislation have implied an artificial segregation of diverse water resources. In response, many entities are pursuing a holistic "Watershed Approach" to resource management. Abstracts are solicited for work (1) investigating the interconnectedness of various water resources or (2) pursuing policy development that acknowledges such interaction. ORAL.

Geochemistry, Aqueous/Organic (7), Geoscience Information (11), Hydrogeology (13).

T23. Geochemistry, Hydrology, and Environmental Impacts of Brines and Saline Waters.

Glenn F. Huff, New Mexico State University; Jeffrey S. Hanor, Louisiana State University.

The study of subsurface brines and saline waters has provided important information on Earth history as well as the origins of petroleum hydrocarbons. More recently, contamination by these waters has become an environmentally important topic. This theme session will provide a forum for discussion of the geochemistry, hydrology, and environmental impacts of brines and saline waters. ORAL.

Environmental Geology (6), Geochemistry, Aqueous/Organic (7), Hydrogeology (13).

T24. Innovative Characterization of DNAPL Impacted Aquifers.

Mark R. Noll, Applied Research Associates, Tyndall Air Force Base, Florida.

The transport and distribution of residual DNAPLs is a critical component to site remediation, and is controlled by aquifer heterogeneity. This session will focus on the use of innovative tools and integration of data from the hydrological, geophysical, and soil science disciplines to develop a quantitative picture of heterogeneous aquifers. ORAL.

Environmental Geology (6), Geophysics/Tectonophysics (10), Hydrogeology (13).

T25. The Role of Geosciences in Ecosystem Analysis.



Institute for Environmental Education.

Donald M. Davidson, Jr., Geological Society of America; Jean D. Juilland, U.S. Department of the Interior, Sacramento, California.

This session will focus on the importance of geoscience investigations, including geochemical as well as mineral and energy resources, in ecosystem analysis. Scientists from all sectors are encouraged to present results of environmental studies based on ecosystems. We anticipate an emphasis on studies showing the role of geosciences in the interdisciplinary aspect of ecosystem analysis. ORAL.

Environmental Geology (6), Geochemistry, Aqueous/Organic (7), Hydrogeology (13).

NEW ORLEANS

BRIDGING THE GULF

T26. Environmental Justice.

Syed Hasan, University of Missouri.

President Clinton, on February 11, 1994, issued an executive order requiring all federal agencies to ensure that their programs do not unfairly inflict environmental harm on the poor and minorities. This presents a new opportunity for geologists to work closely with social scientists, politicians, and decision makers to implement the environmental justice strategy being developed by federal agencies. ORAL.

Engineering Geology (5), Environmental Geology (6), Geology Education (9).

T27. Hydrochemical Interaction Between Shallow Ground Water and Surface Water in Karst Terrane.

Hydrogeology Division. Brian G. Katz, U.S. Geological Survey, Tallahassee; Noel Krothe, Indiana University.

The hydrochemical interaction between ground water and surface water in karst terrane can profoundly affect the water quality of shallow aquifer systems. This symposium will focus on the integration of innovative techniques and novel approaches involving tracers, geochemical and flow modeling, and laboratory studies, to better understand these processes.

Engineering Geology (5), Environmental Geology (6), Hydrogeology (13).

Please check the correct mode of the theme session—poster or oral. If the abstract is submitted inaccurately, the abstract will be transferred automatically to a discipline session.

T28. Dynamics of Aqueous and Hydrocarbon Fluids in Sedimentary Basins.

Janet K. Pitman and Michael Lewan, U.S. Geological Survey, Denver.

The purpose of this theme session is to examine current knowledge and establish future research directions regarding the dynamics of fluids in sedimentary basins. Specific issues to be addressed will include: (1) factors controlling basin-scale fluid flow, (2) petroleum migration through porous and fractured rock, (3) fluid transport and ore deposition, (4) petroleum and water/rock interactions, (5) diagenetic indicators of fluid flow, (6) advective heat transfer related to regional flow systems, (7) role of meteoric water in petroleum degradation, and (8) mass-balance assessments of expelled petroleum.

Geochemistry, Aqueous/Organic (7), Hydrogeology (13), Petroleum Geology (19).

T29. Multidisciplinary Approaches to Hydrogeologic Research on Carbonate Islands.

Hydrogeology Division. Carol Wicks, University of Missouri; Joseph W. Troester, U.S. Geological Survey, Puerto Rico.

This session will highlight research efforts focused on understanding the complex hydrogeologic processes that control the quality and quantity of ground water on carbonate islands. The session will encourage authors to bridge the gulf between disciplines by incorporating

data from diverse fields to further our knowledge of carbonate islands in the Caribbean and throughout the world. ORAL.

Hydrogeology (13), Quaternary Geology/Geomorphology (25), Sediments, Carbonates (27).

T30. Hybrid Carbonate-Siliciclastic Sedimentary Environments.

Paul R. Krutak, Fort Hays State University, Hays, Kansas.

Veracruz-Anton Lizardo reefs in the southwest Gulf of Mexico interfinger with volcanoclastic terrigenous sediments; thus, they constitute a hybrid sedimentary milieu. Ancient examples are common, and many have produced huge volumes of hydrocarbons. This session will bring together a group of international specialists studying both economic and applied scientific aspects of the systems. ORAL.

Petroleum Geology (19), Sediments, Carbonates (27), Stratigraphy (29).

T31. Research Results from the 1994–1995 Louisiana Applied Oil Spill Research and Development Program Projects.

Donald W. Davis, Louisiana State University.

The Louisiana Applied and Educational Oil Spill Research and Development Program (OSRADP) solicits research from Louisiana's public colleges and universities. The program's goal is to promote applied oil-spill-related research and provide practical knowledge to oil-spill prevention and response organizations. In this session, research results from the 1994–1995 award period will be presented. ORAL.

Engineering Geology (5), Environmental Geology (6), Remote Sensing (26).

T32. Halogen Hydrology.

Stanley N. Davis, University of Arizona.

The halogen elements have a long-term use in hydrology both as introduced tracers and as indicators of water origin. Recent work with isotopes of Cl (35, 36, and 37) and I (127, 129) as well as with trace amounts of Br has greatly increased general interest in these elements. ORAL.

Environmental Geology (6), Geochemistry, Aqueous/Organic (7), Hydrogeology (13).

T33. Weathering Silicate Minerals.

Mineralogical Society of America. Art White, U.S. Geological Survey, Menlo Park; Susan L. Brantley, Pennsylvania State University.

This session solicits papers related to the mechanisms and rates of silicate mineral dissolution in addition to studies related to soil,

watershed, and global weathering processes. Special emphasis will be on interdisciplinary approaches resolving differences in spatial and temporal scales and that address causes of inconsistencies between experimental and natural weathering. ORAL.

Geochemistry, Aqueous/Organic (7), Geochemistry, Other (8), Mineralogy/Crystallography (16).

T34. Biological Microinclusions of Aqueous Minerals.

Jack D. Farmer, NASA-Ames Research Center, Moffett Field, California.

Recent investigations have revealed numerous instances of very well preserved microorganisms, including many with recoverable DNA or other biomolecules, as inclusions in aqueous minerals, especially those formed within extreme geochemical environments. Diverse researchers will discuss the processes and implications of biological inclusions as examples of excellent preservation. ORAL.

Geochemistry, Aqueous/Organic (7), Micropaleontology (15), Paleontology/Paleobotany (18).

T35. Experimental Taphonomy: Deep Sea to Terrestrial Realms.

Paleontological Society. Anne Raymond, Texas A&M University; Sally Walker, University of Georgia.

Experimental taphonomy involves the understanding of how organisms and their traces become part of the geologic record. This theme session will focus on new observational and model results from shelf, slope, and coastal environments of the Caribbean and Gulf Coast as well as other areas. It will encompass the fields of micropaleontology, vertebrate and invertebrate paleontology, and paleobotany. ORAL.

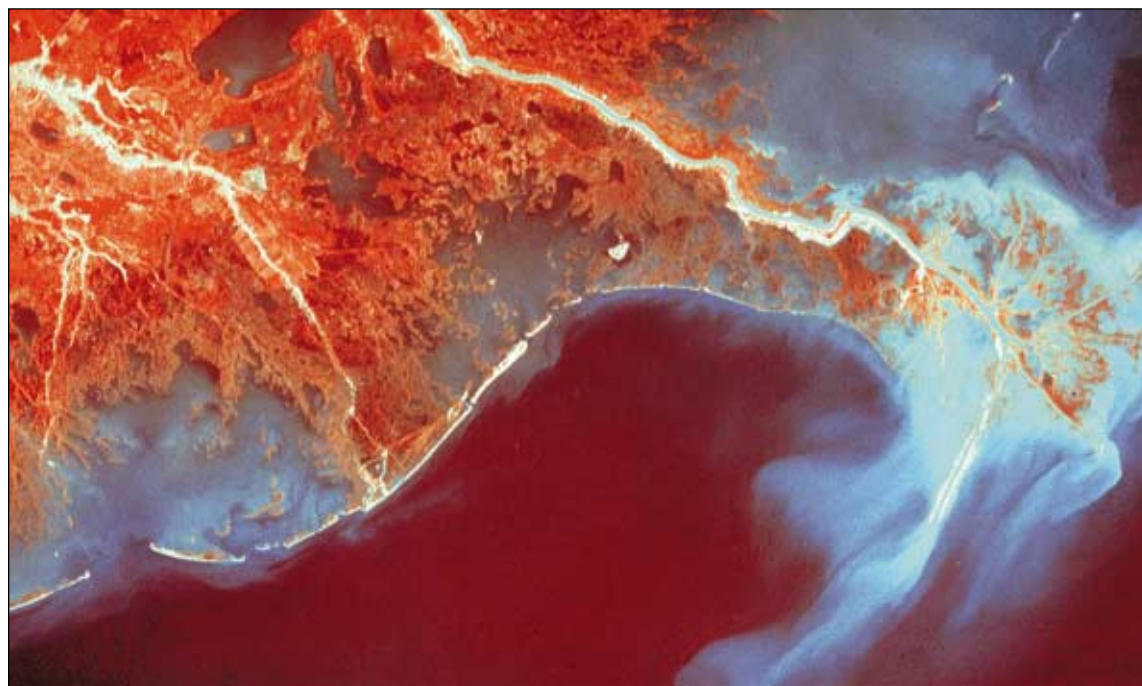
Paleontology/Paleobotany (18), Sediments, Carbonates (27), Sediments, Clastic (28).

T36. Impact in the Gulf: Chicxulub.

Planetary Geology Division. Maureen Steiner, University of Wyoming; Mary Sue Bell, Lunar and Planetary Science Institute, Houston, Texas.

The Gulf of Mexico was the site of the K-T boundary impact. This session will present recent results of studies of the Chicxulub impact site and the consequences of the impact. Reports of studies of the event's impact on the gulf environment as well as on the global environment are solicited. ORAL.

Geochemistry, Other (8), Paleontology/Paleobotany (18), Planetary Geology (23).



Courtesy of RockWare. Digital translation of Landsat MSS image provided by Now What Software.

T37. Global Catastrophes: P-E and K-T Events Compared.

Gerta Keller, Princeton University.

This theme session focuses on the rapid biotic and environmental changes of the two major global catastrophes, the Paleocene-Eocene and Cretaceous-Tertiary boundary events, in a wide spectrum of fossil organisms, stable isotopes, and mineralogic and sedimentologic features. Papers are invited on biotic and environmental changes and/or comparison of these two events. ORAL.

Micropaleontology (15), Paleoclimatology/Paleoceanography/Paleoclimatology (17), Sediments, Clastic (28).

T38. Applications of Coal Geology to Mining and Environmental Problems.

Coal Geology Division. James C. Hower, University of Kentucky; John C. Crelling, Southern Illinois University.

The session will cover applied topics in coal geology and petrology including mining geology, the use of peat and lignite as environmental remediation agents, hazardous air pollutant standards, the beneficial reuse of coal combustion by-products, and other applied topics. ORAL.

Coal Geology (2), Engineering Geology (5), Environmental Geology (6).

T39. Andes to the Amazon: Geology and Mineral Wealth of a Continent.

Richard M. Tosdal, U.S. Geological Survey, Menlo Park; Andrew MacFarlane, Florida International University.

The South American continent presents a diversity of metallic and nonmetallic mineral deposits whose resources are critical to the economies of many nations. This theme session gathers geologists from the Americas and other continents to focus on the geologic and metallogenetic context of these resources through regional synthesis and site-specific studies. ORAL.

Economic Geology (4), Geochemistry, Other (8), Tectonics (31).

T40. Mineral Deposits and Geology of the Caribbean Rim.

Society of Economic Geologists. Phil Pyle, BHP Minerals, Houston, Texas; Robert B. Cook, Auburn University.

The application of specific genetic models in the exploration for potential economic mineral deposits related to the Caribbean rim has resulted in significant discoveries and new insights into the geology of this region. The emphasis of the theme session will be on the results of this recent exploration and the resulting geologic database. ORAL.

Economic Geology (4), Tectonics (31), Volcanology (32).

T41. Appalachian Mineral Deposits.

Society of Economic Geologists. Kula Misra, University of Tennessee; Robert B. Cook, Auburn University.

Significant advances have been made in our understanding of Appalachian mineral deposits, due in part to continued exploration for both base and precious metals as well as the development of several recently discovered deposits. This theme session will address this new body at scales ranging from regional to individual deposits. ORAL.

Economic Geology (4), Geochemistry, Other (8), Structural Geology (30).

T42. Airborne and Spaceborne Radar Studies of the Geologic Environment.

Robert J. Stern, University of Texas, Dallas; Ray Arvidson, Washington University.

Terrain-imaging radar platforms have applications that complement those of traditional remote sensing techniques. Recent advances in radar imaging, most notably the SIR-C experiment of 1994, indicate that the time is right to examine how these advances have led to new perspectives on a wide range of problems concerning our geologic environment. ORAL.

Environmental Geology (6), Geophysics/Tectonophysics (10), Remote Sensing (26).

T43. Advances in Pegmatite Genesis.

William B. Simmons, University of New Orleans.

The focus of this theme session will be on current research into granitic pegmatites, including internal mineralogical and geochemical evolution, regional evolutionary relations between granite and pegmatite systems, conditions of crystallization, wall-rock interactions, origin of pegmatitic textures, and experimental applications. POSTER.

Geochemistry, Other (8), Mineralogy/Crystallography (16), Petrology, Igneous (21).

T44. Simulation, Animation, and Data Visualization in Hydrology.

Hydrogeology Division. Russell S. Harmon, U.S. Army Research Office, Research Triangle Park, North Carolina; Jeffrey Holland, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi; Edward Sudicky, University of Waterloo.

The ideal vehicle for conceptualization and synthesis of 3-D hydrogeological information (e.g., field data, model simulations, and/or geostatistical interpretation) is computer visualization and animation. This session will provide a forum for the demonstration of state-of-the-art visualization and animation techniques, with an interdisciplinary focus on problems in environmental hydrogeology. ORAL.

Computers (3), Engineering Geology (5), Hydrogeology (13).

Please check the correct mode of the theme session—poster or oral. If the abstract is submitted inaccurately, the abstract will be transferred automatically to a discipline session.

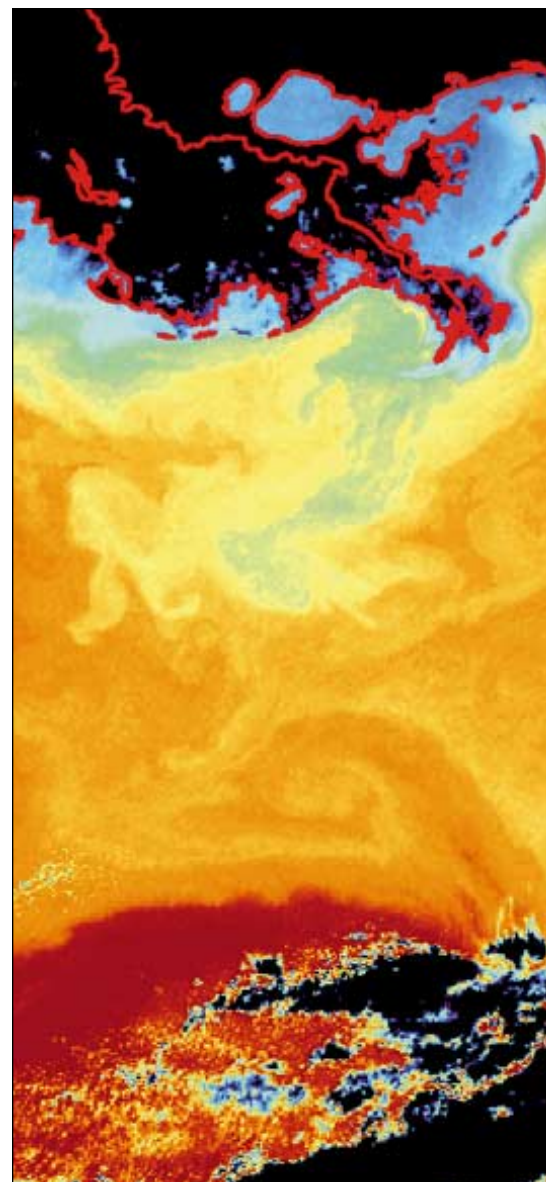
T45. Environmental Issues Across the Geoscience Curriculum.



National Association of Geology Teachers and Institute for Environmental Education. Steven C. Semken, Navajo Community College, Shiprock, New Mexico; R. Heather Macdonald, College of William and Mary; David W. Mogk, Montana State University.

Environmental geosciences can provide common themes across the geoscience curriculum from kindergarten through college. We invite abstracts demonstrating innovative courses and activities that exemplify the relevance of geosciences to societal concerns, practical applications of course material, and enrichment of the curriculum. ORAL and POSTER.

Environmental Geology (6), Geology Education (9), Geoscience Information (11).



Courtesy of LSU Earth Scanning Laboratory. Data from NOAA.

T46. Making Connections: Ties Between K-12 and University Education.

National Association of Geology Teachers, National Earth Science Teachers Association, Geoscience Education Division, Geological Society of America SAGE Program. Leslie Gordon, U.S. Geological Survey, Menlo Park; Cynthia Domack, Hamilton College; Frank Ireton, American Geophysical Union; Barbara Mieras, Geological Society of America.

This session will explore programs that link university and college faculty and/or students with K-12 teachers and/or students. We are interested in descriptions of effective programs ranging from informal outreach activities to long-term partnerships, discussions of what works and what doesn't, and strategies for establishing successful programs. ORAL.

Geology Education (9).

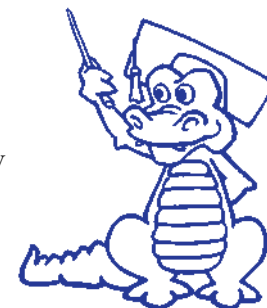
T47. Undergraduate End-of-Program Assessment in Geoscience Departments.

Dean A. McManus and Mark L. Holmes, University of Washington.

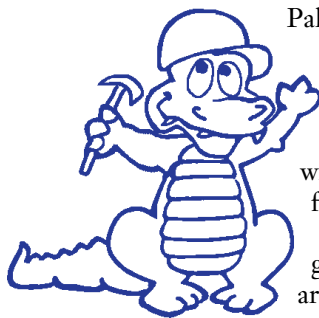
Formal end-of-program assessments are required of ever more geoscience departments to evaluate what students are learning from what they are being taught. Strategies used include undergraduate research, tests, capstone courses, portfolios, and interviews.

Examples of these strategies, their strengths and weaknesses, could help faculty members better assume this new responsibility. ORAL.

Geology Education (9).



FIELD TRIPS



The theme of this year's GSA Annual Meeting is "Bridging the Gulf," and the field trips we will offer are in keeping with that spirit. The geology ranges from the volcanics of Mexico to the Paleozoic rocks of Alabama, and from mountains to the interior of a salt dome. Included will be Appalachian structure, salt dome tectonics, and stratigraphy from lower Paleozoic to Holocene. Environmental and land-use aspects will include delta building, coastal erosion, Mississippi River deposition and flood control, industrial water use and disposal, gravel quarrying, and agriculture. All this will be interspersed with the culture of an area rich with history: pre-Columbian Indian, Colonial, Cajun and plantation development, Civil War forts and battlefields, and one of our most lively and varied present-day populations.

In all, we are offering a great variety. We have the leaders to take you to the best of our geology and to share with you their enthusiasm for it. Trips are led by active researchers and are technical in nature, although students are definitely encouraged to attend.

All trips begin and end in New Orleans unless otherwise indicated. Trip costs are subject to change before registration begins in June, but they are not expected to change significantly. If you register for only a field trip, you must pay a \$25 nonregistrant fee in addition to the field trip fee. This fee may be applied toward meeting registration if you decide to attend the meeting.

For further information, contact the trip leader or the 1995 Field Trip Chair, Whitney Autin, Louisiana State University, Institute for Environmental Studies, 42 Atkinson Hall, Baton Rouge, LA 70803-5705, (504) 388-3420, fax 504-388-4286, or Co-Chair Duncan Goldthwaite, Independent Petroleum Geologist, 4608 James Drive, Metairie, LA 70003, (504) 887-4377.

Premeeting

Explosive Volcanism and Pyroclastic Deposits in East-Central Mexico: Implications for Future Hazards. Tuesday, October 31 through Sunday, November 5. Claus Seibe, Instituto de Geofísica, Universidad Nacional Autónoma de México, Ciudad Universitaria, Circuito Exterior, C.P. 04510 Chichane, México, D.F., México, Phone: 6-22-41-19. Maximum: 24. Cost: \$550, plus airfare. This trip will start and end at the Mexico City airport; participants will make their own flight arrangements. The end of the trip is scheduled to connect with a Continental Airlines flight that arrives in New Orleans at 2:34 p.m. on November 5.

Regressive and Transgressive Depositional Systems of the Mississippi River Delta Plain: Atchafalaya and Lafourche Delta Complexes. Saturday, November 4 through Sunday, November 5. Shea Penland, Coastal Studies Institute, Louisiana State University, Baton Rouge, LA 70803, (504) 388-8670; S. Jeffress Williams and Harry H. Roberts. Maximum: 30. Cost: \$155. This trip will include landings at Isles Derniers, which will involve wading ashore from small boats. Appropriate footwear (sneakers) is recommended.

Wisconsinan to Holocene Soils, Landscapes, and Flood Plain Evolution of the Lower Mississippi Valley. Friday, November 3 through Sunday, November 5. Andres Aslan, Dept. of Geological Sciences, University of Colorado, Boulder, CO 80309, (303) 492-6313; and Whitney Autin. Maximum: 40. Cost: \$190.

Gulf Coast from New Orleans, Louisiana to Pensacola Beach, Northwest Florida. Saturday, November 4 through Sunday, November 5. Ervin G. Otvos, Gulf Coast Research Laboratory, P.O. Box 7000, Ocean Springs, MS 39564-7000, (601) 872-4200. Maximum: 40. Cost: \$160.

Half Day—Concurrent with the Meeting

Engineering Geology of the New Orleans Area: Water, Water, Everywhere. Tuesday, November 7, 7:30 a.m. to 12:30 p.m., or Wednesday, November 8, 7:30 a.m. to 12:30 p.m. Roger T. Saucier, Consultant, 4325 Winchester Road, Vicksburg, MS 39180-8969, (601) 636-7444; and Jesse O. Snowden. Maximum: 40 (each trip). Cost: \$65.

Postmeeting

Geology and Culture: Jackson, Mississippi to Baton Rouge, Louisiana. Thursday, November 9 through Saturday, November 11. Maureen K. Corcoran, USAE Waterways Experiment Station, Attn: CEWES-GG, 3909 Halls Ferry Rd., Vicksburg, MS 39180-6199, (601) 634-3334. Maximum: 40. Cost: \$190.

Paleocene to Early Oligocene Molluscan Biostratigraphy of Western Alabama and Eastern Mississippi. Thursday, November 9 through Sunday, November 12. Charles R. Givens, Dept. of Earth Science, Nicholls State University, Thibodaux, LA 70310, (504) 448-4165; and David Dockery. Maximum: 40. Cost: \$220.

The Appalachian Thrust Belt in Alabama: Influences on Structural Geometry. Thursday, November 9 through Saturday, November 11. William A. Thomas, Dept. of Geological Sciences, University of Kentucky, Lexington, KY 40506-0059, (606) 257-3758; and W. Edward Osborne. Maximum: 40. Cost: \$195. Although the trip ends in New Orleans, the bus can make a stop in the early afternoon on Saturday at the Birmingham, Alabama, airport for anyone wishing to depart from there.

Cultural Adaptation to Landforms in the Lower Mississippi Valley. Friday, November 10. Charles E. Pearson, Environments, Inc., 1260 Main Street, Baton Rouge, LA 70802, (504) 383-7455; and Donald W. Davis. Maximum: 40. Cost: \$75.

Site Characterization and Application of Horizontal Wells for Ground-Water Remediation. Friday, November 10. Ivy Dupree, Dow Chemical Company, P.O. Box 150, Building 3602 E., Plaquemine, LA 70765, (504) 353-1630; and Eric W. Meyer. Maximum: 40. Cost: \$70. Hard hat, safety glasses, and lunch will be provided by Dow Chemical at their plant in Plaquemine.

Internal Structure of the Five Island Salt Dome with a Visit to Cote Blanche Salt Dome. Friday, November 10. Donald H. Kupfer, 7324 Menlo Drive, Apt. 3, Baton Rouge, LA 70808, (504) 766-4566; Brian E. Lock, Whitney Autin, and James T. Neal. Maximum: 36. Cost: \$75.

Sand and Gravel Mining in the Amite River Flood Plain, Southeastern Louisiana. Friday, November 10. Joann Mossa, Dept. of Geography, University of Florida, 3133 Turlington Hall, Gainesville, FL 32611, (904) 392-0494. Maximum: 40. Cost: \$75.

Sponsored by Society of Economic Geologists

Contact trip leaders for information.

Sulfur and Sulfide Mineralization in Gulf Coast Salt Dome Cap Rocks. Friday, November 3 through Monday, November 6. J. Richard Kyle, Dept. of Geological Sciences, University of Texas, Austin, TX 78713, (512) 471-4351. Maximum: 40. Minimum: 20. Cost: \$275.

Gold Deposits of the Carolina Slate Belt. Thursday, November 9 through Saturday, November 11. Doug Crowe, Dept. of Geology, University of Georgia, Athens, GA 30602, (706) 542-2382. Maximum: 40. Minimum: 20. Cost: \$275. Trip begins and ends in Columbia, South Carolina.



An aerial view of a mined segment of the Amite River near Baywood during average flow. Photo by Joann Mossa.

PROFESSIONAL HORIZONS

GSA-Sponsored Continuing Education Courses

Registration information and course descriptions will be published in **June GSA Today**. For additional information contact Edna Collis, Continuing Education Coordinator, GSA headquarters.

Fees will be approximately \$150–\$175 for the first day and \$125–\$150 for the second day. If you register for a GSA course *only*, you must pay a \$25 nonregistrant fee in addition to the course fee. This fee may be applied toward meeting registration if you decide to attend the meeting. Students will receive a discount on all GSA courses.

Tax Deduction: Expenses for continuing education (including registration fees, travel, lodging, and meals) to maintain and improve professional skills are generally tax deductible in whole or in part (Treas. Reg. 1-162-5, Coughlin vs. Commissioner, 203F2d307). Please discuss this with a qualified accountant.

Contaminant Organic Geochemistry.

Saturday, November 4. Cosponsored by the *Hydrogeology Division*. Philip Bennett, University of Texas, Austin; Mary Jo Baedeker, U.S. Geological Survey, Reston. C.E.U. 0.8.

Fundamentals of Project Management for Environmental Professionals.

Saturday and Sunday, November 4–5. Marguerite H. Scully, Consultant, New Orleans, Louisiana. C.E.U. 1.6.

Introduction to Experimental Modeling of Tectonic Processes.

Saturday and Sunday, November 4–5. Cosponsored by the *Structural Geology and Tectonics Division*. Bruno C. Vendeville, University of Texas, Austin; Martha O. Withjack and Gloria Eisenstadt, Mobil Exploration and Producing Technical Center, Dallas, Texas. C.E.U. 1.2.

Introduction to Soil and Ground-Water Remediation Techniques.

Saturday and Sunday, November 4–5. Cosponsored by the *Engineering Geology Division*. Jeffrey L. Peterson and Diane M. Lundquist, Enviros, Inc., Sonoma, California. C.E.U. 1.6.

Multidimensional Computer Visualization in the Geosciences.

Saturday and Sunday, November 4–5. Cosponsored by the *Hydrogeology Division*. Paul J. Morin and Mark Person, University of Minnesota; Mark S. McBride, Dames & Moore, Bethesda, Maryland. C.E.U. 1.6.

Phase I Environmental Site Assessments.

Saturday and Sunday, November 4–5. Cosponsored by the *Engineering Geology Division*. Raymond C. Kimbrough, Tom Joiner & Associates, Inc.; David R. Gillespie, Desert Research Institute, Las Vegas, Nevada. C.E.U. 1.6.



Photo by Bill Cronin.



GSA also offers a program for K–12 teachers.

Photo by Bill Cronin.

Coastal Land Loss.

Sunday, November 5. Robert A. Morton, University of Texas, Austin; Orrin H. Pilkey, Jr., Duke University; Joseph T. Kelley, Maine Geological Survey. C.E.U. 0.8.

Essentials of Subsurface Mapping.

Sunday, November 5. Cosponsored by the *Structural Geology and Tectonics Division*. Duncan Goldthwaite and Robert B. Branson, Atwater Consultants, New Orleans, Louisiana. C.E.U. 0.8.

GIS and the Geosciences.

Sunday, November 5. Richard L. Bedell, Jr., Homestake Mining Company, Sparks, Nevada. C.E.U. 0.8.

Geomorphic Applications of In Situ-Produced Cosmogenic Isotopes.

Sunday, November 5. Cosponsored by the *Quaternary Geology and Geomorphology Division*. Paul R. Bierman, University of Vermont; Alan R. Gillespie, University of Washington. C.E.U. 0.8.

Hydrogeology and Geochemistry of Wetlands.

Sunday, November 5. Cosponsored by the *Hydrogeology Division*. Donald I. Siegel, Syracuse University; Barry G. Warner, University of Waterloo, Ontario. C.E.U. 0.8.

Other Courses and Workshops

Registration and information can be obtained from the contact person listed after each course.

Fractals and Nonlinear Dynamics: New Numerical Techniques for Sedimentary Data.

Friday and Saturday, November 3–4. Sponsored by *SEPM (Society for Sedimentary Geologists)*. For information: Myra Lee Rogers, Education & Conference Manager, SEPM, 1731 E. 71st St., Tulsa, OK 74136-5108, (918) 493-3361, fax 918-493-2093, E-mail: myralee@aip.org.

Effective Teaching: A Workshop for Graduate Students, Assistant Professors, and Anyone Else Interested in Becoming a Better Teacher.

Saturday, November 4. Sponsored by the GSA *SAGE Program* and *National Association of Geology Teachers*. For information: R. Heather Macdonald, Dept. of Geology, College of William and Mary, Williamsburg, VA 23185, (804) 221-2469, fax 804-221-2464.

Weathering Kinetics of Silicate Minerals.

Saturday and Sunday, November 4–5. Sponsored by the *Mineralogical Society of America*. For information: MSA Business Office, 1130 17th St., N.W., Suite 330, Washington, DC 20036, (202) 775-4344, fax 202-775-0018.

Preparing Successful Grant Proposals to Fund Curriculum Innovation in the Geosciences.

Sunday, November 5. Sponsored by the *National Association of Geology Teachers* and *National Science Foundation*. For information: Judith L. Hannah, National Science Foundation, Room 785, 4201 Wilson Blvd., Arlington, VA 22230, (703) 306-1557, fax 703-306-0382, E-mail: jhannah@nsf.gov.

Siliceous Microfossils.

Sunday, November 5. Sponsored by the *Paleontological Society*. For information: Charles D. Blome, U.S. Geological Survey, P.O. Box 25046, MS 919, Denver Federal Center, Denver, CO 80225, (303) 236-5682, E-mail: cblome@greenwood.cr.usgs.gov; Katherine M. Reed, P.O. Box 5991, Lacey, WA 98503, (206) 902-1456; Patricia A. Whalen, Dept. of Geological Sciences, Southern Methodist University, Dallas, TX 75275, (214) 692-2750.

Job Hunting and Career Development Strategies and Skills for Geoscientists.

Sunday, November 5. Sponsored by the *Association for Women Geoscientists*. For information: Kata McCarville, Computing Center, Colorado School of Mines, Golden, CO 80401, (303) 273-3448.

DataBase Forum.

Sunday, November 5. Sponsored by the *Geoscience Information Society*. For information: Kimberly Parker, Kline Science Library, Yale University, 219 Prospect St., P.O. Box 208111, New Haven, CT 06511-8111, (203) 432-3443.

Geology and Public Policy Forum

The GSA Committee on Geology and Public Policy will conduct a forum entitled “The Nation’s Geology—Role of the U.S. Geological Survey, State Surveys, Academic Institutions, and the Private Sector.”



SPECIAL PROGRAMS

Field Cooking Techniques Open Symposium: Call For Recipes

In recognition of New Orleans, a city famous for its cuisine, GSA announces its first cooking contest. Geoscientists have learned to adapt to producing meals under less than ideal conditions in a variety of field situations. We are aware of methods ranging from automotive techniques (also known as radiator cookery) to the Davy Crockett living-off-the-land approach. Deer rifles, jeeps, and campfires will not be allowed in the convention center, so for this event we have chosen to limit the contest to one common field situation: the problem of eating well when only non-perishable food such as anything that will survive in a normal climate without refrigeration for one week or more is available—for example, canned and dried foods, plus other foods like onions, carrots, potatoes, etc.



We are soliciting recipes in two forms: poster and oral. **Poster** format is a recipe only (to be published in a cookbook). You are encouraged to make as many poster presentations as you please and need not follow the strict rules of the contest (e.g., we will allow strange cooking techniques, road kill recipes, etc.). **Oral** format (limited to one per entry) is a recipe to be considered for judging and tasting at a cookoff competition held at the convention center and will be subject to a review by a cookoff committee. A select group of about 10 entries will be chosen for a cookoff during the Annual Meeting. A prize will be awarded for the top two entries. Entry cost is \$7 and includes a copy of the cookbook.

Your recipe(s) should be submitted on a Cook-Off Form by **June 1, 1995**. To obtain a form, contact Terry Pavlis, University of New Orleans, Dept. of Geology and Geophysics, 2000 Lakeshore Drive, New Orleans, LA 70148; (504) 286-6797; E-mail: tpavlis@geology.uno.edu, or Kathy Lynch, GSA headquarters, E-mail: klynch@geosociety.org.

Graduate School Information Forum

The forum will take place at the Ernest N. Morial Convention Center in three sessions from 9:00 a.m. to 5:00 p.m., Monday, November 6, through Wednesday, November 8.

This forum provides a unique opportunity for undergraduate students who are planning to obtain an advanced degree to meet with representatives of graduate schools in an informal setting to discuss interests and explore programs. A list of participating schools will appear in the June and September issues of *GSA Today*.

This year's forum will take place between the poster area and the exhibit hall. Each school will be given use of a 4' x 8' poster board, a table, and four chairs. If your school is interested in participating, contact Matt Ball, GSA headquarters.

Employment Service

GSA will again be offering its Employment Interview Service. Each year, this program provides valuable job-matching opportunities in the geosciences. At last year's meeting in Seattle, participating employers conducted nearly 400 interviews with 200 applicants seeking employment!

As in the past, booths will be provided for employers to interview applicants registered with the Employment Service, and GSA staff will be on hand to coordinate the scheduling of interviews. In particular, students completing doctoral and master's theses during 1995 are encouraged to check the job offerings.

See the July 1994 issue of *GSA Today* for applicant and employer forms and further information, or contact T. Michael Moreland, Employment Service Manager, GSA headquarters. Information is also available on the World Wide Web. The Universal Resource Locator (URL) is <http://www.aescon.com/geosociety/index.html>; check under the Membership section.



New Orleans skyline. Courtesy of GNOTCC (Greater New Orleans Tourist & Convention Commission). Photo by Bryce Lankard.

Evening Highlights

Creole Queen Riverboat Dinner Cruise
Saturday, November 4

Dixieland Jazz GSA Jam
Saturday, November 4

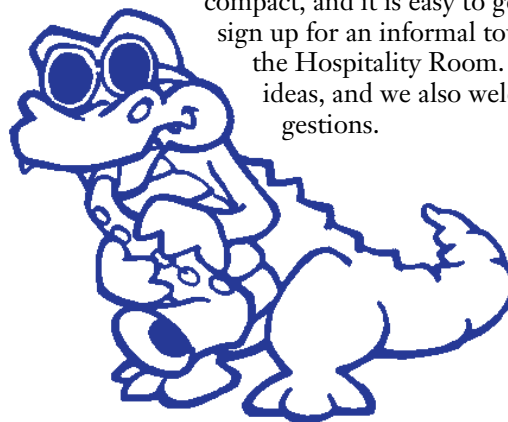
Louisiana Philharmonic and Dinner
Saturday, November 4

Welcoming Party
Sunday, November 5

GSA Presidential Address and Awards Ceremony
Monday, November 6

Alumni Receptions
Monday, November 6

Aquarium of the Americas
Wednesday, November 8



Guest Program

New Orleans is filled with many unique cultures and traditions. From the shores of Lake Pontchartrain to the banks of the Mississippi River, from crawfish étouffée to beignets and café au lait, from Bourbon Street high life to Garden District tranquillity, New Orleans is like no other city. The friendly people, rich history, tantalizing food, and southern hospitality will delight you. Most everything is within walking distance, an inexpensive trolley ride, or a short taxi ride. Please join us.

Guests are invited to visit the GSA Hospitality Room in the Hyatt Regency Hotel. Your hosts will be providing a resource center to help you explore *your* interests. Information on New Orleans and surrounding areas will be available, as well as details on GSA tours and seminars. Early in the week, join us for a special welcoming reception. We are planning special visitors from the Audubon Zoo!

SEMINARS

Welcome to New Orleans

Start the week with an insightful introduction to the many unique areas to explore. The history of this city will amaze you. Learn about the tours and seminars GSA has planned for you.

Mark Twain and Life Along the Mississippi
Phil White creates a life-size characterization of Mark Twain, with tall tales from classic American novelist Samuel Clemens.

What Are We Eating?

We will explore healthy foods and eating habits.

TOURS

Bayou Birding

A chance to view indigenous and migratory fowl of the Louisiana swamps, highlighted by southern bald eagles preparing to nest.

America's Most Interesting City

A quick overview of the many distinct, historical areas of New Orleans.

Honey Island Swamp Tour

A boat tour through one of the wildest and most pristine river swamps in America.

Learning to Cook Creole

Learn firsthand how to prepare the cuisine that has made New Orleans famous.

Town and Country

Learn the heritage of our ancestors with visits to the San Francisco Plantation and a private mansion in the Garden District.

Literary Tour of the French Quarter

Interesting anecdotes will enliven this tour of the inspiration points of William Faulkner, Tennessee Williams, and O. Henry.

Mardi Gras World

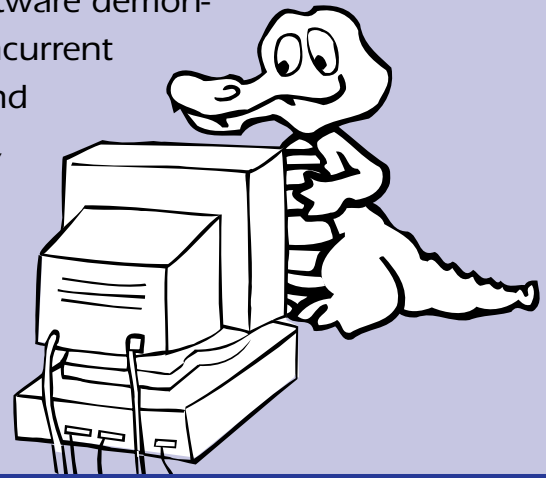
Visit the den of the carnival krewes of Endymion and Bacchus, where 75 magnificent Mardi Gras floats are built and housed.

Informal Tours

In addition to the tours listed above, you might enjoy visiting other attractions in New Orleans with other guest attendees. The city is compact, and it is easy to get around. Plan to sign up for an informal tour (no guide) in the Hospitality Room. We have many ideas, and we also welcome your suggestions.

GSA Software Fair

A Software Fair is being organized for the New Orleans meeting to promote the use of computers in all fields of geology. The Software Fair will provide authors a new forum to display their own software and give participants an opportunity to learn about numerous software applications that are available. Computers will be placed near the poster session area. If there is sufficient interest, the software demonstrations will be organized each day so that they are broadly related to concurrent poster topics. Interested authors of freeware, public domain, shareware, and commercial packages (non-corporate) are invited to contact: Skip Simmons, University of New Orleans, Dept. of Geology and Geophysics, 2000 Lakeshore Drive, New Orleans, LA 70148; (504) 286-6791; fax 504-286-7396; E-mail: WBSES@geology.uno.edu for information and application form. The deadline for receipt of completed applications is August 1, 1995. Applicants will receive details about the final organization of the Software Fair by September 15, 1995.



New Orleans French Quarter. Courtesy of GNOTCC.

REGISTRATION

*Registration materials available in June GSA Today!
June will be the only complete registration issue.*

PREREGISTRATION DEADLINE: SEPTEMBER 29, 1995
CANCELLATION DEADLINE: OCTOBER 6, 1995

Make plans now to take advantage of the **June** registration opportunity! **Events will fill quickly.** There are considerable savings on registration fees if you register early. Registration is required for events. One-day registration is available on-site Saturday through Thursday.

GSA members will automatically receive registration information and forms during the first weeks of June. If you are *not* a member and would like registration forms and further information, please write or call the GSA Registration Coordinator, GSA headquarters. Nonmembers who become GSA members by October 1, 1995, can **preregister** at the member rate. For membership information, contact GSA Membership Services, GSA headquarters.

Meeting registration fees have not been established as we go to print. However, for your budgeting and travel authorization requests, please use the **estimated preregistration fees** below. Final fees will be published in the June issue of *GSA Today*.

Estimated Registration Fees	Advance Full Meeting	On-Site Full Meeting
Professional Member	\$180	\$210
Professional Member One Day	\$105	\$105
Professional Nonmember	\$220	\$250
Professional Nonmember One Day	\$125	\$125
Student Member	\$ 65	\$ 80
Student Member One Day	\$ 40	\$ 40
Student Nonmember	\$ 85	\$100
Student Nonmember One Day	\$ 50	\$ 50
Field Trip and Short Course Only	\$ 25	\$ 35
K-12 Teachers	\$ 25	\$ 35
Guest/Spouse	\$ 75	\$ 90

Accessibility for Registrants with Special Needs

GSA is committed to making every event at the 1995 Annual Meeting accessible to all people interested in attending. If you have special requirements, such as an interpreter or wheelchair accessibility, there will be space to indicate this on the meeting registration form, or you can call Becky Martin, GSA headquarters. If possible, please let us know your needs by October 2.

Members Pay Less! Join Now!

If you are not yet a GSA member, **now** is the time to join. You will save a substantial amount on your registration fee by paying the member rate—almost exactly the amount you would pay to join GSA. That's like joining GSA for free! For membership information, contact T. Michael Moreland at GSA headquarters, (303) 447-2020, ext. 115 or E-mail: tmorelan@geosociety.org.

Abstracts with Programs

Purchase an advance copy through GSA Publication Sales, or pick up a copy on site in the registration area. The *Abstracts with Programs* is not part of your registration fee. For advance sales, contact Publication Sales, P.O. Box 9140, Boulder, CO 80301, 1-800-472-1988, (303) 447-2020, or fax 303-447-1133. Cost: \$22.

EXHIBITS

MORE THAN 250 BOOTHS FILLED WITH THE LATEST

- Geological publications, textbooks, and maps
- Computers and geological software
- Scientific instrumentation
- Microanalysis and photographic equipment
- Geoscience educational supplies and videos
- Gems, minerals, and fossils
- Resource information from environmental, national, and state agencies
- Field supplies and gear
- Earth science program information from major schools and universities

CONVENIENT EXHIBIT HALL HOURS

- Sunday, November 5 5:00 p.m. to 8:00 p.m.
- Monday, November 6 9:00 a.m. to 5:00 p.m.
- Tuesday, November 7 9:00 a.m. to 5:00 p.m.
- Wednesday, November 8 9:00 a.m. to 4:00 p.m.



TRAVEL AND LODGING



Travel

GSA's official travel agent, Travel King East, will be negotiating discounted airfares with the major New Orleans carriers: United, American, and Delta. Travel King is committed to obtaining the best possible fare and will guarantee it.

As with all airline reservations, please use caution regarding change and cancellation penalties that accompany low-fare tickets. This applies especially to field trip and continuing education participants, whose trip or course may be canceled after the September 29 preregistration deadline. Advance bookings with Saturday night stayovers are the best route to lowest fares. Call Travel King at 1-800-458-6398 for a reservation or more information.

The Airport Shuttle offers convenient, inexpensive transportation from the airport to the downtown hotels.

STUDENT TRAVEL GRANTS

The GSA Foundation has awarded matching grants up to a total of \$3500 each to the six GSA Sections. The money, when combined with equal funds from the Sections, is used to assist GSA Student Associates traveling to the 1995 Section meetings and to the Annual Meeting in New Orleans. For information, contact your Section Secretary.

Cordilleran

Bruce Blackerby, (209) 278-2955

Rocky Mountain

Ken Kolm, (303) 273-3932

North-Central

George Hallberg, (319) 335-4500

South-Central

Rena Bonem, (817) 755-2361

Northeastern

Ken Weaver, (410) 554-5532

Southeastern

Harold Stowell, (205) 348-5098

Lodging

GSA has booked rooms at 11 properties, which offer special convention rates ranging from \$76 to \$138 single, and \$86 to \$153 double. A block of 650 rooms is reserved at the Hyatt Regency New Orleans, which, as headquarters, will host most social and business events. Other participating hotels include the Bourbon Orleans Hotel, Chateau Sonesta Hotel, Doubletree Hotel, Embassy Suites, Holiday Inn Crowne Plaza, Holiday Inn Superdome, Hotel Monteleone, Le Pavillon Hotel, Radisson Hotel, and the Windsor Court Hotel.

Activities will take place at the Ernest N. Morial Convention Center, as well as GSA's headquarters hotel, the **Hyatt Regency**, and the Doubletree Hotel. The Hyatt is a first-class property within a ten-minute shuttle ride of the Convention Center. No other hotel in GSA's block matches the Hyatt for accommodations and service.

In addition to the downtown hotels, GSA will be offering special rates **for students** at several motels about 3 miles from downtown. These motels will be in the lower price range, and will NOT be on the GSA shuttle route. New Orleans Public Trolley lines run close to these properties.

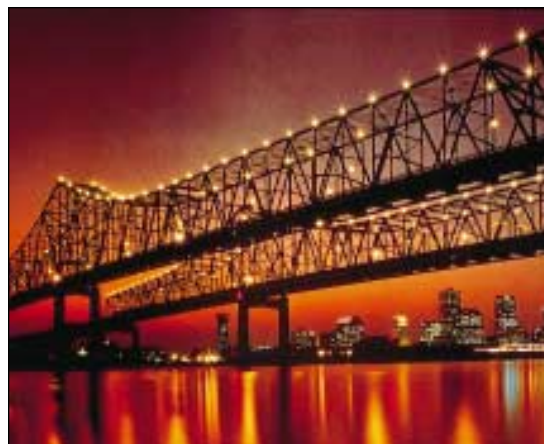
The key to getting your first hotel choice is to make your reservation early. Like last year, GSA will publish housing information and reservation forms in the **June** issue of *GSA Today*. Because November is one of the busiest tourism months for New Orleans, we highly recommend that GSA meeting attendees get their reservations in *as early as possible*. All hotel reservations must be processed by the New Orleans Housing Bureau to get the GSA special rate.

GSA Shuttle

In New Orleans, GSA will be providing a convenient, free shuttle serving the GSA-selected hotels and the Ernest N. Morial Convention Center.



Paddlewheeler Creole Queen. Courtesy of GNOTCC.



Bridge over the Mississippi River. Courtesy of GNOTCC.

NEW ORLEANS

BRIDGING THE GULF

perhaps best be made by analogy. A casual reference to the hard-copy (read "paper") map on which DDM-SVF is based (USGS map I-2431) probably refers to all four map sheets, including the maps, text, and data found on the paper within the brown envelop into which the whole map is inserted. To be a purist, the actual map is the colored "cartoon," complete with contacts and unit and sample labels, that is overlaid on the topographic base. The rest is accompanying figures, tables, and text. In this analogy, the program, created with SuperCard, is the "paper background" on which the digital map is "printed." For example, the programmer may create a card within a window into which she decides to put a map. In this case, the map has been created outside the SuperCard program using a computer-aided drafting program (for example, Canvas). The programmer then pastes this map into the appropriate card in the SuperCard program. Likewise, the programmer may create another card and window into which he decides to insert a figure or another card into which he inserts the map's introductory text. From here the distinction between the program and what is inserted into the program blurs, because the SuperCard program, instead of being a "dumb" white piece of paper on which the map pieces simply sit inert, can provide these pieces with an interactive link to other parts of the digital map. The programmer, anticipating that the geologist might want to know what the map symbol Qbb2 stands for, gives that symbol a script that says, in effect, "when clicked on, go find your unit description (stored elsewhere in the program) and display it on the screen." Similar "hypermedia" links are provided

throughout the program to map labels, text and tables after they are inserted into the SuperCard framework; many are also programmed into the framework (that is, the windows and cards of the program). Because scripts for a type of map label (for example, map unit symbols) can be identical and are easily assigned to each label, building such links is efficient once each label has been assigned an identity (that for the map unit above is simply assigned the name "Qbb2").

Windows Within DDM-SVF

DDM-SVF is a presentation-manager program that provides a series of windows, each containing some component of the map. The program allows the geologist to navigate between and within these windows. The first window (Fig. 1) is the hub, which is always displayed by default on the screen; it contains an index map. To see a part of the detailed map, the user points and clicks at the appropriate place on the Index Map, which closes the index map window, and opens another window (the map window) containing the designated segment of the map (Fig. 2). The user can scroll around the map within the window, a feature common to all windows in the program in which the information in the window might exceed the window's size. When done, the user closes the Map window by clicking a Close box on the window, causing the index map to reappear. The Map window actually contains 24 cards, each containing one map segment, but displays only one card at a time. The reason for dividing the original map into overlapping segments is to accommodate computers with only 8 megabytes of random-access memory, because loading a map segment that is too



Figure 3. Photograph window of DDM-SVF, showing one of the 74 photos in the program. This oblique aerial photo shows the north-central part of the Springerville field in late afternoon light. A click on the Show/Hide Labels button in the upper left hides all labels. A click on the left or right arrow (upper right) displays the previous or next photo in the program; the Get button lets the user type in the next photo she wishes to view. The photo can be saved as a Pict-format file by clicking on the Save as Pict ... button.

large would cause "out-of-memory" problems.

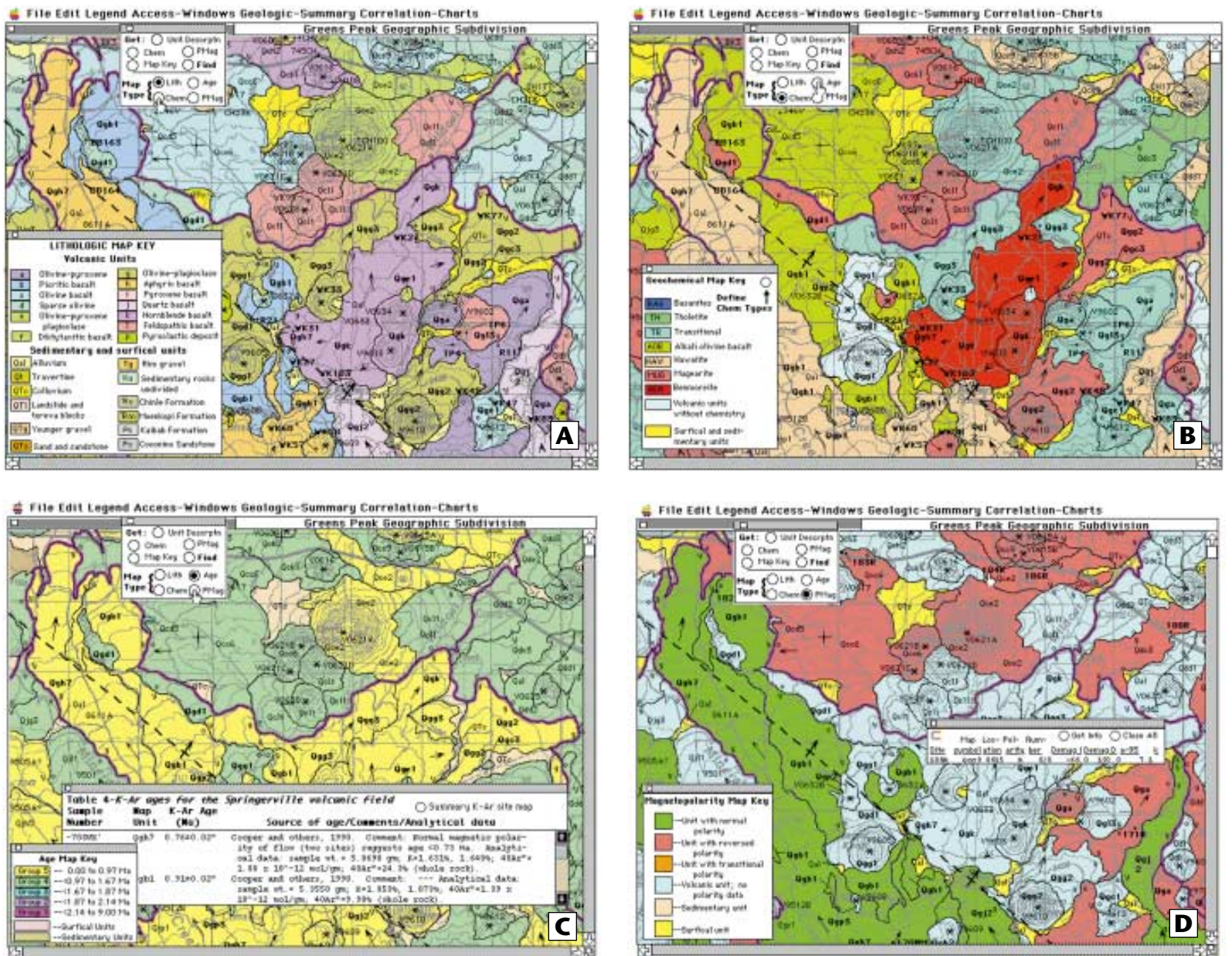
Menus and the Introductory Text Window

The program has menus that enable the user to access additional windows not directly associated with the map proper. For example, the menu titled Correlation of Map Units presents the user with a list that opens a window containing any one of the map's 23 Correlation of Map Units charts. Another menu, Geologic-Summary, also provides the user with a list of selections. The selection Intro-

ductory Text opens a window containing the equivalent of a hard-copy map's summary text. Figures and tables can be called up by clicking on bold-faced words in the text (e.g., "table.1"). The Introductory Text window, as in any word-processor program, has search and find capabilities, and its text can be saved to an ASCII disk file. As the preceding description suggests, DDM-SVF contains all information normally associated with a hard-copy color map, including the explanation of map symbols, correlation diagrams, summary

Map continued on p. 88

Figure 4. A: The Map window of DDM-SVF, showing the lithologic map of the northern part of the Greens Peak map segment. The key to the thematic colors of the map is at the lower left. The cursor, represented by the hand (in the palette at the upper left), is poised to click on the "Chem" button to transform the map to a chemical thematic map, shown in Figure 4B. The user can scroll around the map using the "slider" controls on the right and bottom sides of the map window. B: The Map window of DDM-SVF, showing a geochemical map of the northern part of the Greens Peak map segment. The key to the thematic colors of the map is at the lower left. The cursor, represented by the hand (in the palette at the upper left), is poised to click on the "Age" button to transform the map to an age thematic map, shown in Figure 4C. C: The Map window of DDM-SVF, showing an age map of the northern part of the Greens Peak map segment. The key to the thematic colors of the map is shown at the lower left. A pop-up palette with K-Ar age data for a sample floats above the map. The cursor, represented by the hand (in the palette at the upper left), is poised to click on the PMag button to transform the map to a magnetopolarity thematic map, shown in Figure 4D. D: The Map window of DDM-SVF, showing a magnetopolarity map of the northern part of the Greens Peak map segment. The key to the thematic colors of the map is shown at the lower left. The cursor, represented by the hand, has just clicked on paleomagnetic site 184R; the pop-up palette that resulted is displayed on the right.



Map continued from p. 87

text (including associated figures and tables), unit descriptions, and more.

Map Window

The hypermedia programming built into the maps of the Map window simplifies finding samples (or units), makes information on a map feature instantly available, and allows sequential changes in thematic map type.

Finding Sample Locations and Map Units. There are two methods for locating a map label denoting a sample location or map unit (equivalent to search and find in a word processor program). Using the first method, the user clicks on a Find button displayed on a floating palette window, and types in the desired label (Fig. 2). The program then centers the map segment on that label; a circle surrounds the feature, and the label blinks. The second method for finding labels is provided from the Access-Windows menu, using the Show Access to Units/Samples All Areas selection. This activates a pop-up window with buttons that display a list of labels (sample lists include major-element chemistry, paleomagnetic data, and K-Ar data). A click on the desired label in this "click list" causes the program to locate the feature on the map. The order of samples on a list can be changed "on the fly" by clicking a Sort button to sort the list alphanumerically either by sample number or by associated map unit. Similar click lists are available for displaying less comprehensive data sets, such as isotope, trace-element, or mineral chemistry.

Displaying Unit Descriptions and Analytical Data. When a map segment is displayed, all map labels shown in bold print serve as buttons. Clicking on any of them extracts the associated data from a hidden data field and displays it in a small pop-up window. A click on a unit symbol immediately displays a description of that unit; likewise, a click on a sample label shows its major-element chemical analysis. These windows can be dragged around the screen to better see the map. This type of information can also be called to the screen by clicking on a Get button, superposed on the map in a floating palette window, and typing the wanted label into the resulting pop-up window. Additional links allow the display of major-element chemistry; clicking on the sample identification listed in the unit description's pop-up window (also a floating palette) or clicking on the Get Chem button in that same unit window displays all chemistry for a given unit.

Displaying Digital Photographs. Additional buttons on map segments provide access to digital photographs of geologic features of interest (Fig. 2). These buttons are small purple circles with the photo number and an arrow showing the direction of view (for example, 41 and 42 in Fig. 2), which can be displayed or hidden by a control

from the Access-Windows menu. A click on one of these buttons closes the map window and opens a Photograph window with the photo (Fig. 3). Photos include a caption and labels, which can be hidden to allow viewing of the photo without clutter. A button on the photos allows each to be saved to disk. Where several photos exist for a given feature (e.g., oblique aerial and ground-based photos), a button embedded in each photo calls up the associated photo (after closing the previous one), and buttons on that photo allow return to the original photo. A Digital Photograph Index Map, accompanied by a click list describing all photos, can be called up from the Geologic-Summary menu to provide alternative access to the photos. Photomicrographs of each lithologic classification (and four xenoliths) can be accessed through the click list associated with the Digital Photograph Index Map, from figures describing the lithologic types, or from any map segment where a round gray button similar to those for photos indicates a photomicrograph exists for a sample.

Changing Thematic Map Types.

One of the most useful features of DDM-SVF is its ability to depict thematic attributes while viewing a map segment by simply clicking a button in a floating palette. The Springerville thematic maps consist of four types (Fig. 4): a lithologic map, wherein all 409 volcanic units are assigned (and color coded) to one of 13 lithologies, based on mineral type and abundance; a geochemical map, wherein units are assigned to one of nine geochemical classes; an age map, in which volcanic units are assigned to one of five age groups; and a magnetopolarity map, wherein volcanic units are assigned to one of three polarity groups. Appropriate thematic map keys can be displayed for each map type. When changing map type, an additional change takes place: samples appropriate to the new thematic map type are made visible, and samples that were relevant to the previous map type are hidden. For example, when changing from a lithologic or chemical map (where chemical sites are plotted) to a paleomagnetic map (where paleomagnetic sample sites are plotted), the chemical sites disappear, and the paleomagnetic sample sites appear.

Saving Data From DDM-SVF to ASCII Files

One of the most important facets of this program is that all data can be made accessible outside the program itself for further use. A wealth of data exists in this program, all of which can be saved to disk file: unit descriptions for 409 units; more than 600 major-element analyses; 215 X-ray fluorescence and direct current plasma trace-element analyses; 103 neutron activation analyses; 57 Sr, 21 Nd, and 33 Pb isotopic analyses; 41 K-Ar analyses; and data for more than 180 paleomagnetic sites. All chemical and

paleomagnetic data are saved in tab-delimited ASCII files, which can be directly imported into spread-sheet or word-processing programs for modeling and further use. All map segments and correlation charts for each segment can be saved as Pict format files, which can be opened by most CAD programs. Because these Pict files preserve all vector and raster file formats, and most CAD programs can convert them to DXF files, they also can be imported into geographic information systems (GIS) such as Arc/Info. In addition, all map segments can be printed in color; this capability has been tested with HP Deskwriter C and HP Paintjet XL300 printers.

DDM-SVF Overview—A Built-in Tutorial

Although care has been taken to lay out the program in a logical format, equal importance has been attached to familiarizing the user with the program. This encapsulated look at the program can be found in the DDM overview window, accessed through the Apple menu using the DDM overview selection. This overview gives step-by-step instructions to the user about how the eight different major window types are activated (Fig. 1 is the first page of this window) and delineates what is available in each. A click on any of the eight parts of this first page brings up an associated page with more detailed information on that topic.

PROGRAM VERSIONS

The CD-ROM contains three different versions of DDM-SVF, to meet different users' needs; all are stand-alone applications, needing no other software to run. The first is the full-blown 35 megabyte program; this includes all the features described above. The second version includes no digital photos; its size is 12 megabytes. The last version is a demonstration program of 7 megabytes size; it contains all features the other programs do, but includes only three of the 24 map segments (and their associated unit descriptions, chemical data, and correlation charts) and seven photos. The demo program can be archived and stored on three 1.4 megabyte diskettes.

CONCLUSIONS

Dynamic digital maps can include a far broader range of material than can hard-copy maps, thus enhancing their scientific usefulness. Because of the ease of access such hypermedia programs afford, a wide range of audiences can be reached in one package. For example, a hard-core petrologic modeler or Petrology 320 class may want to examine and extract the isotopic and trace-element data only and may have no interest whatever in the aerial photos. An interested nongeologist, beginning geology student or geomorphologist, on the other hand, might find the aerial photos very interesting. Each person can pick what to look at—with CD-ROM disk space, program size is no object (yet)—and programs can be structured to make wading through unwanted information avoidable.

Those interested in creating their own DDM should examine the digital map making section in the DDM-SVF program—the bottom line is that with a little knowledge of SuperCard, most people should be able to make such a program. An examination of the script in these programs should help; because SuperCard runs in an interpreted mode, all code and parts of any stand-alone program can be loaded into the SuperCard editor and examined, and the process can be stepped through

and modified. It is hoped that making maps of this type will be of special interest to graduate students who have produced high-quality, data-intensive, map-based research that they find difficult to distribute, and to workers in multidiscipline research projects who need to make their data available to their colleagues.

This type of program should not be viewed as a substitute for map-making systems, GIS, or hard-copy maps, each of which has its own valuable place in geologic research. The maps and data in this presentation-manager program can, however, be printed out on desktop printers, and all data can be saved from the program to tab-delimited ASCII format for other use. Future maps of this type offer a venue for workers who find it difficult to publish high-quality color maps and associated data quickly and efficiently. They also can be distributed electronically (for example by Internet), or on disk (either diskettes or CD-ROMs). Because of the digital format, one can include a large quantity of data with the map, something difficult to do with even the most complete analog maps. Further, because of the ability to save data from programs of this type into ASCII format files, these data need never be typed into digital form again, making the data easily accessible and accurately transferable to other workers.

ACKNOWLEDGMENTS

Much of the work on this paper and the associated programs was carried out while I was working for the U.S. Geological Survey's Branch of Astrogeology in Flagstaff, Arizona. I appreciate very much the support of Larry Soderblom in fronting for me on this project. I also thank Glenn Bennett, a former U.S. Geological Survey employee with whom I shared many an evening kibitzing on how to make the program more robust and usable. George Drake of the Department of Biology at the University of Massachusetts also supplied insights and encouragement in this work. Matt Neutra and I taught each other object-oriented programming as we generated SuperMap7/23/92 at the University of Massachusetts. George Ulrich provided key encouragement in his enthusiasm for this project, and many useful suggestions and editing. I appreciate reviews by Dave Schleicher, Laurie Brown, and Karen Mullaney.

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- Condit, C. D., 1995, DDM-SVF: Prototype color digital maps with ancillary data for the Macintosh computer (including lithologic, age-group, magnetopolarity and geochemical maps of the Springerville volcanic field, east-central Arizona and all major- and trace-element chemical and Sr, Nd and Pb isotopic and paleomagnetic data and 74 digital photographs): Boulder, Colorado, Geological Society of America, CD-ROM, ver. 8.23.94, 35 MB.
- Condit, C. D., and Neutra, M., 1992, SuperMap-7/23/92: A prototype dynamic digital map, in Trout, D., et al., compilers, Joint education initiative sampler: U.S. Geological Survey Open-File Report 92-416, CD-ROM, 2.6 MB.
- Condit, C. D., Crumpler, L. S., and Aubele, J. C., 1995, Lithologic, age, geochemical and paleomagnetic maps of the Springerville Volcanic Field, east-central Arizona: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-2431, 4 sheets.
- Peterson, T. D., and Hanmer, S., 1992, Digital cartography with the Macintosh computer, in and out of the field, in Current research, Part E: Geological Survey of Canada Paper 92-1E, p. 1-12.
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- Manuscript received May 28, 1994; revision received September 24, 1994; accepted October 6, 1994* ■

CD-ROM Map Available Soon

The CD-ROM map publication described here by Christopher D. Condit will be released soon by GSA, for use on Macintosh computers only. It describes the geology of the Springerville volcanic field, and includes 24 digital maps, 75 digital color photos, 23 correlation charts, and more than 1200 chemical and geophysical analyses, as well as text, figures, and tables. It also contains about 10 additional geologic HyperCard stacks on such subjects as tsunamis, earthquakes, fossils, and the Northridge earthquake, all by Tau Rho Alpha. The GSA product identification is DPM001M, *Dynamic Digital Map: The Springerville Volcanic Field*, Macintosh version. Prepublication list price is \$24, and the GSA member discount applies. Contact Publication Sales, phone (800) 472-1988 or (303) 447-2020, extension 152. A Windows version may be available later, depending on the release of the Windows version of the SuperCard technology that Condit used.

CALENDAR

Only new or changed information is now being published in *GSA Today*. A complete listing can be found in the **Geoscience Calendar** section on the Internet: <http://www.aescon.com/geosociety/index.html>.

1995 GSA Penrose Conferences

August

August 22-27, **Fault-related Folding**, Banff, Alberta, Canada. Information: David Anastasio, Department of Earth and Environmental Sciences, Lehigh University, Bethlehem, PA 18015-3188, (610) 758-5117, fax 610-758-3677, E-mail: dja2@lehigh.edu.

August 31-September 4, **Fault Rocks**, Leavenworth, Washington. Information: Jerry F. Magloughlin, Department of Geological Sciences, 1006 C.C. Little Building, University of Michigan, Ann Arbor, MI 48109-1063, (313) 747-0664, fax 313-763-4690, E-mail: jerry.magloughlin@um.cc.umich.edu.

September

September 28-October 3, **Tectonic Development of the Canada Basin and Surrounding Regions**, Banff, Alberta, Canada. Information: Lawrence A. Lawver, Institute for Geophysics, University of Texas at Austin, 8701 N. Mopac Expressway, Austin, TX 78759-8397, (512) 471-0433, larry@utig.utexas.edu.

October

October 6-11, **Mesozoic Evolution of the Cordilleran Continental Margin in Central and Southern California**, Tehachapi, California. Information: Andrew Barth, Department of Geology, Indiana/Purdue University, Indianapolis, IN 46202-5132, (317) 274-1243, E-mail: ibsz100@indyvax.iupui.edu.

October 14-20, **Argentine Precordillera**, San Juan, Argentina. Information: Ian W. D. Dalziel, Institute for Geophysics, University of Texas at Austin, 8701 N. Mopac Blvd., Austin, TX 78759-8397, (512) 471-0341, fax 512-471-8844, E-mail: ian@utig.utexas.edu.

1995 Meetings

May

May 12-17, **Effects of Impacts on the Evolution of the Atmosphere and Biosphere with Regard to Short- and Long-term Changes**, Ancona, Italy. Information: A. Montanari, Osservatorio Geologico di Coldigioco, Frontale di Airo, phone and fax 39-733-618291, E-mail: sandro@ogc.ita.it.

May 13-14, **Northeast Friends of the Pleistocene Annual Field Conference**, Portland, Maine. Information: Woodrow Thompson, Maine Geological Survey, State House Station 22, Augusta, ME 04333, (207) 287-7178, fax 207-287-2353, E-mail: thompson@mgsl.doc.state.me.us.

May 14-17, **Highway Geology Symposium**, Charleston, West Virginia. Information: Ken Ashton, West Virginia Geological Survey, P.O. Box 879, Morgantown, WV 26507-0879, (304) 594-2331, fax 304-594-2575.

May 29-June 2, **American Geophysical Union, Mineralogical Society of America, Geochemical Society Spring Meeting**, Baltimore, Maryland. Information: AGU Meetings Department 2000 Florida Avenue, N.W., Washington, D.C. 20009, (202) 462-6900, (800) 966-2481, fax 202-328-0566, E-mail: meetinginfo@kosmos.agu.org.

June

June 2-6, **Society for the Preservation of Natural History Collections Annual Meeting**, Toronto, Ontario, Canada. Information: Janet Waddington, Royal Ontario Museum, 100 Queens's Park, Toronto, Ontario M5S 2C6, Canada.

July

July 16-21, **Caribbean Geological Conference and Geological Society of Trinidad and Tobago Conference**, Port of Spain, Trinidad, West Indies. Information: Anthony Richardson, GSTT Conference Committee, Marabella Post Office, Trinidad, West Indies.

August

August 13-16, **SEPM Congress on Sedimentary Geology: Linked Earth Systems**, St. Pete Beach, Florida. Information: Albert C. Hine, Dept. of Marine Science, University of South Florida, 140 7th Ave. S, St. Petersburg, FL 33701, (813) 893-9161, fax 813-893-9189, E-mail: hine@seas.marine.usf.edu.

August 27-30, **Society for Organic Petrology Annual Meeting**, Houston, Texas. Information: John Castaño, DGSI, 8701 New Trails Drive, The Woodlands, TX 77381, (713) 363-2176, fax 713-292-3528, E-mail: dgsi@aol.com.

August 28-30, **Hydrogeology of Washington State**, Olympia, Washington. Information: Hydrogeologic Symposium Committee, Department of Ecology, P.O. Box 47600, Olympia, WA 98504-7600, (206) 407-6116, fax 206-407-6102. (Abstract deadline: April 30, 1995.)

September

September 10-14, **Geohazards and Engineering Geology**, Coventry, UK. Information: Steve Penn, Coventry University, School of the Built Environment, Priory Street, Coventry, CV1 5FB, UK, phone 44-203 838745, fax 44-203 838485.

September 25-29, **Global Analysis, Interpretation, and Modeling Science Conference**, Garmisch-Partenkirchen, Germany. Information: Dork Sahagian, GAIM Task Force Office, Complex Systems Research Center, Inst. for the Study of Earth, Oceans and Space, University of New Hampshire, Durham, NH 03824, (603) 862-3875, fax 603-862-0188, E-mail: gaim@unh.edu.

September 29-October 1, **Syposium on the Northern Margin of the Southern Province (Lower Proterozoic) of the Canadian Shield**, Sudbury, Ontario, Canada. Information: A. J. Naldrett, Dept. of Geology, University of Toronto, Toronto, Ontario M5S 3B1, Canada, fax 416-978-3938, E-mail: ajn@quartz.geology.utoronto.ca.

October

October 6-7, **SEPM Great Lakes Section Annual Field Conference: Depositional History of the Middle Mississippian Ullin ("Warsaw") and Fort Payne Formations**, Giant City State Park, Illinois. Information: Janis D. Treworgy, Illinois State Geological Survey, 615 E. Peabody Dr., Champaign, IL 61820, (217) 244-6942, fax 217-333-2830, E-mail: janis@geoserv.isgs.uiuc.edu.

October 9-13, **Geological Society of Africa International Conference**, Nairobi, Kenya. Information: Abigail Church, Dept. of Mineralogy, Natural History Museum, Cromwell Road, South Kensington, London SW7 5BD, UK, phone 44-71-938-9385, fax 44-71-938-9268, E-mail: aac@nhm.ac.uk.

October 14-17, **AAPG Eastern Section and New York State Geological Association Joint Annual Meeting**, Schenectady, New York. Information: Kenneth Johnson, Dept. of Geology, Skidmore College, Saratoga Springs, NY 12866, (518) 584-5000, ext. 2622, fax 518-584-3023, E-mail: kjohnson@scott.skidmore.edu.

October 15-20, **Federation of Analytical Chemistry and Spectroscopy Societies (FACSS)**, Cincinnati, Ohio. Information: FACSS, 198 Thomas Johnson Dr., Suite S-2, Frederick, MD 21702-4317, (301) 846-4797. (Abstract deadline: March 31, 1995.)

November

November 1-4, **Society of Vertebrate Paleontology Annual Meeting**, Pittsburgh, Pennsylvania. Information: Chris Beard and Mary Dawson, Section of Vertebrate Paleontology, Carnegie Museum of Natural History, Pittsburgh, PA 15213, (412) 622-3246 or 622-5782, fax 412-622-8837, E-mail: beardc@clp2.clpgh.org.

December

December 5-9, **International Arctic Science Committee Conference for Arctic Research Planning**, Hanover, New Hampshire. Information: Julia Lloyd Wright, Institute of Arctic Studies, 6193 Murdough Center, Dartmouth College, Hanover, NH 03755, (603) 646-2675, fax 603-646-1279, E-mail: julia.lwright@dartmouth.edu or icarp@coos.dartmouth.edu.

December 17-22, **International Chemical Congress of Pacific Basin Societies Symposium on Volcano-Atmosphere Interactions**, Honolulu, Hawaii. Information: R. Andres, Inst. of Northern Engineering, University of Alaska, Fairbanks, AK 99775-5900, (907) 474-7856, fax 907-474-6087, E-mail: ffrja@aurora.alaska.edu.

1996 Meetings

January

January 19-22, **International Conference on Disasters and Mitigation**, Madras, India. Information: A. R. Santhakumar, Chairman, INCODIM, Structural Engineering Division, Anna University, Madras - 600 025, India.

April

April 24-27, **International Conference on Environmental Geology and Land-Use Planning**, Granada, Spain. Information: VI CNGAOT. Dpto. de Congresos de Viajes Sacromonte. C/ Angel Ganivet 6. 18009 Granada, phone 34-58-225598/9, fax 224617, Telex 78484.

June

June 15-27, **Clay Minerals Society Annual Meeting**, Gatlinburg, Tennessee. Information: S. Y. Lee, Environmental Sciences Division, Oak Ridge National Laboratory, P.O. Box 2008, Bldg. 1505, MS-6038, Oak Ridge, TN 37831-6038, (615) 574-6316, fax 615-576-8646, E-mail: syl@ornl.gov.

June 24-26, **International Airborne Remote Sensing Conference and Exhibition**, San Francisco, California. Information: ERIM Conferences, P.O. Box 134001, Ann Arbor, MI 48113-4001, (313) 994-1200, ext. 3234, fax 313-994-5123.

Send notices of meetings of general interest, in format above, to Editor, *GSA Today*, P.O. Box 9140, Boulder, CO 80301.

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GSA ANNUAL MEETINGS

1995

New Orleans, Louisiana
November 6–9
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Hyatt Regency New Orleans



General Chair: *William R. Craig, University of New Orleans*
Technical Program Chair: *Laura Serpa, University of New Orleans*
Field Trip Chair: *Whitney Autin, Louisiana State University*
See November 1994 *GSA Today* for a complete list of field trips.

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FUTURE

Denver	October 28–31	1996
Salt Lake City	October 20–23	1997
Toronto	October 26–29	1998
Denver	October 25–28	1999

For general information on any meeting call the GSA Meetings Department,
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GSA SECTION MEETINGS

1995

SOUTHEASTERN SECTION

Knoxville Hilton Hotel, Knoxville, Tennessee, April 6–7, 1995.
Information: Robert D. Hatcher, Jr., Dept. of Geological Sciences, University of Tennessee, Knoxville, TN 37996-1410, (615) 974-2368, fax 615-974-2368, E-mail: bobmap@utkvtx.utk.edu.

NORTH-CENTRAL and SOUTH-CENTRAL SECTIONS

University of Nebraska, Lincoln, Nebraska, April 27–28, 1995.
Information: Robert F. Diffendal, Jr., 113 Nebraska Hall, University of Nebraska—Lincoln, Lincoln, NE 68588-0517, (402) 472-2410, fax 402-472-2410, E-mail: rfd@unlinfo.unl.edu.

ROCKY MOUNTAIN SECTION

Montana State University, Bozeman, Montana, May 18–19, 1995.
Information: Stephan G. Custer, Department of Earth Sciences, Montana State University, Bozeman, MT 59717-0348, (406) 994-6906, fax 406-994-6923, E-mail: uessc@msu.oscs.montana.edu.

CORDILLERAN SECTION

University of Alaska, Fairbanks, Alaska, May 24–26, 1995. Information: David B. Stone, Geophysical Institute, University of Alaska, Fairbanks, AK 99775-0800, (907) 474-7622, fax 907-474-7290, E-mail: ffdbs@aurora.alaska.edu.

1996

SOUTH-CENTRAL SECTION, University of Texas at Austin, Austin, Texas, March 11–13.

SOUTHEASTERN SECTION, Ramada Plaza Hotel, Jackson, Mississippi, March 14–15.

NORTHEASTERN SECTION, Hyatt Regency, Buffalo, New York, March 21–23.

ROCKY MOUNTAIN SECTION, Rapid City Civic Center, Rapid City, South Dakota, April 17–19.

CORDILLERAN SECTION, Red Lion Hotel, Portland, Oregon, April 22–24.

NORTH-CENTRAL SECTION, Iowa State University, Ames, Iowa, May 2–3.

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Committees continued on p. 91



IEE to Sponsor Symposium on Urban Geology at Section Meeting

GSA's Institute for Environmental Education will sponsor a symposium, "Perspectives on Urban Geology: Principles, Educational Needs, and Case Studies," at the joint meeting of GSA's North-Central and South-Central sections April 27–28, 1995. Some of the subjects to be addressed in the symposium are building stone as an educational resource, predicting areas of potential heave, underground cities, and the problem of human-modified landscapes in mapping. The combined meeting will be held at the University of Nebraska—Lincoln. For further information, contact Perry Wigley, 113 Nebraska Hall, University of Nebraska—Lincoln, Lincoln, NE 68588-0517, (402)472-3471, fax 402-472-2410, E-mail: pwigley@unlinfo.unl.edu.

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The Department of Geology and Geophysics and the Geophysical Institute of the University of Alaska invite applications for a tenure-track Assistant Professor position to begin fall, 1995. We seek a creative, field-oriented sedimentary geologist with broad interests in tectonics and basin analysis. The position will carry significant responsibilities in both research and teaching.

Requirements include a Ph.D. in geology, with expertise in carbonate or clastic stratigraphy, sedi-

mentology, and/or sedimentary petrology. Teaching responsibilities will include stratigraphy, introductory geology, and other undergraduate and graduate courses in sedimentary geology. The successful candidate will be expected to develop and sustain an externally funded research program and to supervise M.S. and Ph.D. students. Preference will be given to candidates with expertise in the relationship of sedimentation to tectonics, quantitative modelling of basin evolution, and/or diagenesis, and who complement existing strengths in terrigenous clastic depositional environments, fold-and-thrust structure, geochronology, and paleomagnetism. Postdoctoral, industry, or other research or professional experience is desirable.

Applications should include a resume and publication list, statement of research and teaching interests, copies of key publications, and names, addresses, and telephone numbers of three references. Applications or requests for further information should be addressed to: Wesley K. Wallace, Chairman, Search Committee, Department of Geology and Geophysics, University of Alaska Fairbanks, Fairbanks, AK 99775-5780. The deadline for applications is April 30, 1995. The University of Alaska is an AA/EEO employer.

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The Department of Geology seeks to fill a position of Visiting Assistant Professor or Visiting Lecturer. The successful candidate is expected to teach a variety of introductory undergraduate geology courses, most likely in the areas of physical geology, regional geology, planetary geology, and environmental geology. Experience in these or closely related branches of physical geology is highly desirable. Candidates with a Ph.D. or equivalent in geoscience are preferred, but applications from candidates who have not yet finished the dissertation will be considered. Applicants should be able to demonstrate promise of being excellent instructors with superior interpersonal skills.

The term of the appointment will be for one year with the possibility of renewal for additional years. This is a non-tenure track position. The starting date of appointment will be August 21, 1995.

Applicants should send a curriculum vita, list of publications, statement of research interests, and the names of three references to: Professor Jay D. Bass, Department of Geology, University of Illinois, 1301 W. Green Street, Urbana, IL 61801; (217) 333-1018; fax 217-244-4996; Email: bass@hercules.geology.uiuc.edu. Preference will be given to applications received before April 21, 1995.

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The present faculty, 20 full-time tenured and 2 part-time, have diverse strengths and represent economic geology, earthquake seismology, exploration geophysics, geochemistry, mineralogy, paleontology, petrology, sedimentology, structural geology, and tectonics. For detailed information the applicants are encouraged to look at the departmental home page at <http://www.geol.vt.edu>. The department offers B.S., M.S., and Ph.D. degrees in geological and geophysical sciences. Faculty are expected to supervise and teach introductory level undergraduate geoscience courses and undergraduate/graduate level courses in their areas of expertise. They are also expected to direct M.S. and Ph.D. candidates while developing and maintaining externally funded research programs. New faculty will play a central role in collaborating with complementary department programs and developing applied programs to prepare students for future job markets. Candidates must be able to demonstrate expertise in quantitative applications in the geosciences.

Interested applicants should send a letter of interest, curriculum vitae, transcripts, names of three references, a statement of anticipated research and teaching interests, along with a short essay explaining where the applicant would like to see him/herself within the geosciences in the 21st Century. Applicants should send their application package to Cahit Çoruh, Chairman, Department of Geological Sciences, Virginia Tech, 4044 Derring Hall, Blacksburg, VA 24061-0420; Phone 703-231-6894; TDD 703-231-3749; Fax: 703-231-3386; email: coruh@vt.edu.

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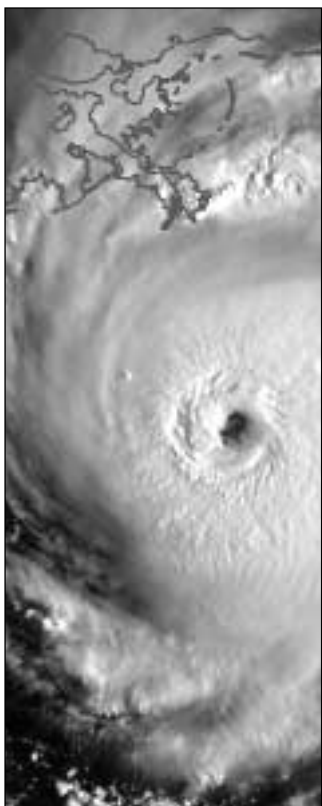
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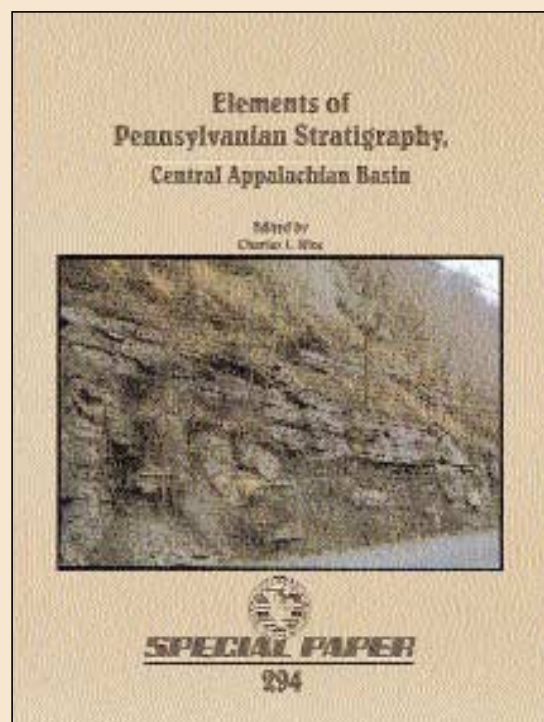
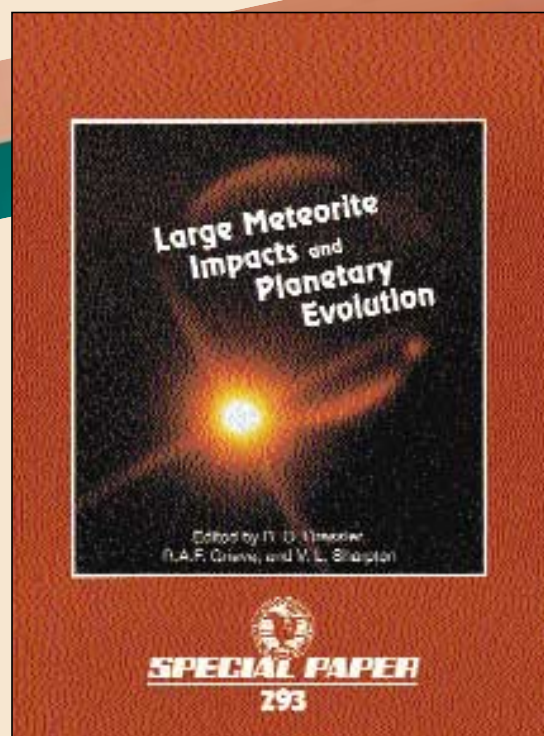
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