

Boston 2001:

A GEO-ODYSSEY

November 1–10, 2001

Annual Meeting and Exposition

Deadlines:

Preregistration: September 28
Cancellation: October 5
Abstracts Submission, Paper: July 17
Abstracts Submission, Online: July 24

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Boston College

2001 GSA Annual Meeting

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Premeeting Field Trips: November 1–4

Short Courses and Workshops: November 3–4

Presidential Address: November 4

Exhibits Open: November 4–7

Technical Program: November 5–8

Postmeeting Field Trips: November 9–10

Come One, Come All!

The Geological Society of America invites YOU to participate in its Annual Meeting in Boston this November. And what a meeting it will be! Superb science, great facilities, exciting field trips and workshops, and wonderful food and entertainment—all in a modern, vibrant city that retains an old-world flair.

This meeting has something for everyone. Note the breadth and quality of the proposed Pardee Symposia and Topical Sessions detailed on the following pages. These reflect the cutting edge and diversity of our science at the beginning of the third millennium. In addition, eight Hot Topic forums will cover current or controversial issues and dozens of discipline sessions.

Submit your abstract now! All the technical sessions will be held in the modern and recently renovated facilities of the Hynes Convention Center in the heart of downtown Boston. Add in the numerous division and society meetings, alumni reunions, and the opportunity to meet and network with old friends and new, and you have a meeting you can't afford to miss.

But wait, there is more! More than 25 diverse field trips, with excursions that will appeal to every specialty, are planned. From the mountains of New England to the beaches of Maine and even to subterranean Boston, there is an excursion just for you. The meeting also includes short courses, workshops, and special forums.

An exciting program for guests is planned, featuring history (Freedom Trail, Concord and Lexington, Plymouth, Sturbridge) and natural history (birding). There will be plenty for the nongeologist—as well as for the geologist who wants a break from the technical sessions—to do.

And, there's Boston itself! Space doesn't even begin to allow room for a list of the things to do and see in this charming and modern, yet very historical, city. Museums, shopping, fine dining, Irish pubs—you name it, Boston has it. The action this November will be at GSA Boston. So submit your abstract, grab your slides and your field gear, come, participate, and enjoy!

J. Christopher Hepburn

Chairman, 2001 GSA Annual Meeting Local Committee

PARDEE KEYNOTE SYMPOSIA

Invited Papers

K1 **Geobiology: Applications to Sedimentary Geology**

Nora Noffke and Andrew H. Knoll, Harvard University, Cambridge, Mass. Thurs., Nov. 8, 8 a.m.–noon.

Microorganisms influence sedimentary processes, and the geobiological signatures they impart provide potentially useful tools in reconstructions of paleoclimate and paleo-environment. This session explores microbial processes in recent sediments and the distribution of geobiological signatures in time and space. ORAL

K2 **Melt in the Crust and Upper Mantle: How Much, Where, for How Long, and What Significance for Geodynamics?**

GSA Structural Geology and Tectonics Division; Geochemical Society; Mineralogical Society of America. Tracy Rushmer, University of Vermont, Burlington, Vt.; Michael Brown, University of Maryland, College Park, Md.; George Bergantz, University of Washington, Seattle, Wash.; Greg Hirth, Woods Hole Oceanographic Institute, Woods Hole, Mass. Tues., Nov. 6, 8 a.m.–noon.

This symposium brings together innovative scientists with backgrounds in petrology, geochemistry, rock properties, and tectonics to consider melt-related processes in the lithosphere. Speakers will address these processes at a variety of length scales, involving established and new techniques to give new insights into the role of melt during orogenesis. ORAL

K3 **Nanogeology: The Application of Nanotechnology in Earth Sciences**

Jaakko K. Putkonen, University of Washington, Seattle, Wash. Thurs., Nov. 8, 1:30–5:30 p.m.

Emerging nanotechnology allows manufacturing of miniature devices that compute, move, sense their environment, and repair themselves. Potential applications for nanogeology include: ultra-small sensors and devices, including transducers for force, pressure, and chemical compounds; and molecular gears, motors, and actuators. Now is the time to plan for applications and shape the future with groundbreaking innovations. ORAL

K4 **Ophiolites as Problem and Solution in the Evolution of Geological Thinking**

GSA History of Geology Division; GSA Structural Geology and Tectonics Division; International Geology Division; Society of Economic Geologists; History of Earth Sciences Society. Sally Newcomb, retired,

Silver Spring, Md.; Yildirim Dilek, Miami University, Oxford, Ohio. Mon., Nov. 5, 1:30–5:30 p.m.

Ophiolites are an important and controversial topic in geology, strongly linked to many earth processes of the seafloor, crust, and mantle. Studies of ophiolites have both reflected and advanced the methods and theories of geology for more than 200 years. This symposium will provide a forum to discuss the history and development of ideas, principles, and theories established in the geological sciences as a result of the investigations of ophiolites and ophiolitic rocks through time. ORAL

K5 **The Emerging Discipline of Medical Geology**

Institute for Earth Science and the Environment; Armed Forces Institute of Pathology; International Union of Geological Sciences; U.S. Geological Survey; COGENENVIRONMENT; IGCP #454; Swedish Geological Survey; Institute for Metal Biology. Dennis Goldman, Geological Society of America, Boulder, Colo.; José A. Centeno, Armed Forces Institute of Pathology, Washington, D.C.; Peter T. Bobrowsky, International Union of Geological Sciences, Victoria, British Columbia, Canada; H. Catherine W. Skinner, Yale University, New Haven, Conn. Mon., Nov. 5, 8 a.m.–noon.

The emerging discipline of medical geology assesses the effects of static and dynamic earth science factors—natural and anthropogenic—on ecological and human health. Health issues related to earth science factors will likely affect each of us within our lifetime. More geoscientists need to become aware of the field and involved in research. This symposium will bring together geoscientists and medical professionals to increase the awareness of these impacts and the need/potential for research. ORAL

K6 **The Future of Biogeochemistry: A Symposium in Honor of Harold C. Helgeson**

Geochemical Society. Dimitri A. Sverjensky, Johns Hopkins University, Baltimore, Md.; Jan Amend and Everett L. Shock, Washington University, St. Louis, Mo.; Eric H. Oelkers, University of Paul Sabatier, Toulouse, France. Tue., Nov. 6, 1:30–5:30 p.m.

We wish to honor and celebrate Hal Helgeson's achievements in theoretical geochemistry, and particularly his current goals and projects bearing on the origin of petroleum, the biogeochemistry of proteins, and enzymes at high temperatures with this symposium. We hope to draw as many researchers as possible to the exciting research possibilities in areas that cross the boundaries

of the geochemical and geological sciences. ORAL

K7 **The Watershed Within: Scientific and Moral Reflections on Water in the 21st Century**

Critical Issues Subcommittee of Geology and Public Policy; GSA Quaternary Geology and Geomorphology Division; Institute for Earth Science and the Environment. George W. Fisher, Johns Hopkins University, Baltimore, Md. Wed., Nov. 7, 1:30–5:30 p.m.

Water use and allocation are critical global policy issues. One-third of the world lives in areas subject to water stress. Discussions of water use must consider availability, human equity, and needs of both ecosystems and future generations. They require both a scientific understanding of water resources and a moral sense of how stakeholders value water and understand equity. This symposium will explore both the scientific and moral dimensions of global water issues. ORAL

K8 **Water's Many Forms in the Solar System: Implications for Geology, Exploration, and Life**

GSA Planetary Geology Division. Susan E.H. Sakimoto, University of Maryland, Baltimore County, Goddard Earth Science and Technology Center, Greenbelt, Md.; Tracy K.P. Gregg, The University at Buffalo, State University of New York, Buffalo, N.Y. Wed., Nov. 7, 8 a.m.–noon.

Our recent discoveries of the role of water in the solar system and our expanding understanding of environmental ranges conducive to life on Earth promise to drive planetary exploration and research in the coming decades. This session explores our current understanding of solar system water, recent solar system discoveries revolutionizing our understanding of the role of water, their implications for environments amenable to life, and our capabilities and motivations for continued exploration. ORAL



Massachusetts coastline.

TOPICAL AND DISCIPLINE SESSIONS

Invited and Volunteered Papers

Topical Sessions

Following is a listing of all approved Topical Sessions. These sessions are topically focused with a mix of invited and volunteered papers. Sessions are designed to promote the exchange of interdisciplinary, state-of-the-art information. Authors can submit papers to a specific topical session and may choose up to three scientific categories. After each topical description below, the categories are identified by name as they appear on the abstract form. PLEASE SUBMIT ONLY IN THE MODE (oral or poster) AND CATEGORIES INDICATED in the description. An abstract submitted in the incorrect mode will be transferred automatically to a discipline session. For a description of each session, visit www.geosociety.org.

Online Abstracts Deadline: July 24

Please use the new online electronic abstract form found on the GSA Web site. An abstract submission fee will be charged. The fee is \$15 for all students; \$25 for all others. (See page 23 for more information.)

Discipline Sessions

From the list found on the abstract form, you may choose up to three discipline categories you feel your abstract would fit best for organizing purposes. The Joint Technical Program Committee representatives organize the papers in sessions focused on disciplines—for example, environmental geoscience or mineralogy.

TOPICAL SESSIONS

T1 Arc Terranes in the Appalachians and Caledonides and Their Role in Paleozoic Orogenesis

Paul Karabinos, Williams College, Williamstown, Mass.; James P. Hibbard, North Carolina State University, Raleigh, N.C.; Anke M. Friedrich, Caltech, Pasadena, Calif. ORAL

Tectonics; Geochemistry, Other; Petrology, Igneous

T2 Proterozoic Tectonic Evolution of the Grenville Orogen in Eastern North America

Richard Tollo, George Washington University, Washington, D.C.; Louise Corriveau, Geological Survey of Canada, Sainte-Foy, Quebec, Canada; M.J. Bartholomew, University of South Carolina, Columbia, S.C. ORAL



Mesozoic dolerite dikes cutting Proterozoic Dedham Granite. Light gray xenolith of Proterozoic Westboro formation in upper left of photo. Saugus, Mass. Photo by Richard H. Bailey.

Precambrian Geology; Tectonics; Geochemistry, Other

T3 Focus on IGCP: Modern and Ancient Plate Boundaries and Orogens

GSA International Division; U.S. National Committee on the Geological Sciences; International Geologic Correlation Program projects 453, 426, 440, 436, 433. Suzanne M. Kay, Cornell University, Ithaca, N.Y.; Eldridge M. Moores, University of California, Davis, Calif.; Mark Cloos, University of Texas, Austin, Tex. ORAL or POSTER

Tectonics; Petrology, Igneous; Geophysics/Tectonophysics/Seismology

T4 Crustal Architecture of Rifted Continental Margins

Webster V. Mohriak, Petroleo Brasileiro S.A., Rio de Janeiro, Brazil; Bruce R. Rosendahl, Miami, Fla. Combined ORAL and POSTER

Geophysics/Tectonophysics/Seismology; Remote Sensing/Geographic Information System; Quaternary Geology/Geomorphology

T5 Melt in the Crust and Upper Mantle: How Much, Where, for How Long, and What Significance for Geodynamics?

GSA Structural Geology and Tectonics Division; Mineralogical Society of America; Geochemical Society. Tracy Rushmer, University of Vermont, Burlington, Vt.; Greg

Hirth, Woods Hole Oceanographic Institution, Woods Hole, Mass.; Michael Brown, University of Maryland, College Park, Md.; George Bergantz, University of Washington, Seattle, Wash. ORAL or POSTER

Tectonics; Remote Sensing/Geographic Information System; Geochemistry, Other

T6 Evolution of the Precambrian Earth

GSA Geophysics Division; GSA Structural Geology and Tectonics Division. Walter D. Mooney, U.S. Geological Survey, Menlo Park, Calif.; Herwart Helmstaedt, Queen's University, Kingston, Ontario, Canada; Desmond E. Moser, Salt Lake City, Utah; Irina Artemieva, University of Uppsala, Uppsala, Sweden. ORAL or POSTER

Geophysics/Tectonophysics/Seismology; Geochemistry, Other; Structural Geology

T7 The Proterozoic of the Eastern Midcontinent and Beyond

GSA Geophysics Division; Illinois Basin Consortium. James A. Drahovzal, Lexington, Ky.; John H. McBride, Illinois State Geological Survey and Dept. of Geology, Champaign, Ill. ORAL or POSTER

Geophysics/Tectonophysics/Seismology; Petrology, Igneous; Remote Sensing/Geographic Information System

T8 "Traces" of Soil Ecosystems through the Phanerozoic: New Insights into Terrestrial Paleoeology, Paleohydrology, and Paleoclimate

Stephen T. Hasiotis, Indiana State University, Terre Haute, Ind.; Marilyn D. Wegweiser, Ball State University, Muncie, Ind. ORAL

Paleontology/Paleobotany; Paleoclimatology/Paleoceanography; Geochemistry, Organic

T9 New Insights into Late Ordovician Climate, Oceanography, and Tectonics

GSA Sedimentary Geology Division. Michael C. Pope, Washington State University, Pullman, Wash.; Mark T. Harris, University of Wisconsin, Milwaukee, Wisc. ORAL or POSTER

Paleontology/Paleobotany; Paleoclimatology/Paleoceanography; Sediments, Carbonates

T10 Holocene Climate Change: Seasonal Variability to Centennial Trends

Lisa Greer, University of Miami, Miami, Fla.; David Hodell, University of Florida, Gainesville, Fla. ORAL

Paleoclimatology/Paleoceanography; Planetary Geology; Public Policy

T11 Sulfur Cycling in Precambrian to Recent Ocean-Atmosphere Systems: A Session Honoring the Career of William T. Holser

Geochemical Society. Timothy W. Lyons, University of Missouri, Columbia, Mo.; Alan J. Kaufman, University of Maryland, College Park, Md. ORAL

Geochemistry, Aqueous; Geomicrobiology; Precambrian Geology

T12 Stratigraphic Paleobiology

Paleontological Society. Steven M. Holland, University of Georgia, Athens, Ga.; Mark E. Patzkowsky, Pennsylvania State University, University Park, Pa. ORAL

Paleontology/Paleobotany; Public Policy; Paleoclimatology/Paleoceanography

T13 Foraminifera: Barometers of the Biotic and Abiotic World

Cushman Foundation. Martin A. Buzas, Smithsonian Institution, Washington, D.C.; Stephen J. Culver, East Carolina University, Greenville, N.C. ORAL

Paleoclimatology/Paleoceanography; Paleontology/Paleobotany; Marine/Coastal Science

T14 Partnerships in Paleontology: Involving the Public in Collaborative Research

Paleontological Society. Paul G. Harnik and Robert M. Ross, Paleontological Research Institution, Ithaca, N.Y. ORAL

Paleontology/Paleobotany; Geoscience Education; Geoscience Information/Communication

T15 Special Session in Honor of Half Zantop

Society of Economic Geologists. Helen N. Mango, Castleton State College, Castleton, Vt.; J. Bruce Gemmill, University of Tasmania, Tasmania, Australia. ORAL

Economic Geology; Geochemistry, Other

T16 Insects and Terrestrial Arthropods in the Fossil Record: Are So Many Really Represented by So Few?

Paleontological Society. Robert E. Nelson, Colby College, Waterville, Maine. Combined ORAL and POSTER

Paleontology/Paleobotany; Public Policy; Stratigraphy

T17 The Fossil Record of Fire: Recognition and Effects

Andrew C. Scott, Royal Holloway, University of

London, Egham, Surrey, U.K.; Howard Falcon-Lang, Dalhousie University, Halifax, Nova Scotia, Canada. ORAL

Sediments, Clastic; Paleontology/Paleobotany; Quaternary Geology/Geomorphology

T18 Radiometric Dating in a Sequence Stratigraphic Framework, Paleozoic through Cenozoic

W. Burleigh Harris, University of North Carolina, Wilmington, N.C.; Gerald R. Baum, Maryland Geological Survey, Baltimore, Md.; Paul D. Fullagar, University of North Carolina, Chapel Hill, N.C. ORAL

Stratigraphy; Geochemistry, Other; Paleontology/Paleobotany

T19 New Perspectives on the Character and Origin of Late Cretaceous–Cenozoic Sequences on the U.S. Atlantic Margin

Kenneth G. Miller, Rutgers, The State University of New Jersey, Piscataway, N.J.; Peter J. Sugarman, New Jersey Geological Survey, Trenton, N.J.; Nicholas Christie-Blick, Lamont-Doherty Earth Observatory of Columbia University, Palisades, N.Y. ORAL

Stratigraphy; Paleoclimatology/Paleoceanography; Sediments, Clastic

T20 Near-Surface Stratigraphic Heterogeneity Beneath the Coastal Plain and Continental Shelf of Eastern North America: Spatial and Temporal Influences on Framework Geology, Processes, Sedimentation, and Morphology

M. Scott Harris, Coastal Carolina University, Conway, S.C.; Gerald H. Johnson, College of William and Mary, Williamsburg, Va. POSTER

Quaternary Geology/Geomorphology; Marine/Coastal Science; Stratigraphy

T21 Recent Advances in Deep-Water Facies Models

GSA Sedimentary Geology Division; SEPM (Society for Sedimentary Geology) Sequence Stratigraphy Research Group. Art D. Donovan, BP, Houston, Tex.; Morgan D. Sullivan, ExxonMobil, Houston, Tex. ORAL

Sediments, Clastic; Stratigraphy; Geophysics/Tectonophysics/Seismology

T22 Quaternary Stratigraphy in Glaciated Terranes: Techniques, Tools, and Mapping

GSA Quaternary Geology and Geomorphology Division. Kathy Goetz Troost, University of Washington, Seattle, Wash.; Richard C. Berg, Illinois State Geological Survey, Champaign,

Ill.; Derek B. Booth, University of Washington, Seattle, Wash. POSTER

Quaternary Geology/Geomorphology; Stratigraphy; Engineering Geology

T23 Sediment-Hosted Lead-Zinc Deposits: Roles of Basin Evolution, Tectonics, and Geochemistry in Ore Genesis

Society of Economic Geologists. Donald F. Sangster, North Gower, Ontario, Canada; George P. Cole, Cominco American Incorporated, Spokane, Wash.; John F. Slack, U.S. Geological Survey, Reston, Va. ORAL

Economic Geology; Geochemistry, Aqueous; Tectonics

T24 Dynamics of Sediments and Sedimentary Environments: A Session in Honor of John B. Southard

GSA Sedimentary Geology Division; SEPM (Society for Sedimentary Geology). Peter R. Wilcock, Johns Hopkins University, Baltimore, Md.; Chris Paola, University of Minnesota, Minneapolis, Minn. ORAL

Sediments, Clastic; Stratigraphy; Marine/Coastal Science

T25 Geochemistry of Siliciclastic Materials: Provenance, Paleoclimates, and Plate Tectonic Settings

GSA Sedimentary Geology Division. Christopher M. Fedo, George Washington University, Washington, D.C.; Grant M. Young and H. Wayne Nesbitt, University of Western Ontario, London, Ontario, Canada; J. Michael Palin, Australian National University, Canberra, Australia. ORAL

Sediments, Clastic; Paleoclimatology/Paleoceanography; Tectonics

T26 Geochemistry of Organic-Rich Sediments from Estuaries, Continental Shelves, Basins, and Upwelling Zones

John F. Bratton, U.S. Geological Survey, Woods Hole, Mass.; Jennifer L. Morford, Woods Hole Oceanographic Institution, Woods Hole, Mass. ORAL or POSTER

Geochemistry, Other; Marine/Coastal Science; Sediments, Clastic

T27 Evaporite Systems: The Geology, Paleontology, and Biology of Evaporite and Near-Evaporite Systems in Both Terrestrial and Extraterrestrial Environments

NASA Astrobiology Institute–Johnson Space Center. Susan J. Wentworth, Lockheed Martin, NASA-Johnson Space Center, Houston, Tex.; Penny A. Morris, University of Houston–

Downtown, Houston, Tex. Combined ORAL and POSTER

Geomicrobiology; Paleontology/Paleobotany; Sediments, Carbonates

T28 High-Resolution Investigations of the Morphodynamics and Sedimentary Evolution of Estuaries

Jasper Knight, University of Ulster, Coleraine, U.K.; Duncan FitzGerald, Boston University, Boston, Mass.; Christopher K. Sommerfield, University of Delaware, Lewes, Del. ORAL

Marine/Coastal Science; Quaternary Geology/Geomorphology; Sediments, Clastic

T29 Linking Sediment Dynamics and Stratigraphy in Modern-Holocene Estuaries

GSA Sedimentary Geology Division. Christopher Sommerfield, University of Delaware, Lewes, Del.; Rocky Geyer, Woods Hole Oceanographic Institution, Woods Hole, Mass. ORAL

Marine/Coastal Science; Quaternary Geology/Geomorphology; Stratigraphy

T30 Anoxia and Black Shale Deposition

D. Jeffrey Over, State University of New York, Geneseo, N.Y.; Frank Etensohn, University of Kentucky, Lexington, Ky. ORAL

Stratigraphy; Paleoclimatology/Paleoceanography; Sediments, Clastic

T31 The Margins of Reefs and Carbonate Platforms

GSA Sedimentary Geology Division; SEPM (Society for Sedimentary Geology). Edward L. Winterer, Scripps Institute of Oceanography, La Jolla, Calif.; Robert N. Ginsburg, University of Miami, Miami, Fla. ORAL

Sediments, Carbonates; Sediments, Clastic; Stratigraphy

T32 America's Coastal Crisis—Providing the Geoscience Information Needed to Conserve and Protect Coastal Resources

GSA Quaternary Geology and Geomorphology Division. S. Jeffress Williams, U.S. Geological Survey, Woods Hole, Mass.; Shea Penland, University of New Orleans, New Orleans, La. ORAL or POSTER

Environmental Geoscience; Geoscience Education; Economic Geology

T33 Coastal Erosion Programs: Collaborative Geologic Research in Action

Harry Martin Jol, University of Wisconsin, Eau Claire, Wisc.; Sandy Vanderburgh, University

College of the Fraser Valley, Abbotsford, Ontario, Canada. ORAL

Marine/Coastal Science; Stratigraphy; Public Policy

T34 Coastal Geology of the National Parks

GSA Sedimentary Geology Division; Institute for Earth Science and the Environment. Rebecca L. Beavers, National Park Service, Denver, Colo.; Suzette M. Kimball, U.S. Geological Survey, Kearneysville, W.Va. ORAL and POSTER

Marine/Coastal Science; Sediments, Clastic; Public Policy

T35 Diffusive Transport Processes in the Subsurface

GSA Hydrogeology Division. Thomas B. Boving, University of Rhode Island, Kingston, R.I.; John E. McCray, Colorado School of Mines, Golden, Colo. ORAL

Hydrogeology; Geochemistry, Aqueous; Environmental Geoscience

T36 Uncertainty in Vadose Zone Flow and Transport Prediction

GSA Hydrogeology Division. Michael J. Nicholl, University of Idaho, Moscow, Idaho; Robert M. Holt, University of Mississippi, University, Miss. ORAL

Hydrogeology; Engineering Geology; Environmental Geoscience

T37 Recent Advancements in Aquifer Hydraulics and Their Applications to Aquifer and Vadose Zone Characterization, Remediation, and Dewatering

GSA Hydrogeology Division. Hongbin Zhan, Texas A&M University, College Station, Tex.; Vitaly A. Zlotnik, University of Nebraska, Lincoln, Nebr. ORAL

Hydrogeology; Environmental Geoscience; Engineering Geology

T38 Flow and Transport in Fractured Aquifers—From Field Characterization to Model Construction

GSA Hydrogeology Division. Todd Halihan, Oklahoma State University, Stillwater, Okla.; David A. Benson, Desert Research Institute, Reno, Nev. ORAL

Hydrogeology; Engineering Geology; Environmental Geoscience

T39 Geochemistry of Karst Waters: A Window on Hydrogeology and Biota

J.B. Martin, University of Florida, Gainesville, Fla.; C. Groves, Western Kentucky University, Bowling Green, Ky. ORAL

Hydrogeology; Geochemistry, Aqueous; Sediments, Carbonates

T40 Isotopic Tracers and Thermal Anomaly Data as Constraints on Groundwater Flow Patterns and Climate History within Sedimentary Systems

GSA Hydrogeology Division. Maria Clara Castro, University of Michigan, Ann Arbor, Mich.; Mark A. Person, University of Minnesota, Minneapolis, Minn. ORAL or POSTER

Hydrogeology; Paleoclimatology/Paleoceanography; Economic Geology

T41 Groundwater Availability Modeling

GSA Hydrogeology Division. Robert E. Mace, Texas Water Development Board, Austin, Tex.; Bridget R. Scanlon and Alan R. Dutton, University of Texas, Austin, Tex. ORAL

Hydrogeology; Environmental Geoscience; Public Policy



View to south from East Point, Nahant, across Massachusetts Bay toward Boston. Rocks are Early Cambrian strata injected by mafic sills and dikes. Nahant, Mass. Photo by Richard H. Bailey.

T42 Groundwater Discharge to Estuaries

GSA Hydrogeology Division; National Ground Water Association. Thomas E. McKenna, Delaware Geological Survey, Newark, Del.; Jonathan B. Martin, University of Florida, Gainesville, Fla. ORAL

Hydrogeology; Marine/Coastal Science; Environmental Geoscience

T43 Iron in Sedimentary Aquifers: Biological, Chemical, and Physical Controls on Iron Mobility

GSA Hydrogeology Division; SEPM (Society for Sedimentary Geology). Janet S. Herman, University of Virginia, Charlottesville, Va.; Isabelle M. Cozzarelli, U.S. Geological Survey, Reston, Va.; Marjorie A. Chan, University of Utah, Salt Lake City, Utah. ORAL

Hydrogeology; Sediments, Clastic; Geochemistry, Aqueous

T44 Hydrology and Hydrogeology of Extreme Environments

GSA Hydrogeology Division. W. Berry Lyons, Ohio State University, Columbus, Ohio. ORAL

Hydrogeology; Geochemistry, Aqueous; Environmental Geoscience

T45 Borehole Geophysical Analysis Techniques for the Definition of Aquifer Properties

GSA Hydrogeology Division. Frederick L. Paillet, Littleton, Colo.; Allen M. Shapiro, U.S. Geological Survey, Reston, Va. ORAL

Hydrogeology; Geophysics/Tectonophysics/Seismology; Environmental Geoscience

T46 Applications of Sedimentology and Geophysics in Hydrogeology

GSA Hydrogeology Division; GSA Sedimentology Division. David W Hyndman, Michigan State University, East Lansing, Mich.; Sarah Kruse, University of South Florida, Tampa, Fla.; Gary Stephen Weissmann, Michigan State University, East Lansing, Mich. ORAL

Hydrogeology; Public Policy; Geophysics/Tectonophysics/Seismology

T47 Developing Countries Session: Sustainable Groundwater Management in Developing Countries for Protecting the Quality and Quantity of Groundwater

Association of Geoscientists for International Development (AGID); GSA International Division. Shrikant Daji Limaye, President, AGID and Vice-President (Asia), International Association of Hydrogeologists, Poona-Pune, India. Combined ORAL and POSTER

Hydrogeology; Environmental Geoscience

T48 Application of Geochemistry to Understanding Groundwater-Surface Water Interactions

GSA Hydrogeology Division. James M. Thomas, Desert Research Institute, Reno, Nev.; Timothy P. Rose, Lawrence Livermore National Lab, Livermore, Calif. ORAL

Geochemistry, Aqueous; Hydrogeology; Environmental Geoscience

T49 Novel Approaches to Tracing Groundwater Flow Systems and Aquifer Processes: Applications of Isotopic and Trace Element Data

GSA Hydrogeology Division. Kevin H. Johannesson, Old Dominion University, Norfolk, Va.; Alan E. Fryar, University of Kentucky, Lexington, Ky. ORAL

Hydrogeology; Geochemistry, Aqueous; Environmental Geoscience

T50 High-Resolution Geochemical Bioarchives: Recognition of Signals and Implications for Evolution, Paleoecology, and Paleoclimatology

Paleontological Society. David H. Goodwin, University of Arizona, Tucson, Ariz.; Stephen A. Schellenberg, University of California, Santa Cruz, Calif. ORAL

Paleontology/Paleobotany; Paleoclimatology/Paleoceanography; Geochemistry, Other

T51 Novel Applications of Bulk and Compound Specific Stable and Radiogenic Isotopes for the Solution of Problems in Organic Geochemistry

Michael H. Engel, University of Oklahoma, Norman, Okla.; Kai-Uwe Hinrichs, Woods Hole Oceanographic Institution, Woods Hole, Mass. ORAL

Geochemistry, Organic; Geomicrobiology; Paleoclimatology/Paleoceanography

T52 Geologic Research and Projects for Understanding 21st Century Engineering Geology

GSA Engineering Geology Division; Association of Engineering Geologists. Duane A. Eversoll, University of Nebraska, Lincoln, Nebr. POSTER

Engineering Geology; Environmental Geoscience; Geoscience Education

T53 Geology and Tunneling: Case Histories

GSA Engineering Geology Division; American Rock Mechanics Association. Herbert H. Einstein, Massachusetts Institute of Technology, Cambridge, Mass.; Judy Ehlen, USA Engineer Research and Development Center,

Alexandria, Va. ORAL

Engineering Geology; Hydrogeology; Structural Geology

T54 Case Histories in Site Characterization

GSA Engineering Geology Division; Association of Engineering Geologists. Judy Ehlen, USA Engineer Research and Development Center, Alexandria, Va.; Allen Wayne Hatheway, Retired Professor of Geological Engineering, University of Missouri, Rolla, Mo. ORAL

Engineering Geology; Structural Geology; Quaternary Geology/Geomorphology

T55 The Geologic and Human Landscape of Prehistoric Mines and Quarries

GSA Archaeological Geology Division. Philip C. LaPorta, City University of New York, The Graduate Center, New York, N.Y. ORAL

Archaeological Geology; Quaternary Geology/Geomorphology; Economic Geology

T56 Geology Applied to Gas Works Site Characterization

GSA Engineering Geology Division; Association of Engineering Geologists. Allen Wayne Hatheway, Retired Professor of Geological Engineering, University of Missouri, Rolla, Mo.; Dennis Unites, Atlantic Environmental Services/GEI, Colchester, Conn. ORAL

Engineering Geology; Environmental Geoscience; Hydrogeology

T57 Evaluation of Sources, Aggregates, Quarries, Construction Materials, and Engineering Structures Using Field and Laboratory Techniques

GSA Engineering Geology Division; Association of Engineering Geologists. Peter P. Hudec, University of Windsor, Windsor, Ontario, Canada; Terry R. West, Purdue University, West Lafayette, Ind. ORAL

Engineering Geology; Environmental Geoscience; Geophysics/Tectonophysics/Seismology

T58 Construction and Geology of the Massachusetts Water Resources Authority Tunnel, Eastern Massachusetts

GSA Structural Geology and Tectonics Division; GSA Geophysics Division; GSA Engineering Geology Division. Mario Carnevale, Hager Geoscience, Waltham, Mass.; Stephen B. Mabee, University of Massachusetts, Amherst, Mass. ORAL

Engineering Geology; Hydrogeology; Quaternary Geology/Geomorphology

T59 Rheological Effects of Fluid-Rock Interactions at Depth: From Experimental Constraints to Interpretations of Field Observations

GSA Structural Geology and Tectonics Division; GSA Geophysics Division. Tim Wawrzyniec, University of Texas, Austin, Tex.; Jane Selverstone, University of New Mexico, Albuquerque, N.M. ORAL or POSTER

Structural Geology; Geophysics/Tectonophysics/Seismology; Petrology, Experimental

T60 Rock Slope Stability in Surface and Underground Excavations

GSA Engineering Geology Division; Association of Engineering Geologists. Chester Watts, Radford University, Radford, Va.; Terry R. West, Purdue University, West Lafayette, Ind. ORAL

Engineering Geology; Structural Geology; Geophysics/Tectonophysics/Seismology

T61 Natural Arsenic in Groundwater: Science, Regulation, and Health Implications

GSA Hydrogeology Division. Stuart Rojstaczer, Duke University, Durham, N.C.; Stephen Peters, University of Michigan, Ann Arbor, Mich. Combined ORAL and POSTER

Geochemistry, Aqueous; Hydrogeology; Public Policy

T62 Munitions: Sources, Fate, and Transport

U.S. Army Environmental Center. Bonnie Packer and Ira May, U.S. Army Environmental Center, Aberdeen Proving Ground, Md. ORAL

Environmental Geoscience; Geochemistry, Other; Geophysics/Tectonophysics/Seismology

T63 Contributions of High-Resolution Geophysics to Understanding Neotectonics and Seismic Hazard

GSA Geophysics Division, GSA Engineering Geology Division. John H. McBride, University of Illinois at Urbana-Champaign, Champaign, Ill.; William J. Stephenson, U.S. Geological Survey, Denver, Colo. ORAL

Geophysics/Tectonophysics/Seismology; Neotectonics/Paleoseismology; Quaternary Geology/Geomorphology

T64 Nothing Ventured, Nothing Gained: Geology and Risk Assessment in the 21st Century

GSA Engineering Geology Division; Association of Engineering Geologists. William C. Haneberg, Haneberg Geoscience, Port Orchard, Wash.; Scott F. Burns, Portland State University, Portland, Ore. ORAL

Engineering Geology; Environmental Geoscience; Public Policy

T65 Erosion of Non-Lithified Sediments; Observations and Models from Millimeter to Hillslope Scales

GSA Quaternary Geology and Geomorphology Division. Jaakko K. Putkonen, University of Washington, Seattle, Wash. ORAL or POSTER

Quaternary Geology/Geomorphology; Sediments, Clastic; Environmental Geoscience

T66 Coal Systems Analysis: A New Approach to the Understanding of Coal Formation, Coal Quality and Environmental Considerations, and Coal as a Source Rock for Hydrocarbons

GSA Coal Geology Division; U.S. Geological Survey. Peter D. Warwick and Robert C. Milici, U.S. Geological Survey, Reston, Va. ORAL

Coal Geology; Economic Geology; Sediments, Clastic

T67 Archaeological Geology and the Pleistocene-Holocene Transition

GSA Archaeological Geology Division. Vance T. Holliday, Madison, Wisc.; Rolfe Mandel, University of Kansas, Lawrence, Kans.; Christopher L. Hill, Montana State University, Bozeman, Mont. ORAL

Archaeological Geology; Planetary Geology; Paleontology/Paleobotany

T68 Old World Archaeology and Quaternary Environments

GSA Archaeological Geology Division. Paul Goldberg, Boston University, Boston, Mass.; Christopher L. Hill, Montana State University, Bozeman, Mont. ORAL

Archaeological Geology; Planetary Geology; Paleontology/Paleobotany

T69 Geobiography: Life Histories of Geologists as a Way to Understand How Science Operates

GSA History of Geology Division; History of Earth Sciences Society. Michele L. Aldrich, Hatfield, Mass.; Alan E. Leviton, California Academy of Sciences, San Francisco, Calif. ORAL or POSTER

History of Geology; Geoscience Education; Geoscience Information/Communication

T70 Ophiolites as Problem and Solution in the Evolution of Geological Thinking

GSA History of Geology Division; GSA Structural Geology and Tectonics Division; International Geology Division, History of Earth Sciences Society. Yildirim Dilek, Miami

University, Oxford, Ohio; Sally Newcomb, retired, Silver Spring, Md. ORAL or POSTER

History of Geology; Tectonics; Petrology, Igneous

T71 Prospecting for Humor in a Geological Vein: Mining a Renewable Resource

Raymond Pestrong, San Francisco State University, San Francisco, Calif.; Richard Lambert, Skyline College, San Bruno, Calif. ORAL

Geoscience Education; Geoscience Information/Communication; History of Geology

T72 Geoscience Information: A Dynamic Odyssey

Geoscience Information Society. Michael Mark Noga, Massachusetts Institute of Technology, Cambridge, Mass.; Barbara J. DeFelicce, Dartmouth College, Hanover, N.H. ORAL

Geoscience Information/Communication; Geoscience Education; Public Policy

T73 Databases to Knowledge Bases: The Informatics Revolution

Association of American State Geologists. Walter S. Snyder, Boise State University, Boise, Idaho; Herman B. Zimmerman, National Science Foundation, Arlington, Va.; M. Lee Allison, Kansas Geological Survey, Lawrence, Kans. ORAL

Geoscience Information/Communication; Public Policy; Remote Sensing/Geographic Information System

T74 Geoinformatics: Extracting Knowledge from the Rock Record Through Construction of Disciplinary Databases and Information Networks

A.K. Sinha, Virginia Polytechnic Institute and State University, Blacksburg, Va. POSTER

Geoscience Information/Communication; Remote Sensing/Geographic Information System; Precambrian Geology

T75 Applications and New Opportunities in Geologic Remote Sensing

GSA Geophysics Division. G. Randy Keller, University of Texas, El Paso, Tex.; Simon J. Hook, Jet Propulsion Laboratory, Pasadena, Calif. ORAL or POSTER

Remote Sensing/Geographic Information System; Geophysics/Tectonophysics/Seismology; Geoscience Information/Communication

T76 Geology in the National Parks; Research, Mapping, Education, and Interpretation

Bruce Heise and James F. Wood, National Park Service, Lakewood, Colo. ORAL



Brewster spit leading to Great Brewster Island. Position of spit is controlled by an underlying ridge of glacial till. Boston Harbor, Mass. Photo by Peter S. Rosen.

Geoscience Education; Environmental Geoscience; Precambrian Geology

T77 Increasing Student Engagement in Geoscience Courses Through Information Technology: A Component of Enrollment Management

National Association of Geoscience Teachers. John C. Butler, University of Houston, Houston, Tex.; Warren Huff, University of Cincinnati, Cincinnati, Ohio. ORAL

Geoscience Education; Geoscience Information/Communication; Petrology, Metamorphic

T78 Academic Training of Engineering Geologists from a Practitioner's Perspective

GSA Engineering Geology Division; Association of Engineering Geologists. Terry R. West, Purdue University, West Lafayette, Ind.; Duane A. Eversoll, Nebraska Geological Survey, Lincoln, Nebr. ORAL

Engineering Geology; Geoscience Education; Public Policy

T79 Innovative Approaches to Undergraduate Teaching of Oceanography

National Association of Geoscience Teachers. Jill M. Whitman, Pacific Lutheran University, Tacoma, Wash.; Karen Grove, San Francisco State University, San Francisco, Calif. ORAL

Geoscience Education; Marine/Coastal Science; Public Policy

T80 Models and Approaches to Teaching Geology to Pre- and In-Service Teachers

National Association of Geoscience Teachers. Matthew Nyman, University of New Mexico, Albuquerque, N.Mex.; Michelle Hall-Wallace, University of Arizona, Tucson, Ariz. ORAL

Geoscience Education; Geoscience Information/Communication

T81 Strategies for Promoting Active Learning in Large Entry-Level Courses

National Association of Geoscience Teachers. R. Heather Macdonald, College of William & Mary, Williamsburg, Va.; Richard Yuretech, University of Massachusetts, Amherst, Mass. ORAL

Geoscience Education

T82 Models of Successful Undergraduate Research Programs in the Geosciences

Council on Undergraduate Research, Geosciences Division. Edward C. Hansen, Hope College, Holland, Mich.; Virginia L. Peterson, Western Carolina University, Cullowhee, N.C. POSTER

Geoscience Education; Environmental Geoscience; Geoscience Information/Communication

T83 Sigma Gamma Epsilon Student Research Poster Session

Sigma Gamma Epsilon. Donald W. Neal, East Carolina University, Greenville, N.C.; Charles J. Mankin, Oklahoma Geological Survey, Norman, Okla. POSTER

Sediments, Clastic; Hydrogeology; Petrology, Metamorphic

T84 Recreating Undergraduate Majors and Curriculum—Approaches for a New Century

National Association of Geoscience Teachers. Duncan Foley, Pacific Lutheran University, Tacoma, Wash. ORAL

Geoscience Education; Geoscience Information/Communication; Public Policy

T85 The Coming Revolution in Earth and Space Science Education

National Association of Geoscience Teachers; National Earth Science Teachers Association. Edward E. Geary, Colorado State University, Fort Collins, Colo.; Frank W. Ireton, Science Systems and Applications, Inc., Lanham, Md. Combined ORAL and POSTER

Geoscience Education; Public Policy; Geoscience Information/Communication

T86 What Can I do with a Major in the Geosciences? Advising Students in Future Career Decisions

National Association of Geoscience Teachers. Laura A. Guertin, University of Colorado, Boulder, Colo. POSTER

Geoscience Education; Geoscience Information/Communication; Petrology, Metamorphic

T87 Fossil Fuel on Federal Land

GSA Coal Geology Division; U.S. Geological Survey; GSA International Division. Leslie F. Ruppert and Peter D. Warwick, U.S. Geological Survey, Reston, Va. ORAL

Coal Geology; Economic Geology; Public Policy

T88 New Topics in Grenville Tectonics: A New Look at Some Old Rocks

Eric L. Johnson, Hartwick College, Oneonta, N.Y.; Philip R. Whitney, New York State Museum, Albany, N.Y.; David Valentino, State University of New York at Oswego, Oswego, N.Y. ORAL

Petrology, Igneous; Petrology, Metamorphic; Precambrian Geology

SEG Special Session

Iron-Oxide(-Copper-Gold) Systems—Deposit Studies to Global Context

Sun., Nov. 4, morning and afternoon sessions. Sponsored by *Society of Economic Geologists*. Information: Mark D. Barton, Dept. of Geosciences, University of Arizona, Tucson, AZ 85721, (520) 621-8529, fax (520) 621-2672, barton@geo.arizona.edu.

Focuses on characteristics and origins of these diverse types of hydrothermal deposits, including relationships to magmatic, tectonic, and climatic processes. Emphasis will be on Proterozoic deposits in Circum-Atlantic terranes (including Brazil, the Baltic, and southern Africa), and Phanerozoic deposits of the Cordillera, particularly in the Andes.

SUBMITTING ABSTRACTS

Abstract deadlines:

- July 17 (paper)
- July 24 (online)

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GSA is using a new abstracts management system that offers many improvements over our previous system and promises to make submitting abstracts easier. Here are a few of the system's advantages:

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Environmental Geoscience
Geochemistry, Aqueous
Geochemistry, Organic
Geochemistry, Other
Geomicrobiology
Geophysics/Tectonophysics/Seismology
Geoscience Education
Geoscience Information/Communication
History of Geology
Hydrogeology
Marine/Coastal Science
Mineralogy/Crystallography
Neotectonics/Paleoseismology
Paleoclimatology/Paleoceanography

Paleontology/Paleobotany
Petrology, Experimental
Petrology, Igneous
Petrology, Metamorphic
Planetary Geology
Precambrian Geology
Public Policy
Quaternary Geology/Geomorphology
Remote Sensing/Geographic
Information System
Sediments, Carbonates
Sediments, Clastic
Stratigraphy
Structural Geology
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Presentation Modes

Select your preferred mode of presentation:
Oral, Poster, or Either (no preference)

Oral Mode—This is a verbal presentation before a seated audience. The normal length of an oral presentation is 12 minutes, plus three minutes for discussion. Projection equipment consists of two 35-mm projectors, one overhead projector, two screens, plus one LCD projector and one laptop computer for PowerPoint presentations. (See p. 44 for more information.). Requests for video projection and computer display will be addressed on a case-by-case basis. You may put in your request for any special audiovisual equipment on the abstract form.

Poster Mode—Each poster session presenter is provided with two Velcro-friendly, horizontal, freestanding display boards approximately 8' wide and 4' high, and one 4' table. Precise measurements will appear in the Speaker Guide, which will be posted on the GSA Web site in September. The speaker must be at the poster booth for at least two of the four presentation hours.

Papers for discipline sessions may be submitted in either oral or poster mode. Papers for topical sessions are to be submitted *only* in the mode noted in the session description. If a topical abstract is submitted in the incorrect mode, the abstract will be transferred automatically to a discipline session.

Title and Keywords

Pick a title for your paper, and select up to five keywords.

Authors

Have the name and contact information for each of the authors available. Please include phone numbers and e-mail addresses.

Abstract Body

Please keep abstracts to 300 words or fewer. The online abstract system will reject abstracts that exceed 320 words. Since your

word processor might count words differently than this system, you should assume 300 words is the target length.

You may include a table or an image with your abstract, but understand that the image and table might reduce the number of words allowed in your abstract. Taken together, the words and images should take up no more space than would be occupied by roughly 320 words alone.

Check the spelling of the abstract's body and title using your own word processor. Then read it again and make sure that it is something the whole world should see. (We won't check or edit it for you.)

Add an extra line between paragraphs or they will run together when displayed. You can do this while typing (before copying) or after you have pasted the copy.

Abstracts Fee

Once the abstract is in place, a window to submit payment will appear. The non-refundable submission fee is \$15 for all students, \$25 for all others.

Submit Abstract on Paper

If you do not have access to the Internet, you'll need to submit an abstract on a paper form. Paper forms for the 2001 Annual Meeting can be obtained from the technical program assistant, Heather Chotvacs, hchotvacs@geosociety.org, (303) 447-2020, ext. 1115.

You May Present Only One Volunteered Abstract

- Please submit only one *volunteered* abstract as speaker or poster presenter in topical and/or discipline sessions. This helps avoid speaker-scheduling conflicts and gives everyone an equal opportunity to be heard. **Multiple submissions as speaker-presenter will result in rejection of all abstracts.**
- This limitation does not apply to, nor does it include, *invited* contributions to keynote symposia or topical sessions.

Joint Technical Program Committee Will Finalize Program in Mid-August

The Joint Technical Program Committee (JTPC) selects abstracts and determines the final session schedule. Speakers will be notified in early September. The JTPC includes representatives from those GSA Associated Societies and Divisions participating in the technical program. GSA Council approved the JTPC technical program chairs.

FIELD TRIPS

Students, spouses, and interested guests are cordially encouraged to attend. Trips are technical in nature, and some can be physically rigorous. Participants should be prepared for wet, cold weather. Trips last from one to four days and are led by active field researchers. The minimum number of registrations for field trips is 12 unless otherwise stated.

If you register for *only* a field trip, you must pay a \$40 nonregistrant fee in addition to the field-trip fee. This fee may be applied toward meeting registration if you decide to attend the meeting. Trip fees include transportation during the trip and a guidebook. Other services such as meals and lodging are noted by the following symbols: B—breakfast; L—lunch; R—refreshments; D—dinner; ON—overnight lodging.

All trips begin and end in Boston at the Hynes Convention Center, *unless otherwise indicated*. Some returning postmeeting trips can stop at Logan International Airport for participants who have evening flights or who would prefer to spend the night closer to the airport. Participants are cautioned against scheduling any tight travel connections with field trip return times, because those times are estimates, and delays in the field can occur. For a list of hotels near the airport and their phone numbers, contact Edna Collis, GSA Field Trip Coordinator, GSA Headquarters, (303) 447-2020, ext. 1134, ecollis@geosociety.org.

Cancellation Deadline: October 5

No refunds will be given after this date. If GSA must cancel a field trip because of logistics, or if minimum registration requirements are not met, a full refund will be issued to you after the meeting. Be aware of flight-change penalties imposed by the airlines. Plan alternatives in advance should the trip you are registered for be canceled.

Attention Students: Scholarships Available

- The *GSA Structural Geology and Tectonics Division* offers up to five \$100 scholarships to division-affiliated student members for division-sponsored field trips. Apply in writing, giving name, institution, class, specialty, poster or talk title, field-trip title, and a one-paragraph rationale, to Christian P. Teyssier by e-mail only (teyssier@tc.umn.edu). The deadline to apply is September 1. See the Structural Geology and Tectonics newsletter for more information.
- The *GSA Coal Geology Division* offers a \$50 scholarship to the first division-affiliated student member who registers for a division-

sponsored field trip. The recipient must pay the full field-trip fee when registering but will be reimbursed \$50 after the GSA meeting by the Coal Geology Division.

For More Information

Contact the field trip's leader or the 2001 Field Trip co-chairs: Dave West, Dept. of Geology, Middlebury College, Middlebury, VT 05753, (802) 443-5029, fax 802-443-2072, dwest@middlebury.edu; and Dick Bailey, Dept. of Geology, Northeastern University, Boston, MA 02115, (617) 373-3181, fax 617-373-4378, r.bailey@nunet.neu.edu.

PREMEETING FIELD TRIPS

1. Quaternary Sea-level Change and Coastal Evolution in Eastern Maine

Thurs.–Sun., Nov. 1–4. Cosponsored by *GSA Quaternary Geology and Geomorphology Division*. Joseph T. Kelley, Dept. of Geological Sciences, University of Maine, Orono, ME 04469-5790, (207) 581-2152, fax 207-581-2202, jtkelley@maine.edu; Dan Belknap; Duncan FitzGerald; Jon Boothroyd. Max.: 45; min.: 12. Cost: \$325 (3B, 3L, 3D, R, 3ON, bus). *Begins in Bangor, Maine, and ends in Boston.*

This trip focuses on the sedimentary deposits associated with profound changes in Quaternary sea level, and the accompanying shoreline changes in eastern (“Downeast”) Maine. We will visit large, raised stratified moraines, glacial-marine deltas, and associated shorelines in some classic sites on the blueberry barrens that are presently under reinvestigation with ground-penetrating radar. In Acadia National Park, we will visit raised and modern sea cliffs, caves, and gravel beaches along with a recently studied carbonate beach. Along the Penobscot Bay coast, we will observe large bluffs of glacial-marine mud and focus on outcrop stratigraphy as well as recent landslides and bluff-hazard mapping. Near the mouth of the Kennebec River, we will visit salt marshes under investigation to measure late Holocene sea-level change and large sand beaches associated with Maine’s largest river.

2. Rare Element Granitic Pegmatites of Northern New England

Fri. and Sat., Nov. 2–3. Carl Francis, Harvard Mineralogical Museum, 24 Oxford St., Cambridge, MA 02138, (617) 495-4758, fax 617-495-8839, francis@eps.harvard.edu; Michael Wise. Max.: 21; min.: 12. Cost: \$230 (1B, 1L, 1D, R, 1 ON, vans).

This trip will contrast granitic pegmatites of the more familiar gem-bearing LCT (Li-Cs-Ta) geochemical type with the less studied NYF (Nb-Y-F) type. Participants will spend two days visiting famous pegmatites, including Palermo

and Hurricane Mountain in New Hampshire, to collect minerals, examine zoning, and consider petrogenesis.

3. The Notches: Bedrock and Surficial Geology of New Hampshire’s White Mountains

Fri.–Sun., Nov. 2–4. Cosponsored by *GSA Quaternary Geology and Geomorphology Division* and *GSA Structural Geology and Tectonics Division*. Timothy T. Allen, Dept. of Geology, Keene State College, Keene, NH 03435-2001, (603) 358-2571, fax 603-358-2257, tallen@keene.edu; John W. Creasy; Thompson Davis; J. Dykstra Eusden; Brian K. Fowler; Woodrow B. Thompson. Max.: 39; min.: 12. Cost: \$250 (2B, 2L, 2D, R, 2ON, bus).

This trip will travel through the spectacular scenery of Pinkham, Crawford, and Franconia Notches in the White Mountains of New Hampshire. These ranges include the highest peaks in the northeastern United States, culminating in Mount Washington, as well as many famous landforms such as The Old Man in the Mountains and Tuckerman Ravine. We will examine the entire geologic history exposed here, from the Ordovician to the Holocene, including the nature of the sedimentation, deformation, metamorphism, and magmatism during the Devonian-Acadian orogeny; the Mesozoic magmatic episodes associated with hot-spot migration and rift-drift crustal extension during the opening of the Atlantic; and the Quaternary history of alpine and continental glaciation and deglaciation, as well as fluvial and landslide activity.

4. The Science Behind A Civil Action

Sat., Nov. 3. Cosponsored by *GSA Hydrogeology Division*. (This trip will also run on Sun., Nov. 4.) Scott Bair, Dept. of Geological Sciences, The Ohio State University, Columbus, OH 43210, (614) 292-0069, fax 614-292-7688, bair.1@osu.edu; Maura Metheny; Terry Lahm; Jack Guswa; John Drobinski; Chuck Myette; Kip Solomon. Max.: 30; min.: 12. Cost: \$80 (1L, R, bus).

Contamination at the Wells G & H Superfund site in Woburn, Massachusetts, is the focus of the book and movie *A Civil Action*. The legal and public health issues at Woburn require understanding the geology, hydrology, and aqueous chemistry of the glacial aquifer and its interaction with the Aberjona River. Our goals are to show the geologic materials comprising the flow system, the hydrologic conditions created by the wetland, river, and municipal wells, and to see the remediation techniques used to clean up the site.

5. The Founders of American Geology: A Visit to their Tombs and Favorite Exposures

Sat. and Sun., Nov. 3–4. Cosponsored by *GSA History of Geology Division*. Gerald M. Friedman, Brooklyn College and Graduate Center, CUNY, P.O. Box 746, Troy, New York, 12181-0746, (518) 273-3247, fax 518-273-3249, gmfriedman@juno.com. Max.: 20; min.: 12. Cost: \$190 (21L, 1D, R, 1ON, vans).

The trip begins in Boston and travels to Lee, Massachusetts, to see the limestones made classical in 1920 by T.N. Dale. It proceeds to Troy, the hallowed ground of the pioneers in American geology. The field trip follows in the footsteps of Amos Eaton (1776–1842), James Hall (1811–1898), and Ebenezer Emmons (1799–1863). We shall visit classical Appalachian outcrops and pause at the graves of the founders of our science.

6. Geological, Geochemical, and Environmental Aspects of Metamorphosed Black Shales in Maine

Sat. and Sun., Nov. 3–4. Charles V. Guidotti, Dept. of Geological Sciences, University of Maine, Orono, ME 04469-5790, (207) 581-2153, fax 207-581-2202, guidotti@maine.maine.edu. Mark Van Baalen. Max.: 20; min.: 8. Cost: \$190 (1B, 1D, R, 1ON, vans).

Sulfide- and graphite-rich schists of the Silurian Smalls Falls Formation in Maine preserve a depositional signature indicative of black shale, thereby providing a window into the paleo-environment, and subsequent complex phase relations and mineral chemistries. Renewed interest in such rocks comes from concerns about toxic elements in groundwater. This field trip will examine these issues across a range of metamorphic grades, while visiting key outcrops in the mountains of northwestern Maine.

7. Avalonian Through Alleghanian Tectonism in Southeastern New England

Sun., Nov. 4. Cosponsored by *GSA Structural Geology and Tectonics Division*. Daniel Murray, Dept. of Geosciences, University of Rhode Island, Kingston, RI 02881, (401) 874-2197, fax 401-874-2190, dpmurray@uri.edu; Rachel Burks; Sharon Mosher; Nasir Hamidzada. Max.: 40; min.: 12. Cost: \$70 (1L, R, bus).

Some of the best evidence for the Paleozoic amalgamation of the eastern margin of North America occurs in the shoreline exposures in Narragansett Bay, around Newport, Rhode Island. This trip will focus on the structural, stratigraphic, metamorphic, and igneous evidence for the Avalonian and Alleghanian orogenies in this region, plus additional stops to and from Boston.

8. The Science Behind A Civil Action

Sun., Nov. 4. See description for Sat., Nov. 3, Field Trip no. 4.

9. Geochronology and Geochemistry of the Shelburne Falls Arc and the Taconian Orogeny in Western New England

Sun., Nov. 4. Cosponsored by *GSA Structural Geology and Tectonics Division*. Paul Karabinos, Dept. of Geosciences, Williams College, Williamstown, MA 01267, (413) 597-2079, fax 413-597-4116, paul.m.karabinos@williams.edu; J. Christopher Hepburn. Max.: 28; min.: 12. Cost: \$70 (1L, R, vans).

This trip will visit spectacular and scenic exposures in the Taconian orogen of western New England. We will explain why we believe that the Taconian orogeny resulted from the collision of Laurentia with the Shelburne Falls arc rather than the Bronson Hill arc. Participants will see the 475 Ma plutonic core of the Shelburne Falls arc beautifully exposed along the Deerfield River and ancient pillow lava from the forearc exposed in the Chickley River. We will visit Glendale Falls where a 447 Ma pluton crosscuts a Taconian thrust and thus helps date the end of faulting in this part of the orogen. We will hike along part of the Appalachian National Scenic Trail to examine the unconformity between Middle Proterozoic Laurentian basement and Late Proterozoic rift clastics in the Day Mountain thrust sheet. We will also see an example of a thrust between the Taconic sequence (continental slope and rise deposits) and coeval continental shelf rocks in the vicinity of Mount Greylock.

10. N-Y-F Pegmatites in the Avalon Terrane of Southeastern New England

Sun., Nov. 4. Michael Wise, Dept. of Mineral Sciences, NHB-119, Smithsonian Institution, Washington, D.C. 20560-0119, (202) 786-2609, fax 202-357-2476, wise.michael@nmnh.si.edu; Carl Francis. Max.: 22; min.: 12. Cost: \$70 (1L, R, vans).

Ordovician to Late Devonian granites of the Avalon terrane are host to rare hornblende- and aegirine-bearing pegmatites characterized by NYF-type chemistry. Participants will examine the Quincy granite in Massachusetts and Scituate granite of southwestern Rhode Island and discuss the relationship of A-type plutonism to the genesis of granitic pegmatites. Comparison with the neighboring Narragansett Pier granite-pegmatite system will also be addressed.

11. Quaternary Environments and History of Boston Harbor, Massachusetts

Sun., Nov. 4. Cosponsored by *GSA Quaternary Geology and Geomorphology Division*. Patrick

Colgan, Dept. of Geology, Northeastern University, Boston, MA 02115, (617) 373-4381, fax 617-373-4378, p.colgan@neu.edu; Peter Rosen. Max.: 50; min.: 12. Cost: \$70 (1L, R, bus).

This trip will examine Quaternary glacial and coastal environments, and the geologic history of Boston Harbor. Recent research on the age, paleontology, and depositional environments of the "drumlin till" will be presented, as well as a look at the coastal modification of glacial landforms by post-glacial sea-level rise. We will visit sites on Long Island and Nantasket to illustrate glacial history, Holocene coastal development of the submerged drumlin topography, and coastal management issues. Coastal features to be discussed include gravel tombolos, cusped spits, and regressive barrier beaches.

12. Urban Geology of Beacon Hill and Vicinity, Boston, Massachusetts: In Memory of James V. O'Connor—A Walking Tour

Sun., Nov. 4. Cosponsored by *GSA History of Geology Division*, *GSA Engineering Geology Division*, and *National Association of Geoscience Teachers*. James W. Skehan, Dept. of Geology & Geophysics, Boston College, 140 Commonwealth Avenue, Chestnut Hill, MA 02467-3809, (617) 552-8312, fax 617-552-2462, skehan@bc.edu; William A. Newman; Wilfred Holton. Max.: 20; min.: 10. Cost: \$20.

This trip will visit sites that are important in the history of Boston and that demonstrate the role of geology in human use and development in densely urban areas. We will begin in downtown Boston's Park Square, starting at the old shoreline of Great Bay and Roxbury Flats at the Prudential Center, the site of the Boston Fish Wiers constructed by native Americans about 4000 yr B.P. Sites on Beacon Hill will include the Boston Common Garage, where engineering and glacial geology features have been well studied by the late Clifford Kaye, who was instrumental in developing a new model for moraine formation by thrusting of frozen sand, gravel, and till slices. We will consider sources and processes involved in filling Great Bay, construction of a Colonial tidal power project, original topography and stratigraphy of Beacon Hill drumlins and/or moraine based on data from construction of the Boston Common Garage that produced a superabundance of groundwater.



Engineering geology of the Big Dig project (Boston Central Artery Project).

CONCURRENT WITH THE MEETING

13. Cobblestones, Puddingstone, and More: Boston's Use of Stone as an Essential Urban Element—A Walking Tour

Tues., Nov. 6. Dorothy Richter, Hager-Richter Geoscience, Inc., 8 Industrial Way, Ste. D-10, Salem, NH 03079, (603) 893-9944, fax 603-893-8313, dorothy@hager-richter.com; Gene Simmons. Max.: 20; min.: 10. Cost: \$20.

Boston has a long and rich history of using geologic material (stone!) in architecture and as an essential element in the urban landscape. Come for a long walk, beginning at the Hynes Convention Center and ending at historic Quincy Market, examining the historic and modern uses of stone in the city along the way. Observe the shift from the use of local, then regional geologic resources to current global building stone sources. Learn about a few building stone mistakes and see how they were corrected.

14. Engineering Geology of the Big Dig Project (Boston Central Artery Project)

Tues., Nov. 6. Cosponsored by GSA *Engineering Geology Division*. Dan Bobrow, Parsons Brinckerhoff, 63 Walnut Court, Stoughton, MA 02072-4159, (617) 951-6228, fax 617-346-7963, djbobrow@bigdig.com; Charles Daugherty. Max.: 35; min.: 12. Cost: \$80 (1L, R, bus).

The Central Artery/Tunnel Project is the largest government-funded public works project in the United States. The subsurface highway alignment through the heart of downtown Boston reaches depths of 120 feet. It is intended to replace the present, outdated, 50-year-old

Central Artery, which is largely a viaduct. The magnitude and variety of construction techniques is astounding. The four miles of cut-and-cover tunnel construction within a heavily congested urban environment contends with complex subsurface glacial and bedrock deposits, large amounts of fill area, adjacent 18th and 19th century structures, and a very complex infrastructure. This field trip will present a photographic tour of total artery construction before taking visitors 80 feet below ground surface for a firsthand viewing of one segment of the cut-and-cover tunnel construction.

15. Igneous Petrology of the Pine Hill Area, Medford, Massachusetts

Tues., Nov. 6. Martin E. Ross, Dept. of Geology, Northeastern University, Boston, MA 02115, (617) 373-3176, fax 617-373-4378, m.ross@nUNET.neu.edu. Max.: 40; min.: 12. Cost: \$40 (R, bus).

The Pine Hill area is one of the critical locations in eastern Massachusetts for studying the intrusive relationships of numerous felsic to mafic dikes, the Dedham granite, and the Middlesex Fels volcanics. Excellent exposures and hiking trails within the park and along the roadcut on I-93 make this an ideal location for examining crosscutting and contact relationships among the dikes and the country rock. The igneous rocks at this location range in age from Precambrian to Jurassic, and dike types include dolerite, andesite, dacite, monchiquite, and camptonite, among others. The centerpiece of the trip is the Mesozoic Medford dolerite dike that attains its maximum thickness of approximately 460 feet at Pine Hill. This durable and readily accessible rock body made it a local source for building stone during the early part of the last century. Major and trace element geochemistry from the Medford dike suggest a major component of crustal contamination and will provide opportunities to

discuss the effects of the assimilation of continental crust by a mafic magma. Views of Boston and Massachusetts Bay from atop Pine Hill are spectacular and are alone worth the trip.

16. Tour of the Salem Harbor Power Plant

Tues., Nov. 6. Cosponsored by GSA *Coal Geology Division*. Cortland F. Eble, Kentucky Geological Survey, 228 MMRB, University of Kentucky, Lexington, KY 40506-0107, (859) 257-5500, fax 859-257-1147, eble@kgs.uky.edu. Max.: 25; min.: 10. Cost: \$25 (R, bus).

This half-day, afternoon trip will visit the Salem Harbor coal-fired power plant in nearby Salem, Massachusetts. The Salem Harbor plant, in operation for more than 30 years, has a generating capacity of 750 megawatts and burns primarily low sulfur Appalachian and South American coal. The visit will demonstrate how coal is delivered to, and handled at, the plant, and then used to generate electricity. Pollution control systems and ash by-product recovery and handling systems will also be addressed and demonstrated. This trip will be of interest to any geoscientist who would like to see how electric power is generated on a large scale.

17. Geology of East Point, Nahant, Massachusetts

Wed., Nov. 7. Martin E. Ross, Dept. of Geology, Northeastern University, Boston, MA 02115, (617) 373-3176, fax 617-373-4378, m.ross@nUNET.neu.edu; Richard H. Bailey. Max.: 40; min.: 12. Cost: \$40 (R, bus).

East Point, located in Nahant, Massachusetts, about 8 miles northeast of Boston, is one of the most scenic and spectacular geologic locations along the southern New England coast. The sea cliff exposures of Early Cambrian mudstones and limestones at East Point are intruded by more than 240 dikes, 13 sills, and the Nahant Gabbro. The dikes range from

intermediate to ultramafic in composition. New age data and major and trace element chemical analyses of these units will be presented that indicate the dikes and sills are not comagmatic with the gabbro. Excellent exposures of dikes, sills, and faults will be visited. The classic exotic "avalonian" small, shelly, and ichnofossil assemblage in the mudstones and limestones will also be examined. How this complex geology fits into the framework of avallonian terranes and the geologic evolution of southeastern New England will also be discussed.

18. Geology, Groundwater Contamination, and Groundwater Remediation at the Massachusetts Military Reservation, Cape Cod

Wed., Nov. 7. Rudolph Hon, Dept. of Geology & Geophysics, Boston College, 140 Commonwealth Ave., Chestnut Hill, MA 02467-3809, (617) 552-3640, fax 617-552-2462, hon@bc.edu; Francis Fedele; Martin Acker; Peter Dillon. Max.: 24; min.: 12. Cost: \$55 (1L, R, vans).

The Massachusetts Military Reservation (MMR) stretches over the tops of Buzzards Bay and Sandwich recessional moraines and extends across the Mashpee Pitted Outwash Plain of the Upper Cape Cod. Past land use at the reservation resulted in presently identified 15 separate groundwater plumes, which are now affecting drinking water supplies on both sides of the MMR boundary. Due to its uniform geological setting, the underlying Sagamore Lens aquifer has become a unique place to study and model migrations of groundwater contamination plumes and a locale for deployment of various remediation technologies. The trip will examine several of the contamination plumes, their settings with respect to the outwash plain, the radial groundwater flow, and the remediation techniques set in place to not only remove contaminants but to balance remedial activities with other environmental concerns. The second part of the trip will examine non-point source contamination plumes of RDX and HMX in the former "impact area."

POSTMEETING TRIPS

19. Deformation, Metamorphism, and Granite Assent in Western Maine

Thurs.–Sun., Nov. 8–11. Cosponsored by *GSA Structural Geology and Tectonics Division*. Gary Solar, Dept. of Earth Sciences, State University of New York, College at Buffalo, Buffalo, NY 14222, (716) 878-4900, fax 716-878-4524, solargs@bscmail.buffalostate.edu; Mike Brown; Paul Tomascak. Max.: 33; min.: 11. Cost: \$350 (3B, 3L, 2D, R, 3ON, vans).

Trip to western Maine to illustrate the evidence for late-syntectonic processes of transpressive deformation, metamorphism, and granite

magma ascent as recorded by structure, petrology and geochemistry of metasedimentary rocks, migmatites, and granites. We will examine closely the structural variation of mineral fabrics, the shapes and sizes of leucosomes, and the relation of larger granite bodies to the regional structure.

20. Geology of Mount Monadnock, New Hampshire

Fri., Nov. 9. Cosponsored by *GSA Structural Geology and Tectonics Division*. Peter Thompson, Dept. of Earth Sciences, University of New Hampshire, Durham, NH 03824, (603) 862-4995, fax 603-862-2649, pj3@hyatia.unh.edu. Max.: 25; min.: 12. Cost: \$55 (1L, R, vans).

The type locality for monadnocks owes its topographical prominence to resistant Devonian quartzites and sillimanite schists that are repeated by an interesting pattern of re-folded folds. Participants will hike up the mountain, weather permitting, to view beautiful exposures of the folds, graded beds, and a post-tectonic mafic dike. Inclement weather plan is to observe evidence at lower elevations for three phases of Acadian folding and thrust faulting in Silurian and Devonian rocks, as well as pre-, syn- and post-Acadian plutons. Participants should note that this is a long, all-day trip.

21. Geology and Water Supply Development at the Massachusetts Military Reservation, Cape Cod

Fri., Nov. 9. Peter Dillon, Foster Wheeler Environmental Corporation, Bldg. 1045, South Outer Rd., Buzzards Bay, MA 02542, (508) 563-7792, fax 508-563-7844, pdillon@fwenc.com; Rudolph Hon; Boyd Allen; Francis Fedele; Kent Gonser. Max.: 24; min.: 12. Cost: \$55 (1L, R, vans).

The Massachusetts Military Reservation (MMR) stretches across the tops of two recessional moraines (Buzzards Bay and Sandwich Moraines) and extends across the Mashpee Pitted Outwash Plain deposits of the Upper Cape Cod. While the geologic and hydrogeologic conditions of the area are conducive to the development of a large-volume public water supply, these same conditions can present issues that may limit the siting and development of water supply wells. The trip will examine the unique geologic and hydrogeologic conditions of the western Cape Cod aquifer, as well as the process of siting and development of a 3 million gallon per day groundwater source. The limitations to siting groundwater supply wells stem from the need to avoid all potential adverse impacts from any of the different near-surface contamination sources and balancing water supply needs with other environmental concerns.

22. MetroWest Water Supply Tunnel Project

Fri., Nov. 9. Cosponsored by *GSA Engineering Geology Division*. Mario Carnevale, Hager Geoscience Inc., 174 Lexington Street, Waltham, MA 02452-4644, (781) 893-9700, fax 781-893-8465, mcarnevale@hagergeoscience.com; Jutta Hager. Max.: 50; min.: 12. Cost: \$65 (1L, R, bus).

The MetroWest Water Supply Tunnel currently under construction west of Boston is 17.6 miles long, with a diameter of 16 feet. Mapping this deep-rock tunnel behind the tunnel boring machine has produced a continuous geologic section from the metasediments of the Boston Basin westward through a complex series of igneous and metamorphic rocks. Our trip will visit facilities related to the MetroWest Water Supply Tunnel construction and maintenance. We will also show how the mapping program has helped refine understanding of the regional geology, in particular the Boston Basin contact and Bloody Bluff fault zone.

23. Recent Developments in the Study of the Neoproterozoic Boston Bay Group

Fri., Nov. 9. Richard H. Bailey, Dept. of Geology, Northeastern University, Boston, MA 02115, (617) 373-3176, fax 617-373-4378, r.bailey@nunes.neu.edu; Margaret D. Thompson; Benjamin H. Bland. Max.: 40; min.: 12. Cost: \$50 (1L, R, vans).

Bedrock immediately underlying the City of Boston and surrounding areas comprises the Neoproterozoic Boston Bay Group. These sedimentary rocks, deposited in a rift system over a dissected magmatic arc, contain the controversial Squantum Member, a diamictite long considered to be of glacial origin. Recent work by Thompson, Bowring, and others on the Boston Bay Group includes U/Pb zircon dates of a lava flow, an ash bed, and clasts within the Squantum, and Bland and Bailey recently reported circular fossils on bed surfaces representing an *Aspidella*-like Ediacaran fossil. This trip will visit four classic coastal localities along the southern edge of the Boston Bay Group outcrop belt where participants can see field relations of the rocks that have been dated, the stratigraphic setting and mode of preservation of Ediacaran fossils, and some of the best sedimentary structures and stratigraphy in the Boston Basin.

24. Metamorphism of a Fold-Thrust Belt in the Hinterland of the Alleghanian Orogen in Southern New England

Fri. and Sat., Nov. 9–10. Cosponsored by *GSA Structural Geology and Tectonics Division*. Robert P. Wintsch, Dept. of Geological Sciences, Indiana University, Bloomington, IN 47405, (812) 855-4018, fax 812-855-7899,

wintsch@indiana.edu; Michael J. Kunk; John N. Aleinikoff. Max.: 30; min.: 11. Cost: \$170 (2L, R, 1ON, vans).

The trip will examine Alleghanian metamorphic and structural overprinting on rocks of the Avalon, Putnam-Nashoba, Merrimack, Central Maine, and Bronson Hill terranes. Some were previously metamorphosed in the Acadian, but all were assembled in the Alleghanian, and most were extended in the Mesozoic. Rocks to be visited include ortho- and paragneisses and schists between terranes, and faults at terrane boundaries—some of Acadian or older age, and most reactivated as Alleghanian ductile thrusts or as Mesozoic brittle normal faults. Most stops will be complemented by petrographic and geochronologic data.

25. The Taconic Questions: Revisiting the Scenes of the Great American Controversies

Fri. and Sat., Nov. 9–10. Cosponsored by *GSA History of Geology Division*. Paul Washington, Dept. of Geosciences, University of Louisiana, Monroe, LA 71209, (318) 342-1898, fax 318-342-1755, gewashington@ulm.edu. Max.: 40; min.: 12. Cost: \$170 (R, 1ON, bus).

The Taconics have been the subject of several controversies over the last two centuries. This trip will visit some of the most controversial sites and look at the geology in terms of the geologic thinking of the day. We will also discuss how the field relations ultimately led to the resolution of each of the controversies, as well as how the geology is currently interpreted.

26. Prehistoric Bedrock Quarries of the Central Appalachians

Fri.–Sun., Nov. 9–11. Philip La Porta, La Porta & Associates, 116 Bellvale Lakes Rd., Warwick, NY 10990, (845) 986-7733, fax 845-988-9988, philiplaporta@cs.com. Max.: 20; min.: 10. Cost: \$280 (3L, R, 3ON, SUVs).

The investigation focuses on the field relations predicting the presence of prehistoric quarry sites and determining the stratigraphic and structural constraints controlling prehistoric quarry development. The field stops will elucidate the relationship between diagenesis and petrofabric and their correlation to raw material selection throughout prehistoric time. The evidence for task subdivision, quarry maintenance, and the social implications of quarry life will be examined.

SOCIETY OF ECONOMIC GEOLOGISTS FIELD TRIPS

Costs and registration forms for the following trips are available at www.segweb.org. Inquiries may also be directed to the Society of

Economic Geologists, 7811 Shaffer Parkway, Littleton, CO 80127, (720) 981-7882; fax 720-981-7874. Fee includes field-trip transportation, all meals, accommodations (double occupancy), and guidebook. Preregistration is required.

Zinc and Iron Deposits of the Adirondack Mountains and New Jersey Highlands

Tues., Oct. 30, through Sat., Nov. 3. Sponsored by *Society of Economic Geologists*. John F. Slack, U.S. Geological Survey, MS 954, Reston, VA 20192, (703) 648-6337, fax 703-648-6383, jfslack@usgs.gov; Craig A. Johnson, U.S. Geological Survey, MS 963, Denver, CO 80225, (303) 236-7935, fax 303-236-4930, cjohnso@usgs.gov; Michael P. Foose, U.S. Geological Survey, MS 954, Reston, VA 20192, (703) 648-6333, fax 703-648-6383, mfoose@usgs.gov; James M. McLelland, Dept. of Geology, Colgate University, Hamilton, NY 13346, (315) 824-7202, fax 315-824-7831, indian@telenet.net; John H. Puffer, Dept. of Geological Sciences, Rutgers University, Newark, NJ 07102, (973) 353-5238, fax 973-353-1965, jpuffer@andromeda.rutgers.edu; Richard A. Volkert, New Jersey Geological Survey, P.O. Box 427, Trenton, NJ 08625, (609) 292-2576, fax: 609-633-1004, richv@njgs.dep.state.nj.us; Robert W. Metsger, 69 Hunters Lane, Sparta, NJ 07871, (973) 729-7824, bobmets@ptdprolog.net.

Trip includes underground visits to the Balmat zinc mine (New York) and the Sterling Hill zinc mine (New Jersey), surface visits to non-titaniferous magnetite deposits of the eastern Adirondacks (e.g., Lyon Mountain and Skiff

Mountain mines) and New Jersey Highlands (e.g., Sulfur Hill and Andover mines), and tours of the Sterling Hill Mining Museum and Franklin Mineral Museum in New Jersey. Trip begins and ends in Boston. Max.: 36. Cost: TBD.

Environmental Geochemistry and Mining History of Massive Sulfide Deposits in the Vermont Copper Belt

Thurs., Nov. 8, through Sat., Nov. 10. Sponsored by *Society of Economic Geologists*.

Jane M. Hammarstrom, (703) 648-6165, jhammars@usgs.gov, Robert R. Seal II, (703) 648-6290, rseal@usgs.gov, and John F. Slack, (703) 648-6337, jfslack@usgs.gov, all at U.S. Geological Survey, MS 954, Reston, VA 20192, fax 703-648-6383; and Matthew A. Kierstead, PAL, Inc., 210 Lonsdale Avenue, Pawtucket, RI 02860, (401) 728-8780, fax 401-728-8784, mkierstead@palinc.com.

Trip includes surface visits to the historic Elizabeth (1793–1958) and Ely (1820–1903) copper mines. In 2000, Elizabeth became the first metal mine designated as a Superfund site in the eastern U.S. based on ecological impacts of acid mine drainage. The trip will cover geological, environmental, historical, and societal aspects of the mine and ongoing EPA activities. Scientific focus will be on recent data obtained on mine wastes and waters in the vicinity of the Elizabeth and Ely mines, and the utility of such data in developing mine reclamation strategies. Trip begins and ends in Boston. Max.: 30. Cost: TBD.



Granite boulder in Proterozoic Roxbury Formation; Squantum member. This rock, thought for many years to be a tillite, is now interpreted to be a submarine debris flow deposit. Squaw Rock Park, Squantum, Mass. Photo by Richard H. Bailey.

SHORT COURSES, WORKSHOPS, AND FORUMS

GSA-Sponsored Professional Development Courses

GSA short courses will be held immediately before the Annual Meeting and are open to members and nonmembers. If you register for *only* a short course, you must pay a \$40 non-registrant fee in addition to the course fee. This fee may be applied toward meeting registration if you decide to attend the meeting. Pre-registration is recommended; on-site registration is an additional \$30.

Continuing Education Unit (CEU) Service

All courses sponsored by GSA offer CEUs. A CEU is defined as 10 contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction, and qualified instruction. A contact hour is defined as a typical 60-minute classroom instructional session or its equivalent. Ten instructional hours are required for one CEU. For CEU record-keeping purposes, please be sure to include your social security number on the registration form.

Cancellation deadline: October 5, 2001

Attention Students: Funds Available

- The *GSA Coal Geology Division* offers a \$50 scholarship to the first division-affiliated student member who registers for a division-sponsored short course. Student *must pay the full course fee* when registering but will be reimbursed \$50 after the GSA meeting by the Coal Geology Division.
- The *GSA Engineering Geology Division* will subsidize the first five student registrants who are valid division members. Students *must pay the full course fee* when registering, but will be reimbursed \$50 after the GSA meeting by the Engineering Geology Division.
- The *GSA Hydrogeology Division* will subsidize the first student registrant who is a valid division member. The student *must pay the full course fee* when registering, but will be reimbursed \$50 after the GSA meeting by the Hydrogeology Division.
- The *GSA Structural Geology and Tectonics Division* offers up to five \$100 scholarships to division-affiliated student members for division-sponsored short courses. Apply in writing, giving name, institution, class, specialty, poster or talk title, short-course

title, and a one-paragraph rationale to Christian P. Teyssier by e-mail only (teyssier@tc.umn.edu). The deadline to apply is September 1. See the Structural Geology and Tectonics Division newsletter for more information.

For More Information

Contact Edna Collis, GSA Program Officer for Professional Development, (303) 447-2020, ext. 1134, or ecollis@geosociety.org.

1. Application of Thermochronometry to Tectonics

Sat. and Sun., Nov. 3–4, 8 a.m.–5 p.m. both days. Hynes Convention Center. Cosponsored by *GSA Structural Geology and Tectonics Division*.

Since most tectonic processes alter the distribution of heat in the crust, the thermal record preserved as isotopic variations in minerals can provide valuable insights regarding timing and rates of deformation processes. This course provides a contemporary treatment of thermochronology and its application to studies of crustal deformation. Relevant isotopic systems and means of interpretation will be presented together with a hands-on introduction to computer-based interpretive models.

Faculty: T. Mark Harrison—Dept. of Earth and Space Sciences and Institute of Geophysics and Planetary Physics, University of California at Los Angeles; Ph.D., Australian National University; Marty Grove—Dept. of Earth and Space Sciences, University of California at Los Angeles; Ph.D., University of California at Los Angeles; Oscar M. Lovera—Dept. of Earth and Space Sciences, University of California at Los Angeles; Ph.D., University of Chicago; Peter K. Zeitler—Dept. of Earth and Environmental Sciences, Lehigh University; Ph.D., Dartmouth College.

Limit: 30. Fee: \$435, students \$415; includes course manual. CEUs: 1.6.

2. Micromorphology of Glacigenic Sediments

Sat. and Sun., Nov. 3–4, 8 a.m.–5 p.m. both days. Boston College. Cosponsored by *GSA Quaternary Geology and Geomorphology Division*.

The objective of this course is to convey the concepts and practices of the techniques associated with the micromorphological examination of sediments. Specifically, the sediments to be investigated will be terrestrial and marine glacial sediments. The workshop will introduce field-sampling techniques and strategies and the various methods of laboratory impregnation of soft sediments. Thin-section description and analyses will be

discussed at length. The terminology and classification methods of micromorphological analyses will be used and illustrated with a large and varied number of thin sections. Participants will be directly involved in thin-section description and interpretation and will be asked to present findings on their samples. Discussion will also illustrate research value and the many applied uses of micromorphological analyses

Faculty: John Menzies—Dept. of Earth Sciences, Brock University; Ph.D., University of Edinburgh; Jaap J.M. van der Meer—Dept. of Geography, Queen Mary College, University of London; Ph.D., University of Amsterdam; James Rose—Dept. of Geography, Royal Holloway, University of London; B.A., University of Leicester.

Limit 30. Fee: \$420, students \$400; includes course manual and lunches. CEUs: 1.6.

3. Applications of Environmental Isotopes to Watershed Hydrology and Biogeochemistry

Sun., Nov. 4, 8 a.m.–5 p.m. Hynes Convention Center. Cosponsored by *GSA Hydrogeology Division*.

This course will focus on practical applications of water, solute, and biomass isotopes for gaining a better understanding of the hydrology and biogeochemistry of watersheds and small basins. The wide range of discussion topics will include tracing water sources and pollutants, flowpath determination, biogeochemical reaction mechanisms, and food-web reconstruction.

Faculty: Carol Kendall—Water Resources Division, U.S. Geological Survey, Menlo Park, California; Ph.D., University of Maryland; Thomas Bullen—Water Resources Division, U.S. Geological Survey, Menlo Park, California; Ph.D., University of California at Santa Cruz.

Limit: 30. Fee: \$340, students \$320; includes course manual and lunch. CEUs: 0.8.

4. Estimating Rates of Groundwater Recharge

Sun., Nov. 4, 8 a.m.–5 p.m. Hynes Convention Center. Cosponsored by *GSA Hydrogeology Division*.

Good estimates of groundwater recharge are required to accurately assess water resources and evaluate aquifer vulnerability to contamination. This course will review theory, assumptions, uncertainties, advantages, and limitations of different approaches for estimating recharge rates. We will discuss physical, tracer, and numerical modeling techniques based on surface water, unsaturated zone, and

saturated zone data. The course content is aimed at practicing hydrologists and advanced hydrology students.

Faculty: Richard W. Healy—U.S. Geological Survey, Denver; B.S., University of Illinois; Bridget R. Scanlon—Bureau of Economic Geology, University of Texas, Austin; Ph.D., University of Kentucky.

Limit: 30. Fee: \$250, students \$230; includes course manual and lunch. CEUs: 0.8.

5. **Management and Leadership Skills for Geoscience Department Chairs and Institute Directors**

Sun., Nov. 4, 8 a.m.–5 p.m. Hynes Convention Center. Cosponsored by *National Association of Geoscience Teachers*.

This course will provide an introduction to the interpersonal tools and skills needed to effectively and efficiently manage and lead in an academic setting. It is designed for faculty and research scientists who are either new to academic administration or wish to prepare themselves for a transition to administration. Even experienced department chairs and institute directors wanting to improve their administrative skills and to network with peers sharing similar responsibilities and challenges will benefit. Participants will learn how to: (1) better mobilize the energy of their faculty and staff toward academic success; (2) confront present and future administrative challenges; and (3) develop insights on how to maintain their personal well-being. This course will take a fresh approach in combining the best of the dynamic, nuts and bolts management training of the business world with the seasoned experience and academic leadership of one of academia's own.

Faculty: Lee J. Suttner—Dept. of Geological Sciences, Indiana University, Bloomington; Ph.D., University of Wisconsin; Sheila Moore—Training Concepts, Chattanooga, Tennessee; B.A., St. Olaf College.

Limit: 30. Fee: \$260, students \$240; includes course manual and lunch. CEUs: 0.8.

6. **Mobilization of Metals from Fossil Fuels: Impacts to the Environment and Human Health**

Sun., Nov. 4, 1–5 p.m. Hynes Convention Center. Cosponsored by *GSA Coal Geology Division*.

Appropriate for those with little or no prior experience in energy geology, this course will examine the sources of metals in fossil fuels and their combustion products, and related environmental and health effects. Issues include toxic elements such as mercury and arsenic, particulate matter (PM_{2.5}), and

regulatory aspects. Case studies of health impacts in the U.S. and abroad will be presented.

Faculty: Robert B. Finkelman—U.S. Geological Survey, Reston, Virginia; Ph.D., University of Maryland; Allan Kolker—U.S. Geological Survey, Reston, Virginia; Ph.D., State University of New York at Stony Brook; Leslie Ruppert—U.S. Geological Survey, Reston, Virginia; M.S., George Washington University.

Limit: 40. Fee: \$190, students \$170; includes course manual and refreshments. CEUs: 0.4.

7. **Practical Geoscience Ethics: Elements, Examples, and Education**

Sun., Nov. 4, 1–5 p.m. Hynes Convention Center. Cosponsored by *American Institute of Professional Geologists* and *GSA Engineering Geology Division*.

The elements of geoscience professional ethics will be examined using case histories to illustrate the issues presented including the distinction between ethical rules and ethical ideals. The course will provide a better foundation in professional ethics for practicing professionals and students and will provide faculty with ideas on how to effectively teach professional ethics in an already overcrowded curriculum.

Faculty: David M. Abbott Jr.—AIPG Ethics Committee Chairman, Denver; M.S., Colorado School of Mines; John W. Williams—San Jose State University; Ph.D., Stanford University.

Limit: 30. Fee: \$200, students \$180; includes course manual and refreshments. CEUs: 0.4.

8. **Tectonics and Topography: Crustal Deformation, Surficial Processes, and Landforms**

Sun., Nov. 4, 8 a.m.–5 p.m. Hynes Convention Center. Cosponsored by *GSA Structural Geology and Tectonics Division*.

This course is intended for geologists with backgrounds in any subdiscipline who wish to learn more about interactions between crustal (tectonic) and surficial (climatic and erosional) processes and about landforms that result from those interactions. Participants will have an opportunity to use simple 2-D computer models (MatLab software) that illustrate feedback between crustal and surficial processes.

Faculty: Dorothy Merritts—Franklin and Marshall College; Ph.D., University of Arizona; Roland Burgmann—University of California at Berkeley; Ph.D., Stanford University.

Limit: 30. Fee: \$385, students \$365; includes course manual and lunch. CEUs: 0.8.

OTHER COURSES, WORKSHOPS, AND FORUMS

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

Sequence Stratigraphy for Graduate Students

Sat. and Sun., Nov. 3–4, 8 a.m.–5 p.m. both days. Cosponsored by *British Petroleum* and *ExxonMobil Exploration Company*.

This free short course is designed to teach graduate students the principles, concepts, and methods of sequence stratigraphy. Sequence stratigraphy is an informal chronostratigraphic methodology that uses stratal surfaces to subdivide the stratigraphic record. This methodology allows the identification of coeval facies, documents the time-transgressive nature of classic lithostratigraphic units, and provides geoscientists with an additional way to analyze and subdivide the stratigraphic record. Using exercises that utilize outcrop, core, well-log, and seismic data, the course provides a hands-on experience to learning sequence stratigraphy. The exercises include classic case studies from which many sequence stratigraphic concepts were originally developed.

Limit: 40. No fee. Preregistration required. Information and registration: Art Donovan, BP Upstream Technology Group, (281) 366-5198, donovaad@bp.com; or Morgan Sullivan, ExxonMobil Upstream Research Company, (713) 431-7184, morgan.d.sullivan@exxon.sprint.com.

Stable Isotope Geochemistry

Sat. and Sun., Nov. 3–4. Colonnade Hotel, Boston. Sponsored by *Mineralogical Society of America* and *Geochemical Society*.

Stable isotope geochemistry is central to the study of the solid Earth, its atmosphere, hydrosphere, biosphere, and extraterrestrial environment. New analytical technology of the past decade is revolutionary, causing wider application and more fundamental understanding. This course will show how isotope ratios in minerals, rocks, and fluids provide evidence for understanding a wide range of natural phenomena including: paleoclimate, marine sedimentation, geomicrobiology, biogeochemical cycles, thermal history, hydrothermal and/or metamorphic fluid flow, and igneous petrogenesis. Speakers will review these topics—with emphasis on O, C, H, S, and N isotopes—and the principles of equilibrium and kinetic isotope exchange.

Limit: 120. Fees, professional: \$265 for MSA/GS members, \$300 for nonmembers. Fees, students: \$75 for MSA/GS members, \$110 for nonmembers. (Fees applicable if

registration is received before August 31; student scholarships available.) Information and registration: MSA Business Office, 1015 18th St. NW, Suite 601, Washington, D.C. 20036-5212, (202) 775-4344, fax 202-775-0018; business@minsocam.org; MSA home page, www.minsocam.org.

Brachiopods

Sun., Nov. 4, 8 a.m.–5 p.m. Sponsored by *Paleontological Society*.

The title says it all. This course is intended to provide a current review and summary of the past 20 years of research on brachiopod biology and paleobiology for nonspecialists. Topics include phylogeny and classification of Linguliformea, Craniiformea, and Rhynchonelliformea; genetics and molecular systematics; embryology and development; physiology; biochemistry; ecology; Phanerozoic paleoecology and paleobiogeography; biostratigraphy and stratigraphic patterns; biogeochemistry, diagenesis, and taphonomy; functional morphology and biomechanics; and patterns of diversity. The course is dedicated to G. Arthur Cooper, who enriched the field of brachiopod research immeasurably.

Faculty: Sandra J. Carlson and Michael R. Sandy.

No fee or registration. Information: Sandra J. Carlson, Department of Geology, University of California, Davis, CA 95616, (530) 752-2834, fax 530-752-0951, carlson@geology.ucdavis.edu.

The Art of Technical Writing: Improving Your Technical Reports

Sun., Nov. 4. Sponsored by *National Ground Water Association*.

This one-day workshop will focus on providing tools to improve technical writing skills. The program is divided into six modules: communication, writing process, principles and rules, style, report organization and presentation, and miscellaneous tips and suggestions. The workshop is organized and will be presented in an interactive manner, providing instructions, exercises, hints, and checkpoints that can be used for future references to continuously improve writing skills. Participants should bring recent samples of their writing. These will be used to establish a current style and identify those areas that can be improved.

Faculty: George R. Lytwynshyn is a senior regional program manager at ENSR Corporation. He has more than 26 years of diverse professional environmental experience in industry, consulting, and construction (remediation). His areas of specialization include: environmental management, environmental investigation, design and remediation, environmental due diligence, and regulatory negotiations. He has performed environmental audits

and assessments for various industrial and commercial operations in the areas of permit compliance, operations, and information management. Lytwynshyn has authored several publications in the areas of remedial system assessments, energy alternatives, technology application, rock mechanics, and geology. He is also an adjunct professor for environmental project management in the Masters of Project Management Program at Northwestern University.

Limit: 38. Fee: \$285; includes notebook and refreshments. Information and registration: NGWA, Customer Service Representatives, 601 Dempsey Road; Westerville, OH 43081; (800) 551-7379, fax 614-898-7786, www.ngwa.org.

Gender Equity Workshop

Sun., Nov. 4, 9 a.m.–1 p.m. Sponsored by *Scientists for Indigenous People, National Association for Black Geologists and Geophysicists, GSA Committee on Minorities and Women in the Geosciences, and GSA Committee on Education*.

This will be an interactive workshop encouraging open discussion. Moret will share information from more than 150 interviews with women and minorities in science and her experience presenting workshops for challenged professionals. Issues on tenure, how to use documentation in your career to build your case for promotion, how to seek legal remedy, and the importance of personal integrity throughout the process. Soft money funding issues and strategies will also be covered. How to have a great career because we represent diversity!

Limit: 40. No fee. Preregistration required. Information and registration: Leuren Moret, President, Scientists for Indigenous People, Former President 1994–1995, Association for Women Geoscientists, P.O. Box 3132, Livermore, CA 94550-3132, (510) 845-3139, fax 510-845-3139, leurenmoret@yahoo.com.

Girl Scout Geology Badge Workshop

Sat., Nov. 3, 9 a.m.–noon. Sponsored by *Scientists for Indigenous People, National Association for Black Geologists and Geophysicists, GSA Committee on Minorities and Women in the Geosciences, and GSA Committee on Education*.

The Girl Scout Geology Badge can be earned at several levels. This workshop covers: how to help a troop earn the badge or many troops at a jamboree event (four AWG women did 235 badges in one day); how to contact the Girl Scouts; required activities; how to work with girls of different ages; how to make science fun and geology “funner”; the importance of the

Girl Scout experience for young women as a critical experience for leadership training in adult life; and, from Moret’s personal interviews, how Girl Scout experience influenced the NASA astronauts and their careers.

Limit: 40. No fee. Preregistration required. Information and registration: Leuren Moret, President, Scientists for Indigenous People, Former President 1994–1995, Association for Women Geoscientists, P.O. Box 3132, Livermore, CA 94550-3132, (510) 845-3139, fax 510-845-3139, leurenmoret@yahoo.com.

Job Hunting and Career Development Workshop

Sun., Nov. 4, 1–3 p.m. Sponsored by *Scientists for Indigenous People, National Association for Black Geologists and Geophysicists, GSA Committee on Minorities and Women in the Geosciences, and GSA Committee on Education*.

This workshop will cover the basics of how to find an entry-level job as a new graduate, employment for persons with advanced degrees, and seeking tenure in academia. Other topics include: new areas of employment and career development in government, as an activist, and in non-governmental organizations where scientists are needed; the importance of participating in professional organizations, how to do that effectively, and how it provides many career advantages and opportunities; how to be a scientist and play a part in community decision making; environmental justice; indigenous people and environmental issues; science and the media; and public policy decision making at different levels of government.

Limit: 750. No fee. Preregistration required. Information and registration: Leuren Moret, President, Scientists for Indigenous People, Former President 1994–1995, Association for Women Geoscientists, P.O. Box 3132, Livermore, CA 94550-3132, (510) 845-3139, fax 510-845-3139, leurenmoret@yahoo.com.

Practical Application of XRF Techniques to the Analysis of Geological Materials

Mon., Nov. 5, 9 a.m.–5 p.m. Philips Analytical, Natick, Massachusetts. Sponsored by *Mineralogical Society of America*.

Designed for both novice and experienced users of XRF techniques in geology, this workshop will focus on practical approaches to XRF analysis of soils, rocks, waters, petroleum-based products (oils, gasolines, etc.), and other types of materials typically encountered by geoanalysts. The course will emphasize practical exercises in sample preparation, calibration methods, and analysis of several different geological sample types.

Limit: 20. No fee. Philips Analytical will provide transportation to and from the Hynes



Old Ironsides. Photo courtesy of the Greater Boston Convention and Visitors Bureau.

Convention Center, as well as lunch for all course participants. To enroll, please send your name, address, telephone, fax, and e-mail address to the MSA business office, 1015 18th St. NW, Suite 601, Washington, D.C. 20036-5212, (202) 775-4344, fax 202-775-0018, business@minsocam.org, or visit and register on the MSA home page, www.minsocam.org. Information: David Coler, david.coler@philips.com.

Digital Forum

Wed., Nov. 7, 8:30–11:30 a.m. Sponsored by *Geoscience Information Society*.

Each year, this forum provides a venue where scientists, information specialists, and publishers gather to discuss issues concerning electronic resources and to view new applications in electronic data for earth scientists.

No fee or registration. Open to all meeting registrants. Information: Adonna Fleming, James A. Michener Library, University of Northern Colorado, Greeley, CO 80639, (970) 351-1530, fax 970-351-2963, acflemi@unco.edu.

Special Workshop: Surviving Academia—From Getting the Job to Winning Tenure

Sun., Nov. 4, 8 a.m.–5 p.m. Sponsored by *Association for Women Geoscientists*.

This workshop constitutes a no-holds-barred review of what it takes to win an academic job and keep it. Segments in the course include: how to maximize the chances of winning an academic job, from the application process to the interview; how to write a publishable scientific paper or acceptable scientific proposal;

and how to teach effectively at undergraduate and graduate levels. Most of all, the workshop provides critical mentoring for both men and women graduate students and current junior faculty on how to maximize chances of earning tenure and promotion once they enter academia. The concepts and materials provided in this course are largely derived from a series of very popular lectures Donald I. Siegel prepared for the Syracuse University Future Professorate Program. The mentoring that Siegel and O'Connell will provide will also be very useful to M.S. students and Ph.D. students moving into government or industry employment. The concepts for success are the same.

Faculty: Donald I. Siegel, Syracuse University; Suzanne O'Connell, Trinity College and Wesleyan University.

Limit: 50. Fee: \$20; includes course manual and lunch. Preregistration required. Information and registration: Donald I. Siegel, Dept. of Earth Sciences, 307 Heroy Geology Laboratory, Syracuse University, Syracuse, NY 13244-1070, (315) 443-3607, disiegel@mailbox.syr.edu.

Panel Discussion: Tenure and Promotion—Letting the Cat Out of the Bag

Sun., Nov. 4, 11 a.m.–1:00 p.m. Sponsored by *Association for Women Geoscientists*.

A panel of tenured geoscientists from an array of academic institutions will share experiences—their own and from their service on tenure and promotion committees—on what it takes to get tenure. What are the pitfalls to watch out for? What documentation do you need to keep? Panelists will include: Gail Ashley, Professor, Rutgers University; Margaret Guccione, Professor, University of Arkansas; Judith Hannah, Chair, Dept. of Earth Resources, Colorado State University; and

Claudia Mora, Associate Professor, University of Tennessee. Join us for lunch and an informed discussion of positive steps you can take to succeed in academia.

Limit: 100. No fee; includes lunch. Preregistration required. Information and registration: Mary Anne Holmes, 214 Bessey Hall, Geosciences Dept., University of Nebraska, Lincoln, NE 68588-0340, (402) 472-5211, fax 402-472-4917, mholmes2@unl.edu, www.awg.org.

Geology, Public Lands, and YOU

Sun., Nov. 4, 8 a.m.–3 p.m. Cosponsored by *Institute for Earth Science and the Environment (IEE)*, *Bureau of Land Management*, *National Park Service*, and *USDA Forest Service*.

Learn the differences between federal land management agencies and their missions. Learn what YOU need to know about gaining access to your special areas of geologic interest in national parks, national forests, and Bureau of Land Management lands. Get pointers on conducting research and getting permits on different types of public lands. Take a crash course in the National Environmental Policy Act (public input to agency decisions). Learn how YOU can influence management of public lands and resources.

Registration is required. Information: Katie KellerLynn, (303) 447-2020, ext. 1194, kkellerlynn@geosociety.org.

Earth Scientists on Capitol Hill: Report from Rachel Sours-Page, GSA–U.S. Geological Survey 2000–2001 Congressional Science Fellow

Wed., Nov. 7, noon–1 p.m. Free.

Geology in Government Mentor Program

Wed., Nov. 7, 11:45 a.m.–1:30 p.m.

This program is for undergraduate and graduate students. Representatives from four governmental agencies will conduct a panel discussion (with interaction from the audience) addressing topics that include: current and anticipated future roles for geoscientists within their particular government segments; discussion of interesting or highly visible geoscience projects currently in process; current and future job opportunities within their agencies. Free to students, lunch provided. Registration required, limited seating.



K-16 EDUCATION WORKSHOPS AND EVENTS

K-16 teachers, graduate students, and scientists are invited to join us for an interesting series of workshops for educators at all levels. Enrollment is limited, so plan to preregister to ensure your spot in these very popular sessions. (Register through GSA for all workshops except #5.) Graduate level recertification will be available through the Colorado School of Mines for both workshops and attendance in the technical sessions for an additional fee and a written assignment.

Look for the Share-a-thon Booth in the Exhibit Hall this year. Our display will include a demonstration of a tabletop seismograph.

For more information on any educational program, or if you would like to participate in the Share-a-thon, please contact Diana Stordeur, the Subaru-GSA Distinguished Earth Science Educator, (303) 447-2020, ext. 1182, dstordeur@geosociety.org.

1. Exploring the Solar System in the Classroom: A Multisensory Approach

Sat., Nov. 3, 8:30 a.m.–4:30 p.m. Come explore our solar system in a fun-filled, action-packed, full-day workshop. Teacher will use numerous hands-on activities to explore the many geologic processes that are active in our solar system. Registered participants will receive classroom materials, including recent posters, maps, slides sets, activity workbooks, and much more. Dress casually! Intended for grade levels K-12. Cost: \$20. Registration is required. Information: Cassandra Runyon, runyonc@cofc.edu.

2. How to Get an Undergraduate Research Program Started

Sun., Nov. 4, 8:30 a.m.–noon. This workshop will present strategies and approaches for developing a research program at a primarily undergraduate institution. The workshop is open to all, but is aimed at graduate students preparing to apply for academic positions and new faculty with limited experience. Presentations will cover strategies for obtaining a job at a predominantly undergraduate institution, funding opportunities to support undergraduate research, and models of successful undergraduate research programs. Breakout sessions and group discussions will be used to develop individual plans and share ideas and strategies for getting started, finding money and time, and selecting projects. Intended for graduate students and college faculty. Cost: \$25. Registration is required. Information: Jill Singer, singerjk@buffalostate.edu, or Ed Hansen, hansen@hope.edu.

3. Designing a Successful Student-Centered Online Geology Course

Sun., Nov. 4, 8:30 a.m.–4:30 p.m. Intended for undergraduates and graduate geoscience faculty. Although Web-based courses are becoming increasingly common, the Internet is still a new teaching medium and is unfamiliar to most instructors. This workshop is designed to familiarize geoscience faculty who have an interest in Web education with successful strategies, methods, and design principles. It will be rooted in educational research and sound pedagogical principles, but will be presented in plain language and aimed at earth science courses. The format will focus on hands-on exploration, critique, and discussion of existing Web courses. No familiarity with html or Java is required. Cost: \$40. Registration is required.

4. Earth Science Activities to Develop Process Skills of Elementary School Students

Sat., Nov. 3, 8:30 a.m.–4:30 p.m. Participants will participate in earth science activities to emphasize the development of the process skills of elementary students. The process skills emphasized will be observing, hypothesizing, planning, interpreting, and communicating with specific activities that can be done in the class. Intended for K-6 teachers. Cost: \$10. Registration is required. Information: Barbara Manner, bmanner@lcn.net.

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5. Earthquakes—A One-Day Workshop for College Faculty

Sun., Nov. 4, 8 a.m.–5 p.m. Topics will include causes of earthquakes, plate tectonics, propagation of seismic waves, statistics and data, Earth structure and hazards. About \$120 worth of materials will be given to each participant. Intended for college faculty who teach introductory earth science courses. Cost: free. Registration is required through L.W. Braille, braille@purdue.edu, (765) 494-5979.

6. Exploring Plate Tectonics: A Hands-on Approach

Sun., Nov. 4, 9 a.m.–4 p.m. This active workshop will introduce educators to the concepts behind the theory of plate tectonics. Effective teaching strategies and a comprehensive series of hands-on activities that employ maps, puzzles, and models are used to show the evidence of Pangea, lithospheric plates, and plate motion. Learn why the continental drift hypothesis is not accepted, and take back to your classrooms an entire unit of plate tectonics activities. Participants will also receive a beautiful map of the sea floor. Intended for K-16 educators. Cost: \$25. Registration is required. Information: Leslie Reynolds Sautter, sautterl@cofc.edu.

7. Evolution: Investigating the Evidence for Teachers Grades 6 to 16

Sat., Nov. 3, 8 a.m.–4:30 p.m. What is the evidence for evolution? Why the controversies? How can teachers present major evolutionary concepts in their classrooms in meaningful ways? Join an energetic team of paleontologists and educators in a full-day, hands-on workshop. We will concentrate on what science is and is not, the importance of teaching evolution, and the best teaching strategies. The format will be a combination of informative sessions, discussions, and hands-on activities presented by grade level. Cost: \$30; includes a 400-page book. Registration is required. Information: jscotch@uclink4.berkeley.edu.

GUEST HOSPITALITY ROOM

Beginning Sun., Nov. 4, guests are invited to visit the Hospitality Room located at the Hynes Convention Center. Your local hosts will provide a resource center with abundant information on Boston and the surrounding areas. Formal and informal tour information will be available. Light refreshments will be served throughout the day. Remember to wear your GSA badge; it will be required for admission to the Hospitality Room and the Exhibit Hall. Guest registration does not include access to the technical sessions; however, a guest can obtain a temporary pass to see a spouse or friend present a paper.

Guest Hospitality Room Hours

Sunday through Wednesday, 8 a.m.–5:30 p.m.
Thursday, 8 a.m.–noon

Seminars

Payment of the guest registration fee entitles you to attend seminars offered in the Guest Hospitality Room. Please see the Annual Meeting Program (distributed at the meeting) for a complete list of seminars, information on topics, and times.

The Many Faces of Boston

Mon., Nov. 5, 10 a.m., Guest Hospitality Room. Thomas H. O'Connor, well known for his scholarly works and popular books on the history of Boston, including his recent best seller *Boston from A to Z*, will present an illustrated lecture on the history of Boston.

GUEST ACTIVITIES

All GSA Annual Meeting registered attendees are welcome to sign up for the tours offered as part of the Guest Program. Reservations for all tours will be accepted on a first-come, first-served basis. The tour operator requires a final guarantee several days in advance for most tours, and most tours have minimums and maximums. Please register early to guarantee your spot. Tours may be canceled if minimums are not met. Plan to arrive at the hospitality room 15 minutes before the scheduled departure times for check-in.

Birding in Eastern Massachusetts

Sun., Nov. 4, 6:30 a.m.–late afternoon

Eastern Massachusetts is well known to birders for its variety of habitats. Add eastern species to your list: shorebirds, seabirds, raptors, and even a snowy owl is possible (and if there is a rarity in the area, we'll chase it!). Almost anything is possible in early November as the last wave of southward-bound migrants is passing through, and the first northern, wintering-over species are arriving. We'll plan

to visit one of the world-renowned Massachusetts hotspots north of Boston—the C Parker River National Wildlife Refuge (a.k.a. Plum Island) or Cape Ann. The exact itinerary will be chosen just prior to the trip, depending on bird reports.

We'll travel by van leaving from the Boylston Street entrance of the Hynes Convention Center by the bus pull-off at 6:30 a.m. Sunday morning, and we'll return in time for the GSA Welcoming Party. Bill Drummond, Massachusetts and world birding guide, will lead the trip with help from local geo-birders. Dress warmly, bring binoculars, and we'll provide a few scopes. Max.: 35; min.: 10. Cost: \$34; includes transportation, guide, beverage, and snack. Lunch will be at participant's expense at a local fast food restaurant, or you may bring your own brown-bag lunch.

Complete Tour of Boston—350 Years in a Day

Mon., Nov. 5, 1–5 p.m.

Boston is composed of many neighborhoods, each with its own architecture and atmosphere. You'll get an overview of the city as you tour the major neighborhoods and the historic sites that make Boston such a fascinating place to visit. You'll see Beacon Hill, Boston's most prestigious address, and visit the Back Bay, an elegant section of Boston, which was built 100 years ago according to the plan of Paris' Bois de Boulogne. You'll pass by the midtown Cultural District, Chinatown, and the South End, which boasts the largest Victorian neighborhood in the United States.

Fenway Park is on the route, as well as the Fens section of Boston, which contains the Museum of Fine Arts, the Symphony Hall, and the Isabella Stuart Gardner Museum. You'll pass by the waterfront and then walk into the North End, Boston's famous Italian neighborhood, where you'll visit the Old North Church to see where the lanterns were hung to signal the beginning of Paul Revere's famous midnight ride. Boston's Freedom Trail continues from here. You'll have time on your own in Quincy Market, Boston's renovated central market, where you can browse among the vast array of carts and shops offering everything from local crafts to merchandise from around the world. Max.: none; min.: 40. Cost: \$29; includes transportation, guide service, admissions, taxes, and gratuities.

Marblehead and Old Salem

Mon., Nov. 5, 9 a.m.–4:30 p.m.

Marblehead's cliffs provide a dramatic backdrop to this picturesque harborside village. See the waterfront, enjoy the scenery, and then head for Salem, famous for its horrific witch trials. Salem also is known for its partici-

pation in the China trade. The sea captains of this era built beautiful and stately homes on Chestnut Street, which has been called the most distinguished street in America. You'll visit this lovely neighborhood, tour the Witch Museum, and then dine in a charming harborside restaurant.

Next will be a private tour of the Peabody Museum's rare Oriental treasures and its wonderful and unusual galleries of seafaring art. Finally, there will be a photo stop at the House of Seven Gables and a visit to Ye Olde Pepper Company, the oldest candy shoppe in America. Max.: 80; min.: 40. Cost: \$63; includes transportation, guide service, admissions, luncheon, taxes, and gratuities.

Lexington and Concord—The Shot Heard Round the World

Tues., Nov. 6, 9 a.m.–1 p.m.

Your first stop is historic Lexington Green, the site of the initial skirmish of the American Revolution. Surrounding the Green are three historic homes, each of which played a significant role in the events that occurred in April 1775. You'll have a private tour of one of these homes, Buckman Tavern, preserved as it was more than 200 years ago, and learn what role it played as our country declared its freedom from England.

After your tour, you'll travel the Battle Road to Concord, where you'll visit the Old North Bridge, see the Minuteman Statue, and stand on the site where embattled farmers stood and fired the shot heard round the world. While in Concord, you'll pass by the homes of Louisa May Alcott, Ralph Waldo Emerson, and Nathaniel Hawthorne, three of Concord's most famous residents. Max.: none; min.: 40. Cost: \$33; includes transportation, professional tour guide, all admissions, taxes, and gratuities.

Historic Plymouth

Tues., Nov. 6, 9:30 a.m.–4:30 p.m.

Drive to historic Plymouth, where your first stop is Plymouth Rock, famous as the spot where settlers first landed in the New World. You'll see this site and then go aboard the *Mayflower II*, a duplicate of the ship that carried those hardy souls across the sea. Next is a visit to Plimoth Plantation, which recreates the lives of the settlers who arrived here from England in the 1600s. Called Pilgrims, they established the first successful English colony in New England.

Both on the ship and at the plantation, actual residents are portrayed. Dressed in authentic clothing and speaking with early accents, these Pilgrims will relate their experiences and answer questions about their lives. You can enter their homes and explore the settlement

on your own. Your visit to the plantation also includes a complete luncheon. Max.: none; min.: 40. Cost \$63; includes round-trip transportation by executive motorcoach, services of a professional tour guide, all admissions, complete luncheon, all taxes, and gratuities.

Harvard University and the JFK Library

Wed., Nov. 7, 9 a.m.–1 p.m.

Explore the world-famous Harvard University area where the young John F. Kennedy lived and studied. Stroll through Harvard Yard, the original campus of the oldest university in the country, and see the Ancient Burying Ground where Harvard's first eight presidents are buried. You'll have time to browse in Harvard Square, with its shops, boutiques, and more than 25 bookstores. Your tour will continue as you travel from Cambridge to the shoreline of Dorchester Bay, where you'll visit the spectacular John F. Kennedy Library, designed by I.M. Pei. The museum was recently redesigned.

First you'll see a short film about President Kennedy, and then you'll walk the campaign trail, view the famous Kennedy-Nixon debates,

see the often humorous press conferences, and continue on through the highlights of his presidency. You can sit in on the strategy sessions during the Cuban missile crisis, see the Kennedy oval office, and view the gifts the Kennedys received during his presidency as well as mementos from his personal life. For a short time, you'll relive the thousand days of Camelot. Max.: none; min.: 40. Cost: \$33; includes transportation, guide service, admissions, taxes, and gratuities.

Sturbridge Village and Salem Cross Inn

Wed., Nov. 7, 9:30 a.m.–4:30 p.m.

Depart for Old Sturbridge Village, where you'll have the opportunity to turn back the clock more than 150 years and experience the life, work, and celebrations of a rural New England community in the early 19th century. More than 200 acres of rolling landscape, woodlands, gardens, country pathways, and a working historical farm, and more than 40 restored buildings are all part of this recreated village. Demonstrations of daily tasks and conversations with costumed interpreters will help you understand early American life. Explore village homes, shops, businesses, and the meeting

house. Wander the country roads that lead from the village to the Freeman farm and the mill neighborhood. The sights, smells, and sounds of 1830s New England will greet you each step of the way on your visit back in time.

You'll then be driven down a quiet country road, where, surrounded by rolling hills and meadows, the Salem Cross Inn recalls a time and place ordinarily beyond the reach of contemporary Americans. The inn is known for its extensive collection of American antiques and furnishings. The collections occupy richly paneled rooms in the ancestral home of a family whose forebear, Peregrine White, was the first person born on the *Mayflower*. Built in 1705, the Salem Cross Inn, with its burning room and stream of spring water flowing through the cellar, withstood countless Indian raids, the French and Indian Wars, and the American Revolution. After a tour of the inn by the owner, you'll be seated for a sumptuous luncheon made from ingredients grown on the inn's farmlands. Max.: none; min.: 40. Cost: \$73; includes transportation, guide service, admissions, tour, luncheon, taxes, and gratuities.



Minute man statue of Captain John Parker, Lexington Common.



Paul Revere Statue and Old North Church. As the oldest church building in Boston (1723), this is where the two lanterns were hung before Paul Revere embarked on his midnight ride: "One if by land, two if by sea." Photos courtesy of the Greater Boston Convention and Visitors Bureau.

EXHIBIT HALL

Visit GSA's Web site, www.geosociety.org, to download the exhibit prospectus and browse an online listing of current exhibitors' products and services. For information on becoming an exhibitor, contact the GSA Exhibit Sales Coordinator, Brenda Martinez, (303) 447-2020, ext. 1138, bmartinez@geosociety.org.

Exhibit Hall Hours

Sun., Nov. 4	6–8 p.m. (New hours!)
Mon., Nov. 5	9 a.m.–5:30 p.m.
Tues., Nov. 6	9 a.m.–5:30 p.m.
Wed., Nov. 7	9 a.m.–5:30 p.m.
Thurs., Nov. 8	Closed, except for the GSA Headquarters Services area, which will be open 9 a.m.–2 p.m.

Visit the Shake-a-Thon at the Share-a-Thon Booths

Alan Kafka of Boston College and co-chair of the 2001 Annual Meeting Education Committee will be providing a seismograph demonstration at the Education Share-a-Thon exhibit, booths 103 and 105. The demonstration will show both live-action readings and recent major seismological activity as registered from Boston. Stop by and see how much the Earth moves beneath your feet.

GSA Headquarters Services

In addition to the regular Exhibit Hall hours, the GSA Headquarter Services booths will also be open on Thursday, from 9 a.m. to 2 p.m., to provide GSA members and meeting attendees an additional opportunity to access GSA services, staff members, and publications.

- ◆ GSA Bookstore
- ◆ GSA Coming Attractions
- ◆ GSA Science and Outreach
- ◆ GSA Foundation
- ◆ GSA Geology and Public Policy Committee
- ◆ GSA Member Services



Bradford Washburn Mountain Photography, edited and compiled by Antony Decaneas, will be available for purchase at the GSA Bookstore in Boston. (Or, order online at www.geosociety.org.)

BRADFORD WASHBURN'S MOUNTAIN PHOTOGRAPHY

on Display in Exhibit Hall

Ansel Adams called him the "roving genius of mind and mountains." Traveling the world for eight decades, mountaineer, explorer, cartographer, and aerial photographer Bradford Washburn has documented the landscape from the Grand Canyon to the Alps, Mount McKinley to Mount Everest. Genius inspired Washburn to pioneer photographic techniques that capture the most remote and inaccessible points on earth under conditions worthy of a stunt man. His genius also transformed his photos—conceived for a purely functional purpose—into works of expressive art.

Born in 1910, Bradford Washburn served as director to the Boston Museum of Science for nearly 40 years. He produced numerous award-winning maps, including those of Mount Everest, Mount McKinley, the Grand Canyon, Mount Washington and New Hampshire's Presidential Range. He performed pioneering research in the areas of aerial film, wireless communications, cold-weather search-and-rescue procedures for the U.S. Army Air Forces, and cold-weather survival techniques.

Visit the Panopticon Gallery booth for a look at Washburn's photography in a display sponsored by GSA.

EXHIBITORS

Computer Software

ERDAS, Inc.
ESRI (Environmental Systems Research Institute, Inc.)
RockWare, Inc.
Tasa Graphic Arts, Inc.

Gem and Mineral Dealers, Jewelry, and Gifts

Donald K. Olson Minerals
Gems and Crystals Unlimited
Cal Graeber-IKON Mining
Komodo Dragon
Lungobe Gemstone Mining Co, Ltd.
Roxy Gemstone Jewelry

Geologic Supplies and Related Equipment

***Brunton Company**
Carolina Biological Supply Company
Forestry Suppliers, Inc.
Great Atlantic Stream Flow Meters
HallTech Environmental/Exploration Outfitters
J.L. Darling Corporation
Thermo Elemental

Government Agencies (Federal, State, Local)

Geoscience Laboratories
NASA's Global Change Master Directory
NASA/EOSDIS
National Park Service
National Research Council Canada—Research Press
National Science Foundation
U.S. Geological Survey
Yucca Mountain Project

Instrumentation, Cameras, Scopes

Advanced Geosciences Inc.
ASC Scientific
Beckman Coulter, Inc.
Finnigan MAT
Kratos Analytical, Inc.
Meiji Techno America
Micromass
New Wave Research—Merchantek Products
***Philips Analytical**
Prior Scientific Inc.
Rigaku/USA, Inc.
SPEX CertiPrep., Inc.
Thermo ARL
Welsh Miners' Lamps—Trianco Corp.

Other—Commercial

AMS, Inc.
Bruker AXS, Inc.
Estwing Manufacturing Company
General Supply Corporation
JEOL USA, Inc.
Poland Spring Bottling, Inc.

***Subaru of America, Inc.**
Ward's Natural Science

Other—Educational

Columbia University Press
GSA K-16 Education Share-a-Thon
International Centre for Diffraction Data
Micropaleontology Press
National Ground Water Association
National Research Council/National Academy of Sciences
Rock Detective Geoscience Education
University of Chicago Press

Professional Societies and Associations

AAPG Bookstore
American Geological Institute
American Geophysical Union
American Institute of Professional Geologists
Association for Women Geoscientists
Association of American State Geologists
Association of Engineering Geologists
Council on Undergraduate Research—Geosciences Division
Cushman Foundation
Geoscience Information Society
GSA Planetary Geology Division
GSA History of Geology Division
Mineralogical Society of America
National Association of Geoscience Teachers
National Earth Science Teachers Association
Paleontological Society
SEPM (Society for Sedimentary Geology)
Sigma Gamma Epsilon
Society of Economic Geologists
Society for Geology Applied to Mineral Deposits

Publications, Maps, Films, and Teaching Aids

Academic Press
American Journal of Science

Brooks/Cole Publishing
Cambridge University Press
Elsevier Science/Geobase Abstracts
Houghton Mifflin Company
John Wiley & Sons, Inc.
Kendall/Hunt Publishing Company
Kluwer Academic Publishers
McGraw-Hill
Mountain Press Publishing Co.
Oxford University Press
Paleontological Research Institution
Prentice Hall
Princeton University Press
Seismo-Watch, Inc.
Springer-Verlag New York, Inc.
Vedams eBooks (P) Ltd.
W.H. Freeman & Company
W.W. Norton and Company
Yale University Press

Services (Exploration, Drillings, Consulting, etc.)

Activation Laboratories, Ltd.
Environmental Isotope Lab
Geochron Laboratories/Krueger Enterprises
XRAL Laboratories

State Surveys

New York State Geological Survey
Oklahoma Geological Survey
Pennsylvania Geological Survey (DCNR)

Universities and Schools

Baylor University
Boston College
Colorado School of Mines
Desert Research Institute
Incorporated Research Institutions for Seismology (IRIS)
Louisiana State University
University of Nevada, Las Vegas
University of Nevada, Reno
Wright State University

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SPECIAL EVENTS

GSA Presidential Address and Awards Ceremony

Sunday, November 4, 4–6 p.m. Ballroom B, Hynes Convention Center.

Save Sunday afternoon from 4 to 6 p.m. for GSA President Sharon Mosher's address, "Plate Boundaries to Politics: Pursuing Passions in Science," and the 2001 Annual Meeting Awards Ceremony.

Awardees of the Penrose Medal, the Day Medal, The Young Scientist Award (Donath Medal), the Public Service Award, and the Distinguished Service Award, as well as the newly elected Honorary Fellows, will be announced in the July issue of *GSA Today*.

Hear Sharon Mosher's address and honor your fellow geoscientists, the awardees and Honorary Fellows, at the Presidential Address and Awards Ceremony, then stick around for the Welcoming Party from 6 to 8 p.m. in the Hynes Convention Center.

Exhibits Opening and Welcoming Party

NEW TIME!

Sun., Nov. 4, 6–8 p.m., Hynes Convention Center, Exhibit Hall C.

Join your colleagues to celebrate the grand opening kickoff for the 2001 GSA Annual Meeting and Exposition! This is the time to meet with friends and plan the next four days of networking and meeting activities. Relax and take this opportunity to view the exhibits and enjoy your favorite beverage.

Award Luncheons and Other Ticketed Group Functions

Associated Societies and GSA Divisions invite their members and other interested guests to join them for their annual meal functions, special addresses, and awards ceremonies. Only a few tickets will be available on-site, so please register early for ticketed functions using the preregistration form on page 47. Check the preregistration form for dates. Location and time of events will appear on your ticket and in the 2001 Annual Meeting Program.

Group Alumni Party

Mon., Nov. 5, 7–9:30 p.m. Sheraton Boston Hotel. Come join your former classmates and colleagues at this year's Group Alumni Party at the Sheraton Boston Hotel.

To include your school in the Group Alumni Party, go to www.geosociety.org and complete the Space Request Form, or contact Andrea Harshman at aharshman@geosociety.org, (303) 447-2020, ext. 1158, for details.



Boston Harbor. Photo courtesy of the Greater Boston Convention and Visitors Bureau.

Private Alumni Receptions

Mon., Nov. 5, 7–10 p.m. Locations will be listed in the Annual Meeting Program. Plan to join your fellow alumni for an evening of memories and renewed connections.

Please see the 2001 Annual Meeting Program for a listing of schools holding individual alumni receptions and locations. If you would like to hold an alumni reception, check with your department head, who may have already arranged this with GSA, or send an e-mail to aharshman@geosociety.org.

Dinner and Boston Symphony

Sat., Nov. 3, 6 p.m. Tiger Lilly Restaurant (adjacent to the Boston Symphony Hall). Enjoy a Malaysian dinner before heading to hear the Boston Symphony Orchestra. The concert program will be announced. Nancy Adams, coordinator. Max.: 50. Cost \$90.

Harborlight Dinner Cruise

Wed., Nov. 7, 7–10 p.m. Take a spectacular moonlit cruise of the Boston Harbor aboard *The Spirit of Boston*. View the site of the Boston Tea Party, Old Ironsides, the Mystic Tobin Bridge, and more. Enjoy entertainment, dancing, and bountiful buffets. Varied menu includes something for every taste. Cash bar. Max: 400; cost: \$62 (includes transportation, harbor cruise, dinner buffet, entertainment, and dancing).

Harvard Museum of Natural History Reception

Tues., Nov. 6, 7–9:30 p.m. Twenty-one million specimens, 4.5 billion years, one great experience. Join GSA at the museum for a wonderful evening of socializing and exploring. Cost: \$35 (includes transportation, museum admission, hors d'oeuvres; cash bar).

GSA Ice Hockey in Boston: Wanna Play?

Tuesday or Wednesday evening; dates to be

announced. Information and sign-up: Grant Garven (ice hockey hydrogeologist), Dept. of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, MD 21218, garven@jhu.edu, (410) 516-8689.

GSA members and friends: Join this co-ed, non-contact, social game for fun and exercise! You'll be required to sign a liability release and pay a nominal fee to cover ice rental expenses, and you'll need to provide your own standard hockey equipment: skates, sticks, helmets, and pads.

A Celebration of Barrier Islands

Tues., Nov. 6, Hynes Convention Center.

Join us in Boston at a unique artist-scientist collaboration celebrating the natural visual splendor of the barrier islands of the world. Batik artist Mary Edna Fraser of Charleston, South Carolina, and geologist Orrin Pilkey of Duke University, winner of the 2000 GSA Public Service Award, will share insights as they view the barrier islands of the world, their processes of origin and evolution and their role as "canaries in the mine" in a time of global sea-level rise.

The large-scale batiks of Mary Edna Fraser, which have been on exhibit at the National Science Foundation, the National Academy of Sciences, and at various art museums, will provide the principal illustrations for the presentation. Two of her batiks will be on display in the lecture room. Barrier islands line more than 10 percent of all open ocean shorelines of the world, and island chains from the Arctic to the tropics—on all continents except the Antarctic—will be featured. Orrin Pilkey will summarize our understanding of global barrier island processes, including new insights (and the discovery of "new" island chains) from an ongoing global study of these hugely dynamic features.

GSA EMPLOYMENT SERVICE

Interview Service

Sun., Nov. 4, noon–5 p.m., and Mon.–Wed., Nov. 5–7, 8 a.m.–5 p.m. GSA Employment Service area, Hynes Convention Center. Information or registration forms: Nancy Williams, GSA Member Services, member@geosociety.org, (303) 447-2020, ext. 1117. Forms are also available in the Professional Development section of GSA's Web site at www.geosociety.org.

Do you need qualified scientists to fill staff needs? Or are you looking for employment in the earth sciences? If so, you are invited to participate in the GSA Employment Interview Service.

Employers: All organizations seeking qualified earth scientists are urged to submit notices of their vacancies and their requests for lists of applicants in advance of the meeting. Interview booths may be reserved at the meeting in half-day increments for a nominal fee. GSA staff will handle all interview scheduling with Employment Service applicants.

Job seekers: Many job seekers have found the Employment Interview Service critical to their successful search for positions. The registration fee for applicants is \$35 for GSA members and associates, and \$65 for nonmembers, and includes year-round service as well as interviewing at the Annual Meeting. Students completing degrees during 2001 are particularly encouraged to join the Employment Matching Service and to check the job offerings at the meeting. Applicants who sign up with the Employment Matching Service by September 15, 2001, will have their information included in the materials that employers receive prior to the meeting, so submit your application form and résumé early to receive maximum exposure. Be sure to indicate on the form that you will be attending the meeting. Both applicants and employers may also register on-site.

Employment Opportunities in the Geological Sciences—Roundtable Discussions

Sun., Nov. 4, 1–3 p.m. GSA Employment Service area, Hynes Convention Center. Information: Nancy Williams, GSA Member Services, member@geosociety.org, (303) 447-2020, ext. 1117.

This annual forum on employment opportunities in the geosciences allows valuable one-on-one interaction between panel members and individuals or small groups. Experts in each of the areas listed below will conduct his or her own roundtable discussion designed to provide a better opportunity to field both general and specific questions on a more personal, individualized basis.

You do not have to be signed up for either the Annual Meeting or the Employment Matching Service to participate in these discussions. Everyone—professionals and students—is encouraged to attend. You may join as many of the discussions as you like.

Roundtable discussion leaders from the following areas will be featured this year:

- Academic and education
- Consulting
- Mining
- Petroleum
- Federal government
- Résumé review.
- State and local government

President's Student Breakfast Reception

ExxonMobil
Exploration

Mon., Nov. 5, 7–8:30 a.m. Back Bay Ballroom, Sheraton Boston Hotel. Sponsored by ExxonMobil, hosted by GSA.

GSA President Sharon Mosher invites all students registered for the meeting to attend a free breakfast buffet sponsored by ExxonMobil Corporation. Sharon and members of the GSA leadership, as well as ExxonMobil staff members, will be on hand to answer questions and address student issues. Registered students will receive complimentary coupons redeemable toward the breakfast buffet. This is one of the most popular events at the meeting for students, and with good reason! Take this opportunity to network with fellow students and meet the officers of GSA!

Graduate School Information Forum

Mon.–Wed., Nov. 5–7, 8 a.m.–5:30 p.m. Hynes Convention Center, Exhibit Hall D. A schedule of participating schools will be published in the October issue of *GSA Today*.

Students: Make one trip to Boston to meet with representatives from 40 to 50 top graduate schools from around the country without spending the travel time and money to go to each school for information and interviews. A complete list of participating schools, with contact names and telephone numbers, is available from Brenda Martinez, Exhibit Sales Coordinator, (303) 447-2020, ext. 1138, bmartinez@geosociety.org.

Universities: For your school name to appear in the October issue of *GSA Today* and in the on-site Annual Meeting Program, you must reserve your spot by July 31, 2001. Reservations received after this date will be accepted on a space-available basis and will not appear in either publication. If your school would like to reserve space, contact Brenda Martinez, Exhibit Sales Coordinator, (303) 447-2020, ext. 1138, bmartinez@geosociety.org.

Student Volunteer Program

Receive a free registration along with other benefits by working as a student volunteer at the GSA Annual Meeting. Go to the Annual Meeting Web site, www.geosociety.org/meetings/2001/index.htm to learn more about the Student Volunteer Program and other student opportunities.

If you have additional questions in regard to the Student Volunteer Program, contact Maxine Vondersaar, mvondersaar@geosociety.org, 1-800-472-1988, ext. 1184.

Swan boats in the Boston Gardens.
Photo courtesy of the Greater Boston Convention and Visitors Bureau.



GSA 2001 Annual Meeting and Exposition—Boston Hotels

Boston Hotels	Rates (single/double)	No. on map	Distance to Hynes Convention Center
Sheraton Boston Hotel *	\$202 / \$224	1	Adjacent
Boston Park Plaza *	\$158 / \$178	2 	1.2 miles
Colonnade Hotel	\$231 / \$258	3	4 blocks
Copley Square Hotel	\$163 / \$171	4	4 blocks
Hilton Boston Back Bay	\$194 / \$212	5	Across the street
Lenox Hotel	\$184 / \$209	6	3 blocks
Midtown Hotel	\$162 / \$162	7	6 blocks
Radisson Boston	\$165 / \$180	8 	1.3 miles
Swissotel Boston	\$199 / \$199	9 	2.1 miles
Tremont Hotel Boston	\$196 / \$196	10 	1.5 miles
Westin Copley Place	\$239 / \$259	11	4 blocks, connected by enclosed walkway

*co-headquarters hotel

 indicates hotels that will offer shuttle service to and from the Hynes Convention Center

Boston Hotel Features

Sheraton Boston Hotel * 1215-room hotel featuring Apropros Restaurant, Turning Point Lobby Bar, Executive Business Center, fitness center with indoor/outdoor heated pool, gift shop, 24-hour room service, and concierge desk. All guest rooms include coffee/tea maker, hair dryer, in-room movies, data port, and voice mail.

Boston Park Plaza * 950-room hotel and Boston's only member of Historic Hotels of America. Full-service concierge, business center, travel agency, pharmacy, barber and beauty salon, gift shop, and fitness center. Dining options are McCormick and Schmick's Seafood Restaurant, M.J. O'Connor's Irish Pub, Au Bon Pain, Finale Desserterie, Montillo's Bakery, Swan Court Lobby Bar & Restaurant, Whiskey Park and room service.

Colonnade Hotel The Colonnade is an independent hotel with 285 rooms. Rooms feature dual-line speaker phones, high speed Internet access, minibar, bathrobe, hair dryer, umbrella, and iron. Hotel offers 24-hour room service, valet parking, fitness room, and award-winning Brasserie Jo restaurant.

Copley Square Hotel 143 guest rooms feature a variety of color schemes; no two rooms are exactly alike. In-room hair dryers, irons and ironing boards, personal voice mail and modem hook-ups, electronic key cards, and electronic safes. Three full-service restaurants (The Original Sports Saloon, Speeder & Earl's, and Cafe Budapest), a take-out restaurant (Tennessee's), concierge, and complimentary afternoon tea served in the lobby.

Hilton Boston Back Bay Newly renovated and offering 385 guest rooms with amenities such as hair dryer, minibar, two telephones with voice mail and data ports, coffee maker, iron, and work desk. Boodles Restaurant offers dining in a fun and relaxed atmosphere; Boodles Bar has the largest selection of American micro beers in the area. There is a fitness room and heated indoor sky-lit swimming pool on the premises.

Lenox Hotel 212-room hotel has the quiet, intimate atmosphere of a small, classic European hotel. Two full-service restaurants, Anago and Samuel Adams Brew House, plus The Upstairs Café (breakfast only), in-room dining, valet parking, concierge, valet service, on-premise exercise room. In-room hair dryers, irons, ironing boards, voice mail, dual-line speaker phones, modem ports, fax machines, plush terry bathrobes.

Midtown Hotel The Midtown offers a blend of spaciousness, economy, and comfort in Boston's historic Back Bay. Each room features private bath, climate control, color television with pay-per-view movies and free HBO, telephones with high-speed Internet access, alarm clocks, coffee makers, and ample closet space.

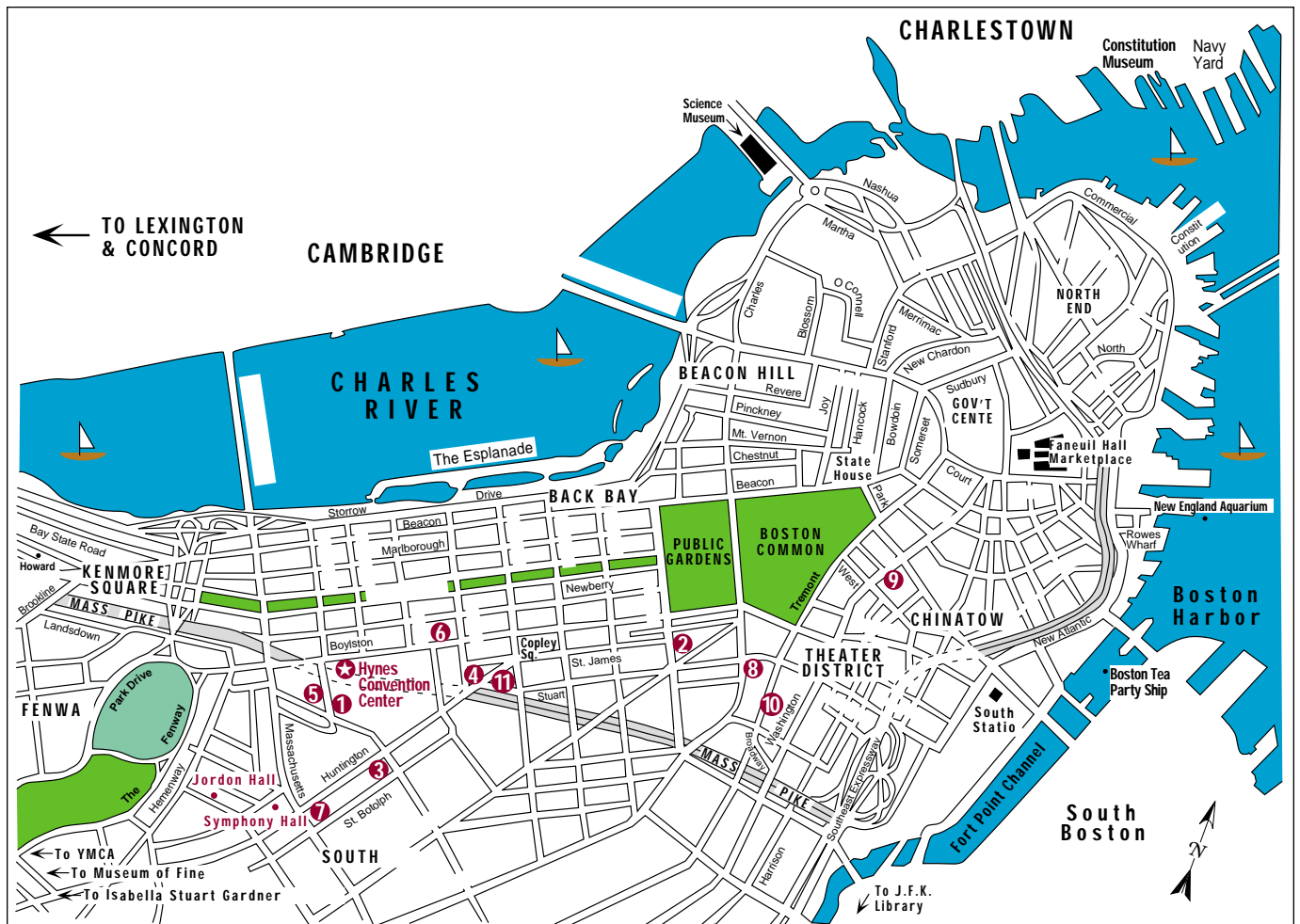
Radisson Boston Located in the heart of Boston's theater district with 356 guest rooms, standard amenities include coffeemakers, data ports, iron, and ironing board. Each room has a private balcony and an inspiring view of Boston. Dining options are the Theater Café and the 57 Restaurant & Bar. Hotel also offers a fitness center and indoor pool.

Swissotel Boston 500 guest rooms feature three multi-line telephones with voice mail, call waiting, and data port, high-speed Internet access, cable television, coffee maker, minibar, hair dryer, iron, and ironing board. Hotel offers 24-hour room service, fitness center/spa with indoor pool, Café Suisse restaurant, Lobby Bar.

Tremont Hotel Boston Centrally located in the heart of downtown Boston, within the city's lively Theater District. Guest room amenities feature coffee maker and complimentary coffee, hair dryers, iron and ironing boards, data ports, free *USA Today* delivered Monday-Friday. Hotel services include fitness center, laundry/valet service, full-service restaurant, lobby lounge, two nightclubs, and room service.

Westin Copley Place 800 standard guest rooms have spacious floor plans and sweeping views of the city. Amenities include a coffee maker with Starbucks coffee, iron/ironing board, in-room safe, plush robe, hair dryer, and Westin's signature line of toiletries. Additional services feature a health club with indoor pool, 24-hour room service, concierge and three restaurants, Turner Fisheries, The Palm and Bar 10.

For more information and to view the hotels, go to the online Hotel Reservation Form at www.geosociety.org.



BOSTON AREA INFORMATION

Getting to Your Hotel from the Airport

- Taxis cost \$15–\$20 to area hotels. All areas within a 12-mile radius of downtown Boston are charged a metered rate. Station wagons, handicap-accessible taxis and credit card taxis are available upon request.
- Shuttles to area hotels depart every 15–30 minutes with an average travel time of 45 minutes and cost \$9–\$11 each way. Not all shuttle companies offer service to all GSA hotels and fares are subject to change. Make advance reservations if possible. For more information on airport transportation, go to www.massport.com.

Back Bay Coach: (617) 746-9909, (888) 222-5229

Logan/Boston Hotel Shuttle: (617) 561-9500, (877) 315-4700

City Transportation: (617) 561-9000

U.S. Shuttle (Reference GSA to receive discount.): (877) SHUTTLE, (617) 889-3366, (781) 894-3100

Getting Around in Boston

GSA Shuttle. Free shuttle service between designated GSA hotels (see grid on pg. 40) and the Hynes Convention Center. Most hotels are within walking distance of the convention center.

Riding the T. The public transportation system in the Boston area—subways, trolleys, buses, and trains—is called the T. Subway and bus stops are indicated by “T” street signs. Service runs seven days a week. Hours are 6 a.m.–midnight Sunday through Thursday, (last train is at 11:45 p.m.), and 6 a.m.–1 a.m. Friday and Saturday (last train is at 12:45 a.m.) The cost is \$1 one way. Visitor passes can be purchased. A one-day pass is \$6.00; a three-day pass is \$11.00, and a seven-day pass is \$22.00. For specific information about public transportation, see www.mbta.com, the Massachusetts Bay Transportation Authority’s home page.

Accessibility for Registrants with Special Needs

GSA is committed to making the Annual Meeting accessible to all people interested in attending. If you need auxiliary aids or

services because of a disability, check the appropriate box on the registration form. If you have suggestions or need further information, contact Andrea Harshman at aharshman@geosociety.org, (303) 447-2020, ext. 1158. Please let us know your needs by October 8.

Tourist Information

For general information about sightseeing, accommodations, restaurants, and shopping visit www.timeout.com/boston/esinf/tourist_info.html. This site is easy to navigate and has much information. If you do not have access to the Internet, contact the Greater Boston Convention and Visitors Bureau, Two Copley Place, Suite 105, Boston, MA 02116-6501, 1-888-SEE-BOSTON.

Weather and Climate

Boston is a comparatively humid climate with an average relative humidity of 68% in November. The average high temperature is 52 °F, the average low is 38 °F, and the monthly average is 45 °F. Normal precipitation is just over 4 inches during November. If you like sunny days, you have a 50% chance of seeing one. The mean wind speed is 13 mph, so keep in mind that this and the humidity will make you feel colder.

Make All Your Meeting Arrangements Online!

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Housing

For the first time, you can make your GSA housing reservations online at www.geosociety.org. It's quick and easy.

GSA has contracted with 11 hotels for special GSA convention rates. Please make reservations early to ensure that you can get a reservation at your preferred hotel. See the hotel grid on page 40 for specific information and pricing on each hotel. Boston hotel rates are high, and to ensure that you can take advantage of the contracted rates, reservations must be made **by September 28**.

The Boston Park Plaza Hotel and the Sheraton Boston Hotel will serve as the co-headquarter hotels and will host business meetings, social events, receptions, and workshops.

Making a Reservation

You have three options:

- 1. Internet:** Use the online hotel reservation form at www.geosociety.org and get immediate confirmation of your reservation.
- 2. Fax:** Complete the hotel reservation form on page 43 and fax it to the Boston Housing Bureau at 312-705-2562.

- 3. Telephone:** Call the Boston Housing Bureau between 9 a.m. and 8 p.m. EST, Monday–Friday at 1-866-870-2415 (toll free) or (312) 396-2122 (international).

Please be sure to read the entire Hotel Reservation Form on page 43 for information regarding hotel reservations. Check all information on the form for accuracy before submitting. List your hotels in order of preference. If your selected hotel is not available, the Housing Bureau will select a hotel on the basis of your specified criteria. **THE RESERVATION CUT-OFF DATE IS SEPTEMBER 28. The GSA convention rates cannot be guaranteed after September 28.** The Boston Housing Bureau will be open and assist with hotel reservations until October 23. After October 23, you must call the hotels directly.

Reservations made online will receive immediate confirmations; all other reservations will receive confirmations within 7 days. If you have not received a confirmation within 7 days, or you need to make a change to or cancel a reservation, contact the Boston Housing Bureau at 1-866-870-2415.

Deposits and Cancellation

All reservations require a one-night room and tax deposit. Any cancellations made within 48 hours of your confirmed arrival date will result in the forfeiture of this deposit.

Travel

Book online at www.geosociety.org and take advantage of the GSA airline discounts—save up to 15%.

Air and Car Travel Discounts: Get There for Less!

Save 5% to 10% on lowest applicable fares with an additional 5% off with a 60-day advance purchase on Delta Airlines, United Airlines, and US Airways. All rules and restrictions apply. Travel between October 29 and November 13, 2001.

Rates with Alamo Rent A Car start as low as \$35/day for economy models and \$155/week with unlimited free mileage.

Calling the Airlines Direct?

When calling airlines direct or if you are using your own travel agent, please use the following codes when making your travel arrangements in order to benefit from the GSA meeting discounts:

Delta Airlines	1-800-241-6760	File # 176879A
United Airlines	1-800-521-4041	File # 560IP
US Airways	1-877-874-7687	GF # 27621973
Alamo Rent A Car	1-800-732-3232	File # 85204GR

See pages 46 and 47 for registration information.

Book Online and Pay NO Transaction Fee!

Visit www.geosociety.org to book your reservations from the convenience of your home or office anytime and be eligible for discounted travel rates. The system is quick and easy.

NOTE: First-time users must register and refer to group #633.

Or, call GSA's official event travel service, Stellar Access, Inc. (SAI), at 800-929-4242 and ask for group #633. Outside the U.S. and Canada: (619) 232-4298, fax 619-232-6497. A \$10 transaction fee will be applied to all tickets purchased via phone service. Reservation hours: Mon.–Fri., 6:30 a.m.–5 p.m. PT.

GSA Annual Meeting and Exposition

Boston 2001: A GEO-ODYSSEY

Boston, Massachusetts ♦ November 1-10, 2001

HOTEL RESERVATION FORM

INSTRUCTIONS

Reservations can be made between **June 6, 2001**, and **October 23, 2001**, by choosing one of the following methods.



INTERNET

Book your reservation online using the interactive site at

www.geosociety.org



FAX

Send a completed form, one copy per room, to **312-705-2562**



TELEPHONE

Call the Boston Housing Bureau, 9 a.m.-8 p.m. EST, Monday-Friday at **866-870-2415 (toll free)**
(312) 396-2122 (international)



ROOM RATES/TAXES

Be sure to book your reservation by SEPTEMBER 28 to take advantage of the special GSA convention rates. After this date, the official GSA room blocks will be released and the hotels may charge significantly higher rates. All rates are per room per night and are subject to a 12.45% tax (subject to change). Hotels may charge additional fees for rooms with more than one occupant. Please provide room and bedding preferences in the Special Request section of this Housing Form. Hotels will assign specific room types upon check-in, based upon availability. ***Please be advised that requests are not guaranteed.***

CONFIRMATIONS

Confirmations will be sent after each reservation booking, modification, and/or cancellation. **Review your confirmation carefully for accuracy.** If you do not receive a confirmation via e-mail, fax, or mail within 7 days after *any* transaction, please contact the Boston Housing Bureau.

MODIFICATION/CANCELLATION

Make, modify, or cancel reservations from 9 a.m. EST on June 6 until 8 p.m. EST on October 23 via the Boston Housing Bureau. Please be advised that after September 28, GSA convention rates are based upon availability and cannot be guaranteed.
**** Any cancellations made within 48 hours of your confirmed arrival date will result in the forfeiture of your one-night room and tax deposit. ****

HOTEL INFORMATION

Arrival Date: _____

Departure Date: _____

Hotel Selection:

(List choices in order of preference.)

First: _____

Second: _____

Third: _____

Fourth: _____

Reservations will be processed on a first come, first served basis. If all four requested hotels are unavailable, please process this reservation according to:

Comparable room rate.

Proximity to conference site.


Room Type: (please fill out both)

Number of people in room: _____

Number of beds in room: _____

Special Request: _____

Smoking Non-Smoking

 _____

List all additional room occupants:

(specify if occupant is a child under age 18)

1. _____ (first) _____ (last)

2. _____

3. _____

DEPOSIT INFORMATION

ALL HOTELS REQUIRE A ONE-NIGHT ROOM AND TAX DEPOSIT PER RESERVATION.

Housing forms without a valid credit card will be returned and will not be processed. Cash, purchase orders and wire transfers are not accepted. Credit card deposits will be charged at the discretion of the hotel holding your reservation on or after October 23. *Credit cards must be valid through November 2001.* Although all reservations must *initially* be guaranteed to a credit card, you may also submit a check deposit *once you have been confirmed a hotel.* Please be advised that there is a **\$15.00** processing fee for cancellations of reservations guaranteed by a check. Checks made out to "Passkey.com/GSA" can be sent to the Housing Bureau at the address below until October 23. After this date, checks must be made out and sent to your assigned hotel.

Passkey.com/GSA

P.O. Box 3191 Boston, MA 02241-3191

Credit Card

American Express

MasterCard

Visa

Other _____

Account Number: _____

Expiration Date: _____
(must be valid through 11/01)

(cardholder's name)

(cardholder's signature)

PRIMARY GUEST INFORMATION: (confirmation will be sent to this guest)

First: _____ MI: _____ Last: _____

Company: _____

Address: _____

City: _____ State/Prov.: _____ Zip/Postal Code: _____

Country: _____

E-mail: _____

Phone: _____ Fax: _____

If outside the USA, please also include country and city codes.

**DO NOT SEND THIS FORM TO GSA. SEND IT TO THE BOSTON HOUSING BUREAU.
PLEASE USE ONE FORM PER ROOM. MAKE COPIES AS NEEDED.**

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Newsroom

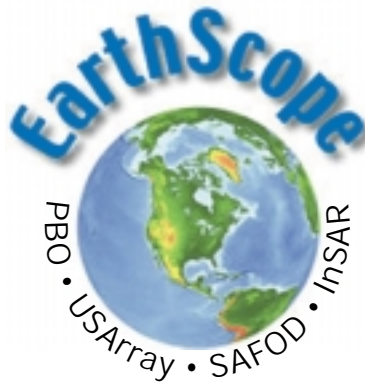
Sun., Nov. 4–Thurs., Nov. 8
Hynes Convention Center

GSA provides a variety of media relations services before and during the Annual Meeting to encourage coverage of science that is of interest to the general public. Newsroom facilities are available for use by media representatives who come on-site, as well as public information officers from participating organizations. Members of the press and public information officers with appropriate credentials may request complimentary meeting registration by contacting Ann Cairns at GSA headquarters (acairns@geosociety.org).

NEW

for Boston: The Equipment You've Been Waiting For

In addition to standard technical equipment—two 35 mm slide projectors, two screens, and one overhead projector—GSA will also provide one LCD projector and one laptop computer loaded with the Windows operating system for anyone interested in giving a PowerPoint presentation. This will be standard equipment in each of the oral technical session rooms. If you intend to give a PowerPoint presentation, please save your presentation on a 100MB IBM-formatted Zip disk. When you arrive at the convention center, please stop by the Speaker Ready Room to test your presentation. More information will be provided in the Speaker's Guide posted on GSA's Web site in mid-August.



EarthScope Workshop:

Making and Breaking a Continent

October 10-12, 2001, Snowbird, Utah

Application Deadline: July 1, 2001

EarthScope: A major research initiative proposed by the National Science Foundation (NSF) Earth Sciences Division to examine the structure and tectonics of North America in unprecedented detail. The facility component of EarthScope includes four elements: San Andreas Fault Observatory at Depth (SAFOD), USArray, Plate Boundary Observatory (PBO), and Interferometric Synthetic Aperture Radar (InSAR). These elements provide highly complementary tools to address a wide variety of fundamental problems concerning continental evolution and dynamics.

Workshop: Explore and develop a wide range of scientific targets for EarthScope. Examples of such targets include large-scale problems of continental scale plate boundary dynamics, mountain building, rifting, and evolution of the stable craton; focussed studies of magmatism, sedimentary basin formation and evolution; and coordinated investigations of volcanoes, earthquake hazards, and resource assessment. Workshop participants are encouraged to expand this list and to develop ideas that integrate the technical resources of EarthScope facilities with complementary geological, hydrological and geophysical information.

Applications: Include a short (less than one page) description of the applicant's intended contribution to the workshop. Notification of application acceptance will be made by August 1, 2001. A short (2–4 page, inclusive of figures) description of the participant's suggestion for subject, process, or natural laboratory to which the EarthScope facility can be directed will be required prior to September 1, 2001. These contributions will be distributed at the workshop, used to form breakout groups to develop themes involving EarthScope, and finally integrated with discussions at the workshop to outline a broad science plan to which the EarthScope facility and supporting science can be aimed. The workshop will be limited to 150 participants. Partial support—air travel (up to \$500), hotel, meals—will be provided by workshop funds. This workshop is supported by the National Science Foundation, National Aeronautics and Space Administration, and the United States Geological Survey.

On Line Application: www.scec.org/earthscope
EarthScope Information: www.earthscope.org

REGISTRATION

Register online at www.geosociety.org.
Go to Boston 2001—A Geo-Odyssey, then to Registration.

Preregistration Deadline: September 28

- Register online at www.geosociety.org.
- Register by mail to 2001 GSA Annual Meeting, P.O. Box 9140, Boulder, CO 80301-9140.
- Register by fax (available 24 hours) at 303-443-1510 or 303-447-0648 (credit card payments only). If you register by fax, please do not send another copy in the mail.

How to Save \$

GSA and Associated Society members can save \$80 (professional members) or \$30 (student members) by preregistering.

Nonmembers can save \$80 (professional members) or \$30 (student members) by joining GSA now. See section on how to join.

GSA offers a discount rate to our members who are 70 years of age and older. Please write your membership number in the space provided and be sure to bring a photo ID to ensure your discount.

Badges? Yes, You Need 'Em!

Badges are needed for access to ALL activities, 10 a.m. Sunday through 5 p.m. Thursday. If your registration form is received at GSA by September 28, your badge will be mailed to you two weeks before the meeting.

If you register after September 28, pick up your badge at the GSA registration desk, Hynes Convention Center.

GSA Members Pay Less—Join Now or at the Meeting

If you are not yet a GSA member, isn't it time you joined? There are two ways to join, and both save you money!

- Pay the nonmember registration rate for the full meeting and complete your membership application at the meeting, and you will receive a FREE membership for 2002. Just look for our Member Services booth at the meeting.

OR

- Join now, pay the lower member registration rate for the meeting, and take advantage of member benefits for the rest of 2001. Professionals and students who join GSA save a substantial amount on their registration fee by paying the member rate. It's like joining GSA for free!

To join now, complete the application form available in the Member Services section on GSA's Web site at www.geosociety.org, or contact Member Services, member@geosociety.org, 888-443-4472, or (303) 447-2020, ext. 1774. It pays to be a GSA member!

Registration Fees	Advance (by 9/28/01)		On-site (after 9/28/01)	
	Full Meeting	One Day	Full Meeting	One Day
Professional Member	\$280	\$175	\$360	\$185
Professional GSA Member (70 or older)	\$225	\$120	\$300	\$130
Professional Nonmember	\$360	\$200	\$450	\$210
Student Member or Student Associate	\$ 90	\$ 60	\$120	\$ 60
Student Nonmember	\$120	\$ 75	\$150	\$ 75
Guest or Spouse	\$ 80	N/A	\$ 80	N/A
K-12 Professional	\$ 40	N/A	\$ 40	N/A
Field Trip or Course Only	\$ 40	N/A	\$ 40	N/A

Member fees apply to members of both GSA and Associated Societies (see registration form for societies).

Guest or spouse fees are for non-geologist spouses or friends of professional or student registrants and are required for those attending guest activities and the exhibit hall. The guest registration fee will not provide technical session access. Any guest wishing to see a specific talk should visit the Guest Hospitality Room for a pass.

Students: A CURRENT student ID is required to obtain student rates. You will have to pay the professional fee unless you have the ID.

Preregistration deadline: September 28

Cancellation deadline: October 5

Registrations will not be processed unless full payment is received. Unpaid purchase orders are NOT accepted as valid registration. The confirmation sent by GSA will be your only receipt. You should receive it within two weeks after your registration is submitted.

Please register only one professional or student per form and retain a copy for yourself.

All registrations received after September 28 will be considered ON-SITE registrations and charged accordingly. Online registration will remain open until October 17, but on-site fees will be charged after September 28. Absolutely no registrations should be mailed or faxed after October 17. After this date, we will handle all registrations at the Hynes Convention Center during the registration hours listed.

On-site fees for Continuing Education Courses are an additional \$30.

On-Site Registration Schedule, Hynes Convention Center

Sat., Nov. 3	7 a.m.–4:30 p.m.
Sun., Nov. 4	7 a.m.–7:30 p.m.
Mon.–Wed., Nov. 5–7	7 a.m.–4:30 p.m.
Thurs., Nov. 8	7–11 a.m.

Cancellations, Changes, and Refunds

All requests for additions, changes, and cancellations must be made in writing and received by October 5, 2001. Faxes are accepted. GSA will refund or credit preregistration fees for cancellations received in writing by October 5. **NO REFUNDS WILL BE MADE ON CANCELLATION NOTICES RECEIVED AFTER THIS DATE.** Refunds will be mailed from GSA after the meeting. Refunds for fees paid by credit card will be credited according to the card number on the preregistration form. There will be NO refunds for on-site registration, *Abstracts with Programs* books, and ticket sales.

Preregistration Form

GSA ANNUAL MEETING • BOSTON

NOVEMBER 1-10, 2001

Preregistration deadline: September 28 Cancellation deadline: October 5

Register online at www.geosociety.org.

GSA Mbr # _____

First Name _____ Last Name _____
 Mailing address Is this a permanent address? Yes No Is this home or work

City _____ State or Province _____ ZIP or Postal Code _____ Country _____
 Daytime Phone _____ Fax _____

Badge Information

First Name/Nickname _____ City/State/Prov. _____

School/Company _____ City/State/Prov. _____

Spouse/Guest First Name/Nickname _____ Last Name _____ City/State/Prov. _____

Will you be working in the exhibit hall? Yes No

Will you be working in the exhibit hall? Yes No

Preregistration Fees (US\$)	Full Meeting	One Day	Qty	Column A US\$ Amt.
Professional Member*	(10) \$280	(11) \$175	1	\$
Professional Member 70 & Older	(12) \$225	(13) \$120	1	\$
Professional Nonmember	(14) \$360	(15) \$200	1	\$
Student Member or Student Associate*	(30) \$ 90	(31) \$ 60	1	\$
Student Nonmember	(32) \$120	(33) \$ 75	1	\$
Guest or Spouse**	(90) \$ 80	N/A	1	\$
K-12 Professional	(60) \$ 40	N/A	1	\$
Short Course or Field Trip Only	(95) \$ 40	N/A	1	\$

Check member affiliation(s) (to qualify for registration member discount): (a) GSA
 (b) AASG (c) AASP (d) AEG (e) AESE (f) AGID (g) AIPG (h) AWG
 (i) CF (j) CUR (k) GIS (l) GS (m) HESS (n) MSA (o) NABGG
 (p) NAGT (q) NESTA (r) NGWA (s) PRI (t) PS (u) SEG (v) SEPM
 (w) SGE (x) SVP (y) GSL

*Member fee applies to any current Professional OR Student Member of GSA or Total Column A \$ _____
 Associated Societies listed above. Discount does not apply to guest registrants.
 **Guest or Spouse registration fee does not allow access to technical sessions.

FAX TO: 303-443-1510 or 303-447-0648
 MAIL TO: GSA ANNUAL MEETING, P.O. BOX 9140, BOULDER, CO 80301-9140
 Remit in U.S. funds payable to 2001 GSA Annual Meeting
 (All preregistrations must be prepaid. Purchase orders not accepted.)

Payment by (check one): Check # _____ American Express VISA MasterCard
 Discover

Card Number _____ Expires _____
 Signature _____

GUEST ACTIVITIES (P. 34)

	Qty	Amount
1. Birding in Eastern Mass., Sun.	(101) \$ 34	\$
2. Complete Tour of Boston, Mon.	(102) \$ 29	\$
3. Marblehead and Old Salem, Mon.	(103) \$ 63	\$
4. Lexington and Concord, Tues.	(104) \$ 63	\$
5. Historic Plymouth, Tues.	(105) \$ 63	\$
6. Harvard Univ., JFK Library, Wed.	(106) \$ 33	\$
7. Sturbridge, Salem Cross Inn, Wed.	(107) \$ 73	\$

SPECIAL EVENTS (P. 38)

1. Harvard Museum of Natural History, Tues.	(201) \$ 35	\$
2. Harborlight Dinner Cruise, Wed.	(202) \$ 62	\$
3. Dinner & Symphony, Sat.	(203) \$ 90	\$

TICKETED GROUP FUNCTIONS

1. G&PP Breakfast, Sun.	(301) \$ 28	\$
2. NAGT, GSA Geosci. Div. Lunch, Mon.	(302) \$ 36	\$
3. AWG Breakfast, Tues., Prof. Student (303A) (303B) \$ 10	(304) \$ 36	\$
4. Paleontological Soc. Lunch, Tues.	(305) \$ 36	\$
5. Hydrogeology Div. Lunch, Tues.	(306) \$ 36	\$
6. SEG Lunch, Tues.	(307) \$ 36	\$
7. MSA Lunch, Tues.	(308A) \$ 10	\$
8. MSA/GS Recept., Tues., Professional Student (308B) \$ 5	(309) \$ 36	\$
9. GIS Lunch, Tues.	(310) \$ 36	\$
10. Hst. of Geology Div. Lunch, Wed.	(311) \$ 36	\$
11. Eng. Geology Div. Lunch, Wed.	(401) \$325	\$
12. Quaternary Sea-level Change	(402) \$230	\$
13. Rare Element Granitic Pegmatites.	(403) \$250	\$
14. The Notches: N.H.'s White Mtns.	(404) \$ 80	\$
15. Science Behind A Civil Action, Sat.	(405) \$190	\$
16. Founders of American Geology.	(406) \$190	\$
17. Metamorphosed Black Shales	(407) \$ 70	\$
18. Avalonion-Alleghanian Tectonism.	(408) \$ 80	\$
19. Science Behind A Civil Action, Sun.	(409) \$ 70	\$
20. Shelburne Falls, Taconian Orogeny.	(410) \$ 70	\$
21. N-Y-F Pegmatites	(411) \$ 70	\$
22. Urban Geology Walking Tour	(412) \$ 20	\$
23. Cobblestones, Puddingstone	(413) \$ 20	\$
24. Engineering Geology of Big Dig	(414) \$ 80	\$
25. Igneous Petrology, Pine Hill.	(415) \$ 40	\$
26. Salem Harbor Power Plant.	(416) \$ 25	\$
27. Geology of East Point, Nahant	(417) \$ 40	\$
28. Groundwater Contamination, MMR (418) \$ 55	(419) \$350	\$
29. Deformation, Metamorphism, & Granite Assent, W. Maine	(420) \$ 55	\$
30. Geology of Mt. Monadnock, N.H.	(421) \$ 55	\$
31. Geology and Water Supply, MMR	(422) \$ 65	\$
32. MetroWest Water Supply Tunnel	(423) \$ 50	\$
33. Neoproterozoic Boston Bay Group.	(424) \$170	\$
34. Metamorphism, Fold-Thrust Belt	(425) \$170	\$
35. The Taconic Questions.	(426) \$280	\$
36. Prehistoric Bedrock Quarries		\$

FIELD TRIPS (P. 24)

1. Quaternary Sea-level Change	(401) \$325	\$
2. Rare Element Granitic Pegmatites.	(402) \$230	\$
3. The Notches: N.H.'s White Mtns.	(403) \$250	\$
4. Science Behind A Civil Action, Sat.	(404) \$ 80	\$
5. Founders of American Geology.	(405) \$190	\$
6. Metamorphosed Black Shales	(406) \$190	\$
7. Avalonion-Alleghanian Tectonism.	(407) \$ 70	\$
8. Science Behind A Civil Action, Sun.	(408) \$ 80	\$
9. Shelburne Falls, Taconian Orogeny.	(409) \$ 70	\$
10. N-Y-F Pegmatites	(410) \$ 70	\$
11. Quaternary Environments, History.	(411) \$ 70	\$
12. Urban Geology Walking Tour	(412) \$ 20	\$
13. Cobblestones, Puddingstone	(413) \$ 20	\$
14. Engineering Geology of Big Dig	(414) \$ 80	\$
15. Igneous Petrology, Pine Hill.	(415) \$ 40	\$
16. Salem Harbor Power Plant.	(416) \$ 25	\$
17. Geology of East Point, Nahant	(417) \$ 40	\$
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19. Deformation, Metamorphism, & Granite Assent, W. Maine	(420) \$ 55	\$
20. Geology of Mt. Monadnock, N.H.	(421) \$ 55	\$
21. Geology and Water Supply, MMR	(422) \$ 65	\$
22. MetroWest Water Supply Tunnel	(423) \$ 50	\$
23. Neoproterozoic Boston Bay Group.	(424) \$170	\$
24. Metamorphism, Fold-Thrust Belt	(425) \$170	\$
25. The Taconic Questions.	(426) \$280	\$
26. Prehistoric Bedrock Quarries		\$

Total Column B \$ _____

SHORT COURSES (P. 29)

For CEU credit—Social Security # _____ Qty Amount

1. Application of Thermochronometry to Tectonics	Professional (501) \$435	\$
Student (501) \$415	\$	
2. Micromorphology of Glacigenic Sediments	Professional (502) \$420	\$
Student (502) \$400	\$	
3. Applications of Environmental Isotopes	Professional (503) \$340	\$
Student (503) \$320	\$	
4. Estimating Rates of Groundwater Recharge	Professional (504) \$250	\$
Student (504) \$230	\$	
5. Management and Leadership Skills	Professional (505) \$260	\$
Student (505) \$240	\$	
6. Mobilization of Metals from Fossil Fuels	Professional (506) \$190	\$
Student (506) \$170	\$	
7. Practical Geoscience Ethics	Professional (507) \$200	\$
Student (507) \$180	\$	
8. Tectonics and Topography	Professional (508) \$385	\$
Student (508) \$365	\$	

IEE-SPONSORED EVENTS (P. 32)

1. Geology, Public Lands, & YOU	(550) FREE	\$ FREE
2. Geology in Govt. Mentor Program	(551) FREE	\$ FREE

K-16 WORKSHOPS (P. 33)

1. Exploring the Solar System	(601) \$ 20	\$
2. Undergraduate Research Program	(602) \$ 25	\$
3. Designing Online Geology Course	(603) \$ 40	\$
4. Activities to Develop Process Skills	(604) \$ 10	\$
5. Exploring Plate Tectonics	(606) \$ 25	\$
6. Evolution: Investigating the Evidence (607) \$ 30		\$

ABSTRACTS WITH PROGRAMS (P. 14)

(Volume shipped approx. 3 weeks prior to meeting. See p. 14 for important information. Colorado residents add 2.9% tax; Boulder, Colorado, residents add 7.46% tax.)

1. GSA Members only	(901) \$ 35	\$
2. Nonmembers	(902) \$ 42	\$

Abstracts volume tax, if applicable \$ _____
Total Column C \$ _____
Total Column B \$ _____
Total Column A \$ _____

TOTAL FEES REMITTED \$ _____

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Calling HQ? Take Note of This Change

In late May, GSA headquarters began using a new phone system that requires the use of four-digit extensions. In order to accommodate this system, the existing three-digit extensions were changed by adding a "1" in front of the number.

For example, to speak with Edna Collis regarding field trips or short courses, call her at extension 1134 (formerly extension 134). The Member Services area can be reached at extension 1774 (formerly extension 774).

"For the same cost, we can now take advantage of technological advances that will improve service to members," said Director of Information Technology Todd Berggren. Helpful features include call forwarding—so you can reach a back-up staff member even if the person you are calling is out of the office—and an automated staff directory—so you can still reach your party even if you don't have his or her extension handy.

2002 GSA Annual Meeting

Denver, Colorado
Colorado Convention Center
October 27-30

Technical Program Chair

John W. Geissman
University of New Mexico

Due Date for Pardee Keynote Symposia and Topical Proposals:

January 17, 2002

Call for Field Trip Proposals

We are interested in proposals for half-day, single-day, and multi-day field trips, beginning or ending in or near Denver and dealing with all aspects of the geosciences.

Due Date for Field Trip Proposals: October 1, 2001

Please Contact the Field Trip Chair

Eric A. Erslev
Department of Earth Resources
Colorado State University
Fort Collins, CO 80523
(970) 491-5661
fax 970-491-6307
erslev@cnr.colostate.edu

For More Information:

(303) 447-2020 or 1-800-472-1988, fax 303-447-0648
meetings@geosociety.org, www.geosociety.org

**Future GSA Meeting:
2003—Seattle, Washington, November 2-5**