

## PROPOSED SESSIONS FOR THE 2001 FALL MEETING

### UNION

#### **U01 Milankovitch and Climate - 25 Years Later**

In commemoration of the 25th anniversary of the historic paper by Hays, Imbrie, and Shackleton on the "Pacemaker of the ice ages," we propose a full-day oral session for the December 2001 meeting in San Francisco. The publication of Hays et al. paper was a watershed event in the history of paleoclimatology that resulted in a greatly increased acceptance of the role of orbital insolation variations on the Pleistocene glaciations. Subsequent work confirmed these findings, expanded the influence to the pre-Pleistocene, and provoked a host of climate modeling studies that have attempted to explain the linkages associated with the orbital pacemaker. The proposed format for the sessions will be a mixture of 20-minute invited talks and contributed abstracts (an additional poster session is also possible). The sessions will focus on a broad spectrum of topics related to orbital insolation forcing and climate, including a retrospective element, advances in the field (observations and modeling, both Pleistocene and pre-Pleistocene), and linkages with higher frequency fluctuations.

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#### **U02 Virtual Earth Laboratories**

Our planet presents us with phenomena of great complexity. Tectonic deformation of the crust, convection in the underlying mantle, dynamo activity of the core, seismic wave propagation, or thermodynamic reactions in solid and magmatic systems are some examples. Traditionally we study these processes in the field or laboratory. However, unprecedented growth in computing resources now presents us with a chance to study many of these complicated processes through careful simulations on a computer. Not surprisingly, computational geophysics has emerged alongside field and laboratory studies as a powerful new tool for Earth Scientists. The impact of this extraordinary development is already being felt. First principle calculations of Earth materials now reinforce high-pressure experiments. Geodynamo simulations add insight into interpreting paleomagnetic observations. Seismologists study wave propagation numerically, while geodynamicists model the evolution of our planet on a global scale. Computational geophysicists share many technical challenges, e.g., efficient algorithms and parallel computing methods, the application of novel Beowulf clusters, or the use of data-assimilation techniques in geophysical simulations. However, they also share a remarkable opportunity to integrate tectonic, seismic mineralogic hypotheses into virtual Earth Laboratories, and testing them against laboratory and field data. In this session, we invite contributions from computational mineralogy, tectonics, mantle and core dynamics, and seismology. We also strongly encourage contributions from observational seismology, geology, mantle geochemistry and high-pressure mineral physics aimed at constraining Earth structure and processes.

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#### **U03 Plate Tectonics and Self-Organization**

This symposium will emphasize some of the broader questions of plate-mantle dynamics such as:

- \* Why do we have plate tectonics at all?
- \* Why are there 12 +- plates presently?
- \* Why are plates organized the way they are?

- \* What is the underlying physics leading to the tectonic style of self-organization?
- \* Do plates control mantle convection and mantle cooling?
- \* What defines a plate?
- \* What makes plate boundaries?
- \* What is the role of the small back-arc-basin plates?
- \* What about plate tectonics in the Archean?
- \* What of the style of tectonics on other planets, and why is Earth (as far as we know) unique?
- \* In far-from-equilibrium systems, the source of the dissipation is as important as the driving forces. What and where is the dissipation in the plate tectonic system? Is the Minimum Dissipation Principle useful?

There have been many AGU sessions on mantle convection, mantle-lithosphere interactions, attempts to marry plates and convection, and on complexity and self-organized criticality. However, we are still far from answering, or even addressing, many of the first order questions of global dynamics. Thus, the goal is to organize a session that both reviews progress in our understanding of why we have plate tectonics, but also tries to look at the problem in different ways than those enumerated above. For example, froths and bubble-rafts may be a useful analog, as they are in studies of re-crystallization, dislocations, localization and various far-from-equilibrium systems. This session will focus on the top of the mantle and the role of the plates and the lithosphere in mantle dynamics and volcanism and evolution of the Earth. The idea that open systems far from equilibrium can organize themselves has been fruitful in many areas of science. Thermal convection itself is often considered the paradigm of self-organization. When interacting tectonic plates develop atop the convecting mantle, they may be organized by convection, or they may dominate the system, thereby organizing convection and controlling the Earth's cooling rate. One attribute of the thermodynamic approach is the ability to provide a unified description of wide classes of systems that is largely independent of the details of the on-going process. Dissipation - a ubiquitous feature of nonequilibrium thermodynamics - is central to self-organization in these systems, but where and how the energy is released is unique to each system. Mantle convection, manifest as subduction of cold slabs, is the likely driving mechanism for plate motion; in that sense, it is often said that the plates ARE mantle convection. However, apart from slab geometry and location, it is still unknown how much convective self-organization and dissipation imprint themselves on the organization of the plates. Exploring the various issues of far-from-equilibrium self-organization, as they apply to Earth science problems and the development of plate tectonics, is the motivation for the session. Subthemes for this session are mantle dynamics as a top-down system, the origins of plate boundaries, pattern formation and self-organization in the Earth sciences, and plate and mantle control of other geospheres (biosphere, atmospheric evolution).

**Conveners:** Don L. Anderson, Seismological Laboratory, California Institute of Technology, MC 252-21, Pasadena, CA 91125 USA, Tel: 626-395-6901, Fax: 626-564-0715, E-mail: [dla@gps.caltech.edu](mailto:dla@gps.caltech.edu); David Bercovici, Yale University, Department of Geology and Geophysics, PO Box 208109, New Haven, CT 06520-8109 USA, Tel: 203-432-3168, Fax: 203-432-3134, E-mail: [david.bercovici@yale.edu](mailto:david.bercovici@yale.edu)

**U04 Ten Years of Science from the 1991 Mount Pinatubo Volcano Eruption** (Joint with G, GP, P, T, NG, MRP, MP)

The 1991 eruption of Pinatubo Volcano in the Philippines was one of the largest volcanic eruptions of the 20th Century and spawned research in many disciplines. For example, in the 10 years since the eruption, volcanologists substantially improved understanding of how strain, magmatic gases, and groundwater produce the distinctive patterns of unrest that foretold Pinatubo's eruption. Atmospheric scientists discovered that winter warming (a forced positive mode of Arctic oscillation) follows large, sulfate-rich tropical explosive eruptions and quantified the effects of volcanic aerosols on ozone depletion. Fluvial hydrologists found world-record sediment yields and are discovering both controls and key indicators of watershed recovery after such a massive disturbance. On its tenth anniversary, we invite papers that emphasize new insights arising from the Pinatubo eruption and its aftermath, in volcanology, volcano-seismology, geochemistry, fluvial and watershed processes, plume transport, effects on ozone, radiative forcing, and climate response.

**Conveners:** Alan Robock, Department of Environmental Sciences, Rutgers University, 14 College Farm Road, New Brunswick, NJ 08901-8551 USA, Tel: 732-932-9478, Fax: 732-932-8644, E-mail: [roboc@envsci.rutgers.edu](mailto:roboc@envsci.rutgers.edu); Christopher Newhall, USGS, Univ. of Washington, Dept Geological Sciences, Box 351310, Seattle, WA 98195 USA, Tel: 206-553-6986, Fax: 206-543-3836, E-mail: [cnewhall@geophys.washington.edu](mailto:cnewhall@geophys.washington.edu); John Power, USGS - Alaska Volcano Observatory, 4200 University Dr., Anchorage, AK 99508 USA, Tel: 907-786-7426, Fax:

#### **U05 Origin and Early Evolution of the Earth (Joint with VGP, T, P, GP, B, A)**

In recent years, our understanding of the accretion and differentiation of the Earth, the evolution of the atmosphere and the origin of life have undergone significant changes as a result of contributions from fields such as planetary dynamics, siderophile element and isotope geochemistry, planetary science and the biogeosciences. As a consequence, earlier paradigms have had to be revised. However, the new scenarios and models have raised many important questions about the origin of the Earth-Moon system and the subsequent early evolution of the Earth. We seek contributions from a broad range of geophysical, planetary, geochemical and biogeoscience disciplines to address aspects of this early history in a synergistic forum. Topics of interest include (but are not limited to) the timing of accretion, core formation, light elements in the core, temperatures and cooling rates, magma oceans, origin of terrestrial volatiles, loss of moderately volatile elements, early atmospheres, impact processes and erosion, water, early crust and continents, origin of life, greenhouse effects, and comparative planetology. It is anticipated that such an interdisciplinary forum will enhance our understanding of this crucial period of Earth history, and strengthen ties between the different disciplines.

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#### **U06 Lacustrine Paleoclimatology: Linking Modern Processes with the Stratigraphic Record**

Climate affects lakes both directly and indirectly through a diverse array of processes. Similarly, the stratigraphic signature of climate variability is influenced by a variety of depositional and post-depositional processes. Thus, a unique climatic interpretation of the stratigraphic record is often impossible. Here we consider studies that try to understand and constrain the climatic interpretation of lacustrine sedimentary records by incorporating studies of lacustrine and climatic processes. We seek contributions from the PEPI transect (the Americas) and elsewhere that include empirical or modeling studies of lake energy and hydrologic budgets or groundwater-lake interactions, studies based on modern calibration data sets, or laboratory studies that consider physical, chemical, and/or biotic variation.

**Conveners:** Sherilyn C. Fritz, Department of Geosciences, University of Nebraska, Lincoln, NE 68588-0340 USA, Tel: 402-472-6431, Fax: 402-472-4917, E-mail: [sfritz2@unl.edu](mailto:sfritz2@unl.edu); Geoffrey O. Seltzer, Department of Earth Sciences, Syracuse University, Syracuse, NY 13244-1070 USA, Tel: 315-443-4980, Fax: 315-443-3363, E-mail: [goseltze@mailbox.syr.edu](mailto:goseltze@mailbox.syr.edu)

#### **U07 Cycles and Trends in Global Surface Mass Redistribution**

Seasonal, interannual, and secular variation in snowcover, ground water, atmospheric surface pressure, and ocean bottom pressure all involve global redistribution of surface mass, and should provide valuable indication of global climate change. This session explores current state of the art and future prospects on monitor global mass redistribution by space geodesy, remote sensing, and in situ measurement. We encourage contributions on the latest in models from the various contributing spheres of mass redistribution, including polar snow and ice models, continental-scale hydrology, and models of mass transport in the oceans and atmosphere.

Contributions are welcome on the effect of mass redistribution on space geodetic measurement of the gravity field, geocenter, Earth rotation, solid Earth deformation, and altimetric measurement of the Earth's various surfaces for mass change calculations. We welcome presentations on prospects for improving our knowledge of mass redistribution from space missions including GRACE (scheduled to launch in November 2001), and how well mass redistribution derived from various branches of Geodesy agree internally and with the sum of the models. We especially welcome presentations providing interdisciplinary insight on what such measurements might imply for our understanding of the water cycle, interactions between Earth's various spheres, and global climate change.

**Conveners:** Geoffrey Blewitt, University of Nevada, Reno, Mail Stop 178, Reno, Nevada 89557 USA, Tel: 775-784-6691 x171, Fax: 775-784-1709, E-mail: [gblewitt@unr.edu](mailto:gblewitt@unr.edu); Benjamin F. Chao, Space Geodesy Branch, Code 926, NASA's

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### **U08 The Science of Abrupt Climate Change and the Implications for Public Policy**

In the past few decades, the research community has focused great attention on gradual physical changes in global and regional climate regimes. Recently, however, there has been a growing awareness that the earth's climate system can shift abruptly from one climate state to another.

Significant attention is now being focused on this issue, but many major gaps in the understanding of abrupt climate changes still exist. The rate, magnitude, and regional extent of these abrupt transitions to different climate states could have far-reaching implications for society and ecosystems. This potential provides strong motivation to better understand the impacts of abrupt climate change and the need for modifications to public policy to deal with these changes. This session will bring together a broad range of scientists investigating abrupt climate change as well as those investigating the societal and ecological impacts of these changes to discuss the current understanding of abrupt climate change, assess proposed mechanisms for such changes, and discuss their potential impacts on society.

**Conveners:** Richard Alley, Pennsylvania State University, 204A Deike Building, University Park, PA 16804-3000 USA, Tel: 814-863-1700, Fax: 814-865-3191, E-mail: [ralley@essc.psu.edu](mailto:ralley@essc.psu.edu); Alexandra R. Isern, Ocean Studies Board, National Research Council, 2101 Constitution Ave. NW, Washington, D.C. 20418 USA, Tel: +1-202-334-2742, Fax: 202-334-2885, E-mail: [aisern@nas.edu](mailto:aisern@nas.edu)

### **U09 Frontiers in Stable Isotope Research: Beyond the Light Elements**

Recent studies have revealed that natural stable isotope fractionations of many elements heavier than S (e.g., Fe, Cu, Zn) are common on Earth. While fractionation mechanisms are generally not yet well-understood, biological reactions appear to be particularly important in some instances. Hence, these novel isotope systems should provide new insights into past and present biogeochemical processes. The study of these systems in meteorites may also provide new constraints on conditions and processes in the early Solar System. Rapid progress is expected in the next few years, especially with the advent of multiple-collector ICP-MS technology. This session aims to provide a forum for the presentation and discussion of new techniques and results in the field of "heavy-element" stable isotope research. Particularly welcome are contributions that describe new findings from natural samples or laboratory studies as well as results of theoretical modelling of fractionation effects.

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### **U10 Database Efforts Within Marine Geology and Geophysics: New Tools for Enhanced Data Access**

The past decade has seen tremendous growth in data acquisition capability within the Marine Geology & Geophysics (MG&G) community, with a wide range of data types collected at increasingly higher resolutions. In addition to traditional ship-based data acquisition, programs in the near future (e.g., observatories) will be collecting and sending data to shore in real time.

With these advances in data acquisition come new problems in data cataloging, access, and synthesis. Scientists across disciplines need the ability to compare different data types, and the tools to manipulate, interpret and visualize these data. At the same time it is also recognized that we need to broaden the use of the data to include the educational community and the general public. The goal of this session is to provide an overview of existing efforts in the MG&G community to define and address these issues. We encourage posters from scientists (users), data providers, engineers, and computer scientists involved in projects for cataloging metadata, improving access to existing data sets, improving coordination among different data sets, improving tools for data analysis and interpretation, and improving usage of the data by the research community and the general public.

**Conveners:** Suzanne Carbotte, Lamont-Doherty Earth Observatory, Palisades, NY 10964 USA, Tel: 845-365-8895, Fax: 845-365-8168, E-mail: [carbotte@ldeo.columbia.edu](mailto:carbotte@ldeo.columbia.edu); Deborah K. Smith, Department of Geology and Geophysics, MS #22, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 USA, Tel: 508-289-2472, Fax: 508-457-2187, E-mail: [dsmith@whoi.edu](mailto:dsmith@whoi.edu); Mary Reagan, Borehole Research Group, Lamont-Doherty Earth Observatory, Palisades, NY 10964 USA, Tel: 845-365-8672, Fax: 845-365-3182, E-mail: [mreagan@ldeo.columbia.edu](mailto:mreagan@ldeo.columbia.edu)



### **U11 Environmental Colloids**

There is increasing evidence that environmental colloids (i.e., organic macromolecules and inorganic microparticles) affect the transport of natural metals and anthropogenic contaminants in hydrologic environments. Colloid generation, stability, and mobility are affected by biological, environmental, geochemical, geophysical, and hydrological processes. Aquatic colloids can facilitate both the removal from, and release into, natural water bodies (eg. estuaries, lakes, groundwater, surface water, and marine environments) of many trace contaminants, metals, radionuclides, and hydrophobic trace organics depending on the environmental conditions (e.g., solids to water ratio) (Honeyman and Santschi, 1989). Recent findings at high solids to water ratios (i.e., groundwater) emphasize the importance of colloids in facilitating transport of elements otherwise not readily mobilized. Colloids have been observed to form in variable redox environments and salt/fresh water interfaces; mobilize plutonium in the subsurface (Kersting et al., 1999, Honeyman, 1999) and other radionuclides (Bauer et. A., 2001); promote mobility of metals in stream water (Kimball, 2000), estuarine and marine environments (Guo et. al., 1997; 2000); and potentially clog fractured rock (Kessler and Hunt, 1999). Colloidal particles may be dislodged by seismic activity, altering hydrologic aquifer permeability and water quality of aquifers and streams (Tokunaga, (1999)). Humic acid colloids that sorb toxic metals may be continuously generated and persist for long periods in shallow groundwaters (Buckau and Kim, 2000). Colloidal gold deposition of biogenic origin was also recently proposed (Southam, 2000) as well as clay accumulation in submarine hydrothermal vents. Colloids, using micellular technology, are used to enhance oil recovery, minimize liquid contaminants in natural gas liquids, and in contaminant remediation with in-situ barriers. New insights into processes that control transport depend on rigorously tested methods, as well as the adaptations of innovations in other disciplines. This session will contain papers describing interdisciplinary scientific studies on colloidal transport in various environmental settings to compare recent advances in techniques, analytical models and findings.

**Conveners:** William L. Dam, Geochemist, Division of Waste Management, U.S. Nuclear Regulatory Commission, Mail Stop T7F3 Washington, DC 20555 USA, Tel: 301-415-6710, Fax: 301-415-5399, E-mail: [wld@nrc.gov](mailto:wld@nrc.gov); Bruce D. Honeyman, Environmental Science and Engineering Division, Colorado School of Mines, Golden, CO 80401 USA, Tel: 303-273-3420, Fax: 303-273-3413, E-mail: [honeyman@mines.edu](mailto:honeyman@mines.edu); James R. Hunt, Lawrence E. Peirano, Environmental Engineering, 535 Davis Hall, University of California, Berkeley, CA 94720-1710 USA, Tel: 510-642-0948, Fax: 510-642-7483, E-mail: [hunt@ce.berkeley.edu](mailto:hunt@ce.berkeley.edu); David Pickett, Center for Nuclear Waste Regulatory Analyses, Southwest Research Institute, 6220 Culebra Road, San Antonio, TX 78238-5166 USA, Tel: 210-522-5582, Fax: 210-522-5155, E-mail: [dpickett@swri.org](mailto:dpickett@swri.org); Peter Santschi, Laboratory for Oceanographic and Environmental Research, Texas A&M University, 5007 Ave U, Galveston, TX 77551 USA, Tel: 409-740-4476, Fax: 409-740-4786, E-mail: [santschi@tamug.tamu.edu](mailto:santschi@tamug.tamu.edu); David Smith, Analytical and Nuclear Chemistry Division, Lawrence Livermore National Laboratory, MS L-231 PO 808, Livermore, CA 94550 USA, Tel: 925-423-5793, Fax: 925-422-3160, E-mail: [smith24@llnl.gov](mailto:smith24@llnl.gov); Tomochika Tokunaga, Department of Geosystem Engineering, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan, Tel: 81-3-5841-7025, Fax: 81-3-3818-7492, E-mail: [tokunaga@geosys.t.u-tokyo.ac.jp](mailto:tokunaga@geosys.t.u-tokyo.ac.jp)

### **U12 Biogeophysics of Global Warming Mitigation**

The amount of carbon-emission free energy needed by mid-century to stabilize CO<sub>2</sub> at "only" twice the preindustrial levels is so massive that it would require a fundamental transformation of the fossil-fuel based global energy system. New carbon-emission-free energy sources could power the global economy of the twenty first century. However, analysis of potential global energy systems and their technological, environmental, and geophysical constraints is in its infancy. Many short- and long-term strategies to combat global warming incorporate technologies with important biogeophysical aspects: These include: (1) lowering non-CO<sub>2</sub> greenhouse emissions, including methane, soot, etc; (2) conservation and energy-demand reduction; (3) CO<sub>2</sub> capture and sequestration; (4) "geoengineering" Earth's radiation balance; and, most importantly, (5) alternate global energy sources and systems (solar, wind and biomass renewables; global scale superconducting transmission lines and hydrogen pipelines; solar power satellites and lunar power systems; "environmentally benign" fission; advanced fusion fuel cycles; extraterrestrial energy sources). We invite contributions analyzing how much carbon-free power various technologies could potentially supply in the next decades and centuries, including analysis of what is feasible in terms of the environment, physics, geophysics, resource limitations, engineering, developmental paths, and economics.

**Conveners:** Marty Hoffert, Andre and Bella Meyer Hall of Physics, Room 503, Mail Code 1013, 4 Washington Place, New York University, New York, NY 10003-6621 USA, Tel: 516-466-9418, Fax: 516-487-0734, E-mail: [marty.hoffert@nyu.edu](mailto:marty.hoffert@nyu.edu); Ken Caldeira, Energy and Environment Directorate, 7000 East Ave, L-103, Lawrence Livermore

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### **U13 Early Applications of Digital Topographic Data from the Shuttle Radar Topography Mission**

Data from the Shuttle Radar Topography Mission, which flew last year, will start becoming available to the SRTM Science Team in June, 2001. By early 2002, the global data set will begin to be released to the public. The 30 m digital elevation model of the entire land mass of the earth between 60 deg N and S latitude will be completed by the end of 2002, forming an unprecedented data set for geoscientists and educators. A variety of investigations will be carried out by the Science Team in the next few months using the data. The investigations will include studies of uplift and erosion of mountain ranges in Asia and South America, evolution of volcanoes in tropical regions, hydrology of the Amazon Basin, topographic characterization of large flood plains, volume changes of ice in Patagonia, earthquake hazards in Burma, urban infrastructure mapping, interactions of climate and tectonics, and comparisons of lidar and radar techniques for geodesy in plate boundary regions. We plan to invite several members of the Science Team (see below) to report early results in these fields and we would be prepared to accept contributed papers if they were on a related topic.

**Conveners:** Tom G Farr, Jet Propulsion Laboratory, Pasadena, CA 91109 USA, Tel: 818-354-9057, Fax: 818-354-9476, E-mail: [tom.farr@jpl.nasa.gov](mailto:tom.farr@jpl.nasa.gov); Paul Rosen, Jet Propulsion Laboratory, Pasadena, CA 91109 USA, Tel: 818-354-0023, Fax: 818-393-5285, E-mail: [Paul.A.Rosen@jpl.nasa.gov](mailto:Paul.A.Rosen@jpl.nasa.gov)

### **U14 Oceans Within Our Solar System and Beyond**

It now appears that there are at least 4 bodies in our Solar System that have large accumulations of liquid either on or below the surface: Earth, Europa, Ganymede and Calisto. The physical and chemical, (and the potential geobiological significance) of these fluid-bearing bodies is a major focus for a wide spectrum of researchers and the general public. Other large ice-rock Solar bodies objects may possess, or have possessed, similar bodies of fluid at some time in their evolution, eg Mars, Titan, Triton, and Pluto. Earth is the only one of these bodies for which we have specific integrated insights and constraints on the dynamic role played by a planetary scale fluid body. Yet, the degree to which insights from our own planet may be useful in guiding exploration of these outer solar system bodies is not now clear. An All-Union Session that brings together Planetologists, Oceanographers, Hydrologists, Geochemists, and Biogeochemists to explore the evident similarities and differences between earth and the potential candidates for space exploration in the coming decades could open the entire AGU membership and through AGU, the public, to this most basic of questions: Is the presence of an ocean on a planetary body an essential (and sufficient?) ingredient for the development and evolution of primitive life? There will be no facile answer to such a question, but the ultimate answer will require a broadly framed, vigorous long-term dialogue crossing many disciplines.

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### **U15 Stick-slip Dynamics in Geological and Geophysical Systems**

Stick-slip behaviour refers to the oscillation between quasi-steady slow and fast sliding modes observed in some geological and geophysical systems. 'Stick' phases occur where strain does not overcome frictional resistance to sliding; 'slip' phases occur where the friction force is exceeded. Stick and slip phases oscillate aperiodically and follow a power-law relationship. The phenomenon of stick-slip therefore demonstrates the interplay between a range of static and dynamic components (stress, strain and friction) of physical systems. Stick-slip behavior also acts to maintain systems in a dynamic equilibrium over certain length scales. Understanding the processes of and controls on stick-slip events on different scales is fundamental to problems in a range of physical science disciplines that include tribology, engineering, structural geology, seismology and non-linear geophysics. Understanding stick-slip dynamics is also important for theoretical and applied geological and geophysical problems as diverse as friction dynamics, fluid flow, stress-strain relations, fault rupture dynamics, earthquake recurrence and predictability and ice and glacier motion.

**Convener:** Jasper Knight, Lecturer, Glacial and Coastal Geomorphology, Glacial Research Group, School of Environmental Studies, University of Ulster, Coleraine, Co Londonderry, Northern Ireland,

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#### **U16 Ocean-Atmosphere-Land Interaction Studies Using Spacebased Scatterometer**

Four spacebased scatterometers (ERS-1, ERS-2, NSCAT, QuikSCAT) launched in the past decade have provided global coverage of ocean surface wind vectors at high spatial resolution, under clear and cloudy conditions day and night. The capability of spacebased scatterometer in measuring polar ice extent and characteristics, land vegetation, soil moisture, and flooding have recently emerged. Scientific applications have extended beyond traditional ocean-atmosphere interaction topics, such wind-driven ocean circulation and marine weather systems, to coastal ecology, air-sea gas flux, polar wind-ice interaction, monsoon influence on continental flooding, ocean influence on Amazon precipitation. This special session welcomes presentation of interdisciplinary studies on the interaction among our atmosphere, hydrosphere and biosphere using spacebased scatterometers.

**Convener:** W. Timothy Liu, M.S. 300-323, Jet Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA 91109 USA, Tel: 818-354-2394, Fax: 818-393-6720, E-mail: liu@pacific.jpl.nasa.gov

#### **U17 Archaeological Evidence for Historic and prehistoric Earthquakes and Volcano Eruptions and their Impact on Human Settlements**

Evidence for the occurrence of ancient destructive earthquakes and volcanic eruptions from archaeological observations is of emerging interest. Such observations not only help extend the historical record of natural disasters backward in time, but also shed light on the settlement, repeated rebuilding, and possible abandonment of ancient cultural centers. Examples can now be found for different regions of Mexico, Central and South America, as well as Greece, Italy and the Middle East. Papers will be presented which describe current research in geophysics, history and archaeology and how these disciplines can interact to produce new insights into the human past as well as the reinterpretation of the patterns of accuracy of past natural disasters.

**Conveners:** Amos Nur, Department of Geophysics, Stanford University, Stanford, CA 94305 USA, Tel: 650-723-9526, Fax: 650-723-1188, E-mail: [nur@pangea.stanford.edu](mailto:nur@pangea.stanford.edu); Robert L. Kovach, Department of Geophysics, Stanford University, Stanford, CA 94305 USA, Tel: 650-723-4827, E-mail: [koc@pangea.stanford.edu](mailto:koc@pangea.stanford.edu)

#### **U18 Scaling Geophysics: where we've been, where we're going?**

From the Earth interior to the upper Atmosphere, geophysical processes are highly nonlinear over wide ranges of temporal and spatial scales. The multiplicity of scales have been often considered and discussed. However, during the last two decades there had been a mushrooming interest on scaling properties of Geophysics, as well as an impetuous development of new concepts, notions, formalisms and techniques, e.g. fractals, multifractals, self-organized criticality and wavelets. From a qualitative understanding of a major Geophysical difficulty, we have arrived at quantitative methods to relate statistics and structures at potentially widely different space-time scales and which provide a systematic basis for aggregation and desaggregation techniques and space-time modeling. This interdisciplinary session will be devoted to the most recent theoretical and operational developments and applications of scaling to characterizing and modeling:

- highly anisotropic fields, such as stratification in the atmosphere and earth interior,
- space-time meteorological, oceanological and hydrological processes and flows,
- anomalous transport and dispersion of pollutants,
- extreme events and their prediction (floods, earthquakes, volcanoes, solar storms).

**Conveners:** Per Bak, Department of Mathematics, Imperial College, 180 Queen's Gate, London SW7 2BZUK, UK, Tel: 44-20-7589-5111, E-mail: [p.bak@ic.ac.uk](mailto:p.bak@ic.ac.uk); Vladimir I. Keilis-Borok, International Institute of Earthquake Prediction Theory and Mathematical Geophysics, Russian Ac. Sci., Warshavskoye sh., 79, kor. 2, Moscow 113556, Russia, Tel: 7-95-110 7795, Fax: 7-95-310 7032, E-mail: [vkborok@mitp.ru](mailto:vkborok@mitp.ru); Rick Lawford, NOAA Office of Global Programs., 1100 Wayne Ave., Suite 1210, Silver Spring, MD 20910 USA, Tel: 301-427-2089 ext. 146, Fax: 301-427-2073, E-mail: [lawford@ogp.noaa.gov](mailto:lawford@ogp.noaa.gov); Shaun Lovejoy, Physics Dept., McGill University, 3600 University St., Montreal, Que. H3A 2T8, Canada, Tel: 514-398-6537, Fax: 514-398-8434, E-mail: [lovejoy@physics.mcgill.ca](mailto:lovejoy@physics.mcgill.ca); Daniel Schertzer, Laboratoire de Modelisation en Mecanique (CNRS UMR 7607), case 162 Universite P. et M. Curie, 4, place Jussieu, F-75252 Paris cedex 05 France, Tel: 33-14-427-4963 (sec: -3790), Fax: 33-14-427.-5259 (or: - 5327), E-mail: [schertze@ccr.jussieu.fr](mailto:schertze@ccr.jussieu.fr)

### **U19 Reconstructions of 19th Century Climate**

There is great potential to generate reconstructions of climate for the 19th century at fine spatial and temporal scales. Nineteenth century historical climate data exist for many parts of the world, and there is a wealth of high resolution proxy data, such as from tree rings and corals, for this century as well. Many proxy records that extend only to the early 19th century have not been fully exploited because of their short length. However, this relatively dense network of historical and paleoclimatic data presents the opportunity to reconstruct regional climate at a fine scale for this century, over many parts of the world. Obtaining a high resolution record of climate for the 19th century for much of the globe will play an important part in our understanding of the current and future climate. The 19th century is of particular interest because it contains climate events and/or characteristics not found in the 20th century (e.g., the conclusion of a period of relatively cold conditions -and some of the coldest years in centuries- for parts of North American and Europe; repeated droughts in the U.S. Great Plains; a high occurrence of hurricanes in the Atlantic), as well as fluctuations in solar irradiance and several highly explosive volcanic eruptions. The goal of this session is to pull together researchers who have studied the climate of this century in order to start to generating a more complete picture of the climate of the 19th century, which appears to have been quite different, in some respect, from the 20<sup>th</sup> century.

**Conveners:** Connie Woodhouse, NOAA Paleoclimatology Program, 325 Broadway E/GC, Boulder, CO, 80305 USA, Tel: 303-497-6297, Fax: 303-497-6513, E-mail: [Connie.Woodhouse@noaa.gov](mailto:Connie.Woodhouse@noaa.gov) or [woodhous@ngdc.noaa.gov](mailto:woodhous@ngdc.noaa.gov); Henry Diaz, NOAA/ERL Climate Diagnostics Center, Mail Code: R/CDC1, 325, Broadway, Boulder, CO 80303 USA, Tel: 303-497-6649, Fax: 30-497-7013, E-mail: [hdiaz@cdc.noaa.gov](mailto:h Diaz@cdc.noaa.gov); or [hfd@cdc.noaa.gov](mailto:hfd@cdc.noaa.gov)

### **U20 State Estimation in Geo-sciences: Status and Prospects**

Time-dependent state estimation has emerged as of importance in various fields of Geo-sciences over the last decade. To some extent this success is due to unprecedented new data sets, e.g. in oceanography, meteorology, and seismology, as well as the new realism of numerical models and great increases in computer power. New software (e.g., automatic differentiation tools), and algorithms (e.g., ensemble methods, robust control) are being developed. This session will review recent developments in state estimation, determination of errors in observations, models, and in resulting states, as well as new approaches that in the future might prove more efficient and flexible than those currently used. Our emphasis will be on applications in geodesy, oceanography, and atmospheric sciences and Geo-sciences generally. Papers are invited that address all aspects of state estimation, and we welcome especially the demonstration of modern methodologies and tools.

**Conveners:** Carl Wunsch, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge MA 02139 USA, Tel: 617-253-5937, Fax: 617-253-4464; Detlef Stammer, Physical Oceanography Research Division, Scripps Institution of Oceanography, Code 0230, La Jolla, CA 92093-0230 USA, Tel: 858-822-3376, Fax: 858) 534-9820, E-mail: ; W. R. Peltier, Department of Physics, University of Toronto, 60 St. George St., Toronto, Ontario, Canada M5S 1A7, Tel: 416-978-2938, Fax: 416-978-8905, Yehuda Bock, University of California San Diego, Institute of Geophysics and Planetary Physics, Code 0225, La Jolla, CA 92093-0225 USA, Tel: 858-534-5292, Fax: 858-534-9873

### **U21 From Seconds to Centuries: Solar Variability and its Impacts on Earth**

The session will be a high-level overview of the enormous range of times scales of solar variability that we have been able to measure and of their effects at Earth, from solar energetic particles that impact Earth in tens of minutes, to solar wind travel times (a few days), to solar rotation times (27 days), to solar cycle times (11 years), to Milankovitch cycle times (tens of thousands of years).

**Conveners:** Judith Lean, Naval Research Laboratory, MC 7673L, Washington, DC 20375 USA, Tel: 202-767-5116, Fax: 202-404-7997, E-mail:

## **ATMOSPHERIC SCIENCES**

### **A01 New Insights Into Stratospheric Chemistry, Dynamics and Transport**

The session will present recent advances in middle atmosphere chemistry, dynamics and transport. We particularly encourage contributions on the following topics:

- \* transport and trends in water vapor
- \* chemistry, dynamics and transport near the tropopause
- \* coupled chemical-dynamical processes
- \* climate change simulations of the stratosphere
- \* analysis of recent measurement campaigns

We intend the session to highlight improvements to the understanding of key processes controlling the structure and composition of the middle atmosphere and how it may be altered by climate change.

**Conveners:** Emily Shuckburgh, Laboratoire de Meteorologie Dynamique, Ecole Normale Supérieure, 24 Rue Lhomond 75231 PARIS CEDEX 05, Tel: +33 1 44 32 22 38, +44 7970 980 421, Fax: +33 1 43 36 83 92, Warwick Norton, Atmospheric, Oceanic and Planetary Physics, Clarendon Laboratory, Parks Road, Oxford OX1 3PU, UK, Tel: 011 44 1865 272 925, Fax: +44 1865 272 923, E-mail: wan@atm.ox.ac.uk

### **A02 Chemical and dynamical data assimilation**

Data assimilation is developing in several areas, including the interplay between atmospheric chemistry and dynamics, and the use of ozone data in particular. In the near future it will play a key role in the exploitation of data from ESA's forthcoming Envisat satellite, NASA's forthcoming Eos Aura satellite and NASDA's forthcoming ADEOS-II satellite. The symposium will provide an opportunity to bring together scientists working on a number of areas concerning these future missions, including remote sensing, data assimilation, atmospheric chemistry and dynamics, and the exploitation of remotely-sensed data using atmospheric and oceanographic models. This symposium welcomes contributions in data assimilation with a special emphasis on the interplay between atmospheric chemistry and dynamics, the use of remotely sensed data from research satellites, and the exploitation of ozone data, including theoretical aspects such as the representation of error covariances.

**Conveners:** William Lahoz, CGAM/DARC, Department of Meteorology, University of Reading, Reading RG6 6BB, UK, Tel: +44 118 9316981, Fax: +44 118 9318316, E-mail: [wal@met.reading.ac.uk](mailto:wal@met.reading.ac.uk); Richard Swinbank, NWP Division, Room 246, Tel: +44-1344 85 6619, Fax: (+44) 1344 85 4046, London Road, Bracknell, Berkshire RG12 2SZ, UK, E-mail: richard.swinbank@metoffice.com

### **A03 Current Understanding of Tropospheric Aerosol: Advances in Laboratory and Field Measurements**

This session will focus on recent and exciting advances in our knowledge of tropospheric aerosols. The state of aerosol measurement is developing due to the increasing concern over the effects of tropospheric aerosols on both human health and climate. New methodologies designed to rapidly characterize particle chemical and microphysical properties have provided the atmospheric science community with increased insight on the complexity and diversity of particles present in the troposphere. It is envisioned that key issues related to mineral dust, organics, soot, sulfate, sea salt and mixed aerosols will be discussed during this special session. These issues include optical properties, phase transitions, heterogeneous chemistry, particle structure and chemical composition. Although most of the session will focus on advances in laboratory and field measurements, the impact of these advances on atmospheric modeling will also be included.

**Conveners:** Vicki H. Grassian, Department of Chemistry, University of Iowa, Iowa City IA 52242 USA, Tel: 319-335-1392, E-mail: vicki-grassian@uiowa.edu; John Jayne, Aerodyne Research Inc, E-mail: jayne@aerodyne.com

### **A04 The Arctic and Antarctic Oscillations: Feedbacks and Connections With the Climate System** (Joint With OS)

Topics include the basic structure of the Arctic and Antarctic oscillations, including their unforced variability, and their development over time on scales from days to decades. Contributions concerning either the hemispheric scale modes or regional modes such as the North Atlantic Oscillation are welcome. Phenomena from the ocean to the mesosphere have been implicated in the generation of these oscillations and their response to external forcings. Papers concerned with response or connections between these patterns and the ocean circulation, sea-ice and the lower and upper atmosphere are therefore especially encouraged.

**Conveners:** Nathan Gillett, Atmospheric, Oceanic and Planetary Physics, Clarendon Laboratory, Parks Road, Oxford OX1 3PU, UK, Tel: +44 186 5 272 088, Fax: +44 1865 272 923, E-mail: [gillett@atm.ox.ac.uk](mailto:gillett@atm.ox.ac.uk); Judith Perlwitz NASA Goddard Institute for Space Studies, 2880 Broadway, New York, NY 10025 USA, Fax: +1-212-678-5552, E-mail: [judith@giss.nasa.gov](mailto:judith@giss.nasa.gov)

### **A05 Lacustrine records of global climate change: a special session in honor of Kerry Kelts**

Lacustrine records are providing new insights into the temporal and spatial variability of past climate change on the continents. The field of limnogeology is at a turning point with the newly developed GLAD 800 drilling system. This, coupled with new analytical approaches for both geochronology and various proxy signals of past climate dynamics, is allowing us to more fully comprehend how the global climate system has impacted continental ecosystems through time, potentially over multiple glacial-interglacial cycles. This session will focus on the last full glacial-interglacial cycle, with special emphasis on time windows of major climate change, including 4 ka, 8.2 ka, the Younger Dryas, and the penultimate (MIS 6/5) glacial - interglacial transition. The session honors the contributions to limnogeology, including the conceptual design of the GLAD 800, by Kerry R. Kelts, who passed away in February 2001.

**Conveners:** Thomas C. Johnson, Large Lakes Observatory, University of Minnesota Duluth, Duluth, MN 55812 USA, Tel: +1-218-726-8128, E-mail: [tcj@d.umn.edu](mailto:tcj@d.umn.edu); Walter E. Dean, U.S. Geological Survey, P. O. Box 25046, MS 980 Denver Federal Center, Denver, CO 80225-0046 USA, Tel: +1-303-236-5760, E-mail: [dean@usgs.gov](mailto:dean@usgs.gov); Vera Markgraf Institute of Arctic and Alpine Research, University of Colorado, Boulder, CO 80309-0450 USA, Tel: +1-303-492-5117, Fax: +1-303-492-6388, E-mail: [markgraf@spot.colorado.edu](mailto:markgraf@spot.colorado.edu); Steve Colman, U.S. Geological Survey, Woods Hole, MA 02543 USA, Tel: +1-508-457-2341, E-mail: [scolman@usgs.gov](mailto:scolman@usgs.gov); E-mail: [schwalb@gfz-potsdam.de](mailto:schwalb@gfz-potsdam.de); [daniel.ariztegui@terre.unige.ch](mailto:daniel.ariztegui@terre.unige.ch); [blas@ipe.csic.es](mailto:blas@ipe.csic.es); Michael Talbot@geol.uib.no

### **REQUESTED UNION SESSION**

#### **A06 Milankovitch and climate - 25 years later** (Joint with U, PL)

In commemoration of the 25th anniversary of the historic paper by Hays, Imbrie, and Shackleton on the "Pacemaker of the ice ages", we propose a full-day oral session for the December 2001 meeting in San Francisco. The publication of Hays et al. paper was a watershed event in the history of paleoclimatology that resulted in a greatly increased acceptance of the role of orbital insolation variations on the Pleistocene glaciations. Subsequent work confirmed these findings, expanded the influence to the pre-Pleistocene, and provoked a host of climate modeling studies that have attempted to explain the linkages associated with the orbital pacemaker. The proposed format for the sessions will be a mixture of 20-minute invited talks and contributed abstracts (an additional poster session is also possible). The sessions will focus on a broad spectrum of topics related to orbital insolation forcing and climate, including a retrospective element, advances in the field (observations and modeling, both Pleistocene and pre-Pleistocene), and linkages with higher frequency fluctuations.

**Conveners:** Thomas J. Crowley, Dept. of Oceanography, Texas A&M University, College Station, TX 77840 USA, Tel: 979-845-0795, Fax: 979-847-8879, E-mail: [tcrowley@ocean.tamu.edu](mailto:tcrowley@ocean.tamu.edu); Warren Prell, Dept. of Geological Sciences, Brown University, Providence, RI, USA, Tel: 401-863-3221, Fax: 401-863-2058, E-mail: [warren\\_prell@brown.edu](mailto:warren_prell@brown.edu)

#### **A07 Predictability of the North American Monsoon System**

The North American monsoon system is a major influence on the warm-season climate over much of North America. This session will provide an overview of current work in analysis and modeling of the North American monsoon. Both modeling and diagnostic studies are appropriate for this session. Contributions are especially encouraged that address predictability of the monsoon on intra-seasonal to inter-annual time scales, and teleconnections of the monsoon with climates of other regions.

**Conveners:** Raymond W. Arritt, Department of Agronomy, Iowa State University, Ames, IA 50011 USA, Tel: +1-515-294-9870, Fax +1-515-294-2619, E-mail: [rwarritt@iastate.edu](mailto:rwarritt@iastate.edu); Robert Oglesby, NASA/MSFC/GHCC, 320 Sparkman Dr., Huntsville AL 35801 USA, Tel: +1-256-961-7595, Fax: +1-256-961-7723, E-mail: [bob.oglesby@msfc.nasa.gov](mailto:bob.oglesby@msfc.nasa.gov)

#### **A08 10 years of UARS**

I would like to propose one special session on HALOE results, in general for measurements, analysis, and modelling results related to the UARS satellite. This year (last half) is particularly important due to the fact that UARS completes orbiting the Earth for 10 years, and have provided ample scientific results for its celebration.

**Conveners:** James Russel III, Hampton University, USA; Mark Scheoberl, GSFC/NASA, USA; and Other Chief Scientists for various UARS instruments.

### **A09 Mid-Century Effects of Climate Change on Water Resources in the West**

The U.S. Department of Energy has funded the Accelerated Climate Prediction Initiative Demonstration Project to perform an experimental "end-to-end" assessment of the possible effects of climate change over the next 30-50 years on water resources in the western United States. This session will present results from this and other recent research on the effects of near-term climate change on this region of the country. As the events of the past year have demonstrated yet again, the environment and economy of the West is particularly vulnerable to climate change and climate variability, particularly as these affect precipitation and water availability. The 30-50 year timeframe is within the planning horizon for many water management, land-use, and environmental issues. The purpose of the session will be to explore the extent to which the risks associated with near-term climate change should be affecting our thinking about these matters. The scope of the session will include research on models and methodologies for assessing regional-scale climate change (including their limitations) as well as results from recent assessments of near-term climate change and climate variability on water resources, agriculture, habitat, energy production and use, fire weather, and other climate-sensitive issues in the West.

**Conveners:** Tim P. Barnett, Scripps Institution of Oceanography, Climate Research Division, USA, E-mail [tbarnett@ucsd.edu](mailto:tbarnett@ucsd.edu); William T. Pennell, Global Environmental Change Research Organization, Pacific Northwest National Laboratory, P.O. Box 999, Richland, WA 99352 USA, E-mail: [william.pennell@pnl.gov](mailto:william.pennell@pnl.gov)

### **A10 Towards a Sargasso Observatory: Integrated physical, biogeochemical and atmospheric studies of the southwestern North Atlantic Ocean** (Joint with OS)

The session will present interdisciplinary research from the Bermuda, Puerto Rico and Carioco time-series sites as well as other collaborative research which has been facilitated by sustained ocean and atmospheric time-series observations. The session will focus on interdisciplinary research results that contribute to a better holistic understanding of the workings of the subtropical gyre. It will also introduce to the wider ocean and atmospheric community the various research components and opportunities within the nascent Sargasso Sea Ocean/Atmosphere Observatory, a consortium formed to coordinate and facilitate research and infrastructure needs in support of science in the region.

### **A11 Chemistry and Transport Near the Tropopause: Results from the 1999 and 2000 ACCENT WB-57F Field Campaigns**

The Atmospheric Chemistry of Combustion Emissions Near the Tropopause (ACCENT) field campaigns were multi-agency sponsored efforts to investigate the chemistry and dynamics of the upper troposphere and lower stratosphere (UT/LS) with a special emphasis on perturbations caused by aircraft and rocket combustion emissions. The missions utilized the NASA WB-57F aircraft and were based at Ellington Field in Houston, Texas during April and September 1999 and September 2000. Over the course of 19 WB-57F sorties the local and regional plume wakes of a variety of aircraft and rocket types were sampled under various meteorological (i.e. convective activity) conditions. The ACCENT mission also collected gaseous and aerosol data in the tropical UT/LS and in the vicinity of hurricane Floyd. The ACCENT data can be used to address a wide variety of important issues concerning the chemistry and dynamics of the natural and perturbed UT/LS region. We invite papers for this session reporting on results from measurement investigations obtained during the ACCENT campaigns, results from modeling studies that incorporate ACCENT data sets, and studies that integrate ACCENT data with coincident data obtained from other balloon, aircraft, and spacecraft platforms.

**Conveners:** R. Friedl, Jet Propulsion Laboratory, USA, E-mail: [Randall.R.Friedl@jpl.nasa.gov](mailto:Randall.R.Friedl@jpl.nasa.gov); K. Rosenlof, NOAA Aeronomy Laboratory, USA, Tel: +1-303-497-7766, Fax: +1-303-497-5373, E-mail: [krosenlof@al.noaa.gov](mailto:krosenlof@al.noaa.gov); M. Ross, The Aerospace Corporation, USA, E-mail: [martin.n.ross@aero.org](mailto:martin.n.ross@aero.org)

### **A12 Integrated studies of terrestrial biosphere B atmosphere exchanges of carbon dioxide, water and energy: FLUXNET approach**

Understanding the flows of CO<sub>2</sub>, water and energy to and from the terrestrial ecosystems is the basis for revealing roles of terrestrial biosphere in global environmental change. This requires constant monitoring of diverse ecosystems, rapid sharing of quality-controlled data among the global science community, and multidisciplinary

synthesizing of scientific findings. This session welcomes reports from the followings topics: Multiyear tower flux measurements; Measurements from underrepresented ecosystems (savannas, tropical rainforests, wetlands, etc.) and regions (Asia, Africa, east Europe and south America); Cross-vegetation type and cross-climate type flux comparisons; Partitioning of NEE or NEP using multiple methods such as stable isotopes, chamber, nighttime flux extrapolation, light response functions, etc.; Impacts of clouds, fronts, extreme weather events, El Niño on flux exchanges; Controls of site conditions, stand age, succession stages, canopy structures, species diversity on flux exchanges; Scaling up of tower flux measurements; Validation of SVAT models for multi-temporal and spatial scales; Interpretation and validation of results from remote sensing such as MODIS derived products and atmospheric inversion; Development of global network of flux towers.

**Conveners:** Lianhong Gu, University of California at Berkeley, Ecosystem Science Division, Dept. of Environmental Science, Policy and Management, 151 Hilgard Hall, Berkeley, CA 94720 USA, Tel.: +1-510-642-2421, Fax: +1-510-643-5098, E-mail: lianhong@nature.berkeley.edu; Dennis Baldocchi, University of California, Berkeley, Ecosystem Science Division, Department of Environmental Science, Policy and Management, 151 Hilgard Hall, Berkeley, CA 94720 USA, Tel: +1-510-642-2874, Fax: +1-510-643-5098, E-mail: baldocchi@nature.berkeley.edu; Steven W. Running, University of Montana, School of Forestry, Missoula, Montana 59812 USA, Tel: +1-406-243-6311, Fax: +1-406-243-4510, E-mail: swr@ntsg.umt.edu.

### **A13 Advances in Aerosol Science and Technology**

The study of atmospheric aerosols is an important component of many research fields including atmospheric chemistry, visibility, human health effects, transport of nutrients and toxics, source apportionment, radiative transfer, global climate, etc. As scientists with increasingly diverse backgrounds enter the field, the number and variety of analytical techniques have increased as well. The development of new analytical techniques and technology and the application of existing technology from other fields have resulted in increasingly sensitive measurements of the size, shape, composition, cloud nucleating and optical properties of aerosols. The rapid advancement of technologies that better characterize aerosol properties will result in vastly increased understanding of the effects of aerosols. This session welcomes papers that focus on the development or application of aerosol analytical techniques that are either novel, unique, or highly sensitive.

**Conveners:** Steven S. Cliff, DELTA Group, Department of Applied Sciences, College of Engineering, One Bainer Dr., University of California, Davis, CA 95616 USA, Tel: +1-530-754-8943, Fax: +1-530-752-9804, E-Mail: sscliff@ucdavis.edu; and Kevin D. Perry, Meteorology Department, One Washington Square, San Jose State University, San Jose, CA 95192-0104 USA, Tel: +1-408-924-5188, Fax: +1-408-924-5191, E-mail: perry@met.sjsu.edu

### **A14 Diagnosing Systematic Errors in Numerical Models of the Climate System**

Assessing how well climate models perform and understanding their systematic errors have long been difficult problems in climate modeling. With increasing resolution, longer simulations, and more complex interactions between major climate system components, new problems and new opportunities have emerged. Accessing and manipulating large data sets containing high-frequency three-dimensional simulation data is but one challenge to the analysis of current climate models. The development of creative analysis techniques that provide insight into the sources of systematic errors is perhaps the most important issue pacing the improvement of numerical models of the climate system. Papers will be welcome that discuss new and novel diagnostic techniques for evaluating climate simulations, especially those methodologies that are capable of revealing the underlying sources of systematic error. These diagnostic approaches can include new ways to look at conventional model intercomparison, as well as process-oriented techniques that illustrate fundamental deficiencies in the representation of key physical processes.

**Conveners:** Gerald L. Potter, Lawrence Livermore National Laboratory, Program for Climate Model Diagnosis and Intercomparison, PO Box 808, MS L-264, Livermore, CA 94550 USA, Tel: +1-925-422-1822, Fax: +1-925-422-7675, E-mail: gpotter@llnl.gov; and James J. Hack, National Center for Atmospheric Research, PO Box 3000, Boulder, CO 80307-3000 USA, Tel: +1-303-497-1387, Fax: +1-303-497-1324, E-mail: jhack@cgd.ucar.edu

### **A15 Sampling Issues in Observing the Atmosphere**

Ground based, air-borne and space-borne instruments that are used to measure transient atmospheric properties have quite different sampling characteristics from one another. These include having different observing volumes, different

spatial and temporal sampling rates, different observing geometries and different fields of view. However, for validation of atmospheric models, for assessing whether instruments meet their requirements, or for data presentation and analysis, such data are often assumed to be representative of a geographically larger region. Since these instruments separately or together give an incomplete spatial and temporal view of such a region this assumption may not be a good one. If this were the case, then data from these instruments would have to be used with care, for example in model validation, in maintaining continuity of measurements, and in change detection. Thus, knowledge is required of the sampling errors and the confidence intervals they provide for the atmospheric properties that are being studied. The relatively few studies that exist on this topic have shown the sampling errors to be quite large - often larger than the observation errors. The need for more such studies to help determine the scientific value of the data they provide is great. This is especially so in the current drive in NASA and ESA for smaller, cheaper, more numerous atmospheric missions. Presentations are called for that examine sampling issues in observing atmospheric properties, such as clouds, precipitation, temperature, humidity, ozone, etc., which result from the sampling characteristics of the observing system.

**Conveners:** I. Astin, Environmental Systems Science Centre, University of Reading, Berkshire, UK, E-mail: [iva@mail.nerc-essc.ac.uk](mailto:iva@mail.nerc-essc.ac.uk); L. Di Girolamo, Department of Atmospheric Sciences, University of Illinois at Urbana-Champaign, Urbana, IL 61801 USA, E-mail: [larry@atmos.uiuc.edu](mailto:larry@atmos.uiuc.edu); G. R. North, Department of Atmospheric Sciences, Texas A&M University, College Station, TX 77843 USA, E-mail: [northead@ariel.met.tamu.edu](mailto:northead@ariel.met.tamu.edu)

#### **A16 Ten Years Of Science From The 1991 Mount Pinatubo Volcano Eruption**

The 1991 eruption of Pinatubo Volcano in the Philippines was one of the largest volcanic eruptions of the 20th Century and spawned research in many disciplines. For example, in the 10 years since the eruption, volcanologists substantially improved understanding of how strain, magmatic gases, and groundwater produce the distinctive patterns of unrest that foretold Pinatubo's eruption. Atmospheric scientists discovered that winter warming (a forced positive mode of Arctic oscillation) follows large, sulfate-rich tropical explosive eruptions and quantified the effects of volcanic aerosols on ozone depletion. Fluvial hydrologists found world-record sediment yields and are discovering both controls and key indicators of watershed recovery after such a massive disturbance. On its tenth anniversary, we invite papers that emphasize new insights arising from the Pinatubo eruption and its aftermath, in volcanology, volcano-seismology, geochemistry, fluvial and watershed processes, plume transport, effects on ozone, radiative forcing, and climate response.

**Conveners:** Alan Robock, Department of Environmental Sciences, Rutgers University, 14 College Farm Road, New Brunswick, NJ 08901-8551 USA, Tel: +1-732-932-9478, Fax: +1-732-932-8644, E-mail: [robock@envsci.rutgers.edu](mailto:robock@envsci.rutgers.edu); Christopher Newhall, USGS, Univ. of Washington, Dept Geological Sciences, Box 351310, Seattle, WA 98195 USA, Tel: +1-206-553-6986, Fax: +1-206-543-3836, E-mail: [cnewhall@geophys.washington.edu](mailto:cnewhall@geophys.washington.edu); John Power, USGS - Alaska Volcano Observatory, 4200 University Dr., Anchorage, AK 99508 USA, Tel: +1-907-786-7426, Fax: +1-907-786-7425, E-mail: [jpower@usgs.gov](mailto:jpower@usgs.gov)

#### **A17 Electrical Effects of Thunderstorms on the Middle and Upper Atmosphere**

Papers are invited for a session to be devoted to all aspects of electrodynamic, radio, and electrochemical effects of thunderstorm activity on the middle and upper atmospheres. Contributors are invited to present their latest results on optical and infrared transient events, associated radio and electromagnetic (ULF VHF) effects, energetic particle and x ray/gamma ray effects, and the thunderstorm and meteorological phenomena associated with middle and upper atmospheric effects. Papers reporting new results from recent field campaigns are of special interest.

**Convener:** Don MacGorman

#### **A18 Lightning and Thunderstorm Electrification**

Rapid technological advances are providing new information with which to study lightning and other discharge processes and to assess how electrical properties of storms depend on storm evolution and on other storm properties. These new technologies were a prime motivation for the Severe Thunderstorm Electrification and Precipitation Studies (STEPS) field program May - July 2000. Furthermore, laboratory studies continue to expand knowledge of microphysical processes that charge water particles, and more realistic numerical cloud models have been developed for examining the interactions and processes underlying the observed electrical properties of storms. This session seeks papers concerning any aspect of the physics, phenomenology, and effects of lightning,

the electrical properties of storms, or the mechanisms by which storms become electrified. Of special interest are observations from STEPS, observations and theory of lightning, relationships of lightning to its host storm, electric fields or charge inside storms, laboratory studies of electrification mechanisms, and numerical storm simulations that include electrical processes.

**Convener:** Don MacGorman

### **A19 SAFARI 2000 - The Southern African Regional Science Initiative**

The Southern African Regional Science Initiative B SAFARI 2000 is an initiative focused on investigating the coupled land-atmosphere processes associated with the emission, transport, transformation, deposition and impact of southern African aerosols and trace gases. Results from research associated with the SAFARI 2000 wet and dry field campaigns will be presented. Abstracts are being sought along the following themes: 1) physical and chemical characterization of southern African aerosols and trace gases; 2) clouds and radiation; 3) physical and chemical characterization of southern African vegetation and land surface; 4) remote sensing and in-situ biomass burning studies; 5) coupled terrestrial-land processes; and 6) satellite validation activities.

**Conveners:** Harold Annegarn, Atmosphere and Energy Research Group, School of Earth Sciences, University of the Witwatersrand, Tel +27 11 717 6551, Fax +27 11 403 7555, E-mail: [annegarn@src.wits.ac.za](mailto:annegarn@src.wits.ac.za); John T. Suttles (Tim), NASA Earth Observing System, Science Systems and Applications, Inc., 132 Indies Drive North, Duck Key, FL 33050 USA, Tel: +1-305- 289-5679, E-mail: [tim.suttles@gssc.nasa.gov](mailto:tim.suttles@gssc.nasa.gov), [jtsuttles@aol.com](mailto:jtsuttles@aol.com); R. J. Swap (Bob), University of Virginia, Department of Environmental Sciences, 291 McCormick Rd., P.O. Box 400123, Charlottesville, VA 22904-4123 USA, Tel: +1-804-924-7714, Fax: +1-804-924-3323, E-mail: [rjs8g@virginia.edu](mailto:rjs8g@virginia.edu), [Swapper@virginia.edu](mailto:Swapper@virginia.edu)

## **BIOGEOSCIENCES**

### **B01 Linked Studies of Hydrology and Biology (Joint with Hydrology)**

The health and well being of populations of most life forms is dependent on the availability and quality of water. The spread of human civilization during the last millennia was largely controlled by water availability and often truncated by the loss of a quality supply. The quality of fresh water also largely determines the quality of aquatic wildlife habitat and the health of ecosystems. In parts of the United States, water quality is degraded to the point of having an adverse affect on aquatic communities or species that frequent water bodies. This session invites papers that link hydrologic investigations of water quantity or quality with biologic investigations of species richness or species population. Papers should address one of the following questions: How was your study conceptualized and implemented? How did site hydrology related to site biology? What was the most relevant hydrologic and biologic information that your study collected? Do the results of your study suggest a management strategy that could improve the habitat of an impacted species?

**Conveners:** William A. Battaglin, U.S. Geological Survey, Box 25046, MS 406, Denver Federal Center, Lakewood, CO 80225 USA, Tel: +1-303-236-5950x202, Fax: +1-303-236-5919, E-mail: [wbattagl@usgs.gov](mailto:wbattagl@usgs.gov); and Stephen D. Porter, U.S. Geological Survey, Box 25046, MS 406, Denver Federal Center, Lakewood, CO 80225 USA, Tel: +1-303-236-5950x216, E-mail: [sdporter@usgs.gov](mailto:sdporter@usgs.gov)

### **B02 Biological mineralization: Joint with Oceans**

The biologically mediated crystallization of inorganic ions produces single crystals and composites with remarkable morphological and chemical properties that fulfill specific functional needs. The abundance of these biominerals throughout the ancient rock record, sediments, as well as the water columns of modern oceans chronicle the intertwined roles of biota and Earth history. A renewed interest in biomineralization is emerging because biomineral compositions and structures are becoming widely used to interpret paleoenvironments and may hold clues for unambiguously identifying minerals with biogenic origins. Further, the physical basis of biomineralization processes continues as one of Nature's best kept secrets. Science cannot yet interpret her blueprints to emulate the most simple nano- or macro-scale structures. Recent advances in the biogeochemistry, materials, and ocean science communities are beginning to decipher the complexity of mineralization processes and their resulting signatures. This special session invites papers to present new findings in this rapidly advancing research area.

**Coveners:** Patricia M. Dove, Virginia Polytechnic Institute and State University, USA, E-mail: dove@vt.edu; and James J. DeYoreo, Lawrence Livermore National Laboratory, USA, E-mail: deyoreo1@llnl.gov

### **B03 Geologic influences on biology and biogeochemistry; long term controls over ecosystem dynamics**

Ecological systems are distributed across landscapes in distinct patterns and exhibit changes through time that reflect the influence of underlying geologic substrates and geological change. Geologic factors influence biology through mechanisms such as nutrient supply through weathering, soil textural controls over water availability and changes in landscape stability. Ecosystems may also respond to remote geologic factors via atmospheric transport of surficial materials. In this session, we encourage the submission of abstracts that explore the linkages between geologic and biologic systems on time scales from decades to millennia. Submissions could include examinations of the role of surficial geology in the distribution of ecological systems through time and space or studies of the mechanisms by which biogeochemical cycles are affected by substrate and eolian inputs.

**Conveners:** Jason Neff, Earth Surface Processes Team, U.S. Geological Survey, MS 980, Denver Federal Center, Denver, CO 80225 USA, Tel: +1-303-236-1306, E-mail: [jneff@usgs.gov](mailto:jneff@usgs.gov); Rich Reynolds, Earth Surface Processes Team, U.S. Geological Survey, MS 980, Denver Federal Center, Denver, CO 80225 USA, Tel: +1-303-236-1303, E-mail: [reynolds@usgs.gov](mailto:reynolds@usgs.gov)

### **B04 Proving Bioremediation**

Our focus is on the evaluation of bioremediation progress or success. Passive or stimulated bioremediation may be cost-effective in eliminating the threat posed by subsurface toxic waste, but assessing the effects of biotic activity is not straightforward. The presence of microbes capable of effecting the desired chemical transformation doesn't guarantee that the transformation is occurring. The observation of decreased concentrations of the targeted contaminant is also insufficient, since other processes, such as dilution and adsorption, can modify concentration. Evidence that bioremediation is occurring may rely on the observation and quantification of contaminant reaction products (e.g., transient biologically-produced intermediates), on the direct measurement of molecular signatures (e.g., mRNA) indicating the appropriate microbial activity, or on indirect measurements of biogeochemical processes that indicate microbe-mediated cleanup. We invite papers that demonstrate the assessment of bioremediation. These may include assessments that demonstrate that bioremediation is not proceeding, or analyses of assessment methods that failed. While bioremediation is the topic of this session, assessments based in other disciplines, such as geochemistry, geophysics, or hydrology, are also encouraged.

**Conveners:** James P. McKinley, Pacific Northwest National Laboratory, USA, Tel: +1-509-375-6841, Fax: +1-509-375-6954, E-mail: [james.mckinley@pnl.gov](mailto:james.mckinley@pnl.gov); Frederick S. Colwell, Idaho National Engineering and Environmental Laboratory, USA, Tel: +1-208-526-0097, Fax: +1-208-526-0828, E-mail: [fxc@inel.gov](mailto:fxc@inel.gov)

### **B05 Integrated studies of terrestrial biosphere B atmosphere exchanges of carbon dioxide, water and energy: FLUXNET approach**

FLUXNET is a global network of micrometeorological tower sites, which measure the exchanges of carbon dioxide, water vapor and energy between terrestrial ecosystem and atmosphere. Its goals are to understand the mechanisms controlling the flows of CO<sub>2</sub>, water and energy to and from the terrestrial biosphere across the spectrum of time and space scales, and to provide ground information for validating estimates of net primary productivity, evaporation and energy absorption that are being generated by sensors mounted on the NASA TERRA satellite. At present, over 140 sites are operating on a long-term and continuous basis. Many sites have produced over 4 years of data. Vegetation under study includes temperate conifer and broadleaved (deciduous and evergreen) forests, tropical and boreal forests, crops, grasslands, chaparral, wetlands and tundra. The latitudinal distribution of these sites ranges from 70 degrees north to 30 degrees south. Data and site information are available from the FLUXNET Web site, <<http://www-eosdis.ornl.gov/FLUXNET>><http://www-eosdis.ornl.gov/FLUXNET>.

The objectives of this proposed FLUXNET special session are:

- To provide a forum where ecologists, atmospheric scientists, micrometeorologists, climatologists can communicate with each other to address issues that require them to work together;
- To provide an opportunity for the global tower flux community to review the scientific advances achieved so far and to identify remaining challenging issues and future directions;
- To publicize the unique flux data collected through FLUXNET.

It may serve as a joint session among Biogeosciences, Atmospheric Sciences and Hydrology.

**Conveners:** Lianhong Gu, Dennis Baldocchi, Steven W. Running

### **B06 Measuring and modeling biosphere-atmosphere exchange of CO<sub>2</sub> and Energy**

We invite speakers to discuss evaluation of carbon dioxide, water vapor and energy fluxes over vegetation, using a combination of modeling and micrometeorological measurements. Flux site data includes meteorological data for driving models or testing climate model outputs, micrometeorological data for climate model testing, and measurements of flux components. Topics that are relevant to this session would include: (1) evaluating ecosystem and canopy process models; (2) evaluating coarse scale inversion model estimates of CO<sub>2</sub> exchange; (3) scaling issues related to flux footprints and model/remote sensing aggregation of input data and model outputs; (4) micrometeorological data analysis issues and approaches to address problems associated with low wind conditions and complex terrain; (5) reducing uncertainty in annual estimates of CO<sub>2</sub> and water vapor exchange; (6) using ecophysiological, micrometeorological and biogeochemical approaches to evaluate CO<sub>2</sub> and water vapor exchange over vegetation; (7) the influence of phenology, incident radiation, and drought on carbon dioxide and water vapor exchange; (8) the influence of disturbance on mass and energy exchange.

**Convener:** Beverly Law, 328 Richardson Hall, College of Forestry, Oregon State University, Corvallis, OR 97331-5752 USA, Tel: +1-541-737-6111, Fax: +1-541-737-1393, E-mail: lawb@fsl.orst.edu

### **B07 Geomicrobiology and Biogeochemistry of Gas Hydrate Systems**

Gas hydrates underlie complex ecosystems in the oceans. This session will focus on the feedback mechanisms among physical, chemical, and biological processes affecting gas hydrate ecosystems. Topics for this session include, but are not limited to, micro- and macro-biological communities affected by gas hydrate formation and degradation, biogeochemistry of gas hydrate-associated hydrocarbons, and geochemical indicators of microbial-gas hydrate interactions. Advanced biological and geochemical techniques are particularly solicited for this session. These include, but are not limited to, molecular biology, high-resolution electron microscopy, lipid biomarkers, compound-specific stable isotopes, and biogeochemical modeling.

**Conveners:** Chuanlun Zhang, Department of Geological Sciences, 101 Geological Sciences, Building, University of Missouri, Columbia, MO 65211 USA, Tel: +1-573-884-2677, Fax: +1-573-882-5458, E-mail: Zhangcl@missouri.edu; Brian D. Lanoil, California Institute of Technology, 1200 California Ave, M/C 170-25, Pasadena, CA 91125 USA, Tel: +1-818-354-3147 Fax: +1-818-393-4445, E-mail: lanoilb@gps.caltech.edu.

### **B08 Food-Webs and Nutrient Cycling in Terrestrial and Near-Shore Ecosystems**

Recent insights into the transformation of stable isotopes during nutrient uptake and cycling have led to revised trophic models of ecosystems. This session seeks to explore the latest observations of how organism physiology, behavior and relationships can be elucidated using isotopic measurements across ecosystems and across food webs. Special emphasis will be placed upon terrestrial soil as well as estuarine environments.

**Conveners:** A. Hope Jahren, The Johns Hopkins University, Department of Earth and Planetary Sciences, Baltimore, MD 21218 USA, Tel: +1-410-516-7134, Fax: +1-410-516-7933, E-mail: jahren@jhu.edu; Katalin Szlavecz, The Johns Hopkins University, Department of Earth and Planetary Sciences, Baltimore, MD 21218 USA, E-mail: szlavecz@jhu.edu

### **B09 Biological Processes and the Isotopic Composition of the Atmosphere**

This session will explore the physiological, ecological, and microbial processes that influence the isotopic composition of CO<sub>2</sub>, water vapor, and other atmospheric trace gases. Relevant topics include but are not limited to, the isotopic composition of above- and belowground organic matter, fractionation effects in the synthesis of organic compounds and respiration, and measured or modeled estimates of photosynthetic and ecosystem discrimination at the ecosystem, regional, or global scale. Abstracts on the application of isotopic methods to investigations of ecosystem physiology, such as partitioning ecosystem fluxes into their component parts, are also encouraged.

**Convener:** Diane E. Pataki, Global Change and Terrestrial Ecosystems (GCTE), Dept. of Biology, University of Utah, 257 South 1400 East, Salt Lake City, UT 84112-0840 USA, Tel: +1-801-581-3545, Fax: +1-801-581-4665, E-mail: pataki@biology.utah.edu

### **B10 The role of disturbance and forest demography in regional carbon balance:**

TBA

**Convener:** A. David McGuire

### **B11 A first look at global terrestrial vegetation dynamics from the EOS MODIS sensor**

A first complete growing season of MODIS terrestrial vegetation data will be completed in 2001. This session will feature papers analyzing first MODIS results for vegetation indices, fire detection, landcover change, leaf area index, fraction PAR and net primary production, all standard MODIS terrestrial products.

**Convener:** Steven W. Running, Numerical Terradynamic Simulation Group, School of Forestry, University of Montana, Missoula, MT 59812 USA, Tel: +1-406-243-6311, Fax: +1-406-243-4510, E-mail: swr@ntsg.umt.edu

### **B12 Biogeophysics of Global Warming Mitigation** (Proposed Fall 2001 Biogeosciences, Climate Change, or Union special session)

The amount of carbon-emission free energy needed by mid-century to stabilize CO<sub>2</sub> at "only" twice the preindustrial levels is so massive that it would require a fundamental transformation of the fossil fuel based global energy system. New carbon-emission-free energy sources could power the global economy of the twenty first century. However, analysis of potential global energy systems and their technological, environmental, and geophysical constraints is in its infancy. Many short- and long-term strategies to combat global warming incorporate technologies with important biogeophysical aspects: These include: (1) lowering non-CO<sub>2</sub> greenhouse emissions, including methane, soot, etc; (2) CO<sub>2</sub> capture and sequestration (3) "geoengineering" Earth's radiation balance and, most importantly, (4) alternate global energy sources and systems (solar, wind and biomass renewables; global scale superconducting transmission lines and hydrogen pipelines; solar power satellites and lunar power systems; "environmentally benign" fission based on uranium & thorium reserves in seawater; advanced fusion fuel cycles; extraterrestrial energy sources). We invite contributions analyzing how much carbon-free power various technologies could potentially supply in the next decades and centuries, including analysis of what is feasible in terms of the environment, physics, geophysics, engineering, and economics.

**Conveners:** Marty Hoffert, Andre and Bella Meyer Hall of Physics, Room 503, Mail Code 1013, 4 Washington Place, New York University, New York, NY 10003-6621 USA, Tel: +1-516-466-9418, Fax: +1-516-487-0734, E-mail: marty.hoffert@nyu.edu; Ken Caldeira, Energy and Environment Directorate, 7000 East Ave, L-103, Lawrence Livermore National Laboratory, Livermore, CA 94550 USA, Tel: +1-925-423-4191, Fax: +1-925-422-6388, E-mail: kenc@llnl.gov; Jae Edmonds, Pacific Northwest National Laboratory, 901 D St. SW, Suite 900, Washington, DC 20024 USA, Tel: +1-202-646-788, Fax: +1-202-646-5233, E-mail: jae@pnl.gov

### **B13 The Extended Organism and the Geophysiology of Ecosystems**

Animals build structures in terrestrial and marine sedimentary environments that serve a physiological function; in these environments, in particular in the pedosphere, the boundary between the animate and inanimate becomes blurred. While the >benefits' of these structures are obvious at the organismic level, the same cannot be said for the ecosystem or landscape level. In this special session, we wish to explore the effect of burrowing animals and their structures on the geophysiology of ecosystems and landscapes, and the interaction between these animals and the inanimate parts of sedimentary environments, with due consideration of spatial and temporal scales. To this end, we seek contributions that address the following and related issues:

- Abundance of burrowers (vertebrate and invertebrate) and spatial patterns and intensity of burrowing activity over a wide range of habitats;
- Experimental evidence for the effects of burrowing on the exchange of water, solutes (nutrient recycling), and gas, and on weathering and geochemical processes;
- Interactions between burrowers and their environments;
- Effects of burrowers on pedogenesis and marine diagenesis;
- Models of bioturbation and its environmental effects.

**Conveners:** Helmut Elsenbeer, Dept. of Civil and Environmental Engineering, University of Cincinnati, Cincinnati, OH 45221-0071 USA, Tel: +1-513-556-3695, Fax: +1-513-556-2599, E-mail: helmut.elsenbeer@uc.edu; Guy N. Cameron, Dept. of Biological Sciences, University of Cincinnati, Cincinnati, OH 45221-0006 USA, Tel: +1-513-556-9740, Fax: +1-513-556-5299, E-mail: g.cameron@uc.edu

### **B14 The Role of Bedrock Geochemistry in Nutrient Cycling**

Carbon, phosphorus, nitrogen and other nutrients contained in bedrock are released into surface and ground water, soil, and sediment through weathering. This session seeks to examine microbiological, geochemical, hydrologic and soils science perspectives on associations between bedrock geochemistry and overlying/downstream nutrient cycles and ecosystems. Studies that investigate nutrient release from bedrock as a cause or effect of Biological nutrient cycling, from microscale to ecosystem and global scales, are of interest.

**Conveners:** JoAnn M. Holloway, U.S. Geological Survey, USA, Tel: +1-303 541-3026, E-mail: [jhollow@usgs.gov](mailto:jhollow@usgs.gov); Jennifer R. Rogers, University of Kansas, USA, Tel: +1-785 864-4976, E-mail: [jrrogers@ku.edu](mailto:jrrogers@ku.edu); Steven T. Petsch, Woods Hole Oceanographic Institution, USA, Tel: +1-508-289-3653, E-mail: [spetsch@whoi.edu](mailto:spetsch@whoi.edu)

#### **B15 The North America Carbon Sink: When and Where?**

This session will provide a focus on "bottom-up" approaches for estimating the interannual variability in the potential continental-scale sinks for atmospheric CO<sub>2</sub>, with emphasis on comparisons of predicted geographic patterns generated from spatial simulation models or other spatial accounting estimates. Intercomparison studies will be presented to reveal differences and similarities between recent model predictions of ecosystem carbon sinks, and to suggest new lines of research to narrow scientific uncertainties for the past several decades of the North America carbon sink.

**Convener:** Chris Potter, Ecosystem Science and Technology Branch, NASA-Ames Research Center Mail Stop 242-4, Moffett Field, CA 94035 USA, Tel: +1-650-604-6164, Fax: +1-650-604-4680, E-mail: [cpotter@mail.arc.nasa.gov](mailto:cpotter@mail.arc.nasa.gov)

#### **B16 Synthetic analyses of large-scale ecological processes**

Ecosystems are complex and heterogeneous across a wide range of spatial and temporal scales. To address this complexity, relevant measurements are being made across these scales with a growing set of approaches and new technologies. As more measurements of more quantities, from different locations, at different times, and at different scales are made, the challenge of interpreting these data collectively in a self-consistent framework grows. Such synthetic analyses are needed to reconcile available measurements, to provide perspective for interpreting observations, and ultimately to improve the understanding of large-scale ecological processes themselves. Creative empirical approaches to synthesis are needed. In addition, models may help with synthesis and provide tools for prediction. This session will focus on novel approaches for the synthetic analyses of large-scale ecological processes including carbon and nutrient dynamics, biogeochemical cycling, and water and energy fluxes.

**Conveners:** George Hurtt, Complex Systems Research Center, Institute for the Study of Earth Ocean and Space, University of New Hampshire, Morse Hall, Durham, NH 03824 USA, Tel: +1-603-862-1792, Fax: +1-603-862-0188, E-mail: [george.hurtt@unh.edu](mailto:george.hurtt@unh.edu); and Jon Foley, Center for Sustainability and the Global Environment, Institute for Environmental Studies, University of Wisconsin, 1225 West Dayton St., Madison, WI 53706 USA, Tel: +1-608-265-9119, Fax: +1-608-265-4113, E-mail: [jfoley@facstaff.wisc.edu](mailto:jfoley@facstaff.wisc.edu)

#### **B17 Carbon, climate change and northern forest ecosystems**

In the past 5 years, there have been significant improvements in our understanding of the impacts of climate change and other global change factors on northern forest ecosystems and the feedback mechanisms by which these ecosystems and their management influence the global climate system. This improved understanding and data has increased our knowledge of the earth system dynamics over a wide range of time scales - extending from the paleo past to the present decades - and our ability to foresee future changes. Papers are being solicited for presentation at the AGU that address this dual role of northern forest ecosystems in the global climate system, with an emphasis on the carbon cycle. The presentations should cover improved process understanding and data, explanatory, diagnostic and predictive modelling techniques, and the current thrust towards integrative earth system models. Of particular interest will be the reconciliation of global carbon cycle analyses (involving atmosphere, ocean and terrestrial), inverse modelling, and bottom-up estimates from northern terrestrial systems.

**Convener:** Mike Apps, Canadian Forest Service-Natural Resources Canada, Pacific Forestry Centre, 506 W. Burnside Road, Victoria BC, V8Z 1M5, Canada, Tel: +1-250-363 0600, Fax: +1-250-363-0775, E-mail: [Mapps@nrcan.gc.ca](mailto:Mapps@nrcan.gc.ca)

#### **B18 Nonlinear controls on coupled water and nitrogen dynamics in arid/semi-arid ecosystems**

Nonlinear controls, e.g., thresholds and feedbacks, on coupled water and nitrogen dynamics of arid/semi-arid ecosystems will be examined for various abiotic and biotic processes, and at a variety of spatial and temporal scales.

Speakers will address the question: what is relative importance of biotic vs. abiotic nonlinear processes as modifiers and/or controllers of coupled water and nitrogen dynamics in arid/semi-arid ecosystems?

**Conveners:** James F. Reynolds, Department of Biology, Phytotron Bldg., Science Dr., Duke University, Durham, NC 27708 USA, Tel: +1-919-660-7404, +1-919-660-7280, Fax: +1-919-660-7425, E-mail: james.f.reynolds@duke.edu; Pep Canadell, GCTE International Project Office, CSIRO Sustainable Ecosystems, PO Box 284, Canberra, ACT, 2601, Australia, Tel: 61-2-6242-1557, Fax: 61-2-6242-1512, E-mail: pep.canadell@gcte.org.

### **B19 Land use and land cover change: observations and consequences**

This session will focus on observations/data sets of land use and land cover change and studies of the consequences of these changes. We invite studies at a variety of scales spanning the local-to-global spatial scales, and decadal-to-century time scales. Data sets of historical land use and land cover change can be compiled from a variety of sources such as paleoecology, land surveys, census reports, aerial photography, remote sensing, etc. This session encourages the participation of studies that use one or more of these sources to compile data sets of land use and land cover change over large spatial scales and/or large temporal scales. Furthermore, we invite studies of the Earth system consequences of land use and land cover change. For example, land cover change can result in changes in regional climate, changes in the biogeochemical cycles of carbon, water, nitrogen, loss of biodiversity, natural resource depletion, etc. We invite observational, theoretical, or modeling studies of the consequences of historical or potential future changes in land use and land cover.

**Conveners:** Navin Ramankutty, Climate, People, and Environment Program (CPEP), Institute for Environmental Studies, University of Wisconsin, 1225 West Dayton St., Madison WI 53706-1695 USA; Rik Leemans, Department of Global Environmental Assessments, National Institute for Public Health & the Environment (RIVM), Antonie van Leeuwenhoeklaan 9, PO Box 1, NL-3720 BA Bilthoven NETHERLANDS, Tel: +31 30 274-3377, E-mail: Rik.Leemans@rivm.nl

### **B20 Forest Nitrogen Cycle, BGC, and Carbon Sequestration**

A number of global carbon cycle assessments have indicated that atmospheric nitrogen (N) deposition to forests may enhance photosynthesis and carbon storage. For example, C isotopic studies indicate a large C uptake in the eastern US where substantial anthropogenic N deposition also occurs. Direct experimental evidence to support a C uptake enhancement due to N deposition at the ecosystem or site measurement scale is, however, lacking and needs to be discussed. This session will focus on experimental evidence relating the forest N cycle to changes in carbon storage at the site and ecosystem level. Papers are especially invited that link forest new N uptake, such as atmospheric deposition, to measured CO<sub>2</sub> uptake and changes therein.

**Convener:** Herman Sievering, USA, E-mail: [hsieveri@carbon.cudenver.edu](mailto:hsieveri@carbon.cudenver.edu)

### **B21 Sampling and Monitoring Life Forms in Extreme Environments**

New life forms found at seafloor hydrothermal vents were only the first, and perhaps the easiest, of a series of discoveries that have shown that heretofore-unknown species occupy niche environments that span extremes of temperature, pressure, salinity, and oxidation/reduction potential. These discoveries have required the development of new techniques for sampling and monitoring - to avoid contaminating the environment of interest or killing the life forms being sought - as well as new methods of accessing these environments. In an effort to more broadly disseminate the technologies developed, and to identify technological needs for more successfully studying these environments, we invite abstracts that deal with recent developments applied to the study of life in extreme environments as well as abstracts detailing technological innovations required to advance this growing field of research.

**Convener:** Donald Thomas, Email: [dthomas@soest.hawaii.edu](mailto:dthomas@soest.hawaii.edu)

## **GEODESY**

### **G01 The New Gravity Missions: First CHAMP Results, Initial GRACE Data Flow, and Preparations for GOCE**

With the launch of CHAMP in July 2000, its first year of successful operation and the science data release in May 2001, for the first time a long uninterrupted time series of high-low satellite-to-satellite tracking and accelerometer data

for a low flying satellite are available to the space geodetic community. With the launch of the GRACE mission (scheduled for November 2001) precision low-low satellite-to-satellite tracking data between two polar, co-orbiting satellites, measured by a microwave ranging system with an accuracy at the few micron level, will become available. In addition, both GRACE satellites carry an improved accelerometer instrument as well as a GPS receiver for high-low satellite-to-satellite tracking. Finally with the GOCE (Gravity Field and Steady-State Ocean Circulation Explorer) space gradiometer mission, planned for launch at end of 2005, the second derivatives of the gravity potential will be directly measured from space. Besides the gradiometer, which is composed by 6 three-axis accelerometers, GOCE will also carry a GPS receiver. The goal of the GOCE mission is to recover the Earth's gravity field with a high spatial resolution (1 cm geoid and 1 mGal accuracy at 100 km resolution or better). All three missions are complimentary in what concerns their instruments, their analysis techniques and their mission profiles. We solicit papers related to first results from the CHAMP science data analyses, the latest status of the GRACE mission and its data flow, as well as to plans and preparations for GOCE. Especially encouraged are presentations concerning lessons-learned from CHAMP and synergies between the three missions. (e.g. accelerometer processing, GPS processing, time variable gravity field).

**Conveners:** Byron Tapley, Center for Space Research, University of Texas at Austin, 2925 W Braker Lane, Suite 200, Austin, TX 78759 USA, Tel: +1-512-471-5573, E-mail: [tapley@csr.utexas.edu](mailto:tapley@csr.utexas.edu); Christoph Reigber, GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg, A-17, Potsdam, D-14473, GERMANY, Tel: +49-(0) 331-288-1100, +49-(0) 331-288-1101, Fax: +49-(0) 331-288-1111, E-mail: [reigber@gfz-potsdam.de](mailto:reigber@gfz-potsdam.de); P.N.A.M. Visser, Delft University of Technology, Kluyverweg 1, 2629 HS, Delft, The Netherlands, Tel: +31-15-278-2595, Fax: +31-15-278-5322, E-mail: [Pieter.visser@lr.tudelft.nl](mailto:Pieter.visser@lr.tudelft.nl)

### **G02 Multi-Disciplinary Studies of Present-Day Sea Level Change**

A variety of different disciplines are actively studying the temporal and spatial characteristics of present day sea level change in an effort to determine the global pattern of sea level rise to constrain global climate models. Tide gauges provide one of the longest records of sea level change; however, these records are "contaminated" by vertical crustal motion (such as glacial isostatic adjustment) and thus solid Earth geophysicists have been studying methods for unraveling the geophysical and oceanographic contributions to this data set. Long records of hydrographic measurements collected from ships are beginning to provide insight into the steric contributions to sea level change. Precise satellite altimetry from TOPEX/Poseidon and other satellites provides a more comprehensive record of sea level change, but these data have only been available since the early 1990s. Global climate models are beginning to provide predictions of the spatial distribution of the sea level change signal, and thus some have begun to develop analysis schemes for testing the observations for the presence of these patterns. Future satellite missions such as GRACE and ICESAT will provide important contributions to sea level change science. This session seeks contributions on all observational and modeling aspects of present-day sea level change in hopes that these cross-disciplinary interactions will provide better insight into the problem.

**Conveners:** R. Steven Nerem, Colorado Center for Astrodynamics Research, UCB431, University of Colorado, Boulder, CO 80309 USA, Tel: +1-303-492-6721, Fax +1-303-492-2825, E-mail: [nerem@colorado.edu](mailto:nerem@colorado.edu); James L. Davis, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., MS 42, Cambridge, MA 02138 USA, Tel: +1-617-496-7640, Fax: +1-617-495-7345, E-mail: [jdavis@cfa.harvard.edu](mailto:jdavis@cfa.harvard.edu)

### **G03 Operational Altimetry: Data sources, systems, and applications.**

This session will focus on present and future operational altimeter data and their applications. With the recent acceptance of the Geosat Follow-On satellite, and the upcoming launches of JASON-1 and ENVISAT, sufficient data will be available in the next 5 years for assimilation into real time systems that predict and monitor oceanographic processes. We solicit abstracts that pertain to the satellite systems themselves, the systems at operational centers for the processing and dissemination of the data, and the systems that assimilate the altimeter data to provide oceanographic products. The end product (ie. for fisheries, environmental management, climate prediction, etc.) often drives many of the underlying assumptions in operational systems.

We encourage the submission of abstracts that demonstrate the wide spectrum of applications and illuminate the fundamental ideas behind the operational systems that process altimeter data.

**Conveners:** Gregg Jacobs, NRL Code 7323, Stennis Space Center, MS 39529 USA, Tel: +1-228-688-4720, Fax: +1-228-688-4759, E-mail: [jacobs@proteus.nrlssc.navy.mil](mailto:jacobs@proteus.nrlssc.navy.mil); John Lillibridge, NOAA Laboratory for Satellite Altimetry, 1315

East-West Highway #3620, Silver Spring, MD 20910-3282 USA, Tel: +1-301-713-2857x121, Fax: +1-301+1-713-4598, E-mail: John.Lillibridge@noaa.gov

#### **G04 The Terrestrial Reference Frame: Definition, Long-term Stability and Limitations** (Joint with T, O, S, H)

Space geodesy supports the study of a wide variety of geophysical and global change processes over ever broader spatial and temporal scales. The ability to accurately measure many of these phenomena depends directly on the accuracy and long-term stability of the terrestrial reference frame. This session will examine the current state-of-the-art in defining the terrestrial reference frame and will consider possible improvements in future realizations. Specifically, we will discuss optimal combinations of results from independent techniques, the use of geodetic and geologic data to establish a global rotational datum (e.g., no-net-rotation vs. hot spot models), current estimates of geocenter motions (i.e., apparent motion of the TRF origin with respect to the Earth's center of mass), specification of the frame's scale, and how all these relate to the interpretation of the accuracy and stability of the frame. We also welcome papers which discuss limitations in the frame definition as discerned from multiple technique comparisons and comparisons with non-geodetic data.

**Conveners:** Kristine Larson, Department of Aerospace Engineering Sciences, University of Colorado at Boulder, Boulder CO 80309-0429 USA, Tel: +1-303-492-6583, Fax: +1-303-492-7881, E-mail: [Kristine.Larson@Colorado.edu](mailto:Kristine.Larson@Colorado.edu); Zuheir Altamimi, Institut Geographique National, ENSG/LAREG, 6-8 Ave. Blaise Pascal, Cite Descartes, Champs-sur-Marne, Marne-la-Vallee, 77455 FRANCE, Tel: 33-1-64-15-3255, Fax: 33-1-64-15-3253, E-mail: [altamimi@ensg.ign.fr](mailto:altamimi@ensg.ign.fr)

#### **G05 Interaction between Solid Earth and its Fluid Envelope: Insights via Earth Rotation Studies**

The Earth is a dynamic system: it has a fluid, mobile atmosphere and oceans, a continually changing distribution of ice, snow, and groundwater, a fluid core undergoing hydromagnetic motion, a mantle undergoing both thermal convection and rebound from glacial loading of the last ice age, and mobile tectonic plates. Both the moment of inertia changes and the motion affect a number of global geodynamical quantities, including Universal Time, length-of-day, polar motion, and nutation (collectively referred to as Earth Rotation or Earth Orientation). Highly accurate observations of Earth Orientation provide a unique and truly global measure of natural and man-made changes in the atmosphere, oceans, and interior of the Earth on a variety of timescales from minutes to millions of years. This session will address the implications of Earth orientation variations, particularly as it applies to the solid Earth, the core, ocean and hydrosphere, cryosphere, atmosphere and the interactions between the various components of the Earth system. The use of geodetic and astronomical measurements analyzed synergistically with complementary interdisciplinary data types will be stressed.

**Conveners:** Jean O. Dickey, Mail-Stop 238-331, Jet Propulsion Laboratory, Oak Grove Drive, 4800, Pasadena, CA 91108 USA, Tel: +1-818-354-3235, Fax: +1-818-393-6890, E-mail: [jean.o.dickey@jpl.nasa.gov](mailto:jean.o.dickey@jpl.nasa.gov); Olivier de Viron, Royal Observatory of Belgium, 3 Ave. Circulaire. B-1180 Brussels, Belgium, Tel: +32 2 373 03 12, Fax: +32 2 374 98 22, E-mail: [o.deviron@oma.be](mailto:o.deviron@oma.be)

#### **G06 Explaining nonlinearly time-varying geodetic observations** (Joint with T)

Modern geodetic techniques (GPS, InSAR, VLBI, LIDAR) and precise ground-based techniques (strainmeters, tiltmeters, leveling, EDM) have revolutionized our ability to accurately measure temporal and spatial surface deformation patterns associated with tectonic, volcanic, and hydrologic processes. We invite studies using geodetic and other geophysical observations of surface deformation to better understand the kinematics and dynamics of non-linearly time-varying deformation processes. These studies may include, but are not limited to: models of decaying postseismic transients; measurements and models of slow earthquakes; geodetic models of magmatic and fluid movement; and surface fluctuations associated with groundwater pumping.

**Conveners:** Gerald W. Bawden, Earthquake Hazards Team, U.S. Geological Survey, 345 Middlefield Road - MS 977, Menlo Park, CA 94025-3591 USA, Tel: +1-650-329-5729, Fax: +1-650-329-5163, E-mail: [gbawden@usgs.gov](mailto:gbawden@usgs.gov); Elizabeth Harding Hearn, Department of Earth and Planetary Sciences, 54-614, Massachusetts Institute of Technology, Boston MA 02139 USA, Tel: +1-617-253-3077, E-mail: [lizh@chandler.mit.edu](mailto:lizh@chandler.mit.edu)

#### **G07 Crustal deformation: new results**

Measurements of crustal deformation, especially those made via space geodesy, are providing new insight into plate kinematics, plate boundary dynamics, the earthquake cycle and volcanic processes. This session welcomes new results that give insights into these problems, and also demonstrations of technical improvements that augment our ability to apply geodetic techniques to these problems.

**Convener:** Jeffrey T. Freymueller, Geophysical Institute, University of Alaska, Fairbanks, PO Box 75730, Fairbanks, Alaska, 99775-7320 USA, Tel: +1-907-474-7286, Fax: +1-907-474-7290, E-mail: [jeff@giseis.alaska.edu](mailto:jeff@giseis.alaska.edu)

### **G08 Advances in modeling of deformation due to earthquakes.**

Over the last decade, rich geodetic data sets have been collected in epicentral areas of several major earthquakes. These data allow detailed inferences about the "fine" structure of earthquake ruptures, as well as insights into the overall mechanical properties of the Earth crust. This session will consider recent advances in interpretation of the spatially dense geodetic/seismic observations of the earthquake-induced deformation. Topics of interest include, but are not limited to models of earthquake slip beyond a dislocation in an elastic half-space, effects of surface topography and medium heterogeneity, modeling of ruptures having complex geometry, and joint interpretation of complementary data sets (e.g., InSAR, GPS, seismic, etc.).

**Conveners:** Mark Simons, Seismological Laboratory, California Institute of Technology, Pasadena, CA 91125 USA, Tel: +1-626-395-6984, Fax: +1-626-564-0715, E-mail: [simons@gps.caltech.edu](mailto:simons@gps.caltech.edu); Yuri Fialko, IGPP/Scripps Institute of Oceanography, University of California San Diego, La Jolla, CA 92093 USA, Tel: (858) 822-5028, Fax: (858) 534-5332, E-mail: [fialko@radar.ucsd.edu](mailto:fialko@radar.ucsd.edu)

### **G09 Temporal Gravity Observations and Crustal Deformation**

With the advent of the new generation of gravimeters (absolute and super-conducting), temporal gravity observations are now a much stronger tool for constraining mass flux within the solid earth. The aim of this session is to present new observations and modeling of crustal deformation and mass flux based on absolute, superconducting and relative surface gravimetry. Possible applications may also include volcano and tectonic deformation, groundwater extraction/movement, and postglacial rebound. Results from other topics are also welcome, such as lunar-solar tides, atmospheric and oceanic mass redistribution, and long-term mantle convection and core dynamics.

**Conveners:** Anahita Tikku, Lamont-Doherty Earth Observatory of Columbia University, 108 Oceanography, 61 Rte. 9W, Palisades, NY 10964, Tel: +1-845-365-8841, Fax: +1-845-365-8179, E-mail: [ani@ldeo.columbia.edu](mailto:ani@ldeo.columbia.edu); David McAdoo, Laboratory for Satellite Altimetry, National Oceanic and Atmospheric Administration, SSMC3, Rm 3620, E/RA31, 1315 East-West Highway, Silver Spring, MD 20901, Tel: +1-301-713-2860 x129, Fax: +1-301-713-4598, E-mail: [dave.mcadoo@noaa.gov](mailto:dave.mcadoo@noaa.gov); Tim Niebauer, Micro-g Solutions, 515 Briggs St., P.O. Box 636, Erie, CO 80516, Tel: +1-303-828-3499, Fax: +1-303-828-3288, E-mail: [tmniebauer@microgsolutions.com](mailto:tmniebauer@microgsolutions.com)

### **G10 SRTM: Mission status and early applications** (Joint with U)

The Shuttle Radar Topography Mission (SRTM), a joint project between NASA and NIMA (the National Imagery and Mapping Agency), consisted of a specially designed radar system that flew on the Space Shuttle Endeavor during an 11-day mission in February 2000. The radar system collected data between 60 deg. N and 56 deg. S, covering over 80 percent of the Earth's land surface. The data will be used to generate a digital topographic map with data points spaced every 1 arcsecond in latitude and longitude. The resultant topographic map will form a homogeneous data set referenced to a uniform global geodetic datum. This session will provide an update on the processing and calibration of the radar data, as well as early results from the science investigations. Examples of the science investigations include studies of uplift and erosion of mountain ranges in Asia and South America, evolution of volcanos in tropical regions, hydrology of the Amazon basin, topographic characteristics of large flood plains, volume changes of ice in Patagonia, urban infrastructure mapping, and comparisons of lidar and radar techniques for geodesy in plate boundary regions. Contributed papers on related session topics related will be considered.

**Conveners:** Tom G. Farr, MS 300/233, Jet Propulsion Laboratory, Pasadena, CA 91109 USA, Tel: +1-818-354-9057, Fax: +1-818-354-9476, E-mail: [tom.farr@jpl.nasa.gov](mailto:tom.farr@jpl.nasa.gov); Paul Rosen, MS 300/235, Jet Propulsion Laboratory, Pasadena, CA 91109 USA, Tel: +1-818-354-0023, Fax: +1-818-393-5285, E-mail: [paul.a.rosen@jpl.nasa.gov](mailto:paul.a.rosen@jpl.nasa.gov)

### **G11 Cycles and Trends in Global Surface Mass Redistribution**

Seasonal, interannual, and secular variation in snowcover, ground water, atmospheric surface pressure, and ocean bottom pressure all involve global redistribution of surface mass, and should provide valuable indication of global climate change. This session explores current state of the art and future prospects on monitor global mass

redistribution by space geodesy, remote sensing, and in situ measurement. We encourage contributions on the latest in models from the various contributing spheres of mass redistribution, including polar snow and ice models, continental-scale hydrology, and models of mass transport in the oceans and atmosphere.

Contributions are welcome on the effect of mass redistribution on space geodetic measurement of the gravity field, geocenter, Earth rotation, solid Earth deformation, and altimetric measurement of the Earth's various surfaces for mass change calculations. We welcome presentations on prospects for improving our knowledge of mass redistribution from space missions including GRACE (scheduled to launch in November 2001), and how well mass redistribution derived from various branches of Geodesy agree internally and with the sum of the models. We especially welcome presentations providing interdisciplinary insight on what such measurements might imply for our understanding of the water cycle, interactions between Earth's various spheres, and global climate change.

**Conveners:** Geoffrey Blewitt, University of Nevada, Reno, Mail Stop 178, Reno, NV 89557 USA, Tel: +1-775-784-6691 x171, Fax: +1-775-784-1709, E-mail: [gblewitt@unr.edu](mailto:gblewitt@unr.edu); Benjamin F. Chao, Space Geodesy Branch, Code 926, NASA Goddard Space Flight Center, Greenbelt, MD 20771 USA, Tel: +1-302-614-6104, Fax: +1-301-614-6099, E-mail: [chao@bowie.gsfc.nasa.gov](mailto:chao@bowie.gsfc.nasa.gov)

## **GEOMAGNETISM AND PALEOMAGNETISM**

### **GP01 Recent Advances in Fundamental and Applied Rock and Mineral Magnetism**

The session will focus on experimental and theoretical studies on rock magnetism of fine particles. Topics of interest include (1) domain structures, changes with temperature, and applications to magnetization processes and demagnetization techniques, (2) new methods of magnetic granulometry, (3) best cleaning techniques and 'pretreatments' in paleomagnetism: their fundamental justification, (4) paleointensity strategies: why they work or don't work, (5) the inverse problem in mineral magnetism: identifying the minerals from their integrated magnetic signal. How do we go from qualitative identifications of remanence carriers to quantitative estimates and models?

**Conveners:** Ozden Ozdemir, Department of Physics, University of Toronto at Mississauga, 3359 Mississauga Road, North, Mississauga, Ontario L5L 1C6, Canada, Tel: +1 (905) 828 3829, Fax: +1 (905) 828 5425, E-mail: [ozdemir@physics.utoronto.ca](mailto:ozdemir@physics.utoronto.ca); Mike Jackson, Institute for Rock Magnetism, University of Minnesota, 291 Shepherd Laboratories, 100 Union St. SE, Minneapolis, MN 55455-0128 USA, Tel: +1-612-624-5274, Fax: +1-612-625-7502, E-mail: [irm@tc.umn.edu](mailto:irm@tc.umn.edu)

### **GP02 Rock Magnetism of Extra-terrestrial Materials**

**Conveners:** Gunther Kletetschka, E-mail: [gunther@core2.gsfc.nasa.gov](mailto:gunther@core2.gsfc.nasa.gov); Joe Kirschvink, E-mail: [kirschvink@caltech.edu](mailto:kirschvink@caltech.edu)

### **GP03 Successes and Failures in Dynamo Simulation Studies**

**Conveners:** Jonathan Aurnou, E-mail: [jona@dtm.ciw.edu](mailto:jona@dtm.ciw.edu); Rainer Hollerbach, E-mail: [rhollerb@princeton.edu](mailto:rhollerb@princeton.edu)

### **GP04 Full vector analyses of the paleofield**

This session seeks contributions which describe recent progress in time changes of the ancient geomagnetic field, polarity transitions, excursions in terms of their absolute and/or relative paleointensity determinations: paleomagnetic observations from marine and lacustrine sediments, volcanic rocks and archeological materials of all ages, methods accessing and improving the reliability of records, and interpretation and modelling related to the geodynamo or other phenomena occurring in the Earth and our planetary system.

**Conveners:** Professor Emilio Herrero-Bervera, SOEST-Hawaii Institute of Geophysics and Planetology, Paleomagnetism and Petrofabrics Laboratory, University of Hawaii at Manoa, 1680 East West Road, Honolulu, Hawaii 96822, USA, Tel (808) 956-6192, Fax (808) 956-3188, E-mail: [herrero@soest.hawaii.edu](mailto:herrero@soest.hawaii.edu); Professor Jean-Pierre Valet, Institut de Physique du Globe de Paris (IPGP), Laboratoire de Paleomagnetisme et Geodynamique, 4 place Jussieu, B89, Tour 24, 75252 Paris Cedex 05, France, Tel 33-1-44-27-39-08, Fax 33-1-44-27-33-73, E-mail: [valet@ipgp.jussieu.fr](mailto:valet@ipgp.jussieu.fr)

### **GP05 Paleomagnetic field behavior on historical to million year time scales**

Over the past few years there has been a dramatic increase in magnetic field data sets that can shed light on second order structure of the geomagnetic field during the past few million years. Improvements in laboratory techniques enable more precise measurements of paleofield direction and intensity for both igneous and sedimentary rocks. Renewed attempts to sample archeological sites are providing denser temporal sampling for the past few thousand years. The expanding magnetic data sets, coupled with associated temporal information, facilitate investigations of both local and global field behavior particularly for the past 5 Myr. Of special interest are relationships among secular variation (both in intensity and direction), the time-averaged geomagnetic field and excursions or reversals. We solicit papers that encompass new data sets, local or global field modeling and related numerical simulations of geomagnetic field behavior.

**Conveners:** Catherine Johnson, IGPP, Scripps Institution of Oceanography, 8800 Biological Grade, La Jolla, CA 92093-0225 USA, Tel: +1-202-478-8814, Fax: +1-858-534-8090, E-mail [johnson@radar.ucsd.edu](mailto:johnson@radar.ucsd.edu); Cathy Constable, IGPP, Scripps Institution of Oceanography, 8800 Biological Grade, La Jolla, CA 92093-0225 USA, Tel: +1-858-534-3183, Fax: +1-858-534-8090, E-mail: [cconstable@ucsd.edu](mailto:cconstable@ucsd.edu)

#### **GP06 Electrical Properties Across Margins: Active, Passive, and Fossil**

We encourage submissions of papers discussing the use of electrical techniques to study the structure across present day active and passive margins, or ancient settings that contain a history of ocean-basin closure. This is intended as a broad session bringing together recent field results from a variety of locations, pertinent laboratory measurements as well as process oriented modeling studies that highlight contributions that might be made by EM techniques in the future. Topics of interest might include:

- (1) The role of water in subduction processes and its impact on electrical properties
- (2) Electrical anisotropy in the crust or mantle as an indicator of tectonic processes
- (3) The use of electrical measurements to study shallow sedimentary processes
- (4) Gas Hydrates
- (5) Passive margin structure using seafloor MT

**Conveners:** Rob Evans, E-mail: [evans@hades.who.edu](mailto:evans@hades.who.edu); Steve Constable, E-mail: [sconstable@ucsd.edu](mailto:sconstable@ucsd.edu)

#### **GP07 Advances in Hydrogeophysical Investigations of the Near-Surface (Joint GP-H)**

The objective of this special session is to highlight recent applications of near-surface geophysics in subsurface hydrology. Oral and poster contributions are sought from scientists interested in: (a) combining petrophysical information with subsurface physical properties inferred from surface, borehole and airborne geophysical prospecting, to obtain spatially distributed parameters that can be used in characterizing flow and transport; and (b) integrating geophysical field and laboratory measurements made across multiple length scales towards characterizing length-scale dependent subsurface heterogeneity in vadose-zone and fractured-rock environments. Applications ranging from high-resolution seismic and radar to electromagnetic induction, magnetic, microgravity and radiometric surveys are solicited. Field studies that integrate several of these methods are particularly welcome, as are laboratory-based contributions that can demonstrate linkages between rock physics and field measurements.

**Conveners:** Mark E Everett, Dept of Geology and Geophysics, Texas A&M University, TX USA, Fax: +1-979-845-6162, Tel: +1-979-862-2129, E-mail: [colt45@beerfrdg.tamu.edu](mailto:colt45@beerfrdg.tamu.edu); David P Lesmes, Dept of Geology and Geophysics, Boston College, Boston, MA USA, Fax: +1-617-552-2462, Tel: +1-617-552-0839, E-mail: [lesmes@bc.edu](mailto:lesmes@bc.edu)

## **HYDROLOGY**

#### **H01 Impacts of riparian vegetation on hydrologic and geomorphic processes**

Riparian vegetation can dramatically impact hydrologic and geomorphic processes within and along stream channels, but the impacts can be both positive and negative, and are poorly understood. Erosion and deposition of sediment, streamflow pattern, bank stability, uptake of water, nutrients and contaminants, and the creation of habitat and recreational opportunities are key processes and products affected by riparian vegetation. With increased societal pressure for environmental improvements, successful management of riparian vegetation can control channel erosion, rehabilitate river corridors, and stabilize streams but at the same time increase the risk to flooding, increase water loss

in dry lands, cause local scour and fill, destabilize banks, and create other unforeseen challenges. This session seeks to identify key issues in riparian environments and to present experimental, field, and numerical investigations into the interaction of riparian vegetation and hydrologic and geomorphic processes.

**Conveners:** Andrew Collison, Kings College London, Strand, London WC2R 2LS, UK, Tel: 662-281-5705, Fax: 662-232-2915, E-mail: collison@sedlab.olemiss.edu. Sean J. Bennett, USDA-ARS, National Sedimentation Laboratory, P.O. Box 1157, Oxford, MS 38655 USA, Tel: +1-662-232-2926, Fax: +1-662-232-2915, E-mail: bennett@sedlab.olemiss.edu

### **H02 Watershed Scale Sediment Routing Through River Networks**

As fluvial sediment is delivered to depositional basins, a record is created of upstream tectonic processes, climatic events, and anthropogenic forcing that is filtered by fluvial transport and storage processes in the channel network. To better interpret the geologic record of tectonics and climate, and to forecast the impacts of anthropogenic activities on riparian systems, methods of routing sediment through river networks are needed. The goal of this session is to attract papers on field, theoretical, and experimental studies that will lead to predictive methods for watershed scale sediment routing.

**Conveners:** Tom Lisle, USDA Forest Service, Redwood Sciences Laboratory, 1700 Bayview Drive, Arcata, CA 95521 USA, Tel: +1-707-825-2930, Fax: +1-707-822-5628, E-mail: ; and Jim Pizzuto, Dept. of Geology, University of Delaware, Newark, DE 19716 USA, Tel: +1-302-831-2710, Fax: +1-302-831-4158, E-mail: pizzuto@udel.edu

### **H03 Submarine and Subaerial Mass-Movement Processes**

Gravity and water strongly dominate the mass-wasting processes sculpting both submarine and subaerial slopes. These processes range from catastrophic debris avalanches with immediate hazards to slow creep influencing long-term sediment flux. Many similarities exist in the processes driving mass movement on land and under sea, however triggering events can differ greatly. The consequences of slope movement can be far reaching; massive debris flows can inundate river valleys and landslide-induced tsunamis can devastate coastlines. Recent advances in imaging systems, monitoring technology, computational capabilities, and theoretical understanding have enabled new insight into mechanisms controlling slope behavior and landslide hazards. We solicit contributions that advance our understanding of submarine and subaerial mass-movement processes through detailed field investigations, marine surveys, laboratory experiments, or dynamic modeling. Please send one copy of your abstract to AGU and E-mail one copy directly to all of the conveners.

**Conveners:** Mark E. Reid, U. S. Geological Survey, 345 Middlefield Road MS 910, Menlo Park, CA 94025 USA, E-mail: mreid@usgs.gov; Philip Watts, Applied Fluids Engineering, Inc., Private Mail Box #237, 5710 E. 7th St., Long Beach, CA 90803 USA, E-mail: phil.watts@appliedfluids.com; and Homa J. Lee, U. S. Geological Survey, 345 Middlefield Rd. MS USA, E-mail: hjlee@usgs.gov

### **H04 Geomorphology Posters (Posters only)**

Geomorphology incorporates diverse approaches to understand the processes of erosion, transport, and deposition of sediment and solutes, and to predict their influence on short-term geomorphic processes and long-term landscape evolution. In this session, we solicit poster presentations on geomorphic processes, particularly the influence of wind, water, and ice on the land surface; the behavior of soil, rock, and ice under applied stresses; landscape evolution and the ages of geomorphic surfaces. We welcome contributions from field or lab experiments, modeling, field monitoring, application of cosmogenic radionuclides, and development of new techniques. Please send one copy of your abstract to AGU and one copy directly to both of the conveners.

**Conveners:** David R. Montgomery, Dept. of Earth & Space Sciences, Univ. of Washington, Seattle, WA 98195-1310 USA, Fax: +1-206-685-2560, E-mail: dave@geology.washington.edu; Ellen Wohl, Dept. of Earth Resources, Colorado State Univ., Ft. Collins, CO USA, E-mail: ellenw@CNR.ColoState.edu

### **H05 Glacial Sediment Systems from Source to Sink**

Temperate glaciers can have enormous impacts on sediment delivery to continental margins. Alaskan glaciers, for example, have among the highest sediment yields measured anywhere, and sediment accumulation rates offshore are commensurately high. Glacial and non-glacial processes produce and transport sediment through glacierized basins, and these processes interact in important ways. Large rockfalls onto glaciers can change their mass balance; glacial retreat removes support from oversteepened valley walls; outburst floods ream near-glacier valleys and deposit large

quantities of material further downstream. Because the hydrology of a glacial river differs from non-glacial rivers, glacial cycles will produce times of varying sediment delivery and transport capacity that will be manifested in deposits throughout the basin. At the shoreline, deltas and nearshore zones are commonly areas of rapid sedimentation, leading to unstable conditions and slope failures. Offshore areas receive pulses of sediment from such failures, as well as large quantities of materials deposited from suspension. We seek papers on the direct effect of glaciers and their processes of erosion, transport and deposition, particularly addressing rates of sediment delivery during normal and catastrophic events, sediment transport in glacial streams, deltas and the offshore zone, and the relationship of sediment transport from one environment to another. We also seek papers on the indirect impacts of glaciers that are linked to glacial processes such as isostatic response, time lags in sediment delivery due to temporary storage, and the response of hillslopes to glacial cycles. The nature of sediment deposition from source to sink including rate and preservation, and the nature of the resulting sediment pile including the recognition of a glacial signal are welcome from both on-shore and off-shore perspectives.

**Conveners:** Suzanne Anderson, CSIDE, Dept. of Earth Sciences, UCSC, Santa Cruz, CA 95064 USA, E-mail: spa@es.ucsc.edu; Dan Lawson, CRREL-Anchorage, PO Box 5646, Fort Richardson, AK 99505 USA, E-mail: dlawson@crrel.usace.army.mil; James Syvitski, INSTAAR, Campus Box 450, University of Colorado, Boulder, CO USA, E-mail: james.syvitski@colorado.edu

#### **H06 Dynamic Behavior of Preferential Flow Channels Due to Mechanical, Thermal, Chemical, and Biological Activity (Joint with Tectonophysics?)**

Preferential flow paths in porous and fractured media result from permeabilities that are higher than those of the surrounding matrix. The mechanical, thermal, chemical and biological activity within these channels can affect their permeability, transport patterns, and geochemistry. Prediction is limited by lack of observation and understanding of interactions between underlying processes, and the large spatial and temporal scales involved. This session focuses on novel strategies for observations and theory that capture permeability development within preferential flow paths. Topics may include: (i) media expansion, compression and fracturing under mechanical, hydraulic and thermal forces, (ii) clogging and unclogging, and (iii) dissolution, precipitation and deposition.

**Conveners:** Peter E. Dijk, School of Civil and Environmental Engineering, Georgia Institute of Technology, 790 Atlantic Drive, Atlanta, GA 30332-0355 USA, Tel: +1-404-385-0849, Fax: +1-404-894-2281, E-mail: peter.dijk@ce.gatech.edu; Carl I. Steefel, Geosciences and Environmental Technologies, L-204, Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94551 USA, Tel: +1-925-424-9807, Fax: +1-925-423- 1997, E-mail: steefel@llnl.gov

#### **H07 Subsurface Microbial Transport and Fate: Mechanisms and Models (Joint with B?)**

The transport and fate of microorganisms in the subsurface is relevant to many scientific problem areas including in situ bioremediation, water quality assessment, microbial ecology and trophodynamics, biogeochemistry of extreme environments, coupling between microbial transport and long-term carbon cycling, subsurface carbon deposition/availability controls of microbial transport, and colloid-facilitated contaminant transport. Many processes of microbial transport and fate (and the associated material and biological properties that influence those processes) are only beginning to be understood, such as geochemical processes that control microbial interactions with aquifer solids, hydrologic processes that cause enhanced advective velocity of biocolloids under selected conditions, and biological processes such as competition among various microbial strains or trophodynamic controls. We solicit presentations that address these subjects through the study of specific process mechanisms and the formulation of quantitative, mechanism-oriented models.

**Conveners:** Timothy D. Scheibe, Pacific Northwest National Laboratory, P.O. Box 999 MS K9-36, Richland, WA 99352 USA, Tel: +1-509-372-6065, Fax: +1-509-372-6089, E-mail: tim.scheibe@pnl.gov; Timothy R. Ginn, Dept. of Civil and Environmental Engineering, 172 Everson Hall, University of California at Davis, Davis, CA 95616 USA, Tel: +1-530-752-1707, E-mail: trginn@ucdavis.edu

#### **H08 Recent Advances in Well Testing**

Well tests have been a fundamental tool in hydrology since the publication of the Theis solution in the 1930s. The purpose of this session is to demonstrate how recent work in well testing has advanced the understanding of subsurface conditions and improved the characterization of well performance. We encourage theoretical and experimental contributions that describe applications for characterizing aquifer properties, evaluating heterogeneities

or fractures, estimating areal recharge or stream-aquifer interactions, assessing alternative well designs, or various other applications.

**Conveners:** Larry Murdoch, Geological Sciences Department, Clemson University, Clemson, SC 29634 USA, Tel: +1-864-656-2597, Fax: +1-864-656-1041, E-mail: [lmurdoch@clemson.edu](mailto:lmurdoch@clemson.edu); Jim Butler, Kansas Geological Survey, 1930 Constant Ave., Campus West, University of Kansas, Lawrence, KS 66047 USA, Tel: +1-785-864-3965, Fax +1-785-864-5317, E-mail: [jbutler@kgs.ukans.edu](mailto:jbutler@kgs.ukans.edu)

#### **H09 Formulation, construction, and application of local-scale models of saturated ground-water flow and transport: Difficulties and solutions**

Analyses of well fields, contaminant plumes, and other local-scale features commonly require construction of detailed models within larger-scale aquifer models. This session explores formulation, construction, and application of such models. Topics include telescopic mesh refinement; up/downscaling of state variables and parameters in coupled grid systems; aquifer-influence functions; parameter estimation in local models; relative advantages and disadvantages of finite-difference, finite-element, analytic-element, and boundary-integral element methods; consistent boundary conditions on local-scale models, including adequacy of regional models to provide local-model boundary conditions and effects of local-boundary treatments on model results; calibration issues; and effects of small-scale hydrologic and geologic features on regional model parameterization.

**Conveners:** Stanley A. Leake, U.S. Geological Survey, 520 N. Park Ave., Tucson, AZ 85716 USA, Tel: +1-520-670-6671 ext. 259, Fax: +1-520-670-5592, E-mail: [saleake@usgs.gov](mailto:saleake@usgs.gov); Steffen Mehl, U.S. Geological Survey, 3215 Marine St. Suite E127, Boulder, CO 80303-1066 USA, Tel: +1-303-541-3078, Fax: +1-303-447-2505, E-mail: [swmehl@usgs.gov](mailto:swmehl@usgs.gov)

#### **H10 Physical and Biogeochemical Processes Associated with Water Quantity and Quality in Aquifer Storage and Recovery (ASR) and Related Systems**

Aquifer storage and recovery (ASR) systems make use of reclaimed water to replenish groundwater supplies. To avoid public health risks, the contaminant inputs and underlying transport processes for ASR systems must be well understood. The purpose of this session is to examine the biological, chemical, and physical processes pertinent to ASR wells, spreading basins and related natural and engineered systems. Papers summarizing laboratory, field and computational investigations are welcome. Sample topics include: Identifying/monitoring contaminants (e.g., endocrine disruptors, pharmaceuticals, viruses) in ASR systems; Elucidating fate and transport issues associated with dissolved and colloidal contaminants; and Optimizing/managing system operations.

**Conveners:** Thomas C. Harmon, Dept. of Civil and Environmental Engineering, University of California, Los Angeles, 5732G Boelter Hall, Los Angeles, CA 90095-1593 USA, Tel: +1-310-206-3735, Fax: +1-310-206-2222, E-mail: [tch@seas.ucla.edu](mailto:tch@seas.ucla.edu); Constantinos V. Chrysikopoulos, Dept. of Civil & Environmental Engineering, University of California, Irvine, Irvine, CA 92616, USA, Tel: +1-949-824-8661, E-mail: [costas@max.eng.uci.edu](mailto:costas@max.eng.uci.edu)

#### **H11 Thirty-five years of Groundwater Modeling: A Tribute to George F. Pinder**

George F. Pinder has made significant and pioneering contributions in groundwater modeling over the past 35 years. This session is intended to provide examples of how his efforts have shaped the development of groundwater modeling, the current state of the discipline, and the modeling challenges that remain. Contributions over the range of saturated and unsaturated flow and transport, numerical methods, and field applications are welcome. Presentations that indicate the influence of Professor Pinder's ideas are particularly encouraged.

**Conveners:** Michael A. Celia, Dept. of Civil Engineering, Princeton University, Princeton, NJ 08544-3074 USA, Tel: +1-609-258-5425, Fax: +1-609-258-2799, E-mail: [celia@karst.princeton.edu](mailto:celia@karst.princeton.edu); William G. Gray, Dept. of Civil Engineering and Geological Sciences, 156 Fitzpatrick Hall, University of Notre Dame, Notre Dame, IN 46556 USA, Tel: +1-219-631-5942, Fax: +1-219-631-9236, E-mail: [wgray@nd.edu](mailto:wgray@nd.edu)

#### **H12 Innovative Technologies for Measuring Subsurface Water and Contaminant Fluxes**

Papers are encouraged on the development and/or application of innovative methods for direct in situ measurement of water and contaminant fluxes. Such measurements have applications in long-term monitoring, aquifer restoration, and contaminant source remediation. For example, flux measurements could be used to estimate of subsurface source strength and mass loading to ground and surface waters. Suitable paper topics encompass laboratory or field applications of water and contaminant flux measurement techniques, flux measurements across interfaces between

hydrologic compartments (e.g., groundwaters and surface waters), and integration of flux measurements over space or time. Submissions on theoretical treatment of fluxes across compliance boundaries or other interfaces are also welcomed.

**Conveners:** Kirk Hatfield, 234 Weil Hall, Department of Civil and Coastal Engineering, University of Florida, Gainesville, FL 32611 USA, Tel: +1-352-392-0956, Fax: +1-352-392-3394, E-mail: khatf@ce.ufl.edu; James W. Jawitz, Department of Civil and Materials Engineering, University of Illinois at Chicago, Chicago IL 60607 USA, Tel: +1-312-996-9840, Fax: +1-312-996-2426, E-mail: jawitz@uic.edu

### **H13 Nonlinear Optimization Methods in Water Resources for Management and Calibration**

This session focuses on optimization methods for identifying management policies, monitoring schemes, or values of calibrated parameters in hydrologic and watersheds models, including models arising from analysis of quantity and quality of groundwater and surface water. Both continuous-variable and discrete-variable optimization problems are included. Papers should discuss algorithms used or developed and the success of numerical application. Authors are encouraged to discuss relative strengths and limitations of methods presented in terms of their ability to find accurate, robust solutions and to solve problems in a computationally efficient manner. Papers that incorporate field-scale applications and/or analysis of uncertainty in model parameters or in observed data are especially encouraged.

**Conveners:** Christine Shoemaker, Civil and Environmental Engineering, Cornell University, Ithaca, NY 14853-6801 USA, Tel: +1-607-255-9233, Fax: +1-607-255-9004, E-mail: CAS12@cornell.edu; Hoshin Gupta, Department of Hydrology and Water Resources, University of Arizona, Tucson AZ 85721 USA, Tel: +1-520-621-9360, Fax: +1-520-621-1422, E-mail: hosh\_stc@hwr.arizona.edu

### **H14 Environmental Analysis in a Regulatory Context (Poster Only)**

The session addresses the constraints and complexities of performing environmental analysis in response to demands of compliance with applicable regulations. Often, the type and goal of the analysis are dictated by various regulations. Complex case studies, where multiple and perhaps contradictory regulations apply to a single problem, are encouraged in an effort to highlight challenges in maintaining consistency of the analyses in the face of diverse regulatory criteria.

**Conveners:** John Tauxe, Neptune and Company, 1505 15<sup>th</sup> St., Suite B, Los Alamos, NM 87544-3063 USA, Tel: +1-505-662-0707x15, Fax: +1-505-662-0500, E-mail: jtauxe@neptuneandco.com; Miguel A. Marino, Department of Civil and Environmental Engineering, University of California, Davis, CA 95616-8628 USA, Tel: +1-530-752-0684, Fax: +1-530-752-5262, E-mail: mamarino@ucdavis.edu

### **H15 Water Resources Management: A Social Perspective**

The central objective of contemporary water resource management practice is to promote stakeholders' participation through appropriate institutional arrangements, in particular, to develop new and more open decision-making processes. The principal stakeholders of many river basins include its residents and the municipal offices, which have the mandate to provide initial water resource management decisions. Depending on the magnitude of management problem, the state/provincial and federal agencies are the other parties that have a major stake in water management in the basin. Several non-government organizations and community-based grass root organizations also play some role in short-term decisions and basin-wide deliberations on water management. To incorporate a wide variety of perspectives of such diverse groups of stakeholders emphasis on at least three sources of knowledge is needed. Firstly, there is a need to include relevant social science research (e.g., perceptions, values) on the affected population and on respective stakeholder groups. Secondly, experiments with participatory decision making processes must be undertaken. Thirdly, there is a need to integrate the results of social science research into an innovative decision-making framework for water resource management. This session attempts to: (1) promote increased involvement of all stakeholders in water resource management; (2) discuss issues of importance for cooperation between organizations with water management-related interests as well as between those organizations and watershed residents; and (3) review the experience and lessons of projects that have been successful in integrating social issues into a decision-making framework for water resource management.

**Conveners:** S.P. Simonovic, Department of Civil and Environmental Engineering, University of Western Ontario, London, ON N6A 5B9, Canada, Tel: 519-661-4075, Fax: 519-661-3779, E-mail: simonovic@uwo.ca; Miguel A. Marino, Department of Civil and Environmental Engineering, University of California, Davis, CA 95616-8628 USA, Tel: +1-530-752-0684, Fax: +1-530-752-5262, E-mail: mamarino@ucdavis.edu

### **H16 Nonlinear Optimization Methods in Water Resources for Management and Calibration**

There has been an explosion in the use of heuristic methods for this type of optimization. However, such heuristic methods have both advantages and disadvantages in comparison to other methods (including those that involve derivative-based optimization). It is expected that this session will incorporate a mixture of both types of optimization methods and hence will promote a lively discussion. This session will focus on the use of optimization methods for identifying management policies, monitoring schemes, or values of calibration parameters in hydrologic and watersheds models, including those models arising in analysis of quantity and quality of groundwater and surface water. Both continuous-variable and discrete-variable optimization problems are of interest. Authors are encouraged to discuss the relative strengths and limitations of the methods presented in terms of their ability to find accurate, robust solutions and to solve the problem in a computationally efficient manner. Papers that incorporate field-scale applications and/or analysis or uncertainty in model parameters or in observed data are especially encouraged.

**Conveners:** Christine Shoemaker, School of Civil and Environmental Engineering, Cornell University, Ithaca, NY 14853 USA, Tel: +1-607-255-9233, Fax: +1-607-255-9004, E-mail: [cas12@cornell.edu](mailto:cas12@cornell.edu); Hoshin Gupta, Department of Hydrology and Water Resources, PO Box 210011, University of Arizona, Tucson, AZ 85721 USA, Tel: +1-520-621-9360, Fax: +1-520-621-1422, E-mail: [hoshin@hwr.arizona.edu](mailto:hoshin@hwr.arizona.edu)

### **H17 Communicating Scientific Consensus in Hydrology**

For many water resources issues, scientific progress has outpaced advancement of institutional capabilities. One reason for this situation appears to be misperceptions about the extent of scientific consensus. By its nature, the research community focuses on areas of uncertainty, even where there is broad consensus about core knowledge. However, the public and policymakers often perceive minor disagreements within the research community as major disputes or large uncertainty that precludes significant action on their part. Possible contributors to this confusion include media coverage that presents 'both sides' of scientific issues with equal weight, as well as the intrusion of political sensitivities or policy agendas during creation of scientific consensus documents. Through invited and contributed presentations related to any of the hydrology disciplines or water resources issues, as well as extended discussion, this session seeks to identify common experiences and possible strategies for improved communication of scientific consensus.

**Conveners:** Holly C. Hartmann, Department of Hydrology and Water Resources, PO Box 210011, University of Arizona, Tucson, AZ 85721 USA, Tel: +1-520-626-8523, Fax: +1-520-626-2488, E-mail: [hollyh@hwr.arizona.edu](mailto:hollyh@hwr.arizona.edu); D. Briane Adams, 3850 Holcomb Bridge Road, Suite 160, Norcross, GA 30092 USA, Tel: +1-770-409-7700, Fax: +1-770-407-7725, E-mail: [dadams@usgs.gov](mailto:dadams@usgs.gov)

### **H18 Remote observation of rivers and wetlands (Joint with Biogeosciences)**

Emerging satellite, aircraft and land-based technologies offer new ways to observe and model dynamic hydrologic, climatic, geomorphic and biological processes in floodplain and wetland environments. Examples include radar-based estimates of water level and surface velocity, incorporation of satellite-derived precipitation fields into distributed watershed models, radar imaging of river and lake ice, mapping of phytoplankton and riparian vegetation, detection of cold pools, and lidar measurements of water surface velocity and floodplain topography. We particularly encourage abstracts that (1) use remote observation to provide new understanding of hydrologic, climatic, geomorphic or biogeochemical processes; (2) develop or refine new satellite, aircraft and land-based methods for remote observation of rivers and wetlands; (3) incorporate remote observations into hydrologic, geomorphic or biogeochemical models; or (4) identify mission requirements or limitations for a hydrology-based satellite mission.

**Conveners:** Larry Smith, Dept. of Geography, UCLA, Los Angeles, CA 90095-1524 USA, Tel: +1-310-825-3154, Fax: +1-310-206-5976, E-mail: [lsmith@geog.ucla.edu](mailto:lsmith@geog.ucla.edu); Doug Alsdorf, Dept. of Geography, UCLA, Los Angeles, CA 90095-1524 USA, Tel: +1-310-794-4987, Fax: +1-310-206-5976, E-mail: [alsdorf@geog.ucla.edu](mailto:alsdorf@geog.ucla.edu)

### **H19 Coupling between the water, energy and carbon cycles in terrestrial systems (Joint with Biogeosciences)**

Active regulation of water, energy and carbon fluxes by terrestrial ecosystems makes the vegetation an important factor in regulating the Earth's hydrological cycle and its climate. Anthropogenic conversion of the Earth's vegetation cover and its feedbacks with the Earth system is believed to have significantly exacerbated the (regional) climate

change. Coupled models, "verified" against paleodata records, support several cases of "evidence" for climate forcing by land and vegetation characteristics. The world research community, under a joint programmatic leadership of IGBP (BAHC) and WCRP (GEWEX), developed series of large scale land surface experiments, which have contributed to a new understanding of the role of biospheric feedbacks in seasonal to inter-annual climate variability, the effects of land surface heterogeneity on atmospheric processes and ultimately effects on regional water and carbon cycles and water resources. Not only vertical exchanges between land biosphere and the atmosphere, but also lateral water flows and associated transport of the constituents in riverine systems, e.g. sediments, N, and P have been drastically affected by anthropogenic activities. Papers on these and related topics are encouraged.

**Conveners:** Pavel Kabat, Alterra Green World Research, PO Box 125, 6700 Wageningen, The Netherlands, Tel: 31 317 474314, Fax: 31 317 424812, E-mail [p.kabat@alterra.wag-ur.nl](mailto:p.kabat@alterra.wag-ur.nl)

Holger Hoff, BAHC International Project Office, Potsdam Institute for Climate Impact Research, Telegrafenberg, D-14473 Potsdam, Germany Tel: 49 (331) 288 2573, Fax: 49 (331) 288 2547

### **H20 Observations and modeling of land surface hydrological processes**

Numerous studies have resulted in observations from field experiments to study the dynamics of land surface behavior; numerical modeling of the evolution of land surface response to solar heating and precipitation; the comparison of simulations to observed quantities from field experiments; and the use of satellite remote sensing data to both drive and validate hydrological models. It is widely believed that the combination of field observations and satellite data with hydrological models will produce improved estimates of hydrologic fluxes and energy budgets. This session will explore this concept through examination of a broad range of topics: water and energy budgets, soil moisture, runoff, streamflow, surface temperature, and latent, sensible, ground heat, and net radiation fluxes. Papers on the above topics are invited.

**Conveners:** Venkat Lakshmi, Department of Geological Sciences, University of South Carolina, Columbia SC 29208 USA, Tel: +1-803-777-3552, Fax: +1-803-777-6610, E-mail: [vlakshmi@geol.sc.edu](mailto:vlakshmi@geol.sc.edu); Kevin Czajkowski, Dept. of Geography and Planning, University of Toledo, Toledo, OH, 43606 USA, Tel: +1-419-530-4274; Fax: +1-419-530-7919, E-mail: [kczejko@pop3.utoledo.edu](mailto:kczejko@pop3.utoledo.edu)

### **H21 Monitoring, measuring, and modeling snow processes (Poster only)**

The storage and modulated release of water from seasonal snowpacks are major components of hydrologic systems in many parts of the world, particularly in mountainous and boreal areas. In these regions, the seasonal snowcover is a critical component of the annual water cycle, controlling soil moisture, soil temperature, streamflow, and the development and stability of terrestrial and aquatic ecosystems. This session will address a broad range of topics that are important to understanding this important resource. We are soliciting poster presentations on all aspects of monitoring, measuring, and modeling snow processes, with emphasis on the following specific topics: investigations into physical properties of snow; linking microscale properties to macroscale processes; snowcover modeling in vegetated and complex terrain; interactions between snowcover, soil and biotic processes; snow measurement and monitoring techniques and instruments; remote Sensing of snowcover properties and extent.

**Conveners:** Adam Winstral, USDA-ARS, Northwest Watershed Research Center, 800 Park Blvd, Suite 105, Boise ID 83712 USA, Tel: +1-208-422-0739, Fax: +1-208-334-1502, E-mail: [awintra@nwrcc.ars.pn.usbr.gov](mailto:awintra@nwrcc.ars.pn.usbr.gov); David Garen, USDA-NRCS, National Water and Climate Center, Portland, OR 97204-3224 USA, Tel: +1-503-414-3021, E-mail: [dgaren@wcc.nrcs.usda.gov](mailto:dgaren@wcc.nrcs.usda.gov)

### **H22 Recent Advancements and Future Prospects in Hydrologic Remote Sensing**

Remote sensing has held a great deal of promise for hydrology, mainly because of the potential to observe large-scale areas and to make entirely new measurements of hydrologic variables not generally possible with traditional techniques. However, hydrologic science has been slow to embrace remote sensing as a useful source of data, presumably because existing techniques have been satisfactory for limited applications. There remain great opportunities for hydrologic remote sensing to make significant impacts on our understanding and prediction of large-scale hydrologic phenomenon, such as snow, precipitation, soil moisture, surface water storage and transport, evapotranspiration, ground water, and freeze/thaw state. Therefore, the focus of this session will be on recent advancements and future prospects for hydrologic remote sensing with a special emphasis on the use of remotely

sensed data for the advancement of hydrologic science. Presentations of new hydrologic instruments and satellite missions are also invited.

**Conveners:** Paul Houser, Head, Hydrological Sciences Branch NASA-GSFC Code 974, Greenbelt, MD 20771 USA, Tel: +1-301-614-5772, Fax: +1-301-614-5808, E-mail: [Paul.Houser@gsfc.nasa.gov](mailto:Paul.Houser@gsfc.nasa.gov); Michael F. Jasinski, Land Surface Hydrology Program Office of Earth Science, Code YS, NASA Headquarters, Washington DC 20546 USA, Tel: +1-202-358-1847, Fax: +1-301-614-5782, E-mail: [mjasinsk@mail.hq.nasa.gov](mailto:mjasinsk@mail.hq.nasa.gov)

### **H23 Integrated studies of terrestrial biosphere B atmosphere exchanges of carbon dioxide, water and energy: FLUXNET approach**

Understanding the flows of CO<sub>2</sub>, water and energy to and from the terrestrial ecosystems is the basis for revealing roles of terrestrial biosphere in global environmental change. This requires constant monitoring of diverse ecosystems, rapid sharing of quality-controlled data among the global science community, and multidisciplinary synthesizing of scientific findings. This session welcomes reports from the followings topics: Multiyear tower flux measurements; Measurements from underrepresented ecosystems (savannas, tropical rainforests, wetlands, etc.) and regions (Asia, Africa, east Europe and south America); Cross-vegetation type and cross-climate type flux comparisons; Partitioning of NEE or NEP using multiple methods such as stable isotopes, chamber, nighttime flux extrapolation, light response functions, etc.; Impacts of clouds, fronts, extreme weather events, El Niño on flux exchanges; Controls of site conditions, stand age, succession stages, canopy structures, species diversity on flux exchanges; Scaling up of tower flux measurements; Validation of SVAT models for multi-temporal and spatial scales; Interpretation and validation of results from remote sensing such as MODIS derived products and atmospheric inversion; Development of global network of flux towers.

**Conveners:** Lianhong Gu, University of California at Berkeley, Ecosystem Science Division, Dept. of Environmental Science, Policy and Management, 151 Hilgard Hall, Berkeley, CA 94720 USA, Tel: +1-510-642-2421, Fax: +1-510-643-5098, E-mail: [lianhong@nature.berkeley.edu](mailto:lianhong@nature.berkeley.edu); Dennis Baldocchi, University of California, Berkeley, Ecosystem Science Division, Department of Environmental Science, Policy and Management, 151 Hilgard Hall, Berkeley, CA 94720 USA, Tel: +1-510-642-2874, Fax: +1-510-643-5098, E-mail: [baldocchi@nature.berkeley.edu](mailto:baldocchi@nature.berkeley.edu); Steven W. Running, University of Montana, School of Forestry, Missoula, Montana 59812 USA, Tel: +1-406-243-6311, Fax: +1-406-243-4510, E-mail: [swr@ntsg.umt.edu](mailto:swr@ntsg.umt.edu).

### **H24 Utilizing the Radar Rainfall Information in Hydrological Applications**

In the last two decades there has been an increasing interest among hydrologists in the use of meteorological radar data in hydrology. Initially it was hoped that high spatial and temporal resolution radar rainfall data would provide a have the potential to be critical new the new source of rainfall and greatly improve points in rainfall-runoff modeling. - the inaccurate representation of rainstorm over the basin by the rain gauge rainfall data. However, if one attempts tries to conclude from the vast range of published studies whether the radar- rainfall information has indeed fulfilled this expectation and significantly improved the ability to predict runoff, clear evidence cannot be found to support it. Although many demonstrate improvement in runoff prediction by using radar, others claim that the large uncertainties in these data prevent a reliable prediction of runoff for individual events. The current session is organized to bring together researchers that investigate different aspects of the use of the radar data as the "new source of rainfall information in hydrological applications". Presentations are welcome on issues, such as: 1) Characterizing uncertainties in the radar rainfall; 2) Examining the effect of radar data uncertainties on runoff and flow prediction; 3) Identifying the time and space scales appropriate to use the radar data in different hydrological applications; 4) Identifying what type of hydrologic prediction models best exploit radar rainfall information; 5) Identifying conditions (climate regimes, basin size, location in radar coverage, etc) in which radar data are best suited for use in the hydrological applications; and, 6) Demonstrating the strengths/weaknesses of radar data compared to rain gauge data for runoff and flow prediction.

**Conveners:** Efrat Morin, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ 85721 USA, Tel: +1-520-626-4279, Fax: +1-520-621-1422, E-mail: [morine@hwr.arizona.edu](mailto:morine@hwr.arizona.edu); Konstantine P. Georgakakos, Hydrologic Research Center, 12780 High Bluff Drive, Suite 250, San Diego, CA 92130 USA, Tel: +1-858-794-2726, Fax: +1-858-792-2519, E-mail: [Kgeorgakakos@hrc-lab.org](mailto:Kgeorgakakos@hrc-lab.org); David C. Goodrich, USDA-ARS-SWRC, 2000 E. Allen Rd., Tucson, AZ 85719 USA, Tel: +1-520-670-6380x144, Fax: +1-520-670-5550, E-mail: [goodrich@tucson.ars.ag.gov](mailto:goodrich@tucson.ars.ag.gov)

## **H25 Spatially Distributed Measurement Techniques and Approaches for Testing Spatially Distributed Models**

There is an increasing need in hydrological research and environmental management to accurately represent and model hydrological processes in a spatial context. For many years now, modeling tools have been available to simulate spatially distributed hydrological processes, but the quality of simulations and process representation have been difficult to assess because of a lack of appropriate field data. There has been renewed interest in field measurements, aimed specifically at testing and improving our understanding and modeling capability of spatial processes in climates from alpine to arid, often involving the use of novel techniques. In addition, some remote sensing techniques have reached the point where they can provide detailed data for model testing. We encourage contributions that illustrate new methods and techniques; use these to critically assess the performance of distributed hydrological models; and develop concepts important to the nature and representation of spatial patterns in hydrological processes.

**Conveners:** Peter Troch, Wageningen Univ/ Sub-Dept Water Resources, Hydrology & Water Management Group, Nieuwe Kanaal 11, Wageningen 6709 AP, Netherlands, work: 31 317 48 27 78, Fax: 32 317 48 48 85, E-mail: [peter.troch@users.whh.wau.nl](mailto:peter.troch@users.whh.wau.nl); Larry Band, Dept. of Geography, UNC, Chapel Hill, NC 27599, Tel: 919-962-3921, fax 919-962-1537, E-mail: [iband@E-mail.unc.edu](mailto:iband@E-mail.unc.edu).

## **H26 Current Issues in Hydro-Ecological Controls on Nutrient Dynamics and Export from Forested Catchments**

(Joint with B)

Understanding the dynamics of ecosystem controls on the retention and release of nutrients to streams from forested watersheds continues to be a challenging area of research with important implications for managing land and water resources in the contributing watersheds. Ecosystem controls on nutrient release involve complex dynamics due to the temporal and spatial variation in biological controls on nutrient cycling processes, such as biological uptake, decomposition and mineralization. Similarly, hydrological controls on these biological processes and on nutrient release are also complex and vary through space and time. Further complexity arises due to differences in biological and hydrological pathways associated with different forms of soluble nutrients (e.g. inorganic versus organic). This section seeks papers from field- and modeling-based research that examine the impact and interactions of hydro-ecological controls on nutrient dynamics with the aim of ultimately providing an integrated understanding of nutrient retention and release from watersheds.

**Conveners:** Creed, I.F. Department of Plant Sciences, The University of Western Ontario, London, ON CANADA N6A 5B7 E-mail: [icreed@uwo.ca](mailto:icreed@uwo.ca) Fax: 519-661-3935 Tel: 519-661-4265, Tague, C.L. Department of Geography, San Diego State University, San Diego, CA, 92182-4493 E-mail: [ctague@mail.sdsu.edu](mailto:ctague@mail.sdsu.edu) Fax: 619-594-4938, Tel: 619-594-3230

## **H27 Coupled Hydrological and Terrestrial Ecosystem Processes (Joint With B)**

Surface and near-surface hydrological and ecosystem processes are intimately coupled in watersheds. An understanding of their interactions is necessary for improved assessment and modeling of water balance, carbon and nutrient cycling, canopy growth, and landscape change and succession. Topics can include the development of distinct terrestrial ecosystem patterns as conditioned by soil water patterns and flowpaths in complex landscapes, the role of these patterns on water balance at the catchment scale, rates of carbon sequestration, and nutrient cycling along topo-edaphic gradients. Topics on the sensitivity of these systems to changes in water balance due to shifts in climate or land cover change are also encouraged. In addition, the session is intended to highlight studies investigating the links between terrestrial ecosystem and hydrological processes. Abstracts are solicited that discuss measurement or modeling studies of ecosystem and hydrological interactions ranging from the plot to watershed scale.

**Conveners:** D. Scott Mackay, Department of Forest Ecology and Management, University of Wisconsin, Madison, WI 53706 USA, Tel: +1-608-262-1669, E-mail: [dsmackay@facstaff.wisc.edu](mailto:dsmackay@facstaff.wisc.edu); Brad Wilcox, Texas A&M Univ, Dept Rangeland Ecol & Mgt, 203 Animal Industries Bldg 2126 TAMU College Station, TX 77843-2126, Fax: (979)845-6430, E-mail: [bwilcox@tamu.edu](mailto:bwilcox@tamu.edu)

## **H28 Theories, applications, and case studies on model transferability and scalability (Joint with A)**

Transferability is an important feature that a model should have in order for it to be applicable to diverse geographical regions and climatic zones with similar model performance. It is one of the focused research areas of the GEWEX Hydrometeorology Panel. Scalability is another useful feature that enables models to be applicable at a wider range of spatial and/or temporal scales. In recent years, significant advances have been made in studying issues relevant to

model transferability and scalability. This session aims to bring together researchers who investigate different aspects of the problems and to report current state-of-art research results. Presentations are welcome on issues related to (1) theories and/or frameworks that show potential strengths for improving model transferability and scalability; (2) development and applications of all kinds of models and their parameterizations dealing with transferability and scalability, such as land surface models, hydrological models, coupled land-atmosphere models or regional climate models, and parameterizations for atmospheric (e.g., clouds and precipitation) and land surface (e.g., runoff and soil moisture) processes; and (3) case studies such as model evaluation and intercomparison under different climate and environmental conditions.

**Conveners:** Xu Liang, Dept. of Civil and Environmental Eng., University of California, Berkeley, CA 94720, Tel.: 510-642-2648, Fax: 510-642-7483, E-mail: [liang@ce.berkeley.edu](mailto:liang@ce.berkeley.edu) ; L. Ruby Leung, Atmospheric Science and Global Change Resource, Pacific Northwest National Laboratory, Richland, WA 99352, Tel: 509-372-6182, Fax: 509-372-6168, E-mail: [ruby.leung@pnl.gov](mailto:ruby.leung@pnl.gov)

### **H29 Watershed Inter-comparison**

Experimental watersheds allow us to evaluate the response of hydro-climatic processes, water quality, soil moisture and streamflow to variations in climate, land-use, and land-cover. Evaluation of multiple watersheds will show how the sensitivity of these effects may vary over different regions and climatic conditions, and how approaches to the management of water resources may differ regionally. This session will focus on comparisons between two or more experimental watersheds. Special emphasis will be placed on inter-comparison efforts across a wide range of geographies, hydro-climatic regions, and spatial and temporal scales which will contrast and compare dominant hydrological, meteorological, and biogeochemical processes.

**Conveners:** Danny Marks, USDA-ARS-NWRC, 800 Park Blvd., Plaza IV, Suite 105 Boise, ID 83712, Tel: 1-208-422-0721, Fax: 1-208-422-1502, E-mail: [danny@nwr.ars.usda.gov](mailto:danny@nwr.ars.usda.gov);

David C. Goodrich, USDA-ARS-SWRC, 2000 E. Allen Rd., Tucson, AZ 85719 USA, Tel: 1-520-670-6380 (144), Fax: 1-520-670-5550, E-mail: [goodrich@tucson.ars.ag.gov](mailto:goodrich@tucson.ars.ag.gov)

### **H30 An Integrated Approach to Hydrologic Research and Applications: A Session in Honor of Dr. John Schaake**

John Schaake has recently retired from the National Weather Service (NWS) after more than 30 years of distinguished service to the hydrologic community. He began his career as a university professor at the University of Florida and MIT before he joined NWS in 1974. Dr. Schaake's contributions to hydrology extend from basic scientific developments to advanced operational applications. His signature contribution has been that he is an ardent champion of an integrated, multi-disciplinary approach to hydrologic research and applications. He is among the pioneers who break the traditional confines of hydrology by working with not only hydrologists, but also scientists of other disciplines including atmospheric scientists, soil physicists, and remote sensing scientists. He has played a pivotal role in getting the GEWEX Continental-scale International Project (GCIP) off the ground about 10 years ago and has ever since been a principal player in ensuring GCIP's success. One of GCIP's hallmark legacies has been the close collaboration between hydrologists and atmospheric scientists to understand water and energy cycles at different space/time scales. GCIP is now transitioning to the next phase - GEWEX America Predictions Project (GAPP), which focuses more on long-term predictability and water resources applications. Dr. Schaake is again working hard to bring researchers and practitioners involved in Advanced Hydrologic Predictions Service (AHPS), a major NWS initiative, and GAPP together to collaborate on research and applications issues of critical importance. This session will consist of invited and contributed presentations in the following areas: land surface hydrologic modeling, stochastic analysis of atmospheric forcing fields (especially precipitation), probabilistic approach to hydrologic forecasting, advanced data assimilation techniques, and water resources applications.

**Conveners:** Qingyun Duan, NOAA/NWS, Hydrology Lab, 1325 East-West Highway, Silver Spring, MD 20910, Tel: 1-301-713-1018x113, Fax: 1-301-713-0963, E-mail: [Qingyun.Duan@noaa.gov](mailto:Qingyun.Duan@noaa.gov); Soroosh Sorooshian, Dept. of Hydrology and Water Resources, University of Arizona, Tucson, AZ 85721, Tel: 1-520-621-1661, Fax: 1-520-621-1422, E-mail: [soroosh@hwr.arizona.edu](mailto:soroosh@hwr.arizona.edu)

### **H31 The symbiotic nature of groundwater and surface-water flow patterns in evolving surface drainage**

The interface of groundwater and surface water is of interest to many researchers with most attention given to quantity and quality considerations. Equally important is the interaction of the pattern of groundwater flow and the pattern of surface-water flow as it affects the topography of the interface. Focus of groundwater flow energy at knickpoints, heads of streams, at points along banks, etc. enhances erosion potential because of pore-pressure effects and other forms of groundwater sapping such as ice needle growth, solution, etc. Stream competency is reduced where there is a loss of flow to the groundwater system. The result is the pattern of groundwater flow influences the evolving pattern of surface-water flow. Similarly, channel-flow characteristics result in distinct erosion and deposition patterns leading to migration of surface channels that in turn modifies the groundwater flow pattern. Abstracts are invited for a poster session on the symbiotic nature of the patterns of groundwater and surface water flow patterns.

**Conveners:** D. Pederson, Department of Geosciences, University of Nebraska-Lincoln, Lincoln, NE 68588-0340 USA, Tel: 1-404-474-7563, E-mail [dpederson2@unl.edu](mailto:dpederson2@unl.edu); X. Chen, Conservation and Survey Division, University of Nebraska-Lincoln, Lincoln, NE 68588-0517 USA, Tel: 1-402-472-0772, E-mail [xchen2@unl.edu](mailto:xchen2@unl.edu)

### **H32 A Strategy for the Advancement of Hydrologic Science.**

A consortium of universities is being formed to provide infrastructure for the advancement of hydrologic science. The science planning, guiding the consortium, will be presented in an oral session, followed by a panel discussion.

Contributed papers on this theme are solicited for a poster session, which will conclude with an open discussion of research infrastructure needs in hydrologic science. The consortium's mission is to facilitate advancements by: i) providing scientists access to data and information at wide ranges of spatial and temporal scales, as well as access to the most appropriate instruments and technologies for the creation of hydrologic understanding to address a list of pressing national and international problems; ii) nurturing general understanding of hydrologic sciences through programs of education and outreach; and iii) assuring applicability of the advances through a program of technology transfer. For additional information on the consortium, see [www.temple.edu/CHR](http://www.temple.edu/CHR).

**Conveners:** Roger Bales, Department of Hydrology and Water Resources, University of Arizona ([roger@hwr.arizona.edu](mailto:roger@hwr.arizona.edu)) and Marshall Moss, UCAHS ([memos@worldnet.att.net](mailto:memos@worldnet.att.net)).

### **H33 Cold Land Processes (Posters only)**

This session is concerned with the hydrology and land-atmosphere interactions of the terrestrial cryosphere, cold land areas where water is either seasonally or permanently frozen. Contributions are solicited on the following topics: (1) the role of snow, frozen ground, and vegetation freeze/thaw processes in hydrologic, climate, and weather prediction; (2) the development, operation, and/or validation of basin or larger scale distributed snow/ice models; (3) advances in the understanding and representation of subgrid variability in distributed snow/ice models; (4) advances in observing frozen precipitation, and in discriminating between frozen and liquid precipitation in observations or models; (5) advances in understanding of the evolution of snow albedo, the representation of patchy snow/ice cover, sublimation, snowmelt and refreezing, the retention and transport of melt water, the representation of blowing snow, and the interaction between snow/ice processes and soil and vegetation processes; and (6) new methods, techniques, and instruments (especially remote sensing) for measuring and monitoring key components of the terrestrial cryosphere.

**Conveners:** Don Cline, National Operational Hydrologic Remote Sensing Center, National Weather Service, 1735 Lake Dr. W., Chanhassen, MN 55317 USA, Tel: +1-952-361-6610, Fax: +1-592-361-6634, E-mail: [cline@nohrc.nws.gov](mailto:cline@nohrc.nws.gov) John Baker, USDA/University of Minnesota, Minneapolis, MN 55414 USA, E-mail: [baker003@umn.edu](mailto:baker003@umn.edu). Ken Kunkel, Illinois State Water Survey, Champaign, IL 61820-7495, Tel: +1-217-244-1488, E-mail: [k-kunkel@uiuc.edu](mailto:k-kunkel@uiuc.edu)

### **H34 Ice - From Molecules to Ice Sheets: A Special Session in Honor of W. Barclay Kamb**

In the course of his productive career Barclay Kamb has studied an unusually broad spectrum of glaciological topics ranging in scale from molecular-level ice physics to ice-sheet dynamics. Through forefront field work, laboratory experiments and theoretical analysis, he has tackled pivotal glaciological problems. His work has led to major advances in understanding ice crystallography, deformation and fabrics, glacier sliding, subglacial water drainage, glacier surges and mechanism of ice streaming. In his honor, we solicit contributions on these and other related glaciological topics. All relevant contributions are welcome. We are particularly interested in contributions that will review recent advances in a glaciological subdiscipline or will integrate some current glaciological developments into a vision of exciting future direction/s in glaciology, or both.

**Conveners:** Slawek Tulaczyk, Department of Earth Sciences, University of California, Santa Cruz, CA 95064, Tel: +1-831-459-5207, Fax: +1-831-459-3074, E-mail: [tulaczyk@es.ucsc.edu](mailto:tulaczyk@es.ucsc.edu);

Charles F. Raymond, Geophysics Program, Box 351650, University of Washington, Seattle, WA 98195, Tel: +1-206-543-4914, Fax: +1-206-543-0489, E-mail: [charlie@geophys.washington.edu](mailto:charlie@geophys.washington.edu).

### **H35 Monitoring an Evolving Cryosphere: The 25th anniversary of the National Snow and Ice Data Center.**

Our ability to measure and monitor the remote polar and alpine regions of the Earth has dramatically improved over the last quarter-century. As records and measurements improve, we recognize important changes underway in the cryosphere. We solicit oral and poster presentations that highlight the use of satellite and in situ data on the cryosphere as a component of the climate system, including sea ice, seasonal snow cover, glaciers, frozen ground, and the great ice sheets.

**Conveners:** Anne Nolin, CIRES/NSIDC, 449 UCB, University of Colorado, Boulder, CO 80309-0449, Tel: (303) 492-6508, Fax: (303) 492-2468, E-mail: [nolin@spectra.colorado.edu](mailto:nolin@spectra.colorado.edu);

Ted Scambos, CIRES/NSIDC, 449 UCB, University of Colorado, Boulder, CO 80309-0449 USA, Tel: +1- 303-492-1113, Fax: +1-303-492-2468, E-mail: [teds@icehouse.colorado.edu](mailto:teds@icehouse.colorado.edu)

### **H36 Glacier Change: Rates and Resolution**

This special session is being designed to accommodate both field-oriented and multispectral remote sensing communities, to examine progress and developments in glacier monitoring. Subtopics may include: (a) Rates of change discerned from remote sensing measurements made at differing resolution, spatial, and temporal scales, (b) Comparison of aerial photography with satellite remote sensing, and (c) Remote sensing results compared to results of reliable, high-resolution field studies. Recent progress of the Global Land Ice Monitoring from Space (GLIMS) project will be featured, but the session is open to any contributions on this focused theme.

**Convener:** Jeffrey S. Kargel, United States Geological Survey, 2255 N Gemini Drive, Flagstaff, Arizona 86001, Tel: (520) 556-7034, E-mail: [jkargel@usgs.gov](mailto:jkargel@usgs.gov).

### **H37 Gas and Vapor Transport Processes in Porous and Fractured Media**

Various issues concerning gas and vapor diffusion in soils and rocks have received increasing attention in recent years. In this session, we encourage interaction on a range of topics including gas diffusion and advection models and processes, enhancement of vapor-phase diffusion in the presence of its liquid phase, gas and vapor transport in the near-surface region including the surface, gas and vapor transport across the capillary fringe region including dissolved gas, vapor transport of volatile organic components (VOCs), vapor-solid sorption, as well as gas and vapor transport issues in fractured rock (e.g., Yucca Mountain). We also seek papers on innovative sensing methods for gas and vapor species in porous and fractured media. We encourage both experimental and theoretical contributions.

**Conveners:** Stephen W. Webb, Environmental Restoration Technology Department, Sandia National Laboratories, P.O. Box 5800, MS 0719, Albuquerque, NM 87185-0719, Tel: 505-844-3931, [swwebb@sandia.gov](mailto:swwebb@sandia.gov), Clifford K. Ho, Geohydrology Department, Sandia National Laboratories, P.O. Box 5800, MS-0735, Albuquerque, NM 87185-0735, Tel: 505-844-2384, [ckho@sandia.gov](mailto:ckho@sandia.gov), Dorthe Wildenschild, Department of Hydrodynamics and Water Resources, Building 115, Technical University of Denmark, DK-2800 Lyngby, Denmark, ph +45 4525 1401, [dw@isva.dtu.dk](mailto:dw@isva.dtu.dk).

### **H38 Evaluation of Unsaturated Flow Models, Recent Advances and Applications**

Recharge and evapotranspiration are critical components of the water cycle from global to local scales that can be evaluated using unsaturated flow modeling. Through improvements in unsaturated flow monitoring, more data are available for input and verification of these codes. Recent advances in codes include the variety of processes simulated, such as liquid and vapor flow, hysteresis, vegetation, and surface runoff. Increased computational power allows larger scale or longer-term simulations to be conducted. Examples of applications of these codes include evaluation of land-atmosphere interactions, cover performance for waste containment, and groundwater recharge. Alternative approaches such as analytical solutions to Richards equations are also being implemented in catchment scale models for large scale evaluation of recharge. We seek both theoretical and applied research results that address the advances and applications of unsaturated flow modeling.

**Conveners:** Bridget R. Scanlon, Bureau of Economic Geology, Univ. of Texas at Austin, Pickle Research Campus, 10100 Burnet Rd., Austin, TX 78758, Tel:(512) 471-8241, Fax: 512-471-0140, [bridget.scanlon@beg.utexas.edu](mailto:bridget.scanlon@beg.utexas.edu); Jirka Simunek, U.S. Salinity Laboratory, USDA, ARS, 450 Big Springs Road, Riverside, CA 92507-4617, Tel: 909-369-4865, Fax: 909-342-4964, [jsimunek@ussl.ars.usda.gov](mailto:jsimunek@ussl.ars.usda.gov).

### **H39 Characterizing Hydraulic Properties of Vadose Zone Materials: Advances in Measurement and Conceptual Models.**

The understanding of the global water balance, aquifer recharge, surface runoff, and evaporation relies on accurate parameterization of the hydraulic processes in the vadose zone. Our ability to simulate hydraulic processes numerically has outpaced our ability to observe them in a laboratory or field setting. Accurate parameterization of hydraulic processes requires accurate characterization of hydraulic properties. This session is a venue for advances in laboratory and field measurement systems, and conceptual modeling for characterization of soil hydraulic properties in vadose zone materials. Significant developments in the measurement of hydraulic properties include a host of novel and affordable laboratory techniques (e.g., various step outflow methods), point measurements (e.g., tension infiltrometers, down-hole infiltrometers, deep bore-hole tensiometry), and field scale approaches (e.g., drain tiles,

piezometer networks). Conceptual modeling to characterize hydraulic properties includes the analytically-based similarity between pressure-water content and conductivity properties, wholesale analysis of soils data bases and generalized numerical inversion techniques. This session excludes the application (i.e., selection, comparison and validation) of models to complex vadose zone systems.

**Conveners:** Jan Boll, Biological Agricultural Engineering Department, University of Idaho, Moscow, ID 83844-0904, Tel: 208-885-7324, [jboll@uidaho.edu](mailto:jboll@uidaho.edu); John Selker, Oregon State University, Gilmore Hall, Corvallis, OR 97331-3906, Tel: 541-737-6304, [selkerj@enr.orst.edu](mailto:selkerj@enr.orst.edu).

#### **H40 Fundamental Advances in Understanding of Pore Scale Transport Phenomena in Porous Medium Systems**

The purpose of this session is to report on recent advances in computational and conceptual understanding of pore-scale flow and transport phenomena in single and multiple fluid porous medium systems as well as the extension, or upscaling, to larger scales. Recent advances in theoretical, computational, and experimental approaches are welcome, including noninvasive technologies for imaging rock geometries and fluid flow migration. We especially encourage approaches utilizing theory and/or computation to describe observations in well-characterized experimental systems.

**Conveners:** Dongxiao Zhang, MS C306, Los Alamos National Lab, Los Alamos, NM 87544, Tel: 505-667-3541, Fax: 505-665-8244, [dongzhang@lanl.gov](mailto:dongzhang@lanl.gov); Cass T. Miller, Univ North Carolina, Public Health CB #7400, Chapel Hill, NC 27599, Tel: 919-966-2643, Fax: 919-966-7911, [casey\\_miller@unc.edu](mailto:casey_miller@unc.edu)

#### **H41 Chemical Heterogeneities and Contaminant Transport in the Vadose Zone**

The transport of contaminants in the vadose zone depends on hydrological, chemical, as well as biological processes. While physical heterogeneities often control the initial spread of contaminants into the subsurface, chemical heterogeneities (e.g. redox zones, organic rich layers, sorbent-laden environments) control the attenuation of many contaminants at depth. The presence of a gas phase in the vadose and the nonlinear relationships between material properties and moisture content make predictions of contaminant transport more complex than for the saturated zone. In-situ measurement techniques to characterize contaminant distribution and chemical heterogeneities are lacking. Few methodologies for long-term monitoring of chemical processes in unsaturated soils have been developed. This session highlights the impact of geochemistry on contaminant transport and transformation in the vadose zone. It is open to field, laboratory, and spectroscopic studies that address spatial measurements and long-term monitoring of contaminants in the vadose zone and the interactions between chemical environment with hydrological and biological processes.

**Conveners:** Earl D. Mattson, Idaho National Engineering & Environmental Laboratory, Department of Geoscience, P.O. Box 1625, Idaho Falls, ID 83415-2107, Tel:208-526-4084, fax 208-526-0875, [matted@inel.gov](mailto:matted@inel.gov); Patrick V. Brady, Sandia National Laboratories, Geochemistry Department 6118, P.O. Box 5800, Albuquerque, NM 87185-0750, Tel: 505-844-7146, Fax: 505-844-7354, [pvbrady@sandia.gov](mailto:pvbrady@sandia.gov)

#### **H42 Recharge and Vadose Zone Processes in Semiarid and Arid Regions**

Recharge, whether it occurs at the mountain front, along ephemeral stream channels or on the basin floor, is a key hydrologic parameter for determining sustainable water use in arid regions. For many years vadose zone processes in arid regions were considered to be similar to those in humid regions, just with significantly lower recharge rates. Recently, with the recognition of distinct vadose zone processes for arid regions, this notion has been challenged. Important questions being address by current research include: What is the role of desert vegetation in controlling vadose zone processes? Does heterogeneity in vegetation, soil structure or topography help to focus recharge? How can recharge along ephemeral streams be quantified? How can recharge be evaluated at the basin scale? What are the relationships between recharge and climate variability? This special session would bring together researchers that are currently working to increase our understanding of arid region vadose zone processes or are developing new methods for quantifying recharge rates. In addition to the questions listed above, topics of interest could include: new geophysical or geochemical methods; methods for separating stream-channel recharge from mountain-front recharge; and modeling of recharge processes.

**Conveners:** Fred M. Phillips, Professor of Hydrology, Department of Earth & Environmental Science, New Mexico Tech, Socorro NM 87801, Tel: 505-835-5540, Fax:505-835-6436, [phillips@nmt.edu](mailto:phillips@nmt.edu); Christopher J. Duffy, Professor, Civil & Environmental Engineering, Penn State University, 212 Sackett Building, University Park, PA 16802, Tel: 814-863-4384, Fax: 814-863-7304, [cxdl1@psu.edu](mailto:cxdl1@psu.edu).

#### **H43 Environmental Vadose Zone Hydrology (POSTER ONLY)**

The vadose zone serves many important environmental roles and is an important link as well as a buffer between the land surface-atmosphere and groundwater. Poster presentations are invited on a broad range of topics in environmental vadose zone hydrology including field investigations, laboratory studies, and modeling analyses. Topics may include unsaturated and multiphase flow and transport processes, plant-soil interaction, evaluation and modeling of heterogeneous systems, assessment of prediction uncertainty, biogeochemical and colloidal matter processes, measurement techniques, and monitoring of vadose zone systems.

**Conveners:** Thomas Harter, Department of Land, Air, and Water Resources, 125 Veihmeyer Hall, University of California, Davis, CA 95616-8628, Tel:530-752-2709, Fax:530-752-5262, thharter@ucdavis.edu; Mike Young, Div. of Hydrologic Sciences, Desert Research Institute  
755 E. Flamingo Road, Las Vegas, NV 89119, voice: 702-895-0489, Fax: 702-895-0427, michael@dri.edu.

#### **H44 Catchment Water Quality Modeling**

Catchment-scale models of water quality are used to answer questions related to the impacts of acid deposition on water quality, the effect of land management practices on water quality, and the effects of land use change on water quality. The types of models used to answer these questions include empirical regression models, indices based on physical or chemical properties of the catchment, lumped parameter conceptual models, and distributed models of catchment biogeochemical and hydrologic processes. We seek presentations illustrating how models are used to understand and predict these and other types of impacts on water quality. We encourage presenters to emphasize both the strengths and the weaknesses of the modelling approach they use and to discuss needs for further model development. Studies coupling different types of models are also encouraged.

**Conveners:** Tom Meixner, Dept. of Environmental Sciences, University of California, Riverside, CA 92521, Tel: +1-909-787-2356, Fax: +1-909-787-3993, E-mail: tmeixner@mail.ucr.edu; Keith Eshleman, Appalachian Environmental Lab, Gunter Hall, University of Maryland, Frostburg, MD 21532, Tel: +1-301-689-7170, Fax: +1-301-689-8518, E-mail: eshleman@al.umces.edu

#### **H45 Influence of Hyporheic and Riparian-Zones on Solute Transport and Biogeochemical Reactions**

Hyporheic and riparian environments create optimal conditions for many important biologically mediated and redox-dependent chemical reactions. Depending on specific circumstances, these environments could enhance reactions such as nitrification or denitrification, precipitation or dissolution of metal oxides, sorption or co-precipitation of trace metals, and degradation of organic compounds. Controls on water fluxes and chemical reactions in hyporheic and riparian environments are not easily characterized, in part because of the relatively small spatial and temporal scales of variability. Presentations addressing both fundamental processes and case studies (e.g. contaminant fate) are sought that examine controls and impacts of hyporheic and riparian zones. We particularly encourage submissions that address the multiple aspects of hydrology and biogeochemistry, such as the interplay of physical, chemical, and biological processes, or linkages between sediments, pore water, and the overlying water column.

**Conveners:** Judson Harvey, U.S. Geological Survey, 430 National Center, Reston, VA 20192, USA, Tel.: +1-703-648-5876, E-mail: jwharvey@usgs.gov; Aaron Packman, Department of Civil Engineering, Northwestern University, A314 Technological Institute, Evanston IL 60208-3109, USA, Tel.: +1-847-491-9902, E-mail: a-packman@northwestern.edu; Brewster Conant, Dept. of Earth Sciences, University of Waterloo, Waterloo, ON N2V 1S1, Canada, Tel: 519-888-4567 ext. 2973, Fax: 519-746-7484, E-mail: bconantj@sciborg.uwaterloo.ca

#### **H46 Chemical Budgets in Hydrologic Systems**

Chemical budgets reflect the basic material facts of systems: inputs and outputs, accumulations and depletions. Sound budgets can improve understanding of weathering, groundwater flow, nutrient and contaminant transport, source loadings, and the interaction of biota with hydrologic systems (watersheds, aquifers, soils, river networks). While conceptually simple, the key elements of budgets are often difficult to determine in natural, heterogeneous systems. This session will focus on recent advances, applied and theoretical, in determination of chemical budgets in hydrologic systems, with emphasis on linkages between hydrologic and chemical budgets, definition of meaningful boundaries and fluxes across boundaries, direct vs. indirect measures of change in storage, the importance of internal cycling vs. external exchange, and implications for understanding of important element/chemical cycles.

**Conveners:** David Genereux, Marine, Earth, & Atmospheric Sciences, Jordan Hall, North Carolina State University, Raleigh, NC 27695-8208, Tel: +1-919-515-6017, Fax: +1-919-515-7802, E-mail: genereux@ncsu.edu; David P. Krabbenhoft, USGS-WRD, 8505 Research Way, Middleton, WI 53562, Tel: +1-608-821-3843, Fax: +1-608-821-3817, E-mail: dpkrabbe@usgs.gov

#### **H47 Linked Studies of Hydrology and Biology (Joint with B)**

The health and well being of populations of most life forms is dependent on the availability and quality of water. The spread of human civilization during the last millennia was largely controlled by water availability and often truncated by the loss of a quality supply. The quality of fresh water also largely determines the quality of aquatic wildlife habitat and the health of ecosystems. In parts of the United States, water quality is degraded to the point of having an adverse affect on aquatic communities or species that frequent water bodies. This session invites papers that link hydrologic investigations of water quantity or quality with biologic investigations of species richness or species population. Papers should address one of the following questions: How was your study conceptualized and implemented? How did site hydrology related to site biology? What was the most relevant hydrologic and biologic information that your study collected? Do the results of your study suggest a management strategy that could improve the habitat of an impacted species?

**Conveners:** William A. Battaglin, U.S. Geological Survey, Box 25046, MS 406, Denver Federal Center, Lakewood, CO 80225, Tel: (303) 236-5950x202, Fax: (303) 236-5919, E-mail: wbattagl@usgs.gov; and Stephen D. Porter, U.S. Geological Survey, Box 25046, MS 406, Denver Federal Center, Lakewood, CO 80225, Tel: (303) 236-5950x216, E-mail: sdporter@usgs.gov

#### **H48 Water Quality of Hydrologic Systems (Poster Only)**

Poster presentations are invited on all aspects of water quality and tracers in hydrology, including field, laboratory, or theoretical work, directed at groundwater or surface water at any spatial scale. Presentations may range from the use of solutes purely as tracers of water movement to investigations focused on geochemical processes. Research on contaminants and/or naturally occurring chemical species is appropriate for this session.

**Conveners:** Rina Freed, Department of Earth and Ocean Sciences, University of British Columbia, Vancouver, B.C., Canada, V6T 1Z4, Tel: 604-822-2577, E-mail: rfreed@eos.ubc.ca; Christophe J. G. Darnault, Environmental & Water Resources Engineering, Malcolm Pirnie Inc., 11832 Rock Landing Drive, Newport News, VA 23606, Tel: 757-873-4480, Fax: 757-873-7752, E-mail: cdarnault@pirnie.com

#### **H49 Biogeochemical interactions in permeable iron (Fe<sup>0</sup>) reactive barriers and implications for environmental remediation.**

Fe<sup>0</sup>-based permeable reactive barrier (PRB) technology is one of the cost-effective means for in-situ, passive treatment of a range of environmental contaminants including chlorinated organic solvents, redox-sensitive metals and radionuclides, and other contaminants such as arsenate and nitrate. Groundwater geochemistry and microbiology play a major role in determining the rate of Fe<sup>0</sup> corrosion, its surface reactivity, microbial activity, mineral precipitation, and consequently barrier clogging and long-term performance of the Fe<sup>0</sup> reactive medium. This special session will address fundamental geochemical and biological reactions associated with Fe<sup>0</sup> reactive barriers, modeling studies of contaminant reactivity and fate, mineral precipitation, and hydraulics in PRBs. The focus will be on integrated studies of reactive-transport and spatial/temporal gradients in biogeochemistry.

**Conveners:** Baohua Gu, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6036, USA, Tel: 865-574-7286, E-mail: b26@ornl.gov; Liyuan Liang, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6036, USA, Tel: 865-574-7286, E-mail: 2ll@ornl.gov; Paul G. Tratnyek, Oregon Graduate Institute, Dept. of Environmental Sci. & Eng., Portland, Oregon 97291-1000, USA, Tel: 503-690-1023, E-mail: tratnyek@ese.ogi.edu; Ulrich Mayer, The University of British Columbia, Vancouver, British Columbia V6T 1Z4, Canada. Tel: 604-822-1539, E-mail: umayer@eos.ubc.ca

#### **H50 The Lake Tahoe Basin: Lessons In Lake And Watershed Science For Western North America**

The Lake Tahoe Basin faces many of the air and water quality problems typical of rapidly developing watersheds in the arid North American west. It is also one of best studied western watersheds, providing an excellent natural laboratory for application of watershed science in assessing environmental and economic impacts of watershed degradation and restoration. Pressing problems include erosion, high ozone levels and poor visibility in the airshed,

wetland loss, loss of old growth forest, plant disease, and wildfire threats. Water quality problems with the lake itself (increased turbidity and loss of transparency, contaminants, invasive species) are strongly linked to development and hydrology within the Basin, and may also be influenced by atmospheric transport from outside the watershed. Developing effective restoration efforts requires a fully integrated science-based watershed approach to the environmental, economic, and conservation problems facing the lake. Presentations on any aspect of lake and watershed science in Lake Tahoe and similar watersheds are invited for this session.

**Conveners:** Charles Goldman, Department of Environmental Science and Policy, University of California, Davis, CA 95616, Tel:+1-530-752-1557, Fax:+1-530-752-3350, E-mail: [crgoldman@ucdavis.edu](mailto:crgoldman@ucdavis.edu); Glenn Miller, Center for Environmental Sciences and Engineering, University of Nevada, Reno, NV 89557, Tel:+1-775-784-4108, Fax:+1-775-784-1142, E-mail: [gcmiller@scs.unr.edu](mailto:gcmiller@scs.unr.edu).

### **H51 The Influence of Natural and Anthropogenic Processes on Mercury Cycling in Mine-Dominated Aquatic Ecosystems**

Most research to date on toxic methyl-mercury (MeHg) production and bioaccumulation has been conducted on systems impacted by atmospheric mercury deposition or by industrial mercury release (e.g. Minamata). However, much less is known about the interplay between natural and anthropogenic processes controlling MeHg in mine-dominated aquatic systems, such as mercury/gold/silver mines in the western United States and in developing countries. This session will focus on the origin, transport, transformation, bioaccumulation and impacts of mercury in mine-dominated systems. The topic is especially timely as mercury has become a critical issue in light of recent federal requirements to establish TMDL (Total Maximum Daily Load) targets for impaired water bodies throughout the U.S., as mandated by the Clean Water Act. Research at these sites provides critical information needed for science-based management and remediation. Presentations on any aspect of mercury cycling in mine-dominated systems are invited for this session, including field, laboratory, or modeling studies.

**Conveners:** Thomas H. Suchanek, Department of Wildlife, Fish and Conservation Biology, University of California, Davis, CA 95616, Tel: +1-530-752-9035, Fax: +1-530-752-4154, E-mail: [thsuchanek@ucdavis.edu](mailto:thsuchanek@ucdavis.edu); Mark Marvin-DiPasquale, US Geological Survey, Menlo Park, CA 94025, Tel: +1-650-329-4442, Fax: +1-650-329-4463, E-mail: [mmarvin@usgs.gov](mailto:mmarvin@usgs.gov).

### **H52 Lacustrine Paleoclimatology: Linking Modern Processes with the Stratigraphic Record** (Joint with H, OS, PL, B, and A)

Climate affects lakes both directly and indirectly through a diverse array of processes. Similarly, the stratigraphic signature of climate variability is influenced by a variety of depositional and post-depositional processes. Thus, a unique climatic interpretation of the stratigraphic record is often impossible. Here we consider studies that try to understand and constrain the climatic interpretation of lacustrine sedimentary records by incorporating studies of lacustrine and climatic processes. We seek contributions from the PEPI transect (the Americas) and elsewhere that include empirical or modeling studies of lake energy and hydrologic budgets or groundwater-lake interactions, studies based on modern calibration data sets, or laboratory studies that consider physical, chemical, and/or biotic variation.

**Conveners:** Sherilyn C. Fritz, Department of Geosciences, University of Nebraska, Lincoln, NE 68588-0340, [sfritz2@unl.edu](mailto:sfritz2@unl.edu); and Geoffrey O. Seltzer, Department of Earth Sciences, Syracuse University, Syracuse, NY 13244-1070, [goseltze@mailbox.syr.edu](mailto:goseltze@mailbox.syr.edu).

### **H53 Synthesis of millennial climate variability**

The session will focus on recent advances in chronology, proxy data, and modeling studies that help to provide a synthesis of decadal to millennial variability in the earth system during the last 80 kyr. We will encourage papers that present high resolution results from terrestrial, marine and ice sheet locations, particularly those with annual-layer or other detailed chronologies. Evidence constraining the spatial and temporal variability in C-14 production rate and reservoir ages, errors associated with U-series dating, and efforts to constrain and model C14 as a paleoceanographic tracer during climatic extremes will also be included. Special emphasis will be placed on studies that seek to develop a better understanding of telecommunication processes on sub-orbital time scales, through evaluation of spatial homogeneity or heterogeneity, or frequency analysis of robust cyclicities to determine leads and lags.

**Conveners:** Jerry McManus, 121 Clark MS #23, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, Tel: 508-289-3328, Fax: 508-289-2175, E-mail: [jmcmanus@whoi.edu](mailto:jmcmanus@whoi.edu); Michael Sarnthein, University of Kiel; Jim Kennett, University of California Santa Barbara.

#### **H54 Stick-slip dynamics in geological and geophysical systems.**

Understanding the processes of and controls on stick-slip events on different scales is fundamental to problems in a range of physical science disciplines that include tribology, engineering, structural geology and geophysics. Understanding stick-slip dynamics is also important for theoretical and applied problems as diverse as friction dynamics, fluid flow, stress-strain relations, earthquake hazard and glacier motion. This session aims to examine theoretical and applied aspects of stick-slip processes from a range of geological and geophysical systems, and to promote interdisciplinarity within the physical sciences. A key outcome is a better understanding of stick-slip mechanics in a range of experimental and environmental settings.

**Convener:** Jasper Knight, School of Environmental Studies, University of Ulster, Coleraine Co, Londonderry, Northern Ireland, BT52 1SA, UK, Tel +44 (0) 28 7032 3179 (direct), Fax +44 (0) 28 7032 4911, E-mail: [j.knight@ulst.ac.uk](mailto:j.knight@ulst.ac.uk).

### **OCEAN SCIENCES**

#### **OS01 Towards a Sargasso Observatory: Integrated physical, biogeochemical and atmospheric studies of the southwestern North Atlantic Ocean** (Joint with A, OS, U)

The session will present interdisciplinary research from the Bermuda, Puerto Rico and Cariaco time-series sites as well as other collaborative research which has been facilitated by sustained ocean and atmospheric time-series observations. The session will focus on interdisciplinary research results which contribute to a better holistic understanding of the workings of the subtropical gyre. It will also introduce to the wider ocean and atmospheric community the various research components and opportunities within the nascent Sargasso Sea Ocean/Atmosphere Observatory, a consortium formed to coordinate and facilitate research and infrastructure needs in support of science in the region.

**Conveners:** Maureen H. Conte, Dept of Marine Chemistry and Geochemistry, MS#25, Woods Hole Oceanographic Institution, Woods Hole MA 02543, 508/289-2931 (office), 508/457-2193 (Fax), E-mail: [mconte@whoi.edu](mailto:mconte@whoi.edu); Tony Knap, Ferry Reach, St. Georges, Bermuda GE 01, Tel 441 297 1880 ext 244, Fax 441 297 0860, E-mail: [knap@bbsr.edu](mailto:knap@bbsr.edu)

#### **OS02 Nearshore and Continental Shelf Processes: Special Session in Honor of Dr. Thomas Kinder**

This special session honors Dr. Thomas Kinder, former program manager for the US Office of Naval Research Coastal Dynamics program. The session concerns the dynamics and interactions of wind, waves, currents, sediment transport, and seabed morphology from the shelf break to the beach face. Papers on all aspects of nearshore and shelf research are solicited. Topics of particular interest include:

- (1) turbulence in the nearshore and on the shelf
- (2) wave-driven currents
- (3) currents generated by winds, tides and other shelf-scale processes
- (4) tsunami propagation and runup
- (5) sediment transport, swash processes and seabed morphology from sand ridges to ripples.

The work may be theoretical, numerical, and/or experimental in nature. When submitting an abstract for this session, please send a copy to both conveners.

**Conveners:** Anna Crawford, Defence Research Establishment Atlantic, 9 Grove St., P.O. Box 1012, Dartmouth, Nova Scotia, Canada, B2Y 3Z7, Tel: 902-426-3100,x370, E-mail: [Anna.Crawford@drea.dnd.ca](mailto:Anna.Crawford@drea.dnd.ca); Merrick Haller, Civil Engineering, 202 Apperson Hall, Oregon State University, Corvallis, OR 97331-2302, E-mail: [hallerm@engr.orst.edu](mailto:hallerm@engr.orst.edu)

#### **OS03 Pushing the envelope: A tribute to the career and accomplishments of John M. Edmond**

John Edmond explored the warmest, coldest, deepest and most reactive locations of the earth's hydrosphere. Across these environs, he expanded our understanding of the modern and paleochemistry of the carbonate system and trace elements in seawater. He collected and interpreted the first samples from active seafloor hydrothermal systems. Through his ongoing study of the chemical composition of rivers and lakes, he brought us new insights into

continental weathering and paleoceanography. This session encourages scientific presentations from all people touched by John's work and enthusiasm, as well as his dedication to science, strong collaborative spirit, and mentoring.

There will be no invited speakers for this session. Those with conflicts - please contact the session organizers for invited status. An obituary appeared in (date, issue of EOS) and a symposium in John's honor is planned for 2002.

**Conveners:** James K.B. Bishop, Earth Sciences Division, Lawrence Berkeley National Berkeley, CA 94720 USA, Tel: +1-510-495-2457, Fax: +1-510-486-5686, E-mail: jkbishop@lbl.gov; Robert W. Collier, COAS - Oregon State University, Ocean Admin Bldg 104, Corvallis, OR 97331-5503, Tel: +1-541-737-4367, Fax: +1-541-737-2064, E-mail: rcollier@oce.orst.edu

#### **OS04 Source to Sink: production, transport and accumulation of sediment (with a special focus on climate signals and impacts)**

This session will explore the processes (observed and modeled) that transfer sediment on the Earth's surface, from mountain tops to the ocean floor. This will include processes in terrestrial and marine portions of sediment dispersal systems, and especially the linkages between various parts of systems. The preserved record of sediment transfer will also be relevant for providing new insight to the history of sedimentary processes and the conditions of the Earth's surface through time (e.g., climate, tectonics, sea level). In addition to these source-to-sink topics, this year's session especially solicits abstracts focused on the response and impact of climate on sedimentary systems. A review of recent findings from the Quaternary reveals emerging patterns that are coherent across broad geographical regions. This session seeks to elucidate such large-scale patterns by bringing together field and model results that show major climatic forcing of river discharge and margin evolution in contrasting regions: from alluvial plains to deep sea, including tropical, temperate, and polar settings. We anticipate that this special focus will yield new ideas and research directions concerning the important links between climate, sediment supply, and stratigraphy.

**Conveners:** Neal Driscoll, Geosciences Research Division, Scripps Institution of Oceanography, University of California, 9500 Gilman Drive, La Jolla, CA 92093, 858-822-5026 USA, Tel: +1-858-822-3310, E-mail: ndriscoll@ucsd.edu; Basil Gomez, Geomorphology Laboratory, Indiana State University, Terre Haute, IN 47809 USA; Tel: +1-812-237-2249, Fax: +1-812-237-8231, E-mail: bgomez@indstate.edu; Steve Goodbred, State University of New York, Stony Brook, Marine Sciences Research Center, State University of New York, Stony Brook, NY 11794-5000, Steve Kuehl, Virginia Institute of Marine Science, College of William and Mary, P.O. Box 1346, Gloucester Pt., VA 23062, Tel: ++1-804-684-7118, Fax: +1-804-684-7250, E-mail: kuehl@vims.edu

#### **OS05 Calibration and Validation Efforts Underway by the Ocean Color Missions**

Optical remote sensing system satellites have been widely used to provide global, synoptic, and local measurements of parameters that relate to major oceanic processes. Information about these processes can be used to investigate biological productivity in the oceans, marine optical properties, the interaction of winds and currents with ocean biology, and how human activities influence the marine and oceanic environment. Concepts and technologies that allow high spectral resolution and versatile spectral-band selection have expanded the realm of marine remote sensing capabilities. Subtle absorption features can be identified in the high-resolution spectra, making it easier to discriminate interlocked-signature objects and open up new ways to address the unique remote sensing challenges of the coastal zone. The maturity of algorithms to reduce and analyze ocean color remote sensing data has also contributed to its increased applications. Presently, there are six ocean color missions (SeaWiFS, MODIS, OSMI, MOS, OCI and OCM) and MERIS and MODIS/Aqua will be launched soon. The US community under the NASA SIMBIOS Program as well as the international community (NASDA, CNES, ENVISAT, etc.) are undertaking substantial research efforts in calibration and validation activities, which span *in situ* bio-optical and atmospheric data collections, algorithm refinement and development, round robin, and data merging activities to produce long term ocean color data sets. This session will focus on ocean color remote sensing calibration and validation activities and applications including current and future sensors (e.g., MODIS, SeaWiFS, POLDER-II, MERIS, etc.) data analysis techniques, and studies of the open oceans, estuaries, and coastal regions. Papers are solicited on the following and related topics:

- Calibration/evaluation of ocean color missions
- MODIS instrument, data, and science
- SeaWiFS instrument, data, and science

- POLDER instrument, data, and science
- MERIS instrument, data, and science
- Atmospheric effects and correction
- Data interpretation, inverse modeling
- Satellite data merging data and science
- Light availability, primary production
- Physical-biological interactions
- Verification of hydrodynamic models
- Water quality and composition.

**Conveners:** Giulietta S. Fargion, GSC-SAIC, NASA / Goddard Space Flight Center, Mail Stop 970.2, Building 28, Greenbelt, MD 20771, 301-286-0744, E-mail: [gffargion@simbios.gsfc.nasa.gov](mailto:gffargion@simbios.gsfc.nasa.gov); Charles R. McClain, NASA / Goddard Space Flight Center, Mail Stop 970.2, Building 28, Greenbelt, MD 20771, Tel: 301-286-5377, E-mail: [mcclain@calval.gsfc.nasa.gov](mailto:mcclain@calval.gsfc.nasa.gov)

### **OS06 Database efforts within Marine Geology & Geophysics: New tools for enhanced data access**

The past decade has seen tremendous growth in data acquisition capability within the Marine Geology & Geophysics (MG&G) community, with a wide range of data types collected at increasingly higher resolutions. In addition to traditional ship-based data acquisition, programs in the near future (e.g., observatories) will be collecting and sending data to shore in real time. With these advances in data acquisition come new problems in data cataloging, access, and synthesis. Scientists across disciplines need the ability to compare different data types, and the tools to manipulate, interpret and visualize these data. At the same time it is also recognized that we need to broaden the use of the data to include the educational community and the general public. The goal of this session is to provide an overview of existing efforts in the MG&G community to define and address these issues. We encourage posters from scientists (users), data providers, engineers, and computer scientists involved in projects for cataloging metadata, improving access to existing data sets, improving coordination among different data sets, improving tools for data analysis and interpretation, and improving usage of the data by the research community and the general public.

**Conveners:** Suzanne Carbotte, Lamont-Doherty Earth Observatory, Palisades, NY 10964, Tel: (845) 365-8895, Fax: (845) 365-8168, E-mail: [carbotte@ldeo.columbia.edu](mailto:carbotte@ldeo.columbia.edu); Deborah K.

Smith, Department of Geology and Geophysics, MS #22, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 USA, Tel: (508) 289-2472, Fax: (508) 457-2187, E-mail:

[dsmith@whoi.edu](mailto:dsmith@whoi.edu), Mary Reagan, Borehole Research Group, Lamont-Doherty Earth Observatory, Palisades, NY 10964 USA, Tel: (845) 365-8672, Fax: (845) 365-3182,

E-mail: [mreagan@ldeo.columbia.edu](mailto:mreagan@ldeo.columbia.edu).

### **OS07 Real-time Oceanography from Land: The Opportunities and the Challenges of Ocean Observatories**

Expeditionary Science has raised both intellectual and practical questions that cannot be answered by Expeditionary Science. Rapidly changing technologies are opening entirely new avenues of real-time inquiry into remote, continually or episodically changing earth and ocean systems at many scales of space and time. A growing spectrum of in situ physical, chemical and biological sensors, newly capable autonomous robotic platforms, high bandwidth satellite communications, and large aperture electro-optical networks of interactive full-ocean laboratories, are changing the approaches we can take to, and the questions we can ask about, any aqueous environment. By no means limited to sea-going scientists, interest in the use and development of complex interactive remote submarine systems extends to the oil industry, the military, a variety of space sciences, and a host of environmental and municipal groups, and a number of private industries interested in living and non-living resources in the ocean. For these reasons, it is clear that progress will be very rapid in many new directions and that the face of Ocean Sciences will change dramatically in the coming decade.

A special session at Fall AGU will allow many of these issues and interest groups to interact over the potentials of this quiet revolution that is taking place. Questions ranging from the manner in which active volcanoes or subduction zone processes support microbial blooms, to issues of surveillance and the well-being of produce oil wells, to the pollution patterns in coastal oceans, to the real time tracking of fish stocks and marine mammals, to basic long-term measurements of air sea exchange and climate variability on large volumes of ocean space will all be addressable with the newly developing capabilities. The opportunities for Ocean Sciences at AGU to redefine itself during this period

and to draw the public into the kinds of activities involved in understanding and maintaining the health of the oceans will be enhanced by the ability to have the public look over our shoulders electronically as we pursue our interests.

**Conveners:** Robert Weller, Clark 204a MS 29, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 USA 508 289 2508 fax 508 457 2161 [rweller@whoi.edu](mailto:rweller@whoi.edu), John R. Delaney, School of Oceanography, Box 357940, University of Washington, Seattle, Washington, 98195, Phn: 206 543-4830, Fax: 206 543-0275, [jdolaney@u.washington.edu](mailto:jdolaney@u.washington.edu); Manhar Dhanak, Center for Hydrodynamics and Physical Oceanography, Department of Ocean Engineering, Florida Atlantic University, 777 Glades Road, Boca Raton, Florida, 33431, Tel: 561 297 2827 / 954 924 7242, Fax: 561 297 3885, E-mail: [manhar@oe.fau.edu](mailto:manhar@oe.fau.edu); James Edson, MS #10, Woods Hole, MA 02543, (508) 289-2935, Fax: 508-457-2194, E-mail: [jedson@whoi.edu](mailto:jedson@whoi.edu)

### **OS08 Glacial/Interglacial Changes in the Carbonate Chemistry of the Deep Ocean**

The mechanism that causes atmospheric CO<sub>2</sub> to change between glacial and interglacial periods remains a mystery. New observational constraints presented over the last ten years, e.g. ice core gases and isotopes, have narrowed the range of options. One of the most important missing pieces is a picture of how the CO<sub>3</sub><sup>=</sup> ion content of the deep ocean has changed. In this session we hope to learn about new proxies for deep sea CO<sub>3</sub><sup>=</sup> and the state of CaCO<sub>3</sub> preservation/dissolution on the sea floor. Contributions that explore the link between deep sea CO<sub>3</sub><sup>=</sup> and atmospheric CO<sub>2</sub> are also invited.

**Conveners:** J. R. Toggweiler, GFDL/NOAA, Princeton University, [jrt@GFDL.NOAA.GOV](mailto:jrt@GFDL.NOAA.GOV); W. S. Broecker, Lamont-Doherty Earth Observatory, Columbia University, E-mail: [broecker@ldeo.columbia.edu](mailto:broecker@ldeo.columbia.edu)

### **OS09 The Caribbean Sea system - its physical oceanography and role in Northern Hemisphere climate variability**

The Caribbean Sea is a major tropical marginal sea of the North Atlantic Ocean. Its numerous adjacent straits provide pathways for the upper limb of the thermohaline circulation, and its warm boreal summer SSTs are a source for tropical storms and hurricanes. It is also a major source of moisture for the North American monsoon and US summer rainfall. Over the years, much has been learned about the inflow and outflow properties of the system through extensive surveys of the neighboring straits, but the variety of circulation patterns obtained in recent high-resolution numerical modeling studies emphasize how little we understand about the dynamics, and forcings, which control the circulation and climate of the region. In this session, we would like to invite papers on the physical oceanography of region, and on climate variability, whose seeds may lie in the region, so that we can assess the state of our knowledge, and explore what aspects of the physical oceanography of the region we need to be able to model to investigate issues concerning northern hemisphere climate variability.

**Conveners:** Roxana C. Wajsowicz, Dept. of Meteorology, University of Maryland, College Park, MD 20742-2425, Tel: (301) 405 5396, Fax: (301) 314 9482, E-mail: [roxana@atmos.umd.edu](mailto:roxana@atmos.umd.edu); David B. Enfield, Physical Oceanography Division, AOML/NOAA, 4301 Rickenbacker Causeway, Miami, FL 33149, Tel: (305) 361 4351, E-mail: [enfield@aoml.noaa.gov](mailto:enfield@aoml.noaa.gov)

### **OS10 Trace elements and isotopes in oceanography**

Measurements of trace elements, together with stable and radioactive isotopes, have found widespread uses in oceanography to investigate processes such as

- 1) removal of dissolved substances from seawater by scavenging;
- 2) mixing processes and ocean circulation, both in modern and ancient oceans;
- 3) modern and paleo fluxes of water-column particulate material including carbon;
- 4) assessing the locations and fluxes of chemical inputs to the ocean;
- 5) constructing realistic models of the above and related processes.

Advances in understanding of these tracers, together with improvements in sampling protocols and analytical techniques, make it timely to bring together experts in the field. We invite presentations on all aspects of the measurement and use of trace elements and isotopes in seawater. Presenters are also invited to advance ideas for a coordinated international research effort to improve our understanding of these tracers, and to enhance their use in oceanographic research.

**Conveners:** Robert Anderson, Geochemistry Building, Lamont-Doherty Earth Observatory, P.O. Box 1000, Palisades, NY 10964, Office: (845) 365-8508, Fax: (845) 365-8155, E-mail: [boba@ldeo.columbia.edu](mailto:boba@ldeo.columbia.edu); Gideon Henderson, Oxford University, E-mail: [Gideon.Henderson@earth.ox.ac.uk](mailto:Gideon.Henderson@earth.ox.ac.uk); Mukul Sharma, Dartmouth University, E-mail:

Mukul.Sharma@dartmouth.edu; Martin Frank, ETH Zürich, Institute for Isotope Geology and Mineral Resources, Department of Earth Sciences, ETH-Zentrum, NO C61, CH-8092 Zürich, Switzerland, Tel.: 0041 1 632 37 45, Fax: 0041 1 632 1179, E-mail: martin.frank@erdw.ethz.ch; Catherine Jeandel, LEGOS (CNRS/CNES/UPS), Toulouse (France), E-mail: Catherine.Jeandel@cnes.fr

### **OS11 Oceanography of the Eastern Boundary region of the Subtropical North Atlantic gyre**

The Eastern Boundary current regime (EBC) of the subtropical North Atlantic occupies a key position with respect to water mass transport and biogeochemical cycles. It includes the transition between major upwelling regions and the oligotrophic gyre, the Gibraltar exchange and the subtropical frontal system of the Azores. It is also under the influence of massive eolian dust input from the Sahara. The physics, biogeochemistry and paleoceanography of the EBC was studied in the framework of the European research project CANIGO (Canary Islands Azores Gibraltar Observations) from 1997-2000. In this session we invite multidisciplinary contributions focusing on oceanographic processes of the Eastern Boundary region of the subtropical North Atlantic on present and past time scales.

**Conveners:** Susanne Neuer, Department of Biology, Arizona State University, Tempe, AZ 85287, USA, Tel: 480 727 7254, Fax: 480 965 2519, susanne.neuer@asu.edu; Gregorio Parrilla, Instituto Español de Oceanografía, Corazón de María 8, 28002 Madrid, Spain, Tel: 34 91 3473608, Fax: 34 91 4135597, E-mail: gregorio.parrilla@md.ieo.es

### **OS12 The RIDGE Endeavour Segment Seafloor Observatory: Results of Coordinated Experiments**

The Endeavour Segment Seafloor Observatory was established as part of the NSF-RIDGE Programs plan to enable investigation of relationships among different ridge crest processes, with continuous observations made throughout time intervals of days to several months. In 2000 and 2001, a consortium of related projects were carried out at the Main Endeavour Field (MEF) and vent sites to the north and south to examine links among tidal effects, phase separation, heat and mass fluxes from the crust, and microbial output from Endeavour hydrothermal systems. These projects built on a number of prior Endeavour observatory projects, including numerous biological observatory cruises, water column time-series studies, and sensor development and testing programs. This session will highlight results of Endeavour Observatory experiments.

**Conveners:** Meg Tivey, Department of Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 USA, Tel: 508-289-3362, Fax: 508-457-2183, E-mail: mktivey@whoi.edu; Karen G. Bemis, Institute of Marine and Coastal Sciences, Rutgers University, Piscataway, NJ 08854-8066 USA, Tel: 732-445-1225, Fax: 732-445-3374, E-mail: bemis@rci.rutgers.edu

### **OS13 Hydrothermal activity in back-arc basins (Joint with V)**

Modern seafloor hydrothermal systems are natural laboratories for investigating alteration of the ocean crust, the genesis of volcanogenic massive sulfide deposits, and microbiological activity. This session is intended to highlight recent research on various aspects of seafloor hydrothermal activity in back arc basins. Within the past couple of years, several multidisciplinary expeditions have undertaken research in these environs, and contributions focusing on magmatic evolution, hydrothermal circulation and alteration, sulfide mineralization, and microbiological activity resulting from these expeditions are encouraged.

**Conveners:** Jay Miller, Ocean Drilling Program, 1000 Discovery Drive, TAMU Research Park, Texas A&M University, College Station, TX 77845 USA, Tel: (979) 845-2197, Fax: (979) 845 0876, E-mail: miller@odpE-mail.tamu.edu; Wolfgang Bach, Woods Hole Oceanographic Institution Department of Marine Chemistry and Geochemistry, 360 Woods Hole Rd., MS#8, Woods Hole, MA02543, USA., Tel: (508) 289-2523, Fax: (508) 457-2159 or 457-2183, E-mail: wbach@whoi.edu; Lizet Christiansen, Department of Earth and Planetary Sciences, Johns Hopkins University, 3400 North Charles St., Baltimore, MD 21218 USA, Tel: (410) 516 8543, Fax: (410) 516-7933, E-mail: [lizet@jh.edu](mailto:lizet@jh.edu)

## **PLANETARY SCIENCES**

### **P01 Scientific Studies in Analog Sites**

I would like to suggest a special session on Analog Science, which is planetary science through the study of unique sites on Earth that are analogues for other terrestrial bodies. This is a growing field, with some exciting earth-based study programs such as the NASA/SETI Institute's Haughton Mars Project at the Haughton Impact Crater on Devon Island in the Canadian Arctic, and numerous other studies and projects in the Antarctic, desert environments, volcanos, and lakes such as Lake Vostok. Analog studies have always played an integral role in planetary science, and will only get more interesting as higher resolution images and perhaps samples are returned from planned missions. Analog studies will be crucially necessary to ensure adequate preparation for high science return on any future human missions, but also to prepare for future robotic missions.

**Convener:** Pascal Lee, SETI Institute and Chris McKay, NASA Ames Research Center

### **P02 Follow the Water: The Search for Past or Present Habitable Environments in the Solar System**

The focus of this session is the astrobiological exploration of the Solar System, with an emphasis on the potential for past and/or present habitability. Potential topics covered include the range of environments inhabited by modern extremophiles on Earth, with implications for exploring for life elsewhere in our Solar System, the record of paleoenvironmental change on Earth and what it tells us about the requirements for the long-term evolution, adaptation and persistence of biological systems, what we have learned about the potential for life on Mars and elsewhere based on recent missions, and mission strategies for the astrobiological exploration of the Solar System.

**Convener:** Jack D. Farmer, Arizona State University, Dept. of Geological Sciences, PO Box 871404, Tempe, AZ 85287-1404, Tel: 480-965-6748, E-mail: jfarmer@asu.edu

### **P03 Mars Global Surveyor: Guiding the Future of Mars Exploration**

Mars Global Surveyor is a breakthrough mission, providing the first high-resolution global topography, the first high resolution images of the surface, the first global mineral maps, the first detailed magnetic anomaly maps, and new insights into the dynamic behavior of the atmosphere. Many of the conventional long-held ideas about Mars have been called into question or overturned and over the past year, the Solar System science community has reviewed and updated the overall Mars science objectives. This session includes papers that highlight recent results that suggest essential follow on observations on the surface and from orbit. Odyssey status, some initial instrument data results, and plans will be briefly presented. Science objectives and the science basis for site selection for the Mars Exploration Rover landed missions in '03 and beyond will be presented. The bulk of the session will be devoted to recent findings from MGS and the questions that arise that can be and must be addressed in the future.

**Conveners:** R. Stephen Saunders, Project Scientist, 2001 Mars Odyssey, Jet Propulsion Laboratory, Mail Stop 180-701, 4800 Oak Grove Drive, Pasadena, CA 91109, Tel: 818 354 2867, Fax: 818 354 0712, E-mail: saunders@jpl.nasa.gov

### **P04 Exploring Weather and Climate with Mars Global Surveyor**

Mars Global Surveyor (MGS) completed its first Martian year in the mapping orbit in February 2001. The polar mapping orbit, where the spacecraft circles the planet 12-13 times per day as the planet turns, is ideal for studying weather phenomena (e.g. dust storms, water clouds, CO<sub>2</sub> clouds, dust devils, sand dunes, surface frost, and wind-driven streaks on the surface). The suite of instruments on MGS has provided new data relevant to Martian weather and climate processes across a range of spatial and temporal scales. For example, the Mars Orbiter Camera (MOC) provides a daily global map of dust clouds, condensate clouds, and frost on the ground, the Thermal Emission Spectrometer (TES) provides estimates of atmospheric and surface temperatures as well as the amounts of atmospheric dust and water while the Mars Orbiter Laser Altimeter (MOLA) measures the ~1 meter changes in the thickness of the polar caps from winter to summer and measures CO<sub>2</sub> and water ice clouds. From multidisciplinary study of these data sets and integration with general circulation models a new understanding of the global transports of water, CO<sub>2</sub>, dust, and energy is emerging. This session will include invited papers providing overviews of the significant results from MGS and contributed papers related to weather and climate processes on Mars are encouraged.

**Conveners:** Andrew P. Ingersoll, Professor of Planetary Science, Division of Geological and Planetary Sciences, California Institute of Technology, Mail Code 150-21, 1200 E. California Blvd., Pasadena, CA 91125, Office Tel: 626-395-

6167, Office Fax: 626-585-1917,  
E-mail: [api@gps.caltech.edu](mailto:api@gps.caltech.edu)

#### **P05 New Paradigms for the Water Cycle on Mars**

Mars Global Surveyor data are opening up a new window on the Martian water cycle. The breadth of the data provides new insights into water cycling within the atmosphere and in the subsurface on time-scales of days to billions of years. This Section will address observations and modelling of the diurnal and seasonal water cycling between the surface and atmosphere, and between the poles, the cycling (?) of crustal water as manifested by the formation of gullies, the implications for atmospheric water loss (as represented by the D/H ratio) of communication with deep subsurface reservoirs, the nature of subsurface water and evidence for changes in subsurface water on geological time.

**Conveners:** Eric Gaidos, [gaidos@gps.caltech.edu](mailto:gaidos@gps.caltech.edu), Mark Richardson [mir@gps.caltech.edu](mailto:mir@gps.caltech.edu)

#### **P06 The Evolution of Volcanism on Mars**

As more data from the Mars Global Surveyor spacecraft arrive and are analyzed we are seeing the fine details of many volcanic features. This information is suggesting new ideas about emplacement mechanisms and eruption styles, and about how these may have changed over geologic time. Also, the new data often prompt us to re-interpret, or at least make better use of, the Viking data. A review of these issues would be timely.

**Conveners:** Lionel Wilson, Environmental Science Department, Institute of Environmental and Natural Sciences, Lancaster University, Lancaster, LA1 4YQ, UK, Tel: +44 1524 593889, +44 1524 594200, Fax: +44 1524 593985, E-mail: [L.Wilson@lancaster.ac.uk](mailto:L.Wilson@lancaster.ac.uk); James W. Head, III, Department of Geological Sciences, Brown University, Box 1846, Providence, RI 02912 USA, Tel: +1-401-863-2526, Fax: +1-401-863-3978, E-mail: [James\\_Head\\_III@Brown.Edu](mailto:James_Head_III@Brown.Edu)

**P07 Surface mineralogy of Earth and Mars: Weathering effects in extreme climate zones** Descriptive paragraph: In terrestrial hot and dry deserts many meteorites of special rare types were found like carbonaceous chondrites, lunar and Martian meteorites. For a valuation of cosmochemical studies on these meteorites keeping for a long time in extreme hot or cold climate environment the influence of weathering (sedimentary) processes have to be investigated. In the case of Martian meteorites also constrains of the surface related processes on Mars are of important. This special session invites papers on petrography, stable and radiogenic isotopes but also sedimentary and transport processes of such desert environments. It will bring together existing work as well as engaged multidisciplinary studies of the geochemical evolution of surface mineralogy.

**Conveners:** Gerlind Dreibus Emil Jagoutz Contact information: Gerlind Dreibus MPI f. Chemie, Mainz P.O. Box 3060 D-55020 Mainz Germany E-mail: [dreibus@mpch-mainz.mpg.de](mailto:dreibus@mpch-mainz.mpg.de)

#### **P08 Galileo's Polar Io Flybys: Magnetospheric and Geologic Observations**

Galileo will have two close encounters with Io later this year, passing close to Io's north pole on 6 August and near the south pole on 14 October. These flybys will provide important constraints on the internal magnetic field of Io and explore the region where plasma acceleration is believed to occur. The encounters will also provide high-resolution observations of new territory not previously seen close-up by Galileo and continued monitoring of active volcanic regions on Io's ever changing face. This session will highlight the new results from these exciting flybys.

**Conveners:** Elizabeth Turtle, University of Arizona, Lunar and Planetary Lab, Tucson, AZ 85721-0092 USA, Tel: (520) 621-8284, Fax: (520) 621-4933, E-mail: [turtle@lpl.arizona.edu](mailto:turtle@lpl.arizona.edu); Krishan Khurana, University of California at Los Angeles, Institute of Geophysics and Planetary Physics, Los Angeles, CA, 90095-1567, Tel: (310) 825-8240, Fax: (310) 206-8042, E-mail: [kkhurana@igpp.ucla.edu](mailto:kkhurana@igpp.ucla.edu)

#### **P09 NEAR and Beyond**

This session will consist of both invited and contributed papers, which will provide an update on the latest results from NEAR investigations of 433 Eros as well as assessments of what we have learned about asteroids, what outstanding questions remain after NEAR, and how the recent Eros data can be used with further observations and modeling to address such questions. Papers are also solicited that place the dramatic Eros results in a larger context of small body research.

**Conveners:** Andy Cheng, APL (Andy.Cheng@jhuapl.edu 240-228-5415), Carle Pieters, Brown Univ. (Carle\_Pieters@Brown.edu, 401-863-2417)

#### **P10 The 2001 and 2002 Leonid meteor storms**

The AGU fall meeting will follow a month after what is expected to be the most intense meteor storm of our lifetime. This occurrence will be seen best over the United States and eastern Asia on November 18 UT, 2001, under dark sky conditions. A second storm is anticipated for Nov. 2002, visible from the United States, but under full Moon conditions. A rare encounter with the dust trail of a comet, 55P/Tempel-Tuttle, these events are expected to put new light on the composition, morphology and dynamics of large cometary grains, their hazard to satellites in Earth's orbit, and their interaction with the Earth's atmosphere. Of particular interest are the visible impacts on the Moon, the luminous trains of bright Leonid fireballs, the survival of organic matter during accretion in the context of the origin of life. In the past year, many results have been published from earlier storm research during the 1999 Leonid storm. Now is a good time to reflect on this work and look forward to the one remaining encounter in Nov. 2002. The next storm is not until 2099. The session intends to inform a diverse audience about a unique upcoming opportunity for research and the status of the field. The session intends to not only appeal to planetary scientists, but also to atmosphere scientists and satellite operators.

**Conveners:** Peter Jenniskens, SETI Institute (pjenniskens@mail.arc.nasa.gov), NASA Ames Research Center and Chet Gardner University of Illinois (cgardner@uillinois.edu; Mail Stop 239-4, Moffett Field, CA 94035-1000, Tel.: 1-650-6043086, Fax: 1-650-6041088

#### **P11 Advances in Modeling Flow Processes: Volcanoes, Floods, Impacts and Mass movements**

Data collected from Mars, Venus and the Gallilean satellites in the past decade have provided researchers with an unprecedented ability to quantify the morphologies on these planetary bodies. For example, there is better global topographic coverage of Venus than there is on Earth, and by the time Mars Global Surveyor (MGS) has finished its extended mission(s), the global topography of Mars will be better constrained than it is on Venus. Advances in terrestrial Global Positioning Systems (GPS) has simultaneously allowed for increasingly detailed (centimeter-scale) topographic investigations of terrestrial landforms, thereby enabling scientists to quantitatively compare landforms on all the solid bodies of the solar system. These new data sets have proved particularly useful for examining the dynamics of material transport. All of these processes involve the transport of material (liquid, solid, gas, or some mixture of any or all three), and require detailed topographic data to help untangle their complexities. This session will bring together researchers quantitatively investigating volcanic flows (such as lava and pyroclastic deposits), floods, impact crater ejecta, and mass wasting deposits (such as debris flows and landslides) to examine new advances in modeling.

**Conveners:** Mark Bulmer, CEPS, National Air and Space Museum, Smithsonian Institution, Washington DC, Tel: (202) 633-9896, E-mail: mbulmer@nasm.si.edu; and Tracy K.P. Gregg, Dept. of Geology, University at Buffalo, Buffalo, NY 14260, Tel: (716) 645-6800 x2463, E-mail: tgregg@nsm.buffalo.edu

#### **P12 The Deep Space One Flyby of Comet Borrelly**

In September 2001 the Deep Space One spacecraft encountered the Comet Borrelly at a closest approach of ~2km. The spacecraft carried two science instruments, MICAS an imager-spectrometer, and PEPE, an electron/plasma analyzer. Additional measurements of the cometary environment could be made by instruments on the spacecraft intended for diagnostic measurements of the spacecraft's ion drive. First results of the flyby will be presented.

**Convener:** Robert M. Nelson, Tel: +1-818-354-1797, E-mail: robert.m.nelson@jpl.nasa.gov

#### **P13 Mert Davies Special Session**

Mert Davies made numerous seminal contributions to geodesy and planetary science over his career. From the time he joined the Rand Corporation in 1947 until today, he became one of the world's foremost experts in using data from deep-space missions to map the planets and to create control networks critical to future missions to the bodies. His career spanned from the earliest orbiter missions to the Moon to marathon voyages to Mars, Venus, Mercury and the satellites of Jupiter and Saturn. Mert's contributions form a foundation for future planetary science missions and data analysis. This session will highlight these contributions and discuss new directions for the future.

**Convener:** David E. Smith, Goddard Space Flight Center, Larry Soderblom, USGS Flagstaff



## SEISMOLOGY

### **S01 Why Intermediate-Depth Earthquakes?** (Joint with T)

Intermediate-depth earthquakes remain one of the outstanding enigmas of seismology and tectonophysics. This session seeks to advance understanding the causes and consequences of earthquakes at intermediate depths within subducting plates. Typically, these earthquakes are thought to occur at pressures too great for standard brittle processes to operate (depths =300 km), and so a variety of mechanisms have been proposed for their occurrence, including (but not limited to) dehydration embrittlement. Depending upon their physical causes, these earthquakes may play an important role in the transport of fluids from subducting slabs and in the deformation of the down-going plates. Such ideas suggest potentially testable relations between the occurrence of these earthquakes, and the thermal, petrological or mechanical characteristics of slabs. We seek contributions addressing the occurrence of intermediate-depth earthquakes, their rupture properties, the seismic structure of the region in which they occur, laboratory constraints on potential processes at depth, and also contributions that address the petrological, thermal, and geodynamical framework of these earthquakes. Intermediate-depth earthquakes can pose significant hazard, as exhibited by intermediate-depth events in 2001 in El Salvador, Central Cascadia, and Southeast Honshu, and contributions specifically related to these events are also welcomed.

**Conveners:** Geoffrey A. Abers (Department of Earth Sciences, Boston University, 685 Commonwealth Ave., Boston MA 02215 USA, E-mail: abers@bu.edu; Bradley R. Hacker, Geological Sciences & Institute for Crustal Studies, University of California, Santa Barbara CA 93106-9630 USA, E-mail: hacker@geol.ucsb.edu.

### **S02 Characteristics and Dynamics of Intraplate vs. Interplate Seismicity**

The large (Mw 7.7) Bhuj, India earthquake of January 26, 2001 has generated considerable discussion regarding the classification of seismicity as intraplate or interplate. Properly classifying regions as intraplate or interplate is important for the characterization of seismic hazard because there is growing evidence that earthquakes in the two regions can be characterized by widely differing scaling properties. The purpose of this session is to bring together experts in lithospheric dynamics and seismology to discuss the characteristics of interplate and intraplate regions (continental or oceanic) with the goal of setting informed guidelines for the classification of future large earthquakes. Papers on the Bhuj earthquake or any aspect of the contrasting structure and tectonics of intraplate and interplate regions are invited.

**Conveners:** Chris Powell, CERI, The University of Memphis, 3876 Central Ave. Suite 1, Memphis, TN 38152-3050 USA, Tel: +1-901-678-8455, Fax: +1-901-678-4734, E-mail: powell@ceri.memphis.edu; Michael Antolik, Department of Earth and Planetary Sciences, Harvard University, 20 Oxford St., Cambridge MA 02138 USA, Tel: +1-617-495-9604, Fax: +1-617-495-0635, E-mail: antolik@seismology.harvard.edu

### **S03 Strong ground motion prediction for scenario earthquakes**

Observations from recent destructive earthquakes have repeatedly shown systematic patterns of strong ground shaking and associated damage that can be largely explained by the detailed characteristics of the earthquake rupture process and wave propagation effects through complex subsurface geology. These observations suggest that successful prediction of ground motions for future scenario earthquakes requires a detailed characterization of source rupture processes, underground geologic structure and seismic velocity models. This session will cover the following aspects of strong ground motion prediction: 1) validation of prediction methodologies through the estimation and waveform modeling of strong ground motions from recent earthquakes, 2) characterization of source rupture processes and underground structure models for the purpose of strong ground motion prediction, 3) simulation methodologies based on earthquake source physics, observational evidence and geological information, and 4) estimation of strong ground motions for scenario earthquakes.

**Conveners:** Robert Graves, URS Corporation, USA, Tel: +1-626-449-7650, Fax: +1-626-449-3536, E-mail: robert\_graves@urscorp.com; Kojiro Irikura, Disaster Prevention Research Institute, Kyoto University, Japan, Tel: +81-774-38-4060, Fax: +81-774-33-5866 E-mail: irikura@egmdpri01.dpri.kyoto-u.ac.jp; Tomotaka Iwata, Disaster Prevention Research Institute, Kyoto University, Japan, Tel: +81-774-38-4060, Fax: +81-774-33-5866, E-mail: iwata@egmdpri01.dpri.kyoto-u.ac.jp.

#### **S04 Applications of Probabilistic Seismic Hazard Mapping Around the World**

Techniques for probabilistic seismic hazard mapping provide a discipline for collecting and combining quantitative geologic, seismologic and engineering information important for estimating seismic hazard. This approach also provides the starting point for quantitative, physically-based assessments of risk. Applications of these techniques are currently underway to prepare new seismic hazard maps, or to revise existing maps, in many regions around the world. Examples of efforts underway include those in Turkey, Uzbekistan, Kyrgyzstan, Italy, New Zealand, Southeast Asia, and others. The U.S. National Map is also currently being revised. Comparison of the approaches and results will focus attention on successful and needed methodological improvements, key data requirements, and new potential applications.

**Conveners:** Robert L. Wesson, U.S. Geological Survey, Box 25046, Denver Federal Center, Denver, CO, 80225 USA, Tel: +1-303-273-8524, E-mail: [rwesson@usgs.gov](mailto:rwesson@usgs.gov); Mark D. Petersen, U.S. Geological Survey, Box 25046, Denver Federal Center, Denver, CO, 80225 USA, Tel: +1-303-273-8546, E-mail: [mpetersen@usgs.gov](mailto:mpetersen@usgs.gov).

#### **S05 Time-dependent earthquake hazard assessment**

This session explores the opportunities and limitations of methods to evaluate temporal variations, especially short-term, in earthquake probabilities. The current state of the art hazard assessment is largely based on the assumption of time-independence; however, aftershocks and foreshocks present clear examples demonstrating that time-dependent elements are important and should be integrated into probabilistic hazard assessment. Varied processes that influence earthquake probabilities have been proposed based on observational data and numerical modeling. These include stress interaction models, transients in seismicity, ground deformation or other geophysical parameters, and recurrence time models. So far, few of these models have been cast as probabilistic, testable forecasts. We are interested in time-dependence on various scales, ranging from hours to days (e.g., foreshocks, short-term precursors), over days to months (e.g., aftershocks, intermediate term precursors) to years to decades (e.g., long term rate changes, stress transfer). Proposed models should be quantitative,

for example, expressing the forecast as a probability gain over a stationary background. General contributions on the statistical formulation of forecast models and the testing of forecast hypotheses are also of particular interest.

**Conveners:** Stefan Wiemer, ETH Zurich, Swiss Seismological Service, ETH Hoenggerberg, CH-8093, Zurich, Switzerland; Tel:+41-1-633-3857, E-mail: [stefan@seismo.ifg.ethz.ch](mailto:stefan@seismo.ifg.ethz.ch); Lucile M. Jones, U. S. Geological Survey, Earthquake Hazards Team, 525 South Wilson Ave., Pasadena, CA 91106, USA, Tel: +1-626-583-7817, Fax: +1-626-583-7827, E-mail: [jones@usgs.gov](mailto:jones@usgs.gov)

#### **S06 Earthquake Stress Transfer and Fault Interactions: Improved Constraints and Alternative Modeling**

##### **Approaches** (Joint with T and G)

Earthquake stress transfer and fault interaction, and how best to model these effects, have been much discussed over the past several years. Given that some fault interaction models are now being incorporated into probabilistic seismic hazard estimates, it is vital to develop a better understanding of the mechanisms by which such interactions may occur. This session will focus on advancing our knowledge of, and ability to properly model, the physics of earthquake stress transfer and fault interactions. The outstanding issues to be addressed include: (1) how to incorporate geodetic and other under-utilized datasets in fault interaction studies; (2) how to combine laboratory and "field" data to arrive at solid constraints on modeling parameters; (3) identifying reasonable approaches to testing stress transfer/fault interaction models, and probability estimates based on them; (4) identifying and quantifying the physical mechanisms responsible for time-dependent nucleation behavior; and (5) moving from simple elastic half-space modeling to more realistic and sophisticated techniques, including layered and 3-D models. We welcome papers from any area of geophysics with bearing on the general stress transfer/fault interaction problem, and we particularly encourage papers which address the above topics, provide new physical constraints, or describe improved modeling methodologies.

**Conveners:** Greg Anderson, Southern California Earthquake Center / U.S. Geological Survey, Pasadena, 525 South Wilson Ave, Pasadena CA 91106 USA, Tel: +1-626-583-6799, Fax: +1-626-583-7827, E-mail: [ganderson@usgs.gov](mailto:ganderson@usgs.gov); Jeanne Hardebeck, Institute of Geophysics and Planetary Physics, University of California, San Diego, La Jolla CA 92093-0225 USA, Tel: +1-858-534-4643, Fax: +1-858-534-5332, E-mail: [jeanne@mahj.ucsd.edu](mailto:jeanne@mahj.ucsd.edu).

#### **S07 The Forecast of Earthquakes: Methods, Models, Simulations and Observations**

The research in earthquake forecasting is actually evolving along both deterministic and probabilistic views for specifying the place, size and time. From the point of view of the depth level, one approach is based on physical knowledge of earthquakes providing the foundations of general or specific laws necessary for any forecasting, while the other one is at dynamical phenomenological level. Simulation studies allow a better understanding of the complexity of reality. The session is concerned with research in the space-time complexity of earthquake occurrence, in various tectonic settings, relevant to forecasting, algorithms, methods and models for single event and probabilistic prediction. Theoretical and applicative results, and causes of uncertainties in earthquake forecasting are contributions of importance. Contributing papers regarding the fundamental concepts of earthquake cycle and seismic gap are desired. Papers addressing phenomenological approaches in terms of dynamics of earthquakes are also expected.

**Conveners:** George Purcaru, Institute of Meteorology and Geophysics, Univ. of Frankfurt/Main, Feldbergstr. 47, D-60323 Frankfurt am Main, Germany, Tel: +49-69-79824907, Fax: +49-69-79823280, E-mail: purcaru@geophysik.uni-frankfurt.de; Omar J. Perez, Department of Earth Sciences, Simon Bolivar University, Sartenejas, Baruta, Edo. Miranda, Caracas 1080A, Venezuela, Tel: +58-212-9063518, Fax: +58-212-9063503, E-mail: ojperetz@usb.ve

#### **S08 Active Tectonics of Taiwan (Joint with T and G)**

The session will bring together Earth Scientists that are interested in the active tectonics of Taiwan. It will provide a forum for new seismologic geologic and geodetic observations and models that describe the actively deforming plate margin. This session will highlight current earthquake research on the active tectonics of Taiwan that address future earthquake hazards in the region. Both oral and poster presentations are welcome.

**Conveners:** Charles M. Rubin, Central Washington University, USA; Yue-Gau Chen, National Taiwan University, Taiwan; John Suppe, Princeton University, USA.

#### **S09 Deep Structure, Tectonics, and Evolution of the Los Angeles Region: New Results from LARSE, Industry, Potential Field, Earthquakes, and Geology**

The purpose of this symposium is to integrate a broad range of research on the deep structure, tectonics, and evolution of the Los Angeles region, using new seismic-imaging data from the Los Angeles Region Seismic Experiment (LARSE), recently released industry seismic data, potential field data, earthquake data, and geologic studies. Major questions to be addressed include 1) depths and shapes of sedimentary basins, 2) locations and geometries of faults, including blind thrust faults and deep crustal decollements, and 3) evolution of structure through time as revealed in geologic correlations among various geological units and structural blocks.

**Convener:** Rob Clayton

#### **S10 Structure and Evolution of Earth's Deep Mantle (Joint with S, G, GP, V, MRP, DI)**

Several recent developments highlight the deep mantle as a region of fundamental importance in understanding the Earth's structure, dynamics, and thermal and chemical evolution. The ultimate fate of downgoing slabs has been brought into question by seismic tomographic models of unprecedented clarity, showing that they penetrate to the CMB in some areas but not in others, and by mineral physics estimates of slab density contrast, suggesting that they may become neutrally buoyant. Mass balance arguments call the concept of a lower mantle as the "graveyard" of oceanic plates into question. Discoveries of ultra low seismic velocities and anisotropy in the very deepest mantle raise questions about the nature of this region, and about mantle-core interaction. Plumes and other upwellings rising from this region may be strongly influenced by such structures. Increasing evidences of chemical heterogeneity and layering in the deep mantle have led to new models and ways of reconciling geochemical and geophysical data. Indeed, the understanding of lower mantle chemistry is key to the understanding of planetary compositions, early mantle and core differentiation and further chemical evolution. One of the most challenging issues in mantle convection is that of the mixing time in this part of the mantle. We welcome presentations that address these and related issues using any approach, including geophysical, seismological and geochemical.

**Conveners:** Paul J. Tackley, Department of Earth and Space Sciences and Institute of Geophysics and Planetary Physics, UCLA, USA, Tel: +1-310-206-9180, Fax: +1-310-825-2779, E-mail: ptackley@ucla.edu; Francis Albarede, Ecole Normale Supérieure de Lyon, 46 Allée d'Italie, 69364 Lyon cedex 7, France, Tel: 33+ 472 72 84 14, Fax: 33+ 472 72 86 77, E-mail: albarede@ens-lyon.fr; Robert D. van der Hilst, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge MA 01239 USA, Tel: +1-617-253-6977, Fax: +1-617-258-9697, E-

mail: hilst@mit.edu.

### **S11 Subduction Factory Science**

The Subduction Factory is Earth's largest but most deeply hidden processing and recycling plant, where subducted oceanic lithosphere and sediments are squeezed, heated, and distilled to extract fluids and melts and where embryonic continental crust is formed. Understanding the workings of the Subduction Factory requires a wide range of multi- and interdisciplinary investigations, including marine- and land-based expeditions and drilling, volcanology, seismology, experimental petrology, geochemistry, and geodynamical modeling. The purpose of this special session is to provide a venue for communicating both the results of recent efforts in this arena and new perspectives on the problem and how it should be studied. Examples of timely contributions include seismic imaging of the slab and mantle wedge, experimental determination of fluid/solid partition coefficients, the effects of volatiles on elemental transport and mantle melting, the dynamics of solid and fluid flow in the mantle wedge, and P-T-t structure of subducting slabs.

**Conveners:** Robert J. Stern, University of Texas at Dallas, USA, Tel: +1-972-883-2442, E-mail: rjstern@utdallas.edu; Patricia Fryer, University of Hawaii, USA, E-mail: patty@leka.soest.hawaii.edu; Terry Plank, Boston University, USA, E-mail: tplank@bu.edu.

### **S12 Seismic and Hydro-acoustic Constraints on Ocean Crustal Dynamics, Volcanism and Hydrothermal Fluid Circulation in the NE Pacific**

Recent studies using both seismic and hydro-acoustic (SOSUS) data have proven extremely useful in defining the dynamics of geological processes occurring along the Juan de Fuca and Gorda plates. Cross-correlation of observational data from earthquakes to fluid flow and temperature from axial hydrothermal vents has shown that sub-surface crustal fluid circulation is extremely sensitive to tectonic stress, and that this stress may be felt over distances of 100s of kilometers. Tomographic studies using ocean bottom seismometers have both identified sub-surface magma chambers and defined their immediate sub-crustal environment. Three major volcanic eruptions have been successfully detected within the spreading centers in the area, using the Navy SOSUS hydroTel array in the region. This Special Session would welcome talks that use a wide variety of seismic and hydro-acoustic data, in addition to parallel hydrothermal and geodetic studies, to understand the real-time dynamics associated of the plate tectonics in the NE Pacific ocean.

**Conveners:** Robert Dziak, Oregon State University/NOAA, Hatfield Marine Science Center, 2115 SE OSU Drive, Newport, OR 97365 USA, E-mail: dziak@pmel.noaa.gov; H. Paul Johnson, Department of Oceanography, University of Washington, Seattle, WA 98195-7940 USA, E-mail: johnson@ocean.washington.edu.

### **S13 Stick-slip dynamics in geological and geophysical systems**

Stick-slip behaviour refers to the oscillation between quasi-steady slow and fast sliding modes observed in some geological and geophysical systems. Stick phases occur where strain does not overcome frictional resistance to sliding; slip phases occur where the friction force is exceeded. Stick and slip phases oscillate aperiodically and follow a power-law relationship. The phenomenon of stick-slip therefore demonstrates the interplay between a range of static and dynamic components (stress, strain and friction) of physical systems. Stick-slip behaviour also acts to maintain systems in a dynamic equilibrium over certain length scales. Understanding the processes of and controls on stick-slip events on different scales is fundamental to problems in a range of physical science disciplines that include tribology, engineering, structural geology, seismology and non-linear geophysics. Understanding stick-slip dynamics is also important for theoretical and applied geological and geophysical problems as diverse as friction dynamics, fluid flow, stress-strain relations, fault rupture dynamics, earthquake recurrence and predictability and ice and glacier motion. This session aims to examine theoretical and applied aspects of stick-slip processes from a range of geological and geophysical systems, and to promote interdisciplinarity within the physical sciences. The session will be of interest to a range of geologists and geophysicists including those in the fields of numerical modeling, macro- and micro-scale experiments on rheology, stress/strain and friction, field observations of seismogenesis, and fault mechanics. A key outcome is a better understanding of stick-slip mechanics in a range of experimental and environmental settings across the physical sciences.

**Convener:**

## SPA – AERONOMY

### SA01 Future Directions in Aeronomy (Joint with P and A)

We invite papers dealing with an assessment of present knowledge in the field of Aeronomy and an exposition of the outstanding problems that are expected to occupy the spotlight in the years ahead. The objective of this session is to inspire the community to think constructively about aeronomy as an individual discipline and its role in the study of the broader space system. What are the promising new research areas? What new initiatives and missions are envisioned? What are the new measurement techniques needed to take aeronomy through the next decade? We would encourage papers addressing general or pervasive scientific issues in both planetary and terrestrial aeronomy (including the comparative approach applied to solar system bodies) as well as papers addressing the role of technology in the future of the discipline. The session will also include papers that review recent progress and address the maturity of our understanding as a basis for projecting directions for the future.

**Conveners:** A.B.Christensen, NOAA/NESDIS, AmKavalleriesand 31, 64295 Darmstadt, Germany, Tel: +49 6151 807 831, Fax: +49 6151 807 831, E-mail: [christensen@eumetsat.de](mailto:christensen@eumetsat.de); M. Galand, Center for Space Physics, Boston University, 725 Commonwealth Ave., Boston, MA, 02215, Tel: 617-353-7431, Fax: 617-353-6463, E-mail: [mgaland@bu.edu](mailto:mgaland@bu.edu); S. W. Bougher, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ, 85721, Tel: 520- 621-4900, Fax: 520-621-4933, E-mail: [sbougher@lpl.arizona.edu](mailto:sbougher@lpl.arizona.edu); C. G. Fesen, Center for Space Sciences, U. of Texas at Dallas, POB 830688 MS FO22, Richardson, TX 75083, Tel: 972 883 2815, Fax: 972 883 2761, E-mail: [fesen@tides.utdallas.edu](mailto:fesen@tides.utdallas.edu); M. C. Kelley, Cornell University Electrical and Computer Engineering 318 Rhodes Hall Ithaca, NY 14853, Tel: 607 255-7425, E-mail: [mikek@ece.cornell.edu](mailto:mikek@ece.cornell.edu); Odile de La Beaujardiere, Chief, AFRL/VSBXP Air Force Research Laboratory, Hanscom AF Base, MA 01731-3010, (O) (781) 377-2760, E-mail: [odile.delabeaujardiere@hanscom.af.mil](mailto:odile.delabeaujardiere@hanscom.af.mil); L. J. Paxton, Space Department, Applied Physics Laboratory, Laurel, MD, Tel: 240-228-6871, Fax: 240-228-6870, E-mail: [larry.paxton@jhuapl.edu](mailto:larry.paxton@jhuapl.edu)

### SA02 A Celebration of Research on Atmospheric Coupling: NSF/CEDAR Accomplishments and New Thrusts

The NSF/CEDAR Program began in 1986 as a grass-roots community initiative for investigations of the Earth's upper atmosphere and the state-of-the-art instrumentation that would be required to study it. CEDAR quickly evolved to encompass multiple diagnostic techniques, theory, modeling, and coordinated observational campaigns as program elements, eventually becoming the dominant national research program in terrestrial aeronomy. CEDAR's hallmarks include collaborative research projects, multi-site field campaigns integrated with a theoretical component, annual workshops, and concerted efforts to involve graduate and undergraduate students. Scientifically, CEDAR's goals are to characterize and understand the atmosphere above about 60 km, emphasizing the coupled energetic and dynamic processes that determine the basic atmospheric composition and structure. Currently, four science initiatives constitute CEDAR's science agenda: coupling with lower altitudes; solar-terrestrial interactions, polar aeronomy, and long term variations. In this session, a few invited papers will summarize some of CEDAR'S accomplishments, recent progress, and future goals. Contributed papers on all aspects of CEDAR science are welcome.

**Conveners:** C.G. Fesen, Center for Space Sciences, U. of Texas at Dallas, POB 830688 MS FO22, Richardson, TX 75083, Tel: 972 883 2815, Fax: 972 883 2761, E-mail: [fesen@tides.utdallas.edu](mailto:fesen@tides.utdallas.edu); R. W. Smith, Geophysical Institute, University of Alaska, Fairbanks, AK 99775, Tel: 907 474 7416, Fax: 907 474 5882, E-mail: [roger.smith@gi.alaska.edu](mailto:roger.smith@gi.alaska.edu)

### SA03 Space Weather Effects on Satellite Drag

Satellite drag variations are a dramatic manifestation of space weather effects. Uncertainties in neutral density models are the major source of satellite drag errors. After three decades of essentially no quantitative progress, the problem is being vigorously and fruitfully attacked on several fronts: space-borne and ground-based measurements, data assimilation or Acalibration@ schemes, solar inputs, models and numerous other related space weather studies. This session reviews the current and forthcoming efforts of the science community in providing understanding of the neutral atmosphere environment. Contributions related to thermospheric variability in the 90 B 1000 km region are welcome.

**Conveners:** J.M Picone, Space Science Division, Code 7643, Naval Research Laboratory, 4555 Overlook Ave., SW, Washington, D.C. 20375, Tel: (202) 404-7880, Fax: (202) 404-8090, E-mail: [picone@nrl.navy.mil](mailto:picone@nrl.navy.mil); and F. A. Marcos, Space

Vehicles Directorate, Air Force Research Laboratory, 29 Randolph Road, Hanscom AFB, MA 01731-3010, Tel: (781) 377-3037, Fax: (781) 377-9950, E-mail: [frank.marcos@hanscom.af.mil](mailto:frank.marcos@hanscom.af.mil).

**SA04 The Mesosphere/Lower Thermosphere Region: Instabilities, Structure, Dynamics, Composition, and Emissions** (Joint With A)

The Mesosphere and Lower Thermosphere (MLT) region between 50 and 150 km is a complex region characterized by a complicated interplay of dynamics, chemistry, and electrodynamics. Papers in this session will explore the interactions between turbulence, radiative processes, chemistry, wave dynamics, electrodynamics, and nonlinear processes in the mesosphere, as well as coupling between the mesosphere and the stratosphere and the mesosphere and lower thermosphere. One focus of the session is to highlight the results from the combined lidar and rocket Turbulent Oxygen Mixing Experiment (TOMEX) that took place in New Mexico in October 2000, but papers on all aspects of the mesosphere, including experimental studies, modeling studies, and theory are also encouraged.

**Conveners:** Han-Li Liu, National Center for Atmospheric Research, 3450 Mitchell La., Boulder, Colorado 80301 USA, Tel: +1-303-497-1564, Fax: +1-303-497-1589, E-mail: [liuh@ucar.edu](mailto:liuh@ucar.edu); James Hecht, Mail Stop M2-259, The Aerospace Corporation, PO Box 92957 Los Angeles, California, 90009 USA, Tel: +1-310-336-7017, Fax: +1-310-336-1636, E-mail: [james.hecht@aero.org](mailto:james.hecht@aero.org); Dennis Riggin, Colorado Research Associates, 3380 Mitchell La., Boulder, Colorado 80301 USA, Tel: +1-303-415-9701x208, Fax: +1-303-415-9702, E-mail: [riggin@colorado-research.com](mailto:riggin@colorado-research.com); Miguel Larsen, Department of Physics, Kinard Lab, Clemson University, Clemson, South Carolina, 29634 USA, Tel: +1.864.656.5309, Fax: +1.864.656.0805, E-mail: [mlarsen@clemson.edu](mailto:mlarsen@clemson.edu).

**SA05 Magnetic Storm Effects on the Middle and Low Latitude Ionosphere and Upper Atmosphere** (Joint with SM, SH)

Recently, much attention has been focused on the description and phenomenology of space weather. A large fraction of space weather events occurs in the earth's ionosphere and upper atmosphere. A quantitative description of the ionospheric and thermospheric response to a magnetic storm has not been fully established due, in part, to the complex interaction between the plasma and neutral species. At high latitudes, Joule heating, generated by an increase in the convection electric field and auroral precipitation, is the primary driver for global thermospheric response. Equatorward wind surges can drive the ionosphere upwards and can initiate ionospheric dynamics. In addition, changes in thermospheric composition can lead to additional ionospheric responses. At low latitudes electrodynamic changes are generated by penetration of magnetospheric electric fields followed by rapid shielding. The evolution and effects on higher latitudes of equatorial spread-F bubbles can be drastically modified under magnetic storm conditions. Recently new data has been collected in the middle and low latitude ionosphere and thermosphere under storm conditions. In this session we will summarize recent progress in both experimental observations and modeling of magnetic storm effects in the middle and low latitude ionosphere and thermosphere. Contributed papers, both experimental and modeling, on all aspects of magnetic storm effects on the middle and low altitude ionosphere and upper atmosphere are welcome. Outstanding issues will be addressed.

**Conveners:** M.J. Keskinen, Naval Research Laboratory, Washington, DC 20375, Tel: 202-767-3215, Fax: 202-767-3553, E-mail: [keskinen@ppd.nrl.navy.mil](mailto:keskinen@ppd.nrl.navy.mil); B.G. Fejer, Center for Atmospheric and Space Sciences, Utah State University, Logan, UT, Tel: 435-797-3627, E-mail: [bfejer@cc.usu.edu](mailto:bfejer@cc.usu.edu); Santi Basu, Air Force Research Laboratory, 29 Randolph Rd., Hanscom AFB, MA 01730, 202-404-4384, E-mail: [sbasu@ppd.nrl.navy.mil](mailto:sbasu@ppd.nrl.navy.mil)

**SPA – SOLAR AND HELIOSPHERIC PHYSICS**

**SH01 Shocks and shock manifestations over the solar cycle** (Joint with SM)

It could be said that interplanetary shocks are the most dramatic manifestations of the sudden encounter of two heliospheric streams. Near the Sun, a shock may be generated by a CME moving much faster than the ambient plasma. The presence of this shock may be inferred by the remote sensing of high-frequency, slowly-drifting radio emissions [MHz], or by flux enhancements of so-called gradual solar energetic particles. Shocks are observed in situ as a sharp discontinuity, often with a dramatic increase in the density and speed of the plasma and the magnitude of the magnetic field. ISTP interplanetary spacecraft and other associated missions allow a multi-spacecraft, almost continuous

coverage of solar wind conditions in the vicinity of Earth. Of particular interest is the study of the evolution of collisionless interplanetary shocks with their capability to dissipate energy, accelerate particles, and influence the geomagnetic environment. Here we solicit contributed papers which will preferentially present a correlative analysis of the shocks from the point of view of their manifestations, sources, and upstream solar wind conditions and their interactions with the near-Earth plasma environment.

**Conveners:** Daniel B. Berdichevsky, Emergent Technology Systems (Also Laboratory for Extraterrestrial Physics, NASA/Goddard Space Flight Center), Mail Code 690, NASA/GSFC, Greenbelt, MD 20740, Tel 301-286-4608, Fax: 301-286-0212, E-mail: berdi@istp1.gsfc.nasa.gov; Donald Reames, Laboratory for High Energy Astrophysics, NASA/Goddard Space Flight Center), Mail Code 661, NASA/GSFC, Greenbelt, Maryland, Tel 301-286-4608, Fax: 301-286-1682, E-mail: reames@milkyway.gsfc.nasa.gov; Alan Lazarus, Center for Space Research, Massachusetts Institute of Technology, Cambridge, MA 02139, E-mail: ajl@space.mit.edu, Tel: 617 253-4284, Fax: 617 253 0861

### **SH02 Interacting CMES and their relationships to interacting ejecta**

It is now well established that coronal mass ejections (CMEs) and interplanetary ejecta are responsible for the severest of geomagnetic storms. Depending on the initial speed, Earth-directed CMEs take 1-5 days to reach the geospace where they are observed in situ as ejecta. In order predict their arrival times, we need to understand the propagation of CMEs in the corona and their physical relationship to ejecta propagating through the interplanetary medium. Early Helios observations showed that ejecta can interact with one another, with shocks, and with corotating streams and other flows. Recent SOHO and Wind observations have revealed that CMEs cannibalize and deflect one another. CMEs also accelerate and decelerate due to their interaction with the solar wind. The CME interactions result in different solar wind signatures compared to isolated events. Compound streams, complex composition signatures and complex profiles of the Dst index are some of the obvious signatures. This special session will bring together observers, theorists and modelers to consolidate what has been learned so far and what needs to be done for a better understanding of these interaction processes. Emphasis will be placed on works connecting near-Sun and near-Earth manifestations of solar transient events. Contributed papers for oral talks and posters dealing with all aspects of the propagation and interaction of CMEs, the propagation and interaction of interplanetary ejecta, and the physical relationships of these near-Sun and near-Earth processes are welcome.

Conveners: Nat Gopalswamy, Center for Solar Physics and Space Weather, The Catholic University of America, Washington DC 20064, Tel: 301-286-5885, Fax: 301-286-5885, E-mail: gopalswamy@cua.edu; Len Burlaga, NASA/Goddard Space Flight Center, Code 692, Greenbelt, MD 20771, Tel: 301-286-5956, Fax: 301-286-1683, E-mail: burlaga@lepvax.gsfc.nasa.gov

### **SH03 High-Energy Phenomena in Solar Flares**

The study of high-energy phenomena in solar flares has benefitted dramatically from the high level of major flare activity during the last year, as observed by the Yohkoh Soft X-Ray Telescope, Hard X-Ray Telescope, and Gamma Ray Spectrometer instruments, as well as the recent launch of the NASA High Energy Solar Spectroscopic Imager (HESSI). This session will use invited and contributed papers to showcase the latest observations of high-energy phenomena in solar flares from these missions and related ground-based observatories. Contributed papers on all aspects of this topic are welcome.

**Conveners:** R.C. Canfield, Department of Physics, Montana State University, Bozeman MT 59717-3840, Tel: (406) 994-5581, Fax: (406) 994-4452, E-mail: canfield@physics.montana.edu; H. S. Hudson, Institute of Space and Astronautical Sciences, 3-1-1 Yoshinodai, Sagamihara, Kanagawa 229, Japan, Tel: +81 (42) 769-4531, Fax: +81 (42) 759-8469, E-mail hudson@isass1.so.ar.isas.ac.jp; G. H. Share, NRL, Code 7652, 4555 Overlook Ave. SW, Washington, DC 20375-5320, Tel: (202) 767-3027, Fax: (202) 767-6473, E-mail share@osse.nrl.navy.mil.

## **SPA – MAGNETOSPHERIC PHYSICS**

### **SM01 Paradigms of Ring Current Decay (Joint with SA, SH)**

Ring current physics has always been driven by several paradigms: the exclusive solar source, the build-up by substorms, the morphological symmetry of the ring current, the decay through charge-exchange, the fidelity of Dst in describing ring current intensity. New paradigms have emerged, which are in partial or complete disagreement with the older ones. This session will focus on the problem of ring current decay, especially during large storms with two-

phase recovery. In particular, we seek contributions on the issues of ring current symmetry during the main and early recovery phases, the influence of wave-particle interactions on the decay rate, and the relative efficiency of charge-exchange and dayside drift losses in the early strong decay of the ring current.

**Conveners:** Ioannis (Yannis) Daglis, Institute for Space Applications and Remote Sensing, National Observatory of Athens, Metaxa and Vas. Pavlou St., Penteli, 15236 Athens, Greece, tel.: +30-1-6138341, Fax: +30-1-6138343, E-mail: daglis@space.noa.gr; and Richard M. Thorne, Department of Atmospheric Sciences, UCLA, 405 Hilgard Ave., Los Angeles, CA 90095-1565, tel.: +1-310-8255974, Fax: +1-310-2065219, E-mail: [rmt@atmos.ucla.edu](mailto:rmt@atmos.ucla.edu)

#### **SM02 Cluster Observations After One Year in Orbit**

The ESA-NASA Cluster mission is the first magnetospheric mission with four identical spacecraft flying in formation. The goal of the mission is to study, in three dimensions, the small and medium scales plasma structures that can be found in the solar wind, bow shock, magnetopause, polar cusps, magnetotail and auroral zone. The session will be devoted to the presentation of the results that have been obtained during the first year of operations, including coordinated ground-based observations. Contributed papers are welcome and may be scheduled as either oral or poster presentations.

**Conveners:** C. Philippe Escoubet, ESA/ESTEC (SCI-SO), Postbus 299, Keplerlaan, 1, 2200 AG Noordwijk, The Netherlands, Tel: 31715653454, Fax: 31715654697, E-mail: [Philippe.Escoubet@esa.int](mailto:Philippe.Escoubet@esa.int); Melvyn L. Goldstein, NASA, Goddard Space Flight Center, Code 692, Greenbelt, MD 20771, USA, Tel: 1 (301) 286-7828, Fax: 1 (301) 286-1683, E-mail: [melvyn.goldstein@gsfc.nasa.gov](mailto:melvyn.goldstein@gsfc.nasa.gov); M. Balikhin, Dept. of Automatic Control and Systems Engineering, University of Sheffield, Mappin St., UK, Tel: +44-(0)-1142225628, Fax: +44-(0)-1142225661, E-mail: [m.balikhin@sheffield.ac.uk](mailto:m.balikhin@sheffield.ac.uk).

#### **SM03 Electrodynamical Coupling of High Latitude Ionosphere and Plasma Sheet. (Joint with SA)**

Recent studies from the FAST, POLAR and Geotail spacecraft have revealed that copious amounts of electromagnetic energy flux propagate down the field lines from the nightside plasma sheet in the form of dissipative Alfvén waves. Space imagers have shown that the increased Alfvénic wave power correlates with the poleward motion of active aurorae, or activations of the poleward boundary, while in situ, low altitude measurements suggest that upward ion beams and counterstreaming electron events are observed at high intensity on the same field lines. Fast flows emanating from reconnection, or other near-Earth processes, provide ample free energy for the aforementioned waves. This session addresses the electromagnetic coupling of plasma sheet activations with the high latitude ionosphere. In particular, Alfvén wave generation, propagation, and dissipation along (or at the ionospheric foot of) the field lines is of primary interest. The effect of the waves on ion and electron populations, the ionospheric closure of the pertinent current, and the effective damping of the ultimate source are themes of importance. Recent Cluster auroral zone field line traversals at various altitudes also provide a unique multi-spacecraft viewpoint that is particularly interesting and timely. Observational, simulation and theory papers are encouraged.

**Conveners:** V. Angelopoulos, Space Sciences Laboratory, University of California, Berkeley, CA 94720-7450, Tel: 510-643-1871, Fax: 510-643-8302, E-mail: [vassilis@ssl.berkeley.edu](mailto:vassilis@ssl.berkeley.edu); and J. R. Wygant, University of Minnesota, Tate Laboratory of Physics, School of Physics and Astronomy, 116 Church St., SE, Minneapolis, MN 55455-0112, Tel: 612-626-8921 Fax: 612-626-2029, E-mail: [wygant@ham.space.umn.edu](mailto:wygant@ham.space.umn.edu).

#### **SM04 Magnetosphere-Ionosphere Connectivity (Joint with SA)**

The coupling between the magnetosphere and ionosphere is mediated by the magnetic field connecting the two. Because charged particles and electric currents follow magnetic field lines, distant regions that are magnetically connected can interact by exchanging mass, momentum, and energy along the field. Accurate knowledge of the connectivity is required if the low-altitude signatures are to be used as a monitor of magnetospheric behavior. At low altitudes, the connectivity is dominated by the Earth's intrinsic magnetic field, but at higher altitudes currents flowing within the magnetosphere cause large, temporally variable field distortions, making the magnetic connection much more complicated. Various approaches have been taken toward establishing and testing our understanding of this connectivity under different geomagnetic conditions, some with the disturbing result that the connection may often be quite different from our expectations. This session will review what is known about the magnetic connectivity between the ionosphere and the magnetosphere, what techniques have been used to determine the connectivity, what uncertainties remain, and possible new techniques that might be brought to bear.

**Convener:** Michelle F. Thomsen, Space and Atmospheric Sciences (NIS-1), MS D466, Los Alamos National Laboratory, Los Alamos, NM 87545, Tel: 505-667-1210, Fax: 505-665-7395, E-mail: [mthomsen@lanl.gov](mailto:mthomsen@lanl.gov).

#### **SM05 Global Magnetospheric Response to Extreme Solar Wind Conditions (Joint with SH)**

During the current solar maximum epoch, the IMAGE mission, in conjunction with the ISTP spacecraft fleet, has produced an unprecedented aggregate data set for the investigation of the Sun-Earth Connection. A large number of events involving extreme solar wind conditions have been observed during this period. For this session, we encourage submission of papers involving coordinated correlative use of imaging, in situ, and ground-based data

sets, to capture the essential dynamics of geospace during recent episodes of extreme solar wind intensity and-or magnetization. Relevant simulation work will also be an important component of this session, especially in comparison with global observations. We will seek to invite papers that are exemplary in demonstrating what can be done using these combined data sets and simulation tools. Examples of the events of greatest interest are those on or about: 2000/07/15-16, 08/11-14, 09/19, 2001/02/13, 03/31, 04/06.

**Conveners:** J. L. Green, NASA GSFC, Code 630, Greenbelt, MD 20771 USA, Tel:+1-301-286-4643, E-mail: james.l.green@gsfc.nasa.gov; S. A. Fuselier, Lockheed Martin Advanced Technology Center, Dept L9-42 Bldg 255, Palo Alto, CA 94304, USA, Tel: +1-650-424-3334, E-mail: fuselier@spasci.com; T. E. Moore, NASA's GSFC, Code 692, Bldg.2-138, Greenbelt, MD, 20771, USA, Tel: +1-301-286-5236, E-mail: [thomas.e.moore@gsfc.nasa.gov](mailto:thomas.e.moore@gsfc.nasa.gov).

### **SM06 From Thunderstorms to Solar Flares: The Scientific Legacy of John R. Winckler** (Joint with A, SA, SH)

John R. Winckler was a pioneer in a number of areas of atmospheric and space physics, from his discovery of X-rays in the aurora to the discovery of sprites above thunderstorms. His work inspired new research into the physics of the aurora, radiation belts, solar flares, cosmic rays and atmospheric lightning phenomena as well as in active experimentation in space. This special session will provide an interdisciplinary forum for the presentation of current results in upper atmosphere electrodynamics, the physics of the aurora, active experimentation from spacecraft, the acceleration of particles and the production of cosmic rays, gamma-rays and X-rays from the Sun. While some historical talks will focus on Winckler's contributions to these fields, the major focus of the session will be on current research that extends his pioneering work.

**Conveners:** R. L. Lysak, School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455, Tel: 612-625-1323, Fax: 612-626-2029, E-mail: [bob@aurora.space.umn.edu](mailto:bob@aurora.space.umn.edu); G. K. Parks, Space Sciences Laboratory, University of California, Berkeley, CA 94720, Tel: 510-643-5512, Fax: 510-643-8302, E-mail: [parks@ssl.berkeley.edu](mailto:parks@ssl.berkeley.edu); D.D. Sentman, Geophysical Institute and Physics Department, University of Alaska, Fairbanks, AK 99775, Tel: 907-474-6442, Fax: 907-474-7290, E-mail: [dsentman@gi.alaska.edu](mailto:dsentman@gi.alaska.edu).

### **SM-07 Modes of Transport in Geospace** (Joint with SH/SA/NG)

New missions have started providing us with a clear view of mass, momentum, and energy transport through the Earth's space environment. It is timely to re-evaluate traditional notions about how transport is organized and to what extent it is determined by large-scale parameters. Between the extremes of laminar and turbulent flow, in many regimes transport is organized in modes, whose identifiers include particle acceleration and bursty flows. The mapping of transport regimes in geospace from these microscales to larger-scale structures, such as plasmoids and flux ropes, is just beginning. One key issue is whether transport is anomalous, resulting from long range correlations in a complex system, or whether the system is complicated with a number of uncorrelated transport mechanisms with disparate spatiotemporal scales taking place simultaneously. The relation between these emerging structures and the power-law distributions in V and B fluctuations (in the plasma sheet, geomagnetism, etc.) remains an open challenge. In addition, predictability of energy transport is currently limited to a few global modes and invites the question on how much it is extendable to small-scale structures. The session welcomes presentations on observations of geospace transport events; methods that quantify their properties; and theoretical work on the emergence, stability, and predictability of modes.

**Conveners:** Dimitris Vassiliadis, USRA at NASA/GSFC, Code 690.2, Building 1, Room 255, Greenbelt, MD 20771, USA, Tel: +1-301-286-9060, Fax: +1-301-286-1681, E-mail: [vassi@electra.gsfc.nasa.gov](mailto:vassi@electra.gsfc.nasa.gov); T. S. Chang, Center for Space Research, Massachusetts Institute of Technology, 77 Massachusetts Ave., Room 37-261, Cambridge, MA 02139, USA, Tel: +1-617-253-7523, Fax: +1-617-253-0861, E-mail: [tsc@space.mit.edu](mailto:tsc@space.mit.edu); and Sandra C. Chapman, Space and Astrophysics Group, Univ. of Warwick, UK, Tel: +44-2476-523390, Fax: +44-2476-692016, E-mail: [sandrac@astro.warwick.ac.uk](mailto:sandrac@astro.warwick.ac.uk).

## **TECTONOPHYSICS**

### **T01 Temporal gravity and crustal deformation**

With the advent of the new generation of gravimeters (absolute and super-conducting), temporal gravity observations are now a much stronger tool for constraining mass flux within the solid earth. The aim of this session is to present new observations and modeling of crustal deformation and mass flux based on absolute, superconducting and relative surface gravimetry. Possible applications may also include volcano and tectonic deformation, groundwater extraction/movement, and postglacial rebound. Results from other topics are also welcome, such as lunar-solar tides, atmospheric and oceanic mass redistribution, and long-term mantle convection and core dynamics.

**Conveners:** Anahita Tikku, Lamont-Doherty Earth Observatory of Columbia University, 108 Oceanography, 61 Rte. 9W, Palisades, NY 10964, Tel: 845-365-8841, Fax: 845-365-8179, E-mail: [ani@ldeo.columbia.edu](mailto:ani@ldeo.columbia.edu); David McAdoo, Laboratory for Satellite Altimetry, National Oceanic and Atmospheric Administration, SSMC3, Rm 3620, E/RA31, 1315 East-West Highway, Silver Spring, MD 20901, Tel: 301-713-2860 x129, Fax: 301-713-4598, E-mail: [dave.mcadoo@noaa.gov](mailto:dave.mcadoo@noaa.gov); and Tim Niebauer, Micro-g Solutions, 515 Briggs St., P.O. Box 636, Erie, CO 80516, Tel: 303-828-3499, Fax: 303-828-3288, E-mail: [tmniebauer@microgsolutions.com](mailto:tmniebauer@microgsolutions.com)

### **T02 Seismic and Hydro-acoustic Constraints on Ocean Crustal Dynamics, Volcanism and Hydrothermal Fluid Circulation in the NE Pacific**

Recent studies using both seismic and hydro-acoustic (SOSUS) data have proven extremely useful in defining the dynamics of geological processes occurring along the Juan de Fuca and Gorda plates. Cross-correlation of

observational data from earthquakes to fluid flow and temperature from axial hydrothermal vents has shown that sub-surface crustal fluid circulation is extremely sensitive to tectonic stress, and that this stress may be felt over distances of 100s of kilometers. Tomographic studies using ocean bottom seismometers have both identified sub-surface magma chambers and defined their immediate sub-crustal environment. Three major volcanic eruptions have been successfully detected within the spreading centers in the area, using the Navy SOSUS hydroTel array in the region. This Special Session would welcome talks that use a wide variety of seismic and hydro-acoustic data, in addition to parallel hydrothermal and geodetic studies, to understand the real-time dynamics associated of the plate tectonics in the NE Pacific ocean.

**Conveners:** Robert Dziak, Oregon State University/NOAA, Hatfield, Marine Science Center, 2115 SE OSU Drive, Newport, OR 97365, E-mail: [dziak@pmel.noaa.gov](mailto:dziak@pmel.noaa.gov); and H. Paul Johnson, Oceanography, University of Washington, Seattle, WA 98195-7940, E-mail: [johnson@ocean.washington.edu](mailto:johnson@ocean.washington.edu)

### **T03 Nankai Seismogenic Zone Studies - New Insights from Recent Investigations**

This session focuses on recent advances in Nankai Seismogenic Zone studies such as Ocean Drilling Program penetrations, deep crustal geophysics, 3-D reflection studies, micro-seismicity investigations, submersible dives, theoretical and/or laboratory experiments and on-land geological work. The Nankai subduction margin has a well-documented history of great earthquakes and tsunamis, and has recently become the center of public attention. The Nankai subduction zone is a prime area to investigate the controls on seismogenic zone rupture and the relationship between earthquakes, deformation, and fluid flow. The Nankai seismogenic zone is relatively shallow and accessible by future riser drilling technology. We solicit contributions that will present results of recent studies on the Nankai subduction margin, especially presentations relevant to the future deep sea drilling into the seismogenic zone, and comparable studies on the other seismogenic zones.

**Conveners:** J. Casey Moore, University of California Santa Cruz, Dept. of Earth Sciences, 1156 High St., Santa Cruz 95064 CA, Tel: 831-459-2574, Fax: 831-459-3074, E-mail: [emoore@earthsci.ucsc.edu](mailto:emoore@earthsci.ucsc.edu); and Hitoshi Mikada, Japan Marine Science and Technology, Deep Sea Research Dept., 2-15, Natsushima-cho, Yokosuka, 237-0061 Kanagawa, Japan, Tel: 81-468-67-3983, Fax: 81-468-66-5541, E-mail: [mikada@jamsetc.go.jp](mailto:mikada@jamsetc.go.jp)

### **T04 Ophiolites and Continental Margins of the Pacific Rim and the Caribbean Region**

Phanerozoic ophiolites in the circum-Pacific orogenic belts and the Caribbean region record significant evidence for tectonic and magmatic processes from rift-drift through accretionary stages of continental margin evolution and seafloor spreading in various tectonic settings. Structural, petrological, and geochemical features of these ophiolites and associated tectonic units (i.e., volcanic arcs, oceanic plateaus, high-P metamorphic belts) provide essential information on mantle flow field effects, including plume activities, collision-induced asthenosphere extrusion, crustal growth via magmatism and tectonic accretion in subduction-accretion cycles, and changes in the structure and composition of the crust and mantle reservoirs through time. Collision-induced mantle flow appears to have played a major role in trench rollback, arc extension, and backarc basin opening and hence in ocean crust generation and ophiolite emplacement in active margins of the Tertiary Western Pacific and similarly might have affected the Mesozoic through Cenozoic tectonics of the North American Cordillera and the Caribbean region. This session will provide a forum for discussing plate tectonic and mantle processes and their interplay during the evolution of the Phanerozoic ophiolites and their continental margins around the Pacific Rim and the Caribbean region (including northern South America). Discussions will include the mode and nature of crustal growth in the accretionary orogens in these areas.

**Conveners:** Yildirim Dilek, Department of Geology, Miami University, Oxford, OH 45056, Tel: (513) 529-2212, Fax: (513) 529-1542, E-mail: [dileky@muohio.edu](mailto:dileky@muohio.edu); and Martin F.J. Flower, Department of Earth & Environmental Geological Sciences, University of Illinois at Chicago, Chicago, IL 60607, Tel: (312) 996-9662, Fax: (312) 413-2279, E-mail: [flower@uic.edu](mailto:flower@uic.edu)

### **T05 Multidisciplinary insights from Seismic Tomography, Mantle Dynamics, Geological Origins and Evolution**

In the past few years multidisciplinary studies have yielded a great deal of information concerning the superplumes under Africa and the Pacific. The concept of superplumes goes beyond the plate tectonics paradigm and deals directly with dynamics of the Earth's interior. In addition to the study of seismic tomography, new data on compositional dependence of elastic wave has come to map thermal/chemical heterogeneities in Earth's interior. Moreover, the

studies of topography of 410km and 660km discontinuities, UHP experiments on the source of superplume, petrological-chemical constraints of superplume rocks on the surface at present or past, and the history of Pacific and African superplumes have been accumulated. Let us join to share the data and ideas to formulate what is the next to be potentially focussed. Arguments from numerical simulation on its origin and evolution represent another outstanding issue of this symposium.

**Conveners:** S. Maruyama, Tokyo Institute of Technology, O-okayama 2-12-1, Meguro-ku, Tokyo 152, Japan, Tel:011-81-3-5734-2618, Fax:011-81-3-5734-3538, E-mail: [smaruyam@geo.titech.ac.jp](mailto:smaruyam@geo.titech.ac.jp); S. Karato, Department of Geology and Geophysics, University of Minnesota, 108 Pillsbury Hall, Minneapolis, MN 55455, Tel: 612-624-7553, Fax: 612-625-3819, E-mail: [karato@tc.umn.edu](mailto:karato@tc.umn.edu); and D. Yuen, Department of Geology and Geophysics and Minnesota Supercomputer Institute, University of Minnesota, Minneapolis, MN 55415, Tel: 612 624 2868, Fax: 612 624 8861, E-mail: [davey@krissy.msi.umn.edu](mailto:davey@krissy.msi.umn.edu)

#### **T06 The impact of rock experimentation on geodynamics-a session in honor of Mervyn Paterson**

Our understanding of geodynamic processes such as mantle convection, mountain building, or crustal extension requires quantitative insights into the material behavior of rocks. We need to understand the mechanics of rock deformation over a broad range of scales in space and time and under thermodynamic boundary conditions covering an enormous span from crust to mantle. Fundamental scientific concepts reaching from microphysical models of friction and rock fracture to strength profiles of the earth's lithosphere have been developed in the laboratory over the last three decades, and they have been applied with great success on the field scale. However, recent developments of new experimental and analytical techniques have greatly improved our understanding of various aspects of deformation in the lithosphere. In particular, the effects of aqueous fluids, partial melts, chemical impurities and second phases on the constitutive behavior of rocks could be investigated with much more experimental rigor than was possible before. Many of these recent advances were achieved using experimental apparatuses originally designed by Mervyn Paterson. By combining the experimental data with new geophysical observations taken on the field and crustal scale, and with improved computational capabilities, it is now feasible to implement more sophisticated dynamic models of lithospheric deformation. The session will cover four thematic topics from laboratory, field, and modeling perspectives: (1) Melt migration and the rheology of partially molten rocks; (2) interrelationships among fluid flow, permeability, and deformation; (3) the role of water and chemical impurities for high-temperature creep of rocks; (4) high-strain deformation, the evolution of microstructure and textures, and shear localization.

**Conveners:** Brian Evans, Department of Earth, Atmospheric and Planetary Sciences, 54-718, Massachusetts Institute of Technology, Cambridge, MA 02139, Tel: 617-253-2856, Fax: 617-253-0620, E-mail: [brievans@MIT.EDU](mailto:brievans@MIT.EDU); and Georg Dresen, GeoForschungsZentrum Potsdam, Telegrafenberg D425, 14473 Potsdam, Germany, Tel: +011-49-331- 288 1320, Fax: +011-49-331- 288 1328, E-mail: [dre@gfz-potsdam.de](mailto:dre@gfz-potsdam.de)

#### **T07 SUBDUCTION FACTORY SCIENCE**

The Subduction Factory is Earth's largest but most deeply hidden processing and recycling plant, where subducted oceanic lithosphere and sediments are squeezed, heated, and distilled to extract fluids and melts and where embryonic continental crust is formed. Understanding the workings of the Subduction Factory requires a wide range of multi- and interdisciplinary investigations, including marine- and land-based expeditions and drilling, volcanology, seismology, experimental petrology, geochemistry, and geodynamical modelling. The purpose of this special session is to provide a venue for communicating both the results of recent efforts in this arena and new perspectives on the problem and how it should be studied. Examples of timely contributions include seismic imaging of the slab and mantle wedge, experimental determination of fluid/solid partition coefficients, the effects of volatiles on elemental transport and mantle melting, the dynamics of solid and fluid flow in the mantle wedge, and P-T-t structure of subducting slabs.

**Conveners:** Robert J. Stern, Geosciences Department, University of Texas at Dallas, Box 830688, 2601 N. Floyd Rd., Richardson TX 75083-0688 U.S.A, Tel: 972-883-2442, Fax: 972-883-2537, E-mail: [rjstern@utdallas.edu](mailto:rjstern@utdallas.edu); Patricia Fryer, University of Hawaii,

E-mail: [patty@leka.soest.hawaii.edu](mailto:patty@leka.soest.hawaii.edu); and Terry Plank, Department of Earth Sciences, 685 Commonwealth Ave., Boston University, Boston MA 02215, Tel: 617-353-4213, Fax: 617-353-3290, E-mail: [tplank@bu.edu](mailto:tplank@bu.edu)

#### **T08 The Physics and Mechanics of Compressive Failure: From Faulting to Ductile Flow**

Compressive failure limits many geologic processes and engineered systems. Recent advances in acoustic emission,

high resolution seismic imaging, electron microscopy, multi-axial loading, etc., have provided unprecedented detail of the geometry and mechanical processes involved in both brittle and ductile failure. This session will explore how recent field, laboratory, and theoretical studies have refined, improved, challenged, or changed our understanding of the physics and mechanics of brittle failure and of the brittle-to-ductile transition in crystalline materials.

**Conveners:** Carl E. Renshaw, Department of Earth Sciences, Dartmouth College, Hanover, NH 03755, Tel: 603-646-3365, Fax: 603-646-3922, E-mail: [renshaw@dartmouth.edu](mailto:renshaw@dartmouth.edu); and Erland M. Schulson, Thayer School of Engineering, Dartmouth College, Hanover, NH 03755, Tel: 603-646-2888, E-mail: [Erland.Schulson@dartmouth.edu](mailto:Erland.Schulson@dartmouth.edu)

### **T09 Structure and Evolution of the Galapagos Volcanic Province**

The Galapagos Volcanic Province (GVP) serves as a natural laboratory for the investigation of many fundamental geological questions. The GVP is the expression of intraplate oceanic magmatism in the presence of a nearby mid-ocean ridge. Because of this unique tectonic setting, study of the GVP can provide invaluable insight into important issues including plume-ridge interaction, mantle plumes and hotspots, ocean islands and magmatic systems, as well as volcanic plateaus and aseismic ridges. Although scientists have worked in the Galapagos region for decades, the past few years have seen an increase in the intensity and diversity of geological research focused on this system, including geochemical, geophysical, and geodynamical studies of both the hotspot and the ridge. The Fall AGU meeting comes at an opportune phase in current and recent Galapagos research, allowing scientists from across the geological disciplines to exchange recent results and to synthesize a more thorough understanding of both the Galapagos Volcanic Province as well as the nature of mantle plumes, ocean islands volcanics, and plume-ridge interaction.

**Conveners:** Juan Pablo Canales, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, 360 Woods Hole Rd., Woods Hole MA 02543, Tel: (508) 289-2893, Fax: (508) 547-2150, E-mail: [jpcanales@whoi.edu](mailto:jpcanales@whoi.edu); and Karen S. Harpp, Geology Department, Colgate University, 13 Oak Dr., Hamilton NY 13346, Tel: (315) 228-7211, Fax: (315) 228-7187, E-mail: [kharp@mail.colgate.edu](mailto:kharp@mail.colgate.edu)

### **T10 Explaining nonlinearly time-varying geodetic observations**

Modern geodetic techniques (GPS, InSAR, VLBI, LIDAR) and precise ground-based techniques (strainmeters, tiltmeters, leveling, EDM) have revolutionized our ability to accurately measure temporal and spatial surface deformation patterns associated with tectonic, volcanic, and hydrologic processes. We invite studies using geodetic and other geophysical observations of surface deformation to better understand the kinematics and dynamics of non-linearly time-varying deformation processes. These studies may include, but are not limited to: models of decaying postseismic transients; measurements and models of slow earthquakes; geodetic models of magmatic and fluid movement; and surface fluctuations associated with groundwater pumping.

**Conveners:** Gerald W. Bawden, Earthquake Hazards Team, U.S. Geological Survey, 345 Middlefield Road - MS 977, Menlo Park, CA 94025-3591, Tel: 650.329.5729, Fax: 650-329-5163, E-mail: [gbawden@usgs.gov](mailto:gbawden@usgs.gov); and Elizabeth Harding Hearn, Department of Earth and Planetary Sciences, 54-614, Massachusetts Institute of Technology, Boston MA 02139, Tel: 617-253-3077, E-mail: [lizh@chandler.mit.edu](mailto:lizh@chandler.mit.edu)

### **T11 Viscoelastic Deformation of the Earth: Observations and Models**

The Earth's viscoelasticity governs a wide range of geophysical phenomena that are characterized by extremely different time scales and levels of stress. These phenomena include, for example, postseismic transients and glacial isostatic adjustment. In addition, the effects of anelasticity are evident in the attenuation and dispersion of seismic body waves and free oscillations, solid Earth body tides, luni-solar nutations and the Chandler wobble. This session is intended as a multi-disciplinary gathering of scientists interested in observations and modeling of the viscoelastic/anelastic response of the solid Earth associated with the above processes. We welcome papers that involve state-of-the-art field observations (e.g., SAR, GPS), 'classic' constraints (e.g., postglacial relative sea level histories, seismic data sets, etc.), laboratory results and advances in computational methods. The session will explore these efforts and linkages that exist between them.

**Conveners:** Jerry X. Mitrovica, Department of Physics, University of Toronto, Toronto, ON M5S 1A7, Canada, Tel: 416-978-4946, E-mail: [jxm@terra.physics.utoronto.ca](mailto:jxm@terra.physics.utoronto.ca); and Shijie Zhong, Department of Physics, University of

### **T12 Structure and Evolution of Earth's Deep Mantle**

Several recent developments highlight the deep mantle as a region of fundamental importance in understanding the Earth's structure, dynamics, and thermal and chemical evolution. The ultimate fate of downgoing slabs has been brought into question by seismic tomographic models of unprecedented clarity, showing that they penetrate to the CMB in some areas but not in others, and by mineral physics estimates of slab density contrast, suggesting that they may become neutrally buoyant. Mass balance arguments call the concept of a lower mantle as the "graveyard" of oceanic plates into question. Discoveries of ultra low seismic velocities and anisotropy in the very deepest mantle raise questions about the nature of this region, and about mantle-core interaction. Plumes and other upwellings rising from this region may be strongly influenced by such structures. Increasing evidences of chemical heterogeneity and layering in the deep mantle have led to new models and ways of reconciling geochemical and geophysical data. Indeed, the understanding of lower mantle chemistry is key to the the understanding of planetary compositions, early mantle and core differentiation and further chemical evolution. One of the most challenging issues in mantle convection is that of the mixing time in this part of the mantle. We welcome presentations that address these and related issues using any approach, including geophysical, seismological and geochemical.

**Conveners:** Paul J. Tackley, Department of Earth and Space Sciences and Institute of Geophysics and Planetary Physics, UCLA, Tel: 310-206-9180, Fax: 310- 825-2779,

E-mail: [ptackley@ucla.edu](mailto:ptackley@ucla.edu); Francis Albarede, Ecole Normale Supérieure de Lyon, 46 Allée d'Italie 69364 Lyon cedex 7, France, Tel: +33 472 72 84 14, Fax: +33 472 72 86 77, E-mail: [albarede@ens-lyon.fr](mailto:albarede@ens-lyon.fr); and Robert D. van der Hilst, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge MA 01239, Tel: 617- 253- 6977, Fax: 617-258-9697, E-mail: [hilst@mit.edu](mailto:hilst@mit.edu)

### **T13 Syn-convergent extension in the Apennines, Italy**

The Apennines of Italy represent an impressive modern example of syn-convergent horizontal extension. Recent work has helped to focus attention on several competing geodynamic models to account for this phenomenon, including structural underplating, slab rollback, and slab breakoff. We invite papers that provide new observations, thoughtful reviews, or geodynamic models of how this orogen works. We encourage a broad range of contributions, including structural and geomorphic data, thermochronometry, seismicity, geodetics, and lithosphere/asthenosphere structure and dynamics.

**Conveners:** Mark Brandon, Department of Geology and Geophysics, Yale University, New Haven, CT 06520-8109, Tel: 203-432-3135, Fax: 203-432-3134, E-mail: [mark.brandon@yale.edu](mailto:mark.brandon@yale.edu); Sean Willett, Department of Earth and Space Sciences, University of Washington, Seattle, WA, 98195, Tel: 206 543-8653, Fax: 206 543-0489, E-mail: [swillett@u.washington.edu](mailto:swillett@u.washington.edu); and Darrel Cowan, Department of Earth and Space Sciences, University of Washington, Seattle, WA, 98195, E-mail: [darrel@u.washington.edu](mailto:darrel@u.washington.edu)

### **T14 The Initiation and Early Evolution of Young Ocean Basins**

This session will bring together researchers examining active processes of ocean basin development in continental and back-arc settings. The topics will address: 1) The architecture and evolution of rifting immediately preceding seafloor spreading, including the role of low-angle vs. high-angle faults, accommodation zones, mantle unroofing, and core complexes, 2) The rheology of the lithosphere during extension, 3) The nature of the ocean-continent transition, 4) The development of juvenile spreading segments, including the transition from rift segmentation to spreading segmentation and the formation of transform faults. Geophysical, thermal, seismic, laboratory, and modeling studies will be presented.

**Conveners:** Andrew M. Goodliffe, Hawaii Institute of Geophysics, SOEST, University of Hawaii, 1680 East West Road, Honolulu, HI 96822, Tel: 808-956-5238, Fax: 808-956-3723, E-mail: [andrew@soest.hawaii.edu](mailto:andrew@soest.hawaii.edu); and Fernando Martinez, Hawaii Institute of Geophysics, SOEST, University of Hawaii, 1680 East West Road, Honolulu, HI 96822, Tel: 808-956-6882, Fax: 808-956-3188, E-mail: [martinez@soest.hawaii.edu](mailto:martinez@soest.hawaii.edu); Philippe Huchon, Observatoire océanologique de Villefranche, La Darse BP 48 - 06230 Villefranche-sur-Mer, France, Tel: (33) 4 93 76 37 54, Fax: (33) 4 93 76 37 66, E-mail: [philippe.huchon@obs-vlfr.fr](mailto:philippe.huchon@obs-vlfr.fr); and Garry D. Karner, Lamont Doherty Earth Observatory, P.O. Box 1000, 61 Route 9W, Palisades, NY 10964-1000 USA, Tel: 845-359-8355, E-mail: [garry@ldeo.columbia.edu](mailto:garry@ldeo.columbia.edu)

### **T15 Initiation of subduction: constraints from the field and from modeling**

Subduction is probably the most important driving force for plate motions, yet the conditions for, as well as the causes and consequences of subduction initiation are poorly understood. This session aims to bring together workers addressing the problem using a variety of methods including numerical modeling, experimental modeling, and field studies in modern and ancient orogens.

**Conveners:** John Encarnacion, Department of Earth and Atmospheric Sciences, Saint Louis University, 329 Macelwane Hall, 3507 Laclede Ave., St. Louis, MO 63130, Tel: 314-977-3119, Fax: 314-977-3117, E-Mail: [jpe@eas.slu.edu](mailto:jpe@eas.slu.edu); and Martha A. House, Division of Geological & Planetary Sciences, MS 100-23, California Institute of Technology, Pasadena, CA 91125, Tel: 626-395-6023, E-Mail: [mhouse@gps.caltech.edu](mailto:mhouse@gps.caltech.edu)

### **T16 Trench-To-Subarc: Diagenetic and Metamorphic Mass Flux in Subduction Zones (GERM/MARGINS Subduction Factory Session)**

Recent study has indicated that profound chemical alteration of subducting materials and related mass flux in fluids occur in forearc regions, beginning with diagenesis at extremely shallow levels, and continuing during prograde, high-P/T metamorphism and perhaps even partial melting of some lithologies in some subduction zones. In this session, we hope to comprehensively consider forearc diagenetic and metamorphic mass flux and its significance for the cycling of materials through convergent margins. We invite abstracts dealing with any and all aspects of this flux and the ways in which its global significance can be evaluated. Topics to be addressed include, but need not be limited to: fluid-flow and chemical alteration accompanying diagenesis during fluid expulsion in accretionary prisms; effects of prograde metamorphic devolatilization on the compositions of subducting materials and the production and mobility of metamorphic fluids; chemical processing in subducting slabs and sediments as recorded in serpentinite seamounts, mud volcanoes, and arc lavas (including across-arc suites); and the potential significance of forearc chemical alteration of subducting rocks for deep-mantle chemical heterogeneity. We encourage both abstracts presenting examples from individual modern or ancient convergent margins and abstracts presenting broader synthesis views. We hope to attract not only geochemical studies, but also studies attacking these problems from geophysical and theoretical approaches.

**Conveners:** Gray E. Bebout, Lehigh University, Department of Earth and Environmental Sciences, Bethlehem, PA 18015 USA, Tel: 610-758-5831, Fax: 610-758-3677, E-mail: [geb0@lehigh.edu](mailto:geb0@lehigh.edu); Jonathan B. Martin, University of Florida, Department of Geology, Gainesville, FL 32611 USA, Tel: 352-392-6219, Fax: 352-392-9294, E-mail: [jmartin@geology.ufl.edu](mailto:jmartin@geology.ufl.edu); and Tim Elliott, University of Bristol, Department of Earth Sciences, Wills Memorial Building, Queen's Road Bristol BS8 1RJ, UK, Tel: +44-117-9545426, Fax: +44-117-9545236, E-mail: [Tim.Elliott@bristol.ac.uk](mailto:Tim.Elliott@bristol.ac.uk)

### **T17 Quantitative Analysis of the Stratigraphic Record: New Approaches in Cyclostratigraphy and the Dating of Sedimentary Sequence**

Improvement in the quantification of time-rock relationships in sedimentary sequences continues to be an important objective in the geological sciences. This includes direct methods, such as radiometric dating of intercalated volcanoclastics or sedimentary precipitates, as well as indirect methods, such as biostratigraphy or the analysis of preserved climatic cyclicity forced by periodic astronomical forcing factors. As the dating of sedimentary sequences improves in resolution, the nature of sedimentary processes in different depositional environments can be more rigorously examined. The purpose of this symposium is to provide a forum for discussion of recent advances in the quantification of time in sedimentary sequences, and to highlight the application of improved time scales to our understanding of geologic processes, such as bulk sediment accumulation rates, rates of precipitation of biogenic and authigenic components, evolutionary rates of marine taxa, etc. Improved knowledge of sediment accumulation processes in environments ranging from epeiric seas to continental margins and ocean basins will have significant implications for both tectonic and oceanographic studies of these systems.

**Conveners:** Bradley Sageman, Department of Geological Sciences, Northwestern University, 1847 Sheridan Rd. - Locy Hall, Evanston, IL 60208, Tel: 847-467-2257, Fax: 847-491-8060, E-mail: [brad@earth.northwestern.edu](mailto:brad@earth.northwestern.edu); and Timothy Herbert, Department of Geological Sciences, Brown University, 324 Brook St., GC131, Providence, RI 02912, Tel: 401-863-1207, Fax: 401-863-2058, E-mail: [timothy\\_herbert@brown.edu](mailto:timothy_herbert@brown.edu)

### **T18 Active Tectonics of Taiwan**

The session will bring together Earth Scientists that are interested in the active tectonics of Taiwan. It will provide a forum for new seismologic geologic and geodetic observations and models that describe the actively deforming plate margin. This session will highlight current earthquake research on the active tectonics of Taiwan that address future earthquake hazards in the region.

**Conveners:** Charles M. Rubin, Central Washington University, Department of Geological Sciences, Ellensburg, Washington 98926, Tel: 509.963-2827, Fax: 509.963-1109, Yue-Gau Chen, Dept of Geosciences, National Taiwan Univ., 245 Choushan Rd., Taipei, Taiwan, ROC Tel: +886-2-2369-7648, Fax: +886-2-2363-6095, E-mail: [ygchen@ccms.ntu.edu.tw](mailto:ygchen@ccms.ntu.edu.tw); and John Suppe, Dept of Geosciences, Guyot Hall, Princeton University, Princeton NJ 08544-1003, Tel: (609) 258-4119, Fax: (609) 258-1274, E-mail: [suppe@princeton.edu](mailto:suppe@princeton.edu)

### **T19 Hotspot-Ridge Interactions**

This special session will bring together papers on latest observational evidence and theoretical models of physical and chemical interactions between hotspot mantle plumes and mid-ocean ridges. Papers describing geological, geophysical, petrological, geochemical, and hydrothermal anomalies of hotspot-ridge systems are solicited. Papers reporting theoretical and laboratory experimental models of hotspot-ridge interactions are especially sought. The objective of this special session is to promote discussion and comparison of observational constraints and theoretical models pertinent to the fundamentals of mantle and lithosphere dynamics as reflected in interacting hotspot and mid-ocean ridge systems.

**Conveners:** Jian Lin, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, Tel. 508-289-2576, Fax: 508-457-2187, E-mail: [jlin@whoi.edu](mailto:jlin@whoi.edu); Jerome Dymant, Institut Universitaire Européen de la Mer, Université de Bretagne Occidentale, 1 Place Nicolas Copernic, Technopole Brest-Iroise 29280 Plouzané Cedex, France, Tel: 33 2 98 49 87 20, Fax: 33 2 98 49 87 60, E-mail: [jerome@univ-brest.fr](mailto:jerome@univ-brest.fr)

### **T20 PLATE TECTONICS AND SELF-ORGANIZATION** (Joint with U)

The symposium will emphasize some of the broader questions of plate-mantle dynamics such as:

- \* Why do we have plate tectonics at all?
- \* Why are there 12 +- plates presently?
- \* Why are plates organized the way they are?
- \* What is the underlying physics leading to the tectonic style of self organization?
- \* Do plates control mantle convection and mantle cooling?
- \* What defines a plate?
- \* What makes plate boundaries?
- \* WHAT IS THE ROLE OF THE SMALL BACK-ARC-BASIN DOMINATED PLATES?
- \* What about plate tectonics in the Archean?
- \* What of the style of tectonics on other planets, and why is Earth (as far as we know) unique?
- \* In far-from-equilibrium systems the source of the dissipation is as important as the driving forces. What and where is the dissipation in the plate tectonic system? Is the Minimum Dissipation Principle useful?

There have been many AGU sessions on mantle convection, mantle-lithosphere interactions, attempts to marry plates and convection, and on complexity and self-organized criticality. However, we are still far from answering many of the first order questions of global dynamics. Thus, the goal is to organize a session that both reviews progress in our understanding of why we have plate tectonics, and but also tries to look at the problem in different ways than those enumerated above. For example, froths and bubble-rafts may be a useful analog, as they are in studies of recrystallization, dislocations, localization and various far-from-equilibrium systems. This session will focus on the top of the mantle and the role of the plates and the lithosphere in mantle dynamics and volcanism and evolution of the Earth. The idea that open systems far from equilibrium can organize themselves has been fruitful in many areas of science. Thermal convection itself is often considered the paradigm of self-organization. When interacting tectonic plates develop atop the convecting mantle, they may be organized by convection, or they may dominate the system, thereby organizing convection and controlling the Earth's cooling rate. One attribute of the thermodynamic approach is the ability to provide a unified description of wide classes of systems that is largely independent of the details of the on-going process. Dissipation - a ubiquitous feature of nonequilibrium thermodynamics - is central to self-organization in these systems, but where and how the energy is released is unique to each system. Mantle

convection, manifest as subduction of cold slabs, is the likely driving mechanism for plate motion; in that sense, it is often said that the plates ARE mantle convection. However, apart from slab geometry and location, it is still unknown how much convective self-organization and dissipation imprint themselves on the organization of the plates. Exploring the various issues of far-from-equilibrium self-organization, as they apply to Earth science problems and the development of plate tectonics, is the motivation for the session. Subthemes are mantle dynamics as a top-down system, the origins of plate boundaries, pattern formation and self-organization in the Earth sciences, and plate and mantle control of other geospheres (biosphere, atmospheric evolution).

#### **T21 Virtual Earth Laboratories (Joint with U)**

Our planet presents us with phenomena of great complexity. Tectonic deformation of the crust, convection in the underlying mantle, dynamo activity of the core, seismic wave propagation, or thermodynamic reactions in solid and magmatic systems are some examples. Traditionally we study these processes in the field or laboratory. However, unprecedented growth in computing resources now presents us with a chance to study many of these complicated processes through careful simulations on a computer. Not surprisingly, computational geophysics has emerged alongside field and laboratory studies as a powerful new tool for Earth Scientists. The impact of this extraordinary development is already being felt. First principle calculations of Earth materials now reinforce high-pressure experiments. Geodynamo simulations add insight into interpreting paleomagnetic observations. Seismologists study wave propagation numerically, while geodynamicists model the evolution of our planet on a global scale. Computational geophysicists share many technical challenges, e.g., efficient algorithms and parallel computing methods, the application of novel Beowulf clusters, or the use of data-assimilation techniques in geophysical simulations. However, they also share a remarkable opportunity to integrate tectonic, seismic mineralogic hypotheses into virtual Earth Laboratories, and testing them against laboratory and field data. In this session, we invite contributions from computational mineralogy, tectonics, mantle and core dynamics, and seismology. We also strongly encourage contributions from observational seismology, geology, mantle geochemistry and high-pressure mineral physics aimed at constraining Earth structure and processes.

**Conveners:** Hans-Peter Bunge, Princeton University, Department of Geosciences, Princeton, NJ 08540 USA, Tel: +1-609-258-4128, Fax: +1-609-258-1274, E-mail: [bunge@princeton.edu](mailto:bunge@princeton.edu); Lars Stixrude, University of Michigan, Department of Geological Sciences, Ann Arbor, MI 48109-1063, USA, Tel: +1-734-647-9071, Fax: +1-734-763-4690, E-mail: [stixrude@umich.edu](mailto:stixrude@umich.edu); Jeroen Tromp, Seismological Laboratory, MC 252-21, California Institute of Technology, Pasadena, CA 91125 USA, Tel: +1-626-395-8117, Fax: +1-626-564-0715, E-mail: [jtromp@gps.caltech.edu](mailto:jtromp@gps.caltech.edu); Rainer Hollerbach, Department of Mathematics, University of Glasgow, Glasgow, G12 8QW UK, Tel: +44-141-330-4745, Fax: +44-141-330-4111

#### **T22 From D<sup>o</sup> to DNA: Causes, Processes, and Effects of Giant Mantle Upwelling (Joint with U)**

Giant mantle upwellings represent a mode of mantle dynamics not clearly related to plate tectonic processes, and result in the emplacement of Large Igneous Provinces (LIPs) - continental flood basalts, volcanic passive margins, and oceanic plateaus - as well as in the uplift of continental and oceanic lithosphere. Such episodic mantle upwellings contrast strongly with the relatively steady-state production of seafloor at the global mid-ocean ridge system, and have been implicated as causal agents of global environmental change. In this session, we seek contributions from seismologists, tomographers, and geodynamicists on the evidence for mantle upwellings, their source region(s), and ultimately their causes and inter-relationships with seafloor spreading and subduction; from geochemists on mantle heterogeneity and sources for components in the mantle upwellings; from geochronologists on the timing and duration of LIPs; from field geoscientists on the formation and development of typical LIPs; from physical volcanologists on the unique characteristics and gas/particulate output of flood volcanism; and from paleoceanographers, climate modelers, and paleontologists on the environmental and biospheric impact of episodic, massive magmatism on the Earth's surface

**Conveners:** Millard F. Coffin, Ocean Research Institute, The University of Tokyo, 1-15-1 Minamidai, Nakano-ku, Tokyo 164-8639, Japan, Tel: +81-(0)3-5351-6430, Fax: +81-(0)3-3377-3293, E-mail: [mcoffin@ori.u-tokyo.ac.jp](mailto:mcoffin@ori.u-tokyo.ac.jp); Andrew D. Saunders, Department of Geology, The University of Leicester, University Road, Leicester LE1 7RH, UK, Tel: +44-(0)116-252-3923, Fax: +44-(0)116-252-3918, E-mail: [ads@le.ac.uk](mailto:ads@le.ac.uk)

#### **T23 Early applications of digital topographic data from the Shuttle Radar Topography Mission (Joint with U)**

Data from the Shuttle Radar Topography Mission, which flew last year, will start becoming available to the SRTM Science Team in June, 2001. By early 2002, the global data set will begin to be released to the public. The 30 m digital elevation model of the entire land mass of the earth between 60 deg N and S latitude will be completed by the end of 2002, forming an unprecedented data set for geoscientists and educators. A variety of investigations will be carried out by the Science Team in the next few months using the data. The investigations will include studies of uplift and erosion of mountain ranges in Asia and South America, evolution of volcanoes in tropical regions, hydrology of the Amazon Basin, topographic characterization of large flood plains, volume changes of ice in Patagonia, earthquake hazards in Burma, urban infrastructure mapping, interactions of climate and tectonics, and comparisons of lidar and radar techniques for geodesy in plate boundary regions.

**Conveners:** Tom G Farr, Jet Propulsion Laboratory, Pasadena, CA 91109, Tel: 818-354-9057, Fax: 818-354-9476, E-mail: [tom.farr@jpl.nasa.gov](mailto:tom.farr@jpl.nasa.gov); Paul Rosen, Jet Propulsion Laboratory, Pasadena, CA 91109, Tel: 818-354-0023, Fax: 818-393-5285, E-mail: [Paul.A.Rosen@jpl.nasa.gov](mailto:Paul.A.Rosen@jpl.nasa.gov)

#### **T24 Database efforts within Marine Geology & Geophysics: New tools for enhanced data access** (Joint with U)

The past decade has seen tremendous growth in data acquisition capability within the Marine Geology & Geophysics (MG&G) community, with a wide range of data types collected at increasingly higher resolutions. In addition to traditional ship-based data acquisition, programs in the near future (e.g., observatories) will be collecting and sending data to shore in real time. With these advances in data acquisition come new problems in data cataloging, access, and synthesis. Scientists across disciplines need the ability to compare different data types, and the tools to manipulate, interpret and visualize these data. At the same time it is also recognized that we need to broaden the use of the data to include the educational community and the general public. The goal of this session is to provide an overview of existing efforts in the MG&G community to define and address these issues. We encourage posters from scientists (users), data providers, engineers, and computer scientists involved in projects for cataloging metadata, improving access to existing data sets, improving coordination among different data sets, improving tools for data analysis and interpretation, and improving usage of the data by the research community and the general public.

**Conveners:** Suzanne Carbotte, Lamont-Doherty Earth Observatory, Palisades, NY 10964, Tel: (845) 365-8895, Fax: (845) 365-8168, E-mail: [carbotte@ldeo.columbia.edu](mailto:carbotte@ldeo.columbia.edu); Deborah K. Smith, Department of Geology and Geophysics, MS #22, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 USA, Tel: (508) 289-2472, Fax: (508) 457-2187, E-mail: [dsmith@whoi.edu](mailto:dsmith@whoi.edu); Mary Reagan, Borehole Research Group, Lamont-Doherty Earth Observatory, Palisades, NY 10964 USA, Tel: (845) 365-8672, Fax: (845) 365-3182, E-mail: [mreagan@ldeo.columbia.edu](mailto:mreagan@ldeo.columbia.edu)

#### **T25 Stick-slip dynamics in geological and geophysical systems**

Stick-slip behaviour refers to the oscillation between quasi-steady slow and fast sliding modes observed in some geological and geophysical systems. 'Stick' phases occur where strain does not overcome frictional resistance to sliding; 'slip' phases occur where the friction force is exceeded. Stick and slip phases oscillate aperiodically and follow a power-law relationship. The phenomenon of stick-slip therefore demonstrates the interplay between a range of static and dynamic components (stress, strain and friction) of physical systems. Stick-slip behaviour also acts to maintain systems in a dynamic equilibrium over certain length scales. Understanding the processes of and controls on stick-slip events on different scales is fundamental to problems in a range of physical science disciplines that include tribology, engineering, structural geology, seismology and non-linear geophysics. Understanding stick-slip dynamics is also important for theoretical and applied geological and geophysical problems as diverse as friction dynamics, fluid flow, stress-strain relations, fault rupture dynamics, earthquake recurrence and predictability and ice and glacier motion. This session aims to examine theoretical and applied aspects of stick-slip processes from a range of geological and geophysical systems, and to promote interdisciplinarity within the physical sciences. The session will be of interest to a range of geologists and geophysicists including those in the fields of numerical modelling, macro- and micro-scale experiments on rheology, stress/strain and friction, field observations of seismogenesis, and fault mechanics. A key outcome is a better understanding of stick-slip mechanics in a range of experiments. ORIGINAL Understanding the processes of and controls on stick-slip events on different scales is fundamental to problems in a range of physical science disciplines that include tribology, engineering, structural geology and geophysics. Understanding stick-slip dynamics is also important for theoretical and applied problems as diverse as friction dynamics, fluid flow, stress-strain relations, earthquake hazard and glacier motion. This session aims to examine theoretical and applied aspects of stick-slip processes from a range of geological and geophysical systems, and to promote interdisciplinarity

within the physical sciences. A key outcome is a better understanding of stick-slip mechanics in a range of experimental and environmental settings.

**Convener:** Jasper Knight, Glacial Research Group, School of Environmental Studies, University of Ulster, Coleraine Co Londonderry, Northern Ireland BT52 1SA, UK; Tel: +44 (0)28 7032 3179, Fax: +44 (0)28 7032 4911, E-mail: [j.knight@ulst.ac.uk](mailto:j.knight@ulst.ac.uk)

#### **T26 Session Commemorating the Fortieth Anniversary of the Synthesis and Discovery of Stishovite ( Joint with MRP)**

We propose a special session at the Fall AGU Meeting to commemorate the fortieth anniversary of the synthesis and discovery of stishovite. In 1961 Stishov and Popova<sup>1</sup> reported the synthesis of "A new modification of silica," and in 1962 Chao, Fahey, and Littler<sup>2</sup> discovered the same phase in nature and published a paper, Stishovite, SiO<sub>2</sub>, a very high pressure new mineral from meteor crater, Arizona." These developments foreshadowed a wide range of activities in the subsequent forty years that have transformed the discipline of high-pressure mineralogy/mineral physics into an essential component of earth science research. Contributions to this session should demonstrate connections to the original stishovite work through the evolution of theoretical, experimental, and field studies of silica, silicates, other mineral phases, and also of analog materials that provide understanding of the physical and chemical foundations of mineralogy. We anticipate that S. M. Stishov and other pioneers in this field will be present for the special session.

**Conveners:** Charles T. Prewitt and Russell J. Hemley

#### **T27 General Earthquake Models: Current Status and Results (Joint with NG)**

General earthquake models (GEM) represent an emerging new field of geophysical research focused on modeling and interpreting the behavior of earthquake fault systems. Rapid advances are being made today as a direct result of recent developments in modern computational hardware and software, the evolving information technology and digital communications infrastructure, and the rapidly growing quantity and quality of solid earth geophysical data sets, from GPS and broadband seismic networks, to interferometric SAR. For this session, papers are solicited that examine the interaction of these computer models, in their various current incarnations, with the available data, and what particular problems are currently being worked on with these models and simulations. We anticipate papers that focus on what the current GEM-type models have already told us, what questions are being studied at the present time, and what is both necessary and possible for the future application of these models to geophysical data sets. One such example might be the application of these models to stress transfer or remote triggering, although there are, of course, many other possibilities.

**Conveners:** Kristy Tiampo, CIRES, 216 UCB, University of Colorado Boulder, CO 80304-0216, Tel: (303)492-4779, Fax: (303)492-5070, E-mail: [kristy@caldera.colorado.edu](mailto:kristy@caldera.colorado.edu); Terry Tullis, Dept Geological Science, Brown University Providence, RI 02912-1846, Tel: (401)863-3829, Fax: (401)863-2058, E-mail: [terry\\_tullis@brown.edu](mailto:terry_tullis@brown.edu); Andrea Donnellan, JPL, MS 126-347, 4800 Oak Grove Dr., Pasadena, CA 91109-8099, Tel: (818)354-4737, Fax: (818)393-5471, E-mail: [donnellan@jpl.nasa.gov](mailto:donnellan@jpl.nasa.gov)

#### **T28 Bumps, lumps and clumps in the mantle's midsection (Joint with S)**

The boundary region between the transition zone and lower mantle has been a source of lively and ongoing discussion. Early debates over the nature of the 660 km seismic discontinuity have evolved to include local heterogeneities, fine structure below 660 km, and mid-mantle seismic reflectors. Downgoing slabs and upwelling plumes must pass through the perovskite phase boundary, which spans a wide depth range depending on the mineralogy. Water and minor elements may play an important role, and recent reports of natural samples provide significant geochemical constraints. This session will provide an interdisciplinary forum for the presentation of recent results on all aspects of the transition zone and its boundary with the lower mantle.

**Conveners:** Catherine McCammon, Bayerisches Geoinstitut, Universität Bayreuth, D-95440 Bayreuth, Germany, Tel: +49-921-553709, Fax: +49-921-553769, E-mail: [catherine.mccammon@uni-bayreuth.de](mailto:catherine.mccammon@uni-bayreuth.de); Craig Bina, Northwestern University, Department of Geological Sciences, 1847 Sheridan Rd, Evanston, IL 60208-2150, Tel: +1-847-491-5097, Fax: +1-847-491-8060, E-mail: [craig@earth.northwestern.edu](mailto:craig@earth.northwestern.edu); and George Helffrich, Wills Memorial Bldg, University of Bristol, Queens Rd, Bristol BS8 1RJ, UK, Tel: +44-117-9288280, Fax: +44-117-9253385, E-mail: [george@gly.bris.ac.uk](mailto:george@gly.bris.ac.uk)

### **T29 Submarine and Subaerial Mass-Movement Processes**

Gravity and water strongly dominate the mass-wasting processes sculpting both submarine and subaerial slopes. These processes range from catastrophic debris avalanches with immediate hazards to slow creep influencing long-term sediment flux. Many similarities exist in the processes driving mass movement on land and under sea, however triggering events can differ greatly. The consequences of slope movement can be far reaching; massive debris flows can inundate river valleys and landslide-induced tsunamis can devastate coastlines. Recent advances in imaging systems, monitoring technology, computational capabilities, and theoretical understanding have enabled new insight into mechanisms controlling slope behavior and landslide hazards. We solicit contributions that advance our understanding of submarine and subaerial mass-movement processes through detailed field investigations, marine surveys, laboratory experiments, or dynamic modeling. Please send one copy of your abstract to AGU and E-mail one copy directly to all of the conveners.

**Conveners:** Mark E. Reid, U. S. Geological Survey, 345 Middlefield Road MS 910, Menlo Park, CA 94025 USA, Tel (650) 329-4891, Fax (650) 329-4936, E-mail: [mreid@usgs.gov](mailto:mreid@usgs.gov); Philip Watts, Applied Fluids Engineering, Inc., Private Mail Box #237, 5710 E. 7th St. Long Beach, CA 90803 USA, Tel/Fax (562) 498-9407, E-mail: [phil.watts@appliedfluids.com](mailto:phil.watts@appliedfluids.com); and Homa J. Lee, U. S. Geological Survey, 345 Middlefield Road MS 999 Menlo Park, CA 94025 USA, Tel (650) 329-5485, Fax (650) 329-5190, E-mail: [hjlee@usgs.gov](mailto:hjlee@usgs.gov)

### **T30 Pushing the envelope: A tribute to the career and accomplishments of John M. Edmond** (Joint with OS) NOTE COULD NOT READ SESSION PROPOSAL TEXT

**Conveners:** James K.B. Bishop, Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720 USA, Tel: 510-495-2457, Fax: 510-486-5686, E-mail: [jkbishop@lbl.gov](mailto:jkbishop@lbl.gov); and Robert W. Collier, COAS - Oregon State University, Ocean Admin Bldg. 104, Corvallis, OR 97331-5503 USA, Tel: 541-737-4367, Fax: 541-737-2064, E-mail: [rcollier@oce.orst.edu](mailto:rcollier@oce.orst.edu)

### **T31 Environmental Colloids** (Joint with U)

There is increasing evidence that environmental colloids (i.e., organic macromolecules and inorganic microparticles) affect the transport of natural metals and anthropogenic contaminants in hydrologic environments. Colloid generation, stability, and mobility are affected by biological, environmental, geochemical, geophysical, and hydrological processes. Aquatic colloids can facilitate both the removal from, and release into, natural water bodies (eg. estuaries, lakes, groundwater, surface water, and marine environments) of many trace contaminants, metals, radionuclides, and hydrophobic trace organics depending on the environmental conditions (e.g., solids to water ratio) (Honeyman and Santschi, 1989). Recent findings at high solids to water ratios (i.e., groundwater) emphasize the importance of colloids in facilitating transport of elements otherwise not readily mobilized. Colloids have been observed to form in variable redox environments and salt/fresh water interfaces; mobilize plutonium in the subsurface (Kersting et al., 1999, Honeyman, 1999) and other radionuclides (Bauer et. A., 2001); promote mobility of metals in stream water (Kimball, 2000), estuarine and marine environments (Guo et. al., 1997; 2000); and potentially clog fractured rock (Kessler and Hunt, 1999). Colloidal particles may be dislodged by seismic activity, altering hydrologic aquifer permeability and water quality of aquifers and streams (Tokunaga, (1999)). Humic acid colloids that sorb toxic metals may be continuously generated and persist for long periods in shallow groundwaters (Buckau and Kim, 2000). Colloidal gold deposition of biogenic origin was also recently proposed (Southam, 2000) as well as clay accumulation in submarine hydrothermal vents. Colloids, using micellar technology, are used to enhance oil recovery, minimize liquid contaminants in natural gas liquids, and in contaminant remediation with in-situ barriers. New insights into processes that control transport depend on rigorously tested methods, as well as the adaptations of innovations in other disciplines. This session will contain papers describing interdisciplinary scientific studies on colloidal transport in various environmental settings to compare recent advances in techniques, analytical models and findings.

**Conveners:** William L. Dam, Division of Waste Management, U.S. Nuclear Regulatory Commission, Mail Stop T7F3 Washington, DC 20555, Tel: (301) 415-6710, Fax: (301) 415-5399, E-mail: [wld@nrc.gov](mailto:wld@nrc.gov); Bruce D. Honeyman, Environmental Science and Engineering Division, Colorado School of Mines, Golden, CO 80401, Tel: (303) 273-3420, Fax: (303) 273-3413, E-mail: [honeyman@mines.edu](mailto:honeyman@mines.edu); James R. Hunt, 535 Davis Hall, University of California, Berkeley, CA 94720-1710, Tel: (510) 642-0948, Fax: (510) 642-7483, E-mail: [hunt@ce.berkeley.edu](mailto:hunt@ce.berkeley.edu); David Pickett, Center for Nuclear Waste Regulatory Analyses, Southwest Research Institute, 6220 Culebra Road, San Antonio TX 78238-5166, Tel: (210) 522-5582, Fax: (210) 522-5155, E-mail: [dpickett@swri.org](mailto:dpickett@swri.org); Peter Santschi, Laboratory for Oceanographic and

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### **T32 Role of Mass and Heat Transfer in Rock Fracturing**

There is an increasing awareness in the coupling of the transfer of mass and heat and rock fracturing in geological environments. Mass and heat transfer may affect the petrophysical and rheological properties of rocks as well as the driving stress responsible for the nucleation, propagation, and linkage of opening- and shearing-mode fractures. Mass and heat transfer may enhance or impede brittle failure and may result in secondary changes in fracture aperture with a potential feedback on the transfer processes. Contributions are invited in all disciplines that consider fracture and the transfer of mass and heat as coupled processes. We specifically encourage submissions that take a multidisciplinary approach, combining different methods such as field based studies, laboratory experiments, and numerical modeling.

**Conveners:** Peter Eichhubl, Stanford Rock Fracture Project, Dept. of Geological and Environmental Sciences, Stanford University, Stanford, CA 94305-2115, Tel: 650 723 4296, Fax: 650 725 0979, E-mail: [eichhubl@pangea.stanford.edu](mailto:eichhubl@pangea.stanford.edu); Atilla Aydin, Stanford Rock Fracture Project, Dept. of Geological and Environmental Sciences, Stanford University, Stanford, CA 94305-2115, Tel: 650 725 8708, Fax: 650 725 0979, E-mail: [aydin@pangea.stanford.edu](mailto:aydin@pangea.stanford.edu)

### **T33 Vertical Coupling and Decoupling at Convergent Margins**

The aim of this special session is to examine processes of lateral deformation partitioning and vertical coupling/decoupling at convergent margins. In particular, we invite contributions that discuss the relation between upper crustal deformation and deformation lower in the lithosphere (lower crust, upper mantle). For example, the relation between large vertical-axis rotations of upper crustal blocks and bulk displacement / deformation partitioning is poorly understood. Whether upper-crustal block rotations at convergent margins imply mid-crustal, low-angle detachments is open to debate, as is whether the rotating blocks react to side- or basal-driven boundary conditions. Contributions will be invited on deformation style in these detachment / attachment zones and how the crust achieves compatibility between the upper partitioned crust and mid-crustal subhorizontal shear zones. The symposium aims to bring together an international group of Earth Scientists working in continental and oceanic – both modern and ancient - convergent margin settings.

**Conveners:** John Grocott, School of Earth Sciences and Geography, Kingston University, Surrey KT1 2EE UK, Tel: (0)20 8547 7530, Fax: (0)20 8547 7497, E-mail: [GL\\_S047@kingston.ac.uk](mailto:GL_S047@kingston.ac.uk); Ken McCaffrey, Department of Geological Sciences, University of Durham, Durham, DH1 3LE UK, Tel: 0191 374 2523, Fax: 0191 374 2510, E-mail: [k.j.w.mccaffrey@durham.ac.uk](mailto:k.j.w.mccaffrey@durham.ac.uk); and Basil Tikoff, Geology and Geophysics, University of Wisconsin - Madison, Madison WI 53706 USA, Tel: (608) 262-4678, Fax: (608) 262-0693, E-mail: [basil@geology.wisc.edu](mailto:basil@geology.wisc.edu)

## **VOLCANOLOGY, GEOCHEMISTRY AND PETROLOGY**

### **V01 Nanoparticles In The Environment**

Nanoparticles (particles with nanometer-scale dimensions) are almost ubiquitous constituents of materials that comprise the Earth's surface and near-surface regions. They are common in atmospheric dust, they are present as suspended solids in water, and they are abundant in weathered rocks, soils, sediments, and volcanic ash. Nanoparticles are the predominant product of biomineralization reactions and are common in living organisms. The majority of the reactive surface area in the environment may be associated with nanoparticles. Through reactions such as adsorption, precipitation, dissolution, and catalysis on their surfaces, nanoparticles can control the form, distribution, and mobility of both contaminants and nutrients. Nanometer-scale particles are also important technologically, for example as catalysts, quantum dot electronic devices, ion exchangers, battery materials, and starting materials for chemical syntheses. This special session, complementing the Mineralogical Society of America short course on the same topic to be held right before the Fall AGU, will bring together research contributions in this broad area.

**Conveners:** Jillian F. Banfield, Univ of Wisconsin - Madison, Dept Geology & Geophysics, 1215 W Dayton St, Madison, WI 53706-1692, E-mail, [jill@geology.wisc.edu](mailto:jill@geology.wisc.edu); Alexandra Navrotsky, Univ of California-Davis, Dept Chem Engin & Mtrls Sci, 1 Shields Dr, Davis, CA 95616-8779, E-mail: [anavrotsky@ucdavis.edu](mailto:anavrotsky@ucdavis.edu)

### **V02 Geochemical and isotopic tracers of Earth processes**

This session honors Gilbert N. Hanson on the occasion of his 65<sup>th</sup> birthday. His research has cut across conventional disciplines and spanned a wide array of Earth processes including mineral cooling and diffusion studies, trace element and isotope modeling in igneous systems, Precambrian geology and tectonics, direct dating of metamorphic index minerals, water-rock modeling of regional diagenesis and dolomitization, pioneering studies in application of boron isotopes to surficial processes, provenance and process studies in terrigenous clastic sediments, direct dating of

sedimentary deposition and diagenesis, and Long Island glacial geology and hydrology. The proposed session would emphasize current research using geochemical and isotopic tracers to understand processes operating throughout the Earth.

### **V03 Conduit processes during explosive basaltic eruptions**

Description: This special session will present results from experiments aimed at understanding conduit processes during explosive basaltic eruptions from Strombolian to Hawaiian-fountaining. New insights into these processes have been gained through coincident, multidisciplinary studies using techniques such as infrasound, seismic, thermal monitoring, OP-FTIR, and Doppler radar. These studies have led to an improved understanding of source mechanisms, conduit advection, degassing, crystallization, fragmentation level, eruption dynamics, and pyroclast dispersal. We encourage submissions relating multidisciplinary observations and physical modeling of dynamic processes of conduit physics.

**Convenors:** Maurizio Ripepe, Dipartimento di Scienze della Terra, Università di Firenze, via LaPira, 4, 50121 - Firenze, Italy, Fax: +39 55 218628, Tel: +39 55 2757479, E-mail: [maurizio@ibogfs.cineca.it](mailto:maurizio@ibogfs.cineca.it); Andy Harris, HIGP/SOEST, University of Hawaii, 2525 Correa Road, Honolulu, HI 96822 USA, Fax: +1-808-956-6322, Tel: +1-808-956-3157, E-mail: [harris@higp.hawaii.edu](mailto:harris@higp.hawaii.edu); Matthias Hort, GEOMAR, University of Kiel, Wischhofstr. 1-3, D-24148 Kiel, Germany, Fax: +49 431 600 2698, Tel: +49 431 600 2645. E-mail: [mhort@geomar.de](mailto:mhort@geomar.de)

### **V04 Trench-To-Subarc: Diagenetic and Metamorphic Mass Flux in Subduction Zones (GERM/MARGINS Subduction Factory Session)**

Recent study has indicated that profound chemical alteration of subducting materials and related mass flux in fluids occur in forearc regions, beginning with diagenesis at extremely shallow levels, and continuing during prograde, high-P/T metamorphism and perhaps even partial melting of some lithologies in some subduction zones. In this session, we hope to comprehensively consider forearc diagenetic and metamorphic mass flux and its significance for the cycling of materials through convergent margins. We invite abstracts dealing with any and all aspects of this flux and the ways in which its global significance can be evaluated. Topics to be addressed include, but need not be limited to: fluid-flow and chemical alteration accompanying diagenesis during fluid expulsion in accretionary prisms; effects of prograde metamorphic devolatilization on the compositions of subducting materials and the production and mobility of metamorphic fluids; chemical processing in subducting slabs and sediments as recorded in serpentinite seamounts, mud volcanoes, and arc lavas (including across-arc suites); and the potential significance of forearc chemical alteration of subducting rocks for deep-mantle chemical heterogeneity. We encourage both abstracts presenting examples from individual modern or ancient convergent margins and abstracts presenting broader synthesis views. We hope to attract not only geochemical studies, but also studies attacking these problems from geophysical and theoretical approaches.

**Convenors:** Gray E. Bebout, Lehigh University, Department of Earth and Environmental Sciences, Bethlehem, PA 18015 USA, Tel: +1-610-758-5831, Fax: +1-610-758-3677, E-mail: [geb0@lehigh.edu](mailto:geb0@lehigh.edu); Jonathan B. Martin, University of Florida, Department of Geology, Gainesville, FL 32611 USA, Tel: +1-352-392-6219, Fax: +1-352-392-9294, E-mail: [jmartin@geology.ufl.edu](mailto:jmartin@geology.ufl.edu); Tim Elliott, University of Bristol, Department of Earth Sciences, Wills Memorial Building, Queen's Road, Bristol BS8 1RJ, UK, Tel, Building, Queen's Road, Bristol BS8 1RJ, UK, Tel, +44-117-9545426, Fax: +44-117-9545236, E-mail: [Tim.Elliott@bristol.ac.uk](mailto:Tim.Elliott@bristol.ac.uk)

### **V05 Rheology and Structure of Earth Materials**

The rheological properties of materials are important in many aspects of Earth science. The viscosity of silicate melts, with and without bubbles and crystals, is of fundamental importance to understanding the dynamics of magmatism. The mechanical properties of single crystals as well as polycrystalline silicate and oxide aggregates with and without melt films, are important in understanding the behaviour of the mantle during convection. The different rheologies of these materials determined as a function of strain-rate and composition at high temperature and/or high pressure and the proposed deformation mechanisms are related to the structure of the material.

This session is designed to bring together the different ideas and techniques and results on the relationship between rheology and structure of Earth materials including flow of silicate melts near the surface of the planet, deformation of materials undergoing a phase transition and deformation of mantle and core materials and analogs.

**Convener:** Sharon Webb, Exp. & Ang. Mineralogie, Goldschmidtstr. 1, Georg-August-Universität, 37077 Göttingen, Germany, Tel. 0551-393861, Fax. 0551-393863, E-mail: [swebb@gwdg.de](mailto:swebb@gwdg.de)

### **V06 SUBDUCTION FACTORY SCIENCE**

The Subduction Factory is Earth's largest but most deeply hidden processing and recycling plant, where subducted oceanic lithosphere and sediments are squeezed, heated, and distilled to extract fluids and melts and where embryonic continental crust is formed. Understanding the workings of the Subduction Factory requires a wide range of multi- and interdisciplinary investigations, including marine- and land-based expeditions and drilling, volcanology, seismology,

experimental petrology, geochemistry, and geodynamical modelling. The purpose of this special session is to provide a venue for communicating both the results of recent efforts in this arena and new perspectives on the problem and how it should be studied. Examples of timely contributions include seismic imaging of the slab and mantle wedge, experimental determination of fluid/solid partition coefficients, the effects of volatiles on elemental transport and mantle melting, the dynamics of solid and fluid flow in the mantle wedge, and P-T-t structure of subducting slabs.

**Conveners:** Robert J. Stern, U. Texas at Dallas, Tel: 972-883-2442, E-mail: [rjstern@utdallas.edu](mailto:rjstern@utdallas.edu); Patricia Fryer, U. Hawaii, E-mail: [patty@leka.soest.hawaii.edu](mailto:patty@leka.soest.hawaii.edu); Terry Plank, Boston University, E-mail: [tplank@bu.edu](mailto:tplank@bu.edu)

#### **V07 Volcanic Observations from Space: New Results from the EOS Satellite Instruments**

In 1991, NASA launched a comprehensive program to study the Earth as one environmental system, now called the Earth Science Enterprise. The program began with several free-flying satellites and continued with the launch of Landsat 7 in 1999 and *Terra*, the first Earth Observing System (EOS) satellite, later that year. Followed by the Earth Observing-1 platform late in 2000, the EOS satellite instruments have now entered a planned 18 year global monitoring phase. There are currently six EOS-designated satellites carrying 16 instruments, all of which are providing integrated measurements on the interactions between the Earth's global cycles. Included in this effort, are the science investigations which examine the solid Earth cycle and the natural hazards that are an inevitable result. Higher spatial, spectral, and temporal resolution EOS data have spawned a variety of new algorithms designed to study numerous aspects of volcanology. Thermal anomaly detection, plume chemistry and mass flux, lava composition and textural properties, the interaction of ash with the natural and human environment, and mitigation of hazards are but a few of the topics being addressed with remote sensing. This session is designed to showcase the current research in volcanic systems and processes using the new EOS satellite data sets. It is also intended to provide a forum for field, aircraft, or other satellite-validated EOS observations of volcanic edifices and the processes affecting them.

**Conveners:** Michael Ramsey, Department of Geology & Planetary Science, University of Pittsburgh, Pittsburgh, PA 15260-3332, Tel: 412-624-8772, E-mail: [ramsey@ivis.eps.pitt.edu](mailto:ramsey@ivis.eps.pitt.edu); Luke Flynn, Hawaii Institute of Geophysics & Planetology, University of Hawaii at Manoa, Honolulu, HI 96822, Tel: 808-956-3154, E-mail: [flynn@higp.hawaii.edu](mailto:flynn@higp.hawaii.edu)

#### **V08 Highly Siderophile element chemistry of the Earth, Moon and Planets (A special session in honor of Dr. John Morgan)**

We cannot make worthwhile predictions about a volcano's activity without thoroughly understanding the processes occurring inside it. This was a basic tenet of Bruno Martinelli. It is only possible to understand volcanic processes if we can understand the dynamic properties and movements of the fluids involved as well as the volcano's internal structure. It is impossible to deduce this information from the observation of a single volcanic parameter such as seismicity. Rather, we must combine insights from the joint interpretation of measurements of many different physical and physico-chemical phenomena, as well as observations of a volcano's geological and petrological characteristics. We invite contributions to this session describing systems for the joint and concurrent measurement and analysis of several parameters, as well as the results and interpretation of data from such systems.

**Conveners:** Peggy Hellweg, Berkeley Seismological Laboratory, UC Berkeley, Berkeley CA 94520, USA, Tel: ++1-925-254-0569, Fax: ++1-415-840-0071, E-mail: [geo\\_enterprise@compuserve.com](mailto:geo_enterprise@compuserve.com); Marta Calvache, Observatorio Vulcanologico de Pasto, PO Box 1795, Pasto, COLOMBIA, Tel: ++57-27-314752, Fax: ++57-27-31 05 14, E-mail: [mcavache@ingomin.gov.co](mailto:mcavache@ingomin.gov.co); Susanna Falsaperla, Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Catania, Piazza Roma, 2, 95123 Catania, ITALY, Tel: +39-95-448084, Fax: ++39-95-435801, E-mail: [susanna@iiv.ct.cnr.it](mailto:susanna@iiv.ct.cnr.it)

#### **V09 Experimental volcanology: Sturtevant Memorial Session**

Volcanic eruptions are one of the clearest expressions of the continuing evolution of planet Earth. Yet our understanding of the forces controlling the timing, extent, magnitude and frequency of volcanic eruptions is poor. Understanding explosive eruptions is especially difficult due to their relative rarity and inaccessibility in the field. Here, an experimental approach is of great and growing importance. We invite scientists from the diverse branches of the earth sciences related to volcanic eruptions to contribute to a broad discussion of the issues, challenges, developments, and accomplishments of recent experimental volcanology. We welcome presentations of laboratory experiments focussed on any aspect of eruption dynamics including degassing, vesiculation, fragmentation, pyroclastic flow generation and emplacement, lava flow, dome-building plume formation, magma chamber convection and volcanic tremor. Brad Sturtevant was a pioneer in the development of experiments for the understanding of volcanic eruptions. This session is in honor of his clarity of thought, ingenuity of design and objectivity of analysis.

#### **V10 Structure and Evolution of the Galapagos Volcanic Province**

The Galápagos Volcanic Province (GVP) serves as a natural laboratory for the examination of a wide range of fundamental geological questions. The GVP is the expression of intraplate oceanic magmatism (presumably originating from a mantle plume) in the presence of a nearby mid-ocean ridge. Because of this unique tectonic setting, geological, geochemical, and geophysical studies of the GVP can provide invaluable insight into numerous important questions,

including: Plume-ridge interactions: How is plume material transported to and dispersed along ridges; how do plumes influence the location and segmentation history of nearby spreading centers; how do systematic, plume-induced variations in magma supply affect the interlinked volcanic, tectonic, and hydrothermal processes accompanying crustal formation, as well as mid-ocean ridge biological communities?

Mantle plumes and hot spots: What is the thermal structure of the Galapagos mantle plume; how does plume composition vary temporally and geographically; how does the plume interact with the surrounding mantle and lithosphere; and what is the structure and origin of oceanic swells associated with intraplate volcanism?

Ocean volcanic islands and magmatic systems: How are the large western shield volcanoes related to the central and eastern archipelago; how has the nature of volcanism changed during the evolution of the system; does the presence of the adjacent mid-ocean ridge affect the distribution and composition of material erupted from the plume; and how does the lithospheric structure in the GVP affect the frequency and composition of volcanism in the archipelago?

Volcanic plateaus and aseismic ridges: What is the present lithospheric structure in the GVP; how has lithospheric structure changed since initiation of the Galapagos plume and formation of the Carnegie and Cocos ridges, as well as during interaction with the migrating ridge; and what is the role of these aseismic ridges in controlling the style of subduction at nearby convergent margins?

Although scientists have worked in the Galapagos region for decades, the past few years have seen an increase in the intensity and diversity of geological research focused on this system, including geochemical, geophysical, and geodynamical studies of both the present hotspot and its evolution. We believe that the Fall AGU meeting comes at an opportune phase in current and recent Galapagos research. A Special Session will permit scientists from across the geological disciplines to exchange recent results and observations and to synthesize a more thorough understanding of both the Galapagos Volcanic Province as well as the nature of mantle plumes, ocean islands volcanics, and plume-ridge interaction.

**Conveners:** Juan Pablo Canales, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, 360 Woods Hole Rd., Woods Hole MA 02543, Tel: (508) 289-2893 Fax: (508) 547-2150 E-mail: [jpcanales@whoi.edu](mailto:jpcanales@whoi.edu); Karen S. Harpp, Geology Department, Colgate University, 13 Oak Dr., Hamilton NY 13346, Tel: (315) 228-7211 Fax: (315) 228-7187 E-mail: [kharpp@mail.colgate.edu](mailto:kharpp@mail.colgate.edu)

#### **V11 Session Commemorating the Fortieth Anniversary of the Synthesis and Discovery of Stishov**

We propose a special session at the Fall AGU Meeting to commemorate the fortieth anniversary of the synthesis and discovery of stishovite. In 1961 Stishov and Popov<sup>1</sup> reported the synthesis of "A new modification of silica," and in 1962 Chao, Fahey, Littler, and Milton<sup>2</sup> discovered the same phase in nature and published a paper, "Stishovite, SiO<sub>2</sub>, a very high pressure new mineral from meteor crater, Arizona." These developments foreshadowed a wide range of activities in the subsequent forty years that have transformed the discipline of high-pressure mineralogy/mineral physics into an essential component of earth science research. Contributions to this session should demonstrate connections to the original stishovite work through the evolution of theoretical, experimental, and field studies of silica, silicates, other mineral phases, and also of analog materials that provide understanding of the physical and chemical foundations of mineralogy.

**Conveners:** Charles T. Prewitt and Russell J. Hemley, Conveners, Geophysical Laboratory and Center for High-Pressure Research, Carnegie Institution of Washington, 5251 Broad Branch Rd. NW, Washington, DC 20015. Tel: (202) 478-8900 Fax: (202) 478-8901 E-mail: [prewitt@gl.ciw.edu](mailto:prewitt@gl.ciw.edu); [hemley@gl.ciw.edu](mailto:hemley@gl.ciw.edu)

#### **V12 Database efforts within Marine Geology & Geophysics: New tools for enhanced data access** (Joint with OS)

The past decade has seen tremendous growth in data acquisition capability within the Marine Geology & Geophysics (MG&G) community, with a wide range of data types collected at increasingly higher resolutions. In addition to traditional ship-based data acquisition, programs in the near future (e.g., observatories) will be collecting and sending data to shore in real time.

With these advances in data acquisition come new problems in data cataloging, access, and synthesis. Scientists across disciplines need the ability to compare different data types, and the tools to manipulate, interpret and visualize these data. At the same time it is also recognized that we need to broaden the use of the data to include the educational community and the general public. The goal of this session is to provide an overview of existing efforts in the MG&G community to define and address these issues. We encourage posters from scientists (users), data providers, engineers, and computer scientists involved in projects for cataloging metadata, improving access to existing data sets, improving coordination among different data sets, improving tools for data analysis and interpretation, and improving usage of the data by the research community and the general public.

**Conveners:** Suzanne Carbotte, Lamont-Doherty Earth Observatory, Palisades, NY 10964 USA, Tel: +1-845-365-8895, Fax: +1-845-365-8168, E-mail: [carbotte@ldeo.columbia.edu](mailto:carbotte@ldeo.columbia.edu); Deborah K. Smith, Department of Geology and Geophysics, MS #22, Woods Hole Oceanographic Institution, Woods Hole, MA 02543 USA, Tel: +1-508-289-2472, Fax: +1-508-457-2187, E-mail: [dsmith@whoi.edu](mailto:dsmith@whoi.edu); Mary Reagan, Borehole Research Group, Lamont-Doherty Earth Observatory, Palisades, NY 10964 USA, Tel: +1-845-365-8672, Fax: +1-845-365-3182, E-mail: [mreagan@ldeo.columbia.edu](mailto:mreagan@ldeo.columbia.edu)

### **V13 Heavy element stable isotope fractionations**

"Recent studies have revealed that natural stable isotope fractionations of many elements heavier than S (e.g., Fe, Cu, Zn) are common on Earth. While fractionation mechanisms are generally not yet well-understood, biological reactions appear to be particularly important in some instances. Hence, these novel isotope systems should provide new insights into past and present (bio-) geochemical processes. The study of these systems in meteorites may also provide new constraints on conditions and processes in the early Solar System. Rapid progress is expected in the next few years, especially with the advent of multiple-collector ICP-MS technology. This session aims to provide a forum for the presentation and discussion of new techniques and results in the field of "heavy-element" stable isotope research. Particularly welcome are contributions that describe new findings from natural samples or laboratory studies as well as results of theoretical modeling of fractionation effects." The investigation of natural isotope fractionations of heavy elements (e.g., Cu, Zn, Mo, Tl) is a field of research that is currently making rapid progress, due to new and improved analytical methods. Furthermore, such investigations have recently attracted significant attention, as is demonstrated by the publication of several articles (e.g., Beard et al. (1999) *Nature* 285: 1889-1892; Anbar et al. (2000) *Nature* 288: 126-128) in high-impact journals and a well-received session (organized by Francis Albarede and Ariel Anbar) at the EUG XI meeting in Strasbourg this year. Clearly, the research that is being done in this field is still in its infancy. Uncovering the isotope fractionation mechanisms of previously unstudied elements is not an easy task and this will certainly require multidisciplinary efforts. This is one of the reasons why we would like to have the opportunity to convene a "Union" Session. Most importantly, however, we are convinced that the future application of such heavy-element isotope tracers has enormous potential in a wide variety of research fields, including geo- and cosmochemistry.

**Convener:** Mark Rehkamper, ETH Zurich, Institute of Isotope Geology & Mineral Resources NO C61, CH-8092 Zurich, Switzerland, Tel: +41 1 632 7922, Nu Plasma Lab: 632 0940, Fax: +41 1 632 1179, E-mail: markr@erdw.ethz.ch

### **V14 Ten Years of Science from the 1991 Mount Pinatubo Volcano Eruption**

The 1991 eruption of Pinatubo Volcano in the Philippines was one of the largest volcanic eruptions of the 20th Century and spawned research in many disciplines. For example, in the 10 years since the eruption, volcanologists substantially improved understanding of how strain, magmatic gases, and groundwater produce the distinctive patterns of unrest that foretold Pinatubo's eruption. Atmospheric scientists discovered that winter warming (a forced positive mode of Arctic oscillation) follows large, sulfate-rich tropical explosive eruptions and quantified the effects of volcanic aerosols on ozone depletion. Discovering both controls and key indicators of watershed recovery after such a massive disturbance. On its tenth anniversary, we invite papers that emphasize new insights arising from the Pinatubo eruption and its aftermath, in volcanology, volcano-seismology, geochemistry, fluvial and watershed processes, plume transport, effects on ozone, radiative forcing, and climate response.

**Conveners:** Alan Robock, Department of Environmental Sciences, Rutgers University, 14 College Farm Road, New Brunswick, NJ 08901-8551, Tel: 732-932-9478, Fax: 732-932-8644, E-mail: [robock@envsci.rutgers.edu](mailto:robock@envsci.rutgers.edu); Christopher Newhall, USGS, Univ. of Washington, Dept Geological Sciences, Box 351310, Seattle, WA 98195, Tel: 206-553-6986, Fax: 206-543-3836, E-mail: [cnewhall@geophys.washington.edu](mailto:cnewhall@geophys.washington.edu); John Power, USGS - Alaska Volcano Observatory, 4200 University Dr., Anchorage, AK 99508, Tel: 907-786-7426, Fax: 907-786-7425, E-mail: [jpower@usgs.gov](mailto:jpower@usgs.gov)

### **V15 From D" to DNA: Causes, Processes, and Effects of Giant Mantle Upwellings**

Giant mantle upwellings represent a mode of mantle dynamics not clearly related to plate tectonic processes, and result in the emplacement of Large Igneous Provinces (LIPs) - continental flood basalts, volcanic passive margins, and oceanic plateaus - as well as in the uplift of continental and oceanic lithosphere. Such episodic mantle upwellings contrast strongly with the relatively steady-state production of seafloor at the global mid-ocean ridge system, and have been implicated as causal agents of global environmental change. In this session, we seek contributions from seismologists, tomographers, and geodynamicists on the evidence for mantle upwellings, their source region(s), and ultimately their causes and inter-relationships with seafloor spreading and subduction; from geochemists on mantle heterogeneity and sources for components in the mantle upwellings; from geochronologists on the timing and duration of LIPs; from field geoscientists on the formation and development of typical LIPs; from physical volcanologists on the unique characteristics and gas/particulate output of flood volcanism; and from paleoceanographers, climate modelers, and paleontologists on the environmental and biospheric impact of episodic, massive magmatism on the Earth's surface.

**Conveners:** Millard F. Coffin, Ocean Research Institute, The University of Tokyo, 1-15-1 Minamidai, Nakano-ku, Tokyo 164-8639, Japan, Tel: +81-(0)3-5351-6430, Fax: +81-(0)3-3377-3293, E-mail: [mcoffin@ori.u-tokyo.ac.jp](mailto:mcoffin@ori.u-tokyo.ac.jp); Andrew D. Saunders, Department of Geology, The University of Leicester, University Road, Leicester LE1 7RH, UK, Tel: +44-(0)116-252-3923, Fax: +44-(0)116-252-3918, E-mail: [ads@le.ac.uk](mailto:ads@le.ac.uk)

### **V16 Environmental Colloids**

There is increasing evidence that environmental colloids (i.e., organic macromolecules and inorganic microparticles) affect the transport of natural metals and anthropogenic contaminants in hydrologic environments. Colloid generation, stability, and mobility are affected by biological, environmental, geochemical, geophysical, and hydrological processes. Aquatic colloids can facilitate both the removal from, and release into, natural water bodies (eg. estuaries, lakes, groundwater, surface water, and marine environments) of many trace contaminants, metals, radionuclides, and hydrophobic trace organics depending on the environmental conditions (e.g., solids to water ratio) (Honeyman and Santschi, 1989). Recent findings at high solids to water ratios (i.e., groundwater) emphasize the importance of colloids in facilitating transport of elements otherwise not readily mobilized. Colloids have been observed to form in variable redox environments and salt/fresh water interfaces; mobilize plutonium in the subsurface (Kersting et al., 1999, Honeyman, 1999) and other radionuclides (Bauer et al., 2001); promote mobility of metals in stream water (Kimball, 2000), estuarine and marine environments (Guo et al., 1997; 2000); and potentially clog fractured rock (Kessler and Hunt, 1999). Colloidal particles may be dislodged by seismic activity, altering hydrologic aquifer permeability and water quality of aquifers and streams (Tokunaga, (1999)). Humic acid colloids that sorb toxic metals may be continuously generated and persist for long periods in shallow groundwaters (Buckau and Kim, 2000). Colloidal gold deposition of biogenic origin was also recently proposed (Southam, 2000) as well as clay accumulation in submarine hydrothermal vents. Colloids, using micellar technology, are used to enhance oil recovery, minimize liquid contaminants in natural gas liquids, and in contaminant remediation with in-situ barriers. New insights into processes that control transport depend on rigorously tested methods, as well as the adaptations of innovations in other disciplines. This session will contain papers describing interdisciplinary scientific studies on colloidal transport in various environmental settings to compare recent advances in techniques, analytical models and findings.

**Conveners:** William L. Dam, Division of Waste Management, U.S. Nuclear Regulatory Commission, Mail Stop T7F3, Washington, DC 20555, Tel: (301) 415-6710, Fax: (301) 415-5399, E-mail: wld@nrc.gov; Bruce D. Honeyman, Environmental Science and Engineering Division, Colorado School of Mines, Golden, CO 80401, Tel: (303) 273-3420, Fax: (303) 273-3413, E-mail: honeyman@mines.edu; James R. Hunt, Lawrence E. Peirano, 535 Davis Hall, University of California, Berkeley, CA 94720-1710, Tel: (510) 642-0948, Fax: (510) 642-7483 E-mail: hunt@ce.berkeley.edu; David Pickett, Center for Nuclear Waste Regulatory Analyses Southwest Research Institute, 6220 Culebra Road, San Antonio TX 78238-5166, Tel: (210) 522-5582, Fax: (210) 522-5155 E-mail: dpickett@swri.org; Peter Santschi, Laboratory for Oceanographic and Environmental Research, Texas A&M University, 5007 Ave U, Galveston, TX 77551, Tel: 409-740-4476, Fax: 409-740-4786, E-mail: santschi@tamug.tamu.edu; David Smith, Analytical and Nuclear Chemistry Division, Lawrence Livermore National Laboratory, MS L-231 PO 808, Livermore, CA 94550, Tel: 925-423-5793, Fax: 925-422-3160, E-mail: smith24@llnl.gov; Tomochika Tokunaga, Department of Geosystem Engineering, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan, Tel: +81-3-5841-7025, Fax: +81-3-3818-7492, E-mail: tokunaga@geosys.t.u-tokyo.ac.jp

### **V17 Virtual Earth Laboratories**

Our planet presents us with phenomena of great complexity. Tectonic deformation of the crust, convection in the underlying mantle, dynamo activity of the core, seismic wave propagation, or thermodynamic reactions in solid and magmatic systems are some examples. Traditionally we study these processes in the field or laboratory. However, unprecedented growth in computing resources now presents us with a chance to study many of these complicated processes through careful simulations on a computer. Not surprisingly, computational geophysics has emerged alongside field and laboratory studies as a powerful new tool for Earth Scientists. The impact of this extraordinary development is already being felt. First principle calculations of Earth materials now reinforce high-pressure experiments. Geodynamo simulations add insight into interpreting paleomagnetic observations. Seismologists study wave propagation numerically, while geodynamicists model the evolution of our planet on a global scale. Computational geophysicists share many technical challenges, e.g., efficient algorithms and parallel computing methods, the application of novel Beowulf clusters, or the use of data-assimilation techniques in geophysical simulations. However, they also share a remarkable opportunity to integrate tectonic, seismic mineralogic hypotheses into virtual Earth Laboratories, and testing them against laboratory and field data. In this session, we invite contributions from computational mineralogy, tectonics, mantle and core dynamics, and seismology. We also strongly encourage contributions from observational seismology, geology, mantle geochemistry and high-pressure mineral physics aimed at constraining Earth structure and processes.

**Conveners:** Hans-Peter Bunge, Princeton University, Department of Geosciences, Princeton, NJ 08540 USA, Tel: +1-609-258-4128, Fax: +1-609-258-1274, E-mail: bunge@princeton.edu; Lars Stixrude, University of Michigan, Department of Geological Sciences, Ann Arbor, MI 48109-1063, USA, Tel: +1-734-647-9071, Fax: +1-734-763-4690, E-mail: stixrude@umich.edu; Jeroen Tromp, Seismological Laboratory, MC 252-21, California Institute of Technology, Pasadena, CA 91125 USA, Tel: +1-626-395-8117, Fax: +1-626-564-0715, E-mail: jtromp@gps.caltech.edu; Rainer

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## **ATMOSPHERIC AND SPACE ELECTRICITY**

### **AE01 Thunderstorm Electrical Effects on the Middle and Upper Atmosphere and Ionosphere**

Papers are invited for a special session to be devoted to all aspects of the electrical, mechanical and chemical effects of thunderstorm activity on the middle and upper atmospheres. Contributors are invited to present their latest results on optical and infrared transient events, associated radio and electromagnetic (ULF-VHF) effects, energetic particle and x-ray/gamma ray effects, and the thunderstorm and meteorological correlates of these phenomena.

**Conveners:** D.D. Sentman, Geophysical Institute, University of Alaska, Fairbanks, AK 99775-7320, Tel: (907) 474-6442, Fax: (907) 474-7290, E-mail: [dsentman@gi.alaska.edu](mailto:dsentman@gi.alaska.edu); V.P. Pasko, Department of Electrical Engineering, Communications and Space Sciences Laboratory, The Pennsylvania State University, University Park, PA 16802-2706, Tel: (814) 865-3467, Fax: (814) 865-7065, E-mail: [vpasko@psu.edu](mailto:vpasko@psu.edu)

### **AE02 Lightning and Storm Electrification**

Recent technological advances are providing new tools for studying lightning physics and effects, electrical charge structure of the various types of thunderstorms, and cloud electrification processes. New technologies include ground-based and satellite systems for mapping lightning discharges, lightning-triggering facilities, improved electric field sensors, microphysical probes, and polarimetric radar. Further, laboratory studies continue to expand our knowledge of microphysical processes that charge hydrometeors, and more realistic numerical cloud models have been developed for examining the processes occurring in thunderstorms. This session seeks papers concerned with all aspects of the lightning discharge (natural or triggered), the spatial and temporal distributions of lightning activity, the electrical properties of storms, the mechanisms by which storms become electrified, the global circuit of atmospheric electricity, and lightning effects on the chemistry of the atmosphere. Observations of these phenomena obtained by recent field programs, including the Airborne Field Mill Project in Florida, EULINOX in Europe, and STEPS in the central United States, are particularly invited. Of special interest are the results of triggered-lightning experiments, VHF imaging of lightning discharges, studies of the relationships between lightning and non-electrical cloud properties, mapping of lightning activity, measurements of the electric field inside storms, laboratory studies of electrification mechanisms, and numerical storm simulations that include electrical processes.

**Conveners:** V. A. Rakov, Dept. of Electrical and Computer Engineering, University of Florida, P.O. Box 116130, Gainesville, FL 32611-6130, tel.: (352) 392-4242, Fax: (352) 392-8381, E-mail: [rakov@ece.ufl.edu](mailto:rakov@ece.ufl.edu); D. R. MacGorman, CIMMS, University of Oklahoma, 100 E. Boyd, Rm. 1110, Norman, OK 73019, tel.: (405) 325-5667, Fax: (405) 325-7614, E-mail: [don.macgorman@nssl.noaa.gov](mailto:don.macgorman@nssl.noaa.gov)

## **EDUCATION AND HUMAN RESOURCES**

### **ED01 Showcase on Undergraduate Research in the Geophysical Sciences**

Many academic programs for undergraduates provide little opportunity for students to engage in research activities. Yet most students who have had these opportunities, when asked about their impact, describe the research as the highlight of their undergraduate program and the activity that best prepared them for their subsequent graduate school and/or work careers. This session will feature examples of successful research programs for undergraduate students, with examples from across the range of geophysical disciplines and from a variety of institutional settings. The poster session will include presentations by faculty about perceived benefits, potential pitfalls, and suggestions for success, and presentations by students to showcase examples of undergraduate research. Students must submit their posters to a regular scientific theme session, as well as to the Showcase on Undergraduate Research poster session.

**Conveners:** Karen Grove, Department of Geosciences Chair, San Francisco State University, San Francisco, CA 94132 USA, Tel: 415-338-2061, E-mail: [kgrove@sfsu.edu](mailto:kgrove@sfsu.edu); Jill Singer, Department of Earth Sciences, Buffalo State College, Buffalo, NY 14222 USA, Tel: 716-878-6731, E-mail: [singerjk@buffalostate.edu](mailto:singerjk@buffalostate.edu); and Roberta Johnson, UCAR/NCAR, P.O. Box 3000, Boulder, CO 80307 USA, Tel: 303-497-2173, E-mail: [rmjohnsn@ucar.edu](mailto:rmjohnsn@ucar.edu)

### **ED02 Informal Education: A Powerful Tool in Science Literacy**

So often in trying to educate our youth in the science and technology of interest to AGU we forget the importance of all the opportunities outside the classroom to connect not only to students but to the public in general. This extracurricular realm of learning can be collectively grouped in the term "informal education". In mentioning informal education many think first of science centers, museums, and planetariums. These are important venues for education, but the many other avenues that can be used should not be forgotten. There are libraries, scout groups, science clubs, lecture series, nature hikes, community days, concerts, and web chats to name a few. Virtually anything that brings people together can be used for education purposes. This session emphasizes the programs, events, experiences, materials, etc. that have been used to communicate Earth and space science in an informal atmosphere. Innovative ideas are especially sought. The lessons learned, both good and bad should be a part of the presentations so that all might benefit.

**Conveners:** Jim Thieman, Code 633, NASA/GSFC, Greenbelt, MD 20771 USA, Tel: 301-286-9790, E-mail: [thieman@nssdc.gsfc.nasa.gov](mailto:thieman@nssdc.gsfc.nasa.gov); Cherilynn A. Morrow, Education & Outreach Department, Space Science Institute, 3100 Marine St., Suite A353, Boulder, CO 80303-1058 USA, Tel: 303-492-7321 E-mail: [camorrow@colorado.edu](mailto:camorrow@colorado.edu); David Alexander, Lockheed-Martin Solar & Astrophysics Lab, Dept H1-12 B252, 3251 Hanover St, Palo Alto, CA 94304 USA, Tel: 650-424-2047, E-mail: [alexander@lmsal.com](mailto:alexander@lmsal.com); Mike Carlowicz, Code 690, NASA/GSFC, Greenbelt, MD 20771, USA, Tel: 301 286-6353, E-mail: [mcarlowi@pop600.gsfc.nasa.gov](mailto:mcarlowi@pop600.gsfc.nasa.gov); and Pat Reiff, Rice University, Hermann Brown Bldg Rm 202, 6100 Main St, MS 108, Houston, TX 77005-1892 USA, Tel: 713-348-4634, E-mail: [reiff@rice.edu](mailto:reiff@rice.edu)

### **ED03 AGU Scientists' Roles and Partnerships in Support of K-14 Education and Public Outreach - Part II**

This session is a follow-up to the highly-subscribed session conducted at the Spring 2001 meeting. Traditionally, the research directorates of funding agencies like NASA and NSF contribute substantively to training the next generation of scientists via fellowships and the support of graduates and postgraduates in their usual scientific roles on research proposals. In recent years, research directorates at NASA and NSF have been expanding their educational scope to address national needs for improving K-14 science education and enhancing general literacy in science, mathematics and technology. There is now a greater emphasis on the integration of research and education at all levels and on the involvement of NASA and NSF-supported scientists in partnership with K-12 education and public outreach (EPO) professionals. This session is intended to showcase the diversity of roles scientists are playing in support of successful partnerships with the education and public outreach programs of research institutions and NASA missions, teachers, schools of education, school districts, museums, curriculum developers, educational radio and television, educational Web developers, and others. A new set of key policy makers from NASA and NSF will be invited, as well as a diverse cadre of practicing AGU scientists who are making important contributions to American education.

**Conveners:** Cherilynn A. Morrow, Education & Outreach Department, Space Science Institute, 3100 Marine St., Suite A353, Boulder, CO 80303-1058 USA, Tel: +1-303-492-7321 E-mail: [camorrow@colorado.edu](mailto:camorrow@colorado.edu)

### **ED04 Women in the Geosciences: Developments, Current Status and Outstanding Challenges**

While the geoscience academic community has grown over the past 2 decades, women are still an under-represented population within the field. Today, the percentage of women in the geosciences falls from approximately 35% at the graduate level, to around 12% at the faculty level. Clearly, despite efforts to attract and retain women in the geosciences, there are outstanding issues that need addressing at the individual, departmental, institutional and professional society levels. Women who wish to pursue a career in the geosciences should not be deterred, at any stage, from doing so relative to their male colleagues. This session will focus on some of the challenges and opportunities available to women entering and staying in the geosciences, such as tandem couple issues, opportunities at primarily research versus primarily teaching institutions, alternative career routes (in particular career tracks in which women have left and re-entered mainstream research and teaching), and retention of women at the graduate/postdoctoral and postdoctoral/faculty transitions.

**Conveners:** Jennifer Giesler, Department of Anthropology, 2001 HSSB, University of California Santa Barbara, Santa Barbara, CA, 93106, USA, Tel: 805-893-2516, Fax: 805-893-8707, E-mail: [jgiesler@agu.org](mailto:jgiesler@agu.org); Catherine Johnson, Scripps Institution of Oceanography, 9500 Gilman Drive, La Jolla, CA 92093 USA, Tel: 202-478-8814, Fax: 858-534-5532, E-mail: [johnson@radar.ucsd.edu](mailto:johnson@radar.ucsd.edu); and Marcia K. McNutt, Monterey Bay Aquarium Research Institute, 7700 Sandholdt Road, Moss Landing, CA 95039 USA, Tel: 831-775-1814, Fax: 831-775-1647, E-mail: [mcnutt@mbari.org](mailto:mcnutt@mbari.org)

### **ED05 Geoscience Graduate Degrees: Preparation for a Global Job Market**

Graduate education has traditionally prepared students for academic and research careers. Graduates entering non-academic fields typically find that they need to augment and/or reassess the relative importance of the knowledge and skills transferred during graduate school. What skills are valued by employers in industry, consulting, government, the media, and non-profits? How should graduate students best prepare themselves for broader career options? How can graduate advisors and university career counselling centers facilitate this training? Are students

prepared for the global market? We invite presentations from employers, faculty advisors, career counselors, those who study employment trends, and geoscience graduates who have successfully pursued non-academic careers.

**Conveners:** Jennifer Giesler, Department of Anthropology, 2001 HSSB, University of California Santa Barbara, Santa Barbara, CA, 93106, USA, Tel: 805-893-2516, Fax: 805-893-8707, E-mail: [jgiesler@agu.org](mailto:jgiesler@agu.org); Catherine Johnson, Scripps Institution of Oceanography, 9500 Gilman Drive, La Jolla, CA 92093 USA, Tel: 202-478-8814, Fax: 858-534-5532, E-mail: [johnson@radar.ucsd.edu](mailto:johnson@radar.ucsd.edu); and Amanda Staudt, Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA 02138 USA, Tel: 617-495-8455, Fax: 617-495-4551, E-mail: [amanda96@post.harvard.edu](mailto:amanda96@post.harvard.edu)

#### **ED06 Diversity And Geoscience Societies: Sharing Our Mutual Interests**

For 30 years and more, geoscience societies have established programs for increasing diversity in the geosciences. However, although these professional societies have mutual interests in improving diversity, and whereas individual members are often participants in more than one organization, there has been little to no effort on part of these professional societies to share successful strategies for increasing the participation of underrepresented populations in the geoscience community. Likewise, we have not had an opportunity to bring together representatives from organizations focusing on underrepresented scientists with professional societies, in order to enable both groups to benefit from sharing information about needs and strategies. This session is a first step to establish dialogue between geoscience professional societies. Representatives from AGU, GSA, AGI, AAPG, and AMS, as well as societies that primarily represent persons underrepresented in science, such as the NABGG, SACNAS, AWIG, ASIS, etc., will be invited to present the programs that they have established and to share with the geoscience community their interests and goals in improving diversity. This session is particularly timely in that the information provided will help in the development of AGU's Diversity Plan, to be implemented through CEHR and its Diversity subcommittee. This session will include a follow-up discussion by the community on how we the societies can collaborate to improve diversity.

**Conveners:** Roberta Johnson, UCAR/NCAR, P.O. Box 3000, Boulder, CO 80307 USA, Tel: +1-303-497-2173, E-mail: [rmjohnsn@ucar.edu](mailto:rmjohnsn@ucar.edu); Frank Hall, Dept. of Geology and Geophysics, University of New Orleans, New Orleans, LA 70148 USA, Tel: +1-504-280-6352, E-mail: [frhall@uno.edu](mailto:frhall@uno.edu)

#### **ED07 Evolution in the Classroom: Resources, Strategies and Issues**

Today's science educators face challenges when teaching evolution and the nature of science. Evolution is a fundamental theme in both the National Science Education Standards and the Benchmarks for Science Literacy. But, teaching evolution is controversial in many communities. This session will consider the issues, current status of evolution in the classroom, review resources, and introduce the new curriculum projects that support teaching evolution and the nature of science. NSF, NASA and others have supported new curriculum materials that support teaching evolution in pre-college classrooms; these projects will be reviewed. Invited and contributed papers.

**Conveners:** Edna DeVore, SETI Institute, 2035 Landings Dr. Mountain View, CA 94043m USA Tel: 650-960-4538, Fax: 650-961-7099, E-mail: [edevore@seti.org](mailto:edevore@seti.org); Kathleen O'Sullivan, San Francisco State University, 1600 Holloway, San Francisco, CA, USA Tel: 415-338-1599, Fax: 415-338-0914, E-mail: [kaosul@orion.sfsu.edu](mailto:kaosul@orion.sfsu.edu)

#### **ED08 Earth System Science Education Alliance: Inquiry-Based, Online Learning Communities**

The science education community envisions teachers presenting science as a process and engaging students in meaningful, relevant tasks and, as a result, students interpreting their world in scientific terms. Turning that vision into a reality can be tough. Educators need both a deep understanding of Earth system science and the opportunity to learn to teach in a manner that reflects research on how students learn. The best way for teachers to attain the necessary skills to implement science as inquiry in their classrooms is to experience such a classroom themselves. The Earth System Science Education Alliance (ESSEA) was established for this purpose - to provide K-12 teachers with rigorous online professional development courses that feature student-centered, knowledge-building communities in which teams of participants solve problems, build models, and design classroom activities. ESSEA is a partnership between the Institute for Global Environmental Strategies (IGES) and the Center for Educational Technologies (CET) at Wheeling Jesuit University, through funding from NASA's Earth Science Enterprise. ESSEA is supporting universities, colleges, and science education organizations in offering Earth system science online graduate courses that have been developed within the CET at Wheeling Jesuit University. The courses have been successfully implemented for both in-service and pre-service teacher education. An annual announcement by ESSEA solicits proposals from US teams interested in offering the courses. Currently 12 institutions from across the US are offering the courses, with plans to select and fund 8 new organizations in February 2002. This session will include presentations by ESSEA program management and participating ESSEA universities, focusing on the content and structure of the courses, which can be freely downloaded and used by any organization, lessons learned about online instruction, and information on how to participate in ESSEA.

**Conveners:** Theresa Schwerin, Institute for Global Environmental Strategies (IGES), 1600 Wilson Blvd., Suite 901, Arlington, VA 22209 USA, Tel: +1-703- 312-0825, E-mail: [theresa\\_schwerin@strategies.org](mailto:theresa_schwerin@strategies.org); Bob Myers Center for

Educational Technologies (CET), Wheeling Jesuit University, 316 Washington Ave., Wheeling, West Virginia 26003 USA, Tel: +1-304-243-2368, E-mail: bmyers@cet.edu

### **ED09 Education and Public Outreach Materials Developed through NASA Sponsored Projects**

Projects funded by NASA's strategic enterprises and contracts at NASA research centers such as the Space and Earth Sciences Data Analysis (SESDA) at Goddard Space Flight Center (GSFC) are producing education and public outreach (EPO) materials for formal and informal education as well as providing outreach to the media and general public.

Invited speakers from selected formal education (grade levels K-16+) and informal education projects as well as public and media outreach efforts will anchor this session. All NASA funded EPO projects are encouraged to submit abstracts for the session to showcase the broad range of these efforts.

**Conveners:** Robert Gabrys, NASA Goddard Space Flight Center, Mailstop 130.3, Greenbelt, MD 20771 USA, Tel: +1-301-286-7205, E-mail: Robert.E.Gabrys.1@gsfc.nasa.gov; M. Frank Ireton, SSAI, 10210 Greenbelt Road, Suite 500, Lanham, MD 20706 USA, Tel: +1-301-867-2034, E-mail: frank\_ireton@sesda.com; Blanche Meeson, NASA Goddard Space Flight Center, Mailstop 900.0, Greenbelt, MD 20771 USA, Tel: +1-301-614-5341, E-mail: bmeeson@see.gsfc.nasa.gov

## **HISTORY OF GEOPHYSICS COMMITTEE**

### **GC01 Synthesis of millennial climate variability**

The session will focus on recent advances in chronology, proxy data, and modeling studies that help to provide a synthesis of decadal to millennial variability in the earth system during the last 80 kyr. We will encourage papers that present high resolution results from terrestrial, marine and ice sheet locations, particularly those with annual-layer or other detailed chronologies. Evidence constraining the spatial and temporal variability in C-14 production rate and reservoir ages, errors associated with U-series dating, and efforts to constrain and model C14 as a paleoceanographic tracer during climatic extremes will also be included. Special emphasis will be placed on studies that seek to develop a better understanding of telecommunication processes on sub-orbital time scales, through evaluation of spatial homogeneity or heterogeneity, or frequency analysis of robust cyclicities to determine leads and lags.

**Convener:** Jerry McManus, 121 Clark MS #23, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, Tel: 508 289-3328, Fax: 508 289-2175, E-mail: jmcmanus@whoi.edu

### **GC02 Paleoclimatic Reconstructions Using Nearshore Proxies: Proxy Development, Climate History, and Human Impacts**

Reconstructions of climate conditions near the coast have important implications for both marine and terrestrial ecosystems, including human settlement and adaptation patterns. For example, changes in coastal upwelling affect inland climate patterns as well as coastal marine productivity. Proxies of coastal climate change on seasonal or decadal time scales are particularly needed for climate reconstructions in temperate regions outside the habitat range of reef-building corals. We welcome contributions related to calibration and development of marine and terrestrial near-shore climate proxies, reconstructions of coastal climate conditions based on these proxies, and the impacts of climate change on human settlements and adaptations to the changing environment.

**Conveners:** Ann Russell, Department of Geology, University of California, Davis, CA 95616, Tel: (530) 752-3311, Fax: (530) 752-0951, E-mail: [russell@geology.ucdavis.edu](mailto:russell@geology.ucdavis.edu); Michael Kennedy, Department of Anthropology, University of California, Davis, CA 95616, E-mail: [makennedy@ucdavis.edu](mailto:makennedy@ucdavis.edu)

### **GC03 Multi-Disciplinary Studies of Present-Day Sea Level Change**

A variety of different disciplines are actively studying the temporal and spatial characteristics of present day sea level change in an effort to determine the global pattern of sea level rise to constrain global climate models. Tide gauges provide one of the longest records of sea level change; however, these records are "contaminated" by vertical crustal motion (such as glacial isostatic adjustment) and thus solid Earth geophysicists have been studying methods for unraveling the geophysical and oceanographic contributions to this data set. Long records of hydrographic measurements collected from ships are beginning to provide insight into the steric contributions to sea level change. Precise satellite altimetry from TOPEX/Poseidon and other satellites provides a more comprehensive record of sea level change, but these data are only available since the early 1990s. Global climate models are beginning to provide predictions of the spatial distribution of the sea level change signal, and thus some have begun to develop analysis

schemes for testing the observations for the presence of these patterns. Future satellite missions such as GRACE and ICESAT will provide important contributions to sea level change science. This session seeks contributions on all observational and modeling aspects of present-day sea level change in hopes that these cross-disciplinary interactions will provide better insight into the problem.

**Conveners:** R. Steven Nerem, Colorado Center for Astrodynamics Research, UCB431, University of Colorado, Boulder, CO, 80309, Tel: 303-492-6721, Fax: 303-492-2825, E-mail: nerem@colorado.edu; James L. Davis, Harvard-Smithsonian Center for Astrophysics, 60 Garden St., MS 42, Cambridge, MA 02138, Tel: 617-496-7640, Fax 617-495-7345, E-mail: jdavis@cfa.harvard.edu

#### **GC04 Mid-Century Effects of Climate Change on Water Resources in the West**

The U.S. Department of Energy has funded the Accelerated Climate Prediction Initiative Demonstration Project to perform an experimental "end-to-end" assessment of the possible effects of climate change over the next 30-50 years on water resources in the western United States. This session will present results from this and other recent research on the effects of near-term climate change on this region of the country. As the events of the past year have demonstrated yet again, the environment and economy of the West is particularly vulnerable to climate change and climate variability, particularly as these affect precipitation and water availability. The 30-50 year timeframe is within the planning horizon for many water management, land-use, and environmental issues. The purpose of the session will be to explore the extent to which the risks associated with near-term climate change should be affecting our thinking about these matters. The scope of the session will include research on models and methodologies for assessing regional-scale climate change (including their limitations) as well as results from recent assessments of near-term climate change and climate variability on water resources, agriculture, habitat, energy production and use, fire weather, and other climate-sensitive issues in the West.

**Conveners:** Tim P. Barnett, Scripps Institution of Oceanography, Climate Research Division, E-mail: tbarnett@ucsd.edu; William T. Pennell, Global Environmental Change Research Organization, Pacific Northwest National Laboratory, P.O. Box 999, Richland, WA 99352, E-mail: william.pennell@pnl.gov

#### **GC05 Climate observing system challenges**

Recent reports by the NRC and others have pointed out the severe challenges facing the U.S. research community in continuing, developing, and archiving key global climate records, both from the surface and from space. This session is designed to summarize these challenges.

The technical issues facing long-term climate observations include but are not limited to:

- Intercalibration and overlapping measurements of changing observation instruments whether in space or on the ground.
- Achieving the high accuracy and stability of measurement required to study climate change.
- Achieving sufficient sampling rigor when faced with climate variables like cloud ice water that vary in magnitude by 3 orders of magnitude while changes significant to climate may be as little as a few percent.
- Achieving sufficient sampling to establish the statistical significance of extreme events which in some cases are more important than changes in the mean.
- Rigorous validation of the indirect remote sensing from space-borne observations often required for true global observations.
- Balancing the need for short term detailed process measurements and longer time scale continuous climate records, both of which are required for progress in improving and testing climate models
- Achieving data systems that are sufficiently rigorous and redundant for long-term archive, while still sufficiently flexible to handle the evolution of changing research needs.
- Maintaining data record quality when the length of climate data records must exceed the length of research careers.
- Spanning the space/time sampling from point measurements of rainfall or temperature to spaceborne observations at tens of km.
- Obtaining new observations of key climate parameters that have not been traditionally measured.

**Conveners:** Bruce Wielicki; Russ Davis; Jim Hack; Tom Ackerman; Chris Justice

## SNOW, ICE AND PERMAFROST

### **IP01 Ice - From Molecules to Ice Sheets: A Special Session in Honor of W. Barclay Kamb**

In the course of his productive career Barclay Kamb has studied an unusually broad spectrum of glaciological topics ranging in scale from molecular-level ice physics to ice-sheet dynamics. Through forefront fieldwork, laboratory experiments and theoretical analysis, he has tackled pivotal glaciological problems. His work has led to major advances in understanding ice crystallography, deformation and fabrics, glacier sliding, subglacial water drainage, glacier surges and mechanism of ice streaming. In his honor, we solicit contributions on these and other related glaciological topics. All relevant contributions are welcome. We are particularly interested in contributions that will review recent advances in a glaciological subdiscipline or will integrate some current glaciological developments into a vision of exciting future direction/s in glaciology, or both.

**Conveners:** Slawek Tulaczyk, Department of Earth Sciences, University of California, Santa Cruz, CA 95064, Tel: +1-831-459-5207, Fax: +1-831-459-3074, E-mail: [tulaczyk@es.ucsc.edu](mailto:tulaczyk@es.ucsc.edu);

Charles F. Raymond, Geophysics Program, Box 351650, University of Washington, Seattle, WA 98195, Tel: +1-206-543-4914, Fax: +1-206-543-0489, E-mail: [charlie@geophys.washington.edu](mailto:charlie@geophys.washington.edu).

### **IP02 Monitoring an Evolving Cryosphere: The 25th anniversary of the National Snow and Ice Data Center**

Our ability to measure and monitor the remote polar and alpine regions of the Earth has dramatically improved over the last quarter-century. As records and measurements improve, we recognize important changes underway in the cryosphere. We solicit oral and poster presentations that highlight the use of satellite and in situ data on the cryosphere as a component of the climate system, including sea ice, seasonal snow cover, glaciers, frozen ground, and the great ice sheets.

**Conveners:** Anne Nolin, CIRES/NSIDC, 449 UCB, University of Colorado, Boulder, CO 80309-0449, Tel: (303) 492-6508, Fax : (303) 492-2468, E-mail: [nolin@spectra.colorado.edu](mailto:nolin@spectra.colorado.edu);

Ted Scambos, CIRES/NSIDC, 449 UCB, University of Colorado, Boulder, CO 80309-0449, Tel: (303) 492-1113, Fax: (303) 492-2468, E-mail: [teds@icehouse.colorado.edu](mailto:teds@icehouse.colorado.edu)

### **IP03 Glacier Change: Rates and Resolution**

This special session is being designed to accommodate both field-oriented and multispectral remote sensing communities, to examine progress and developments in glacier monitoring. Subtopics may include: (a) Rates of change discerned from remote sensing measurements made at differing resolution, spatial, and temporal scales, (b) Comparison of aerial photography with satellite remote sensing, and (c) Remote sensing results compared to results of reliable, high-resolution field studies. Recent progress of the Global Land Ice Monitoring from Space (GLIMS) project will be featured, but the session is open to any contributions on this focused theme.

**Convener:** Jeffrey S. Kargel, United States Geological Survey, 2255 N Gemini Drive, Flagstaff, Arizona 86001, Tel: (520) 556-7034, E-mail: [jkargel@usgs.gov](mailto:jkargel@usgs.gov)

### **IP04 Glacial Sediment Systems from Source to Sink (Joint with DI)**

Temperate glaciers can have enormous impacts on sediment delivery to continental margins. Alaskan glaciers, for example, have among the highest sediment yields measured anywhere, and sediment accumulation rates offshore are commensurately high. Glacial and non-glacial processes produce and transport sediment through glacierized basins, and these processes interact in important ways. Large rockfalls onto glaciers can change their mass balance; glacial retreat removes support from oversteepened valley walls; outburst floods ream near-glacier valleys and deposit large quantities of material further downstream. Because the hydrology of a glacial river differs from non-glacial rivers, glacial cycles will produce times of varying sediment delivery and transport capacity that will be manifested in deposits throughout the basin. At the shoreline, deltas and nearshore zones are commonly areas of rapid sedimentation, leading to unstable conditions and slope failures. Offshore areas receive pulses of sediment from such failures, as well as large quantities of materials deposited from suspension. We seek papers on the direct effect of glaciers and their processes of erosion, transport and deposition, particularly addressing rates of sediment delivery during normal and catastrophic events, sediment transport in glacial streams, deltas and the offshore zone, and the relationship of sediment transport from one environment to another. We also seek papers on the indirect impacts of glaciers that are linked to glacial processes such as isostatic response, time lags in sediment delivery due to temporary storage, and the response of hillslopes to glacial cycles. The nature of sediment deposition from source to sink including rate and preservation, and the nature of the resulting sediment pile including the recognition of a glacial signal are welcome from both on-shore and off-shore perspectives.

**Conveners:** Suzanne Anderson, CSIDE, Dept. of Earth Sciences, UCSC, Santa Cruz, CA 95064, E-mail:

[spa@es.ucsc.edu](mailto:spa@es.ucsc.edu); Dan Lawson, CRREL-Anchorage, PO Box 5646, Fort Richardson, AK 99505, E-mail:

[dlawson@crrel.usace.army.mil](mailto:dlawson@crrel.usace.army.mil); James Syvitski, INSTAAR, Campus Box 450, University of Colorado, Boulder, CO, E-mail: [james.syvitski@colorado.edu](mailto:james.syvitski@colorado.edu)

### **IP05 Synthesis of millennial climate variability** (Joint with PL, OS)

The session will focus on recent advances in chronology, proxy data, and modeling studies that help to provide a synthesis of decadal to millennial variability in the earth system during the last 80 kyr. We will encourage papers that present high resolution results from terrestrial, marine and ice sheet locations, particularly those with annual-layer or other detailed chronologies. Evidence constraining the spatial and temporal variability in C-14 production rate and reservoir ages, errors associated with U-series dating, and efforts to constrain and model C14 as a paleoceanographic tracer during climatic extremes will also be included. Special emphasis will be placed on studies that seek to develop a better understanding of telecommunication processes on sub-orbital time scales, through evaluation of spatial homogeneity or heterogeneity, or frequency analysis of robust cyclicities to determine leads and lags.

**Conveners:** Jerry McManus, 121 Clark MS #23, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, Tel: 508-289-3328, Fax: 508-289-2175, E-mail: [jmcmamus@whoi.edu](mailto:jmcmamus@whoi.edu); Michael Sarnthein, University of Kiel, Jim Kennett, University of California, Santa Barbara

### **IP06 Early applications of digital topographic data from the Shuttle Radar Topography Mission**

Data from the Shuttle Radar Topography Mission, which flew last year, will start becoming available to the SRTM Science Team in June, 2001. By early 2002, the global data set will begin to be released to the public. The 30 m digital elevation model of the entire land mass of the earth between 60 deg N and S latitude will be completed by the end of 2002, forming an unprecedented data set for geoscientists and educators. A variety of investigations will be carried out by the Science Team in the next few months using the data. The investigations will include studies of uplift and erosion of mountain ranges in Asia and South America, evolution of volcanoes in tropical regions, hydrology of the Amazon Basin, topographic characterization of large flood plains, volume changes of ice in Patagonia, earthquake hazards in Burma, urban infrastructure mapping, interactions of climate and tectonics, and comparisons of lidar and radar techniques for geodesy in plate boundary regions. We plan to invite several members of the Science Team (see below) to report early results in these fields and we would be prepared to accept contributed papers if they were on a related topic.

**Conveners:** Tom G. Farr, Jet Propulsion Laboratory, Pasadena, CA 91109, Tel: 818-354-9057, Fax: 818-354-9476, E-mail: [tom.farr@jpl.nasa.gov](mailto:tom.farr@jpl.nasa.gov); Paul A. Rosen, Jet Propulsion Laboratory, Pasadena, CA 91109, Tel: 818-354-0023, Fax: 818-393-5285, E-mail: [Paul.A.Rosen@jpl.nasa.gov](mailto:Paul.A.Rosen@jpl.nasa.gov)

### **IP07 Stick-slip dynamics in geological and geophysical systems**

Understanding the processes of and controls on stick-slip events on different scales is fundamental to problems in a range of physical science disciplines that include tribology, engineering, structural geology and geophysics. Understanding stick-slip dynamics is also important for theoretical and applied problems as diverse as friction dynamics, fluid flow, stress-strain relations, earthquake hazard and glacier motion. This session aims to examine theoretical and applied aspects of stick-slip processes from a range of geological and geophysical systems, and to promote interdisciplinarity within the physical sciences. A key outcome is a better understanding of stick-slip mechanics in a range of experimental and environmental settings.

**Convener:** Jasper Knight, School of Environmental Studies, University of Ulster, Coleraine Co, Londonderry, Northern Ireland, BT52 1SA, UK, Tel +44 (0) 28 7032 3179, Fax +44 (0) 28 7032 4911, E-mail: [j.knight@ulst.ac.uk](mailto:j.knight@ulst.ac.uk).

## **MINERAL AND ROCK PHYSICS**

### **MR01 New Directions in Experimental Mineralogy & Petrology**

Experimental techniques for mineralogy and petrology have developed enormously over the past 40 years. For example, experiments at extreme conditions that were once considered unobtainable have become routine. And short time scales have become accessible with intense radiation sources. Thus experimental mineralogy and petrology have provided the basis of the current wide-ranging and detailed understanding of processes that occur within the Earth. Furthermore, mineralogists working with high-pressure techniques have contributed to essentially all of the groundbreaking discoveries in all areas of high-pressure science, especially the physics of the solid state. Experimental petrologists are now contributing essential skills and insights to biological studies, including those addressing the very origin of life. The purpose of this symposium is to provide a forum to address the question of how mineralogy and petrology should build on its past successes and developments in experimental techniques, and to review the scientific questions that can be expected to be addressed by the future developments in the field. Contributions should emphasize possible future prospects, founded upon current results.

**Conveners:** Ross Angel & Nancy Ross, Virginia Tech, E-mail: [rangel@vt.edu](mailto:rangel@vt.edu) & [nross@vt.edu](mailto:nross@vt.edu); and John Parise, SUNY, Stony Brook, E-mail: [jparise@sunysb.edu](mailto:jparise@sunysb.edu)

### **MR02 Bumps, Lumps and Clumps in the Mantle's Midsection** (Joint with S, T, V, DI)

The boundary region between the transition zone and lower mantle has been a source of lively and ongoing discussion. Early debates over the nature of the 660 km seismic discontinuity have evolved to include local heterogeneities, fine structure below 660 km, and mid-mantle seismic reflectors. Downgoing slabs and upwelling plumes must pass through the perovskite phase boundary, which spans a wide depth range depending on the mineralogy. Water and minor elements may play an important role, and recent reports of natural samples provide significant geochemical constraints. This session will provide an interdisciplinary forum for the presentation of recent results on all aspects of the transition zone and its boundary with the lower mantle.

**Conveners:** Catherine McCammon, Bayerisches Geoinstitut, Universität Bayreuth, D-95440 Bayreuth, Germany, Tel: +49-921-553709, Fax: +49-921-553769, E-mail: [catherine.mccammon@uni-bayreuth.de](mailto:catherine.mccammon@uni-bayreuth.de); Craig Bina, Northwestern University, Department of Geological Sciences, 1847 Sheridan Rd, Evanston, IL 60208-2150, Tel: +1-847-491-5097, Fax: +1-847-491-8060, E-mail: [craig@earth.northwestern.edu](mailto:craig@earth.northwestern.edu); George Helffrich, Wills Memorial Bldg, University of Bristol, Queens Rd, Bristol BS8 1RJ, UK, Tel: +44-117-9288280, Fax: +44-117-9253385, E-mail: [george@gly.bris.ac.uk](mailto:george@gly.bris.ac.uk)

### **MR03 Session Commemorating the Fortieth Anniversary of the Synthesis and Discovery of Stishovite**

We propose a special session at the Fall AGU Meeting to commemorate the fortieth anniversary of the synthesis and discovery of stishovite. In 1961 Stishov and Popova<sup>1</sup> reported the synthesis of "A new modification of silica," and in 1962 Chao, Fahey, Littler, and Milton<sup>2</sup> discovered the same phase in nature and published a paper, "Stishovite, SiO<sub>2</sub>, a very high pressure new mineral from meteor crater, Arizona." These developments foreshadowed a wide range of activities in the subsequent forty years that have transformed the discipline of high-pressure mineralogy/mineral physics into an essential component of earth science research. Contributions to this session should demonstrate connections to the original stishovite work through the evolution of theoretical, experimental, and field studies of silica, silicates, other mineral phases, and also of analog materials that provide understanding of the physical and chemical foundations of mineralogy. We anticipate that S. M. Stishov and other pioneers in this field will be present for the special session.

**Conveners:** Charles T. Prewitt and Russell J. Hemley, Geophysical Laboratory and Center for High-Pressure Research, Carnegie Institution of Washington, 5251 Broad Branch Rd. NW, Washington, DC 20015, Tel: (202) 478-8900, Fax: (202) 478-8901, E-mail: [prewitt@gl.ciw.edu](mailto:prewitt@gl.ciw.edu); & [hemley@gl.ciw.edu](mailto:hemley@gl.ciw.edu)

### **MR04 The impact of rock experimentation on geodynamics-a session in honor of Mervyn Paterson**

Our understanding of geodynamic processes such as mantle convection, mountain building, or crustal extension requires quantitative insights into the material behavior of rocks. We need to understand the mechanics of rock deformation over a broad range of scales in space and time and under thermodynamic boundary conditions covering an enormous span from crust to mantle. Fundamental scientific concepts reaching from microphysical models of friction and rock fracture to strength profiles of the earth's lithosphere have been developed in the laboratory over the last three decades, and they have been applied with great success on the field scale. However, recent developments of new experimental and analytical techniques have greatly improved our understanding of various aspects of deformation in the lithosphere. In particular, the effects of aqueous fluids, partial melts, chemical impurities and second phases on the constitutive behavior of rocks could be investigated with much more experimental rigor than was possible before. Many of these recent advances were achieved using experimental apparatuses originally designed by Mervyn Paterson. By combining the experimental data with new geophysical observations taken on the field and crustal scale, and with improved computational capabilities, it is now feasible to implement more sophisticated dynamic models of lithospheric deformation. The session will cover four thematic topics from laboratory, field, and modeling perspectives: (1) Melt migration and the rheology of partially molten rocks; (2) interrelationships among fluid flow, permeability, and deformation; (3) the role of water and chemical impurities for high-temperature creep of rocks; (4) high-strain deformation, the evolution of microstructure and textures, and shear localization.

**Conveners:** Brian Evans, Department of Earth, Atmospheric and Planetary Sciences 54-718, Massachusetts Institute of Technology, Cambridge, MA 02139, Tel: 617-253-2856, Fax: 617-253-0620, E-mail: [brievans@MIT.EDU](mailto:brievans@MIT.EDU); and Georg Dresen, GeoForschungsZentrum Potsdam Telegrafenberg D425, 14473 Potsdam, Germany, Tel: 011-49-331- 288 1320, Fax: 011-49-331- 288 1328, E-mail: [dre@gfz-potsdam.de](mailto:dre@gfz-potsdam.de)

### **MR05 Stick-slip dynamics in geological and geophysical systems**

Understanding the processes of and controls on stick-slip events on different scales is fundamental to problems in a range of physical science disciplines that include tribology, engineering, structural geology and geophysics. Understanding stick-slip dynamics is also important for theoretical and applied problems as diverse as friction dynamics, fluid flow, stress-strain relations, earthquake hazard and glacier motion. This session aims to examine theoretical and applied aspects of stick-slip processes from a range of geological and geophysical systems, and to promote interdisciplinarity within the physical sciences. A key outcome is a better understanding of stick-slip mechanics in a range of experimental and environmental settings.

**Conveners:** Jasper Knight, Glacial Research Group, School of Environmental Studies, University of Ulster, Coleraine Co Londonderry, Northern Ireland, BT52 1SA, UK, Tel: +44 (0)28 7032 3179, Fax: +44 (0)28 7032 4911, E-mail, [j.knight@ulst.ac.uk](mailto:j.knight@ulst.ac.uk)

#### **MR06 Plate Tectonics And Self-Organization**

The symposium will emphasize some of the broader questions of plate-mantle dynamics such as:

- \* Why do we have plate tectonics at all?
  - \* Why are there 12 +- plates presently?
  - \* Why are plates organized the way they are?
  - \* What is the underlying physics leading to the tectonic style of self organization?
  - \* Do plates control mantle convection and mantle cooling?
  - \* What defines a plate?
  - \* What makes plate boundaries?
  - \* What about plate tectonics in the Archean?
  - \* What of the style of tectonics on other planets, and why is Earth (as far as we know) unique?
  - \* In far-from-equilibrium systems the source of the dissipation is as important as the driving forces. What and where is the dissipation in the plate tectonic system? Is the Minimum Dissipation Principle useful? We are still far from answering many of the first order questions of global dynamics. Thus, the goal is to organize a session that both reviews progress in our understanding of why we have plate tectonics, and but also tries to look at the problem in different ways. This session will focus on the top of the mantle and the role of the plates and the lithosphere in mantle dynamics and volcanism and evolution of the Earth. The idea that open systems far from equilibrium (and not at critical points) can organize themselves has been fruitful in many areas of science. One attribute of the thermodynamic approach is the ability to provide a unified description of wide classes of systems that is largely independent of the details of the on-going process. Dissipation - a ubiquitous feature of nonequilibrium thermodynamics - is central to self-organization in these systems, but where and how the energy is released is unique to each system
- Conveners: Don L. Anderson, Seismological Laboratory, California Institute of Technology, MC 252-21, Pasadena, CA 91125, USA, Tel: 626-395-6901, Fax: 626-564-0715, E-mail: [dla@gps.caltech.edu](mailto:dla@gps.caltech.edu); and David Bercovici Yale University, Dept. Geology & Geophysics, PO Box 208109, New Haven, CT 06520-8109, USA, Tel: 203-432-3168, Fax: 203-432-3134, E-mail: [David.Bercovici@yale.edu](mailto:David.Bercovici@yale.edu)

#### **MR07 Structure and Evolution of Earth's Deep Mantle** (Joint with T, S, G, GP, V, DI)

Several recent developments highlight the deep mantle as a region of fundamental importance in understanding the Earth's structure, dynamics, and thermal and chemical evolution. The ultimate fate of downgoing slabs has been brought into question by seismic tomographic models of unprecedented clarity, showing that they penetrate to the CMB in some areas but not in others, and by mineral physics estimates of slab density contrast, suggesting that they may become neutrally buoyant. Mass balance arguments call the concept of a lower mantle as the "graveyard" of oceanic plates into question. Discoveries of ultra low seismic velocities and anisotropy in the very deepest mantle raise questions about the nature of this region, and about mantle-core interaction. Plumes and other upwellings rising from this region may be strongly influenced by such structures. Increasing evidences of chemical heterogeneity and layering in the deep mantle have led to new models and ways of reconciling geochemical and geophysical data. Indeed, the understanding of lower mantle chemistry is key to the the understanding of planetary compositions, early mantle and core differentiation and further chemical evolution. One of the most challenging issues in mantle convection is that of the mixing time in this part of the mantle. We welcome presentations that address these and related issues using any approach, including geophysical, seismological and geochemical.

**Conveners:** Paul J. Tackley, Department of Earth and Space Sciences and Institute of Geophysics and Planetary Physics, UCLA, Los Angeles, CA, Tel: 310- 206-9180, Fax: 310- 825-2779, E-mail: [ptackley@ucla.edu](mailto:ptackley@ucla.edu); Francis Albarede, Ecole Normale Supérieure de Lyon, 46 Allée d'Italie, 69364 Lyon cedex 7, France, Tel: 33+ 472 72 84 14, Fax: 33+ 472 72 86 77, E-mail: [albarede@ens-lyon.fr](mailto:albarede@ens-lyon.fr); and Robert D. van der Hilst, Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge MA 01239, USA, Tel: 617- 253 6977, Fax: 617-258-9697 E-mail: [hilst@mit.edu](mailto:hilst@mit.edu)

## NONLINEAR GEOPHYSICS COMMITTEE

### **NG01 Scaling and Fractals in Geophysics: In Honor of Mandelbrot's 50<sup>th</sup> Jubilee** (Joint with A, B, H, OS, S, T, V)

This session is in honor of the contributions of Benoit B. Mandelbrot, the father of fractals, who will be the keynote speaker. The concept of fractals is integral to scaling and has been found to apply to many earth processes and patterns. Iterative mathematical models that generate fractal patterns in space and time have also been extensively applied to earth processes and patterns. This session will provide both a review of the impact of scaling and fractals in geophysics and an overview of the current state of research. Although we will have several key invited speakers, we strongly encourage both oral and poster contributions from all parts of the scientific community.

**Conveners:** Christopher Barton, U.S. Geological Survey, 600 4<sup>th</sup> St., South, St. Petersburg, FL 33701, USA, Tel: +1-727-803-8747 (x3014), Fax: +1-727-803-2030, E-mail: barton@usgs.gov; Sarah F. Tebbens, College of Marine Sciences, University of South Florida, 140 7<sup>th</sup> Ave., South St. Petersburg, FL 33701, USA, Tel: +1-727-553-1538, Fax: +1-727-553-3966, Cellular: 727-804-2361, E-mail: tebbens@marine.usf.edu.

### **NG02 Self-Organizing Complex Earth Systems** (Joint with A, GP, OS, S, T)

Self-organization is often a result of strongly correlated dynamics arising in high-dimensional nonlinear systems, and is usually the consequence of interactions between the various parts of the system. Self-organization in complex geosystems can lead to space-time patterns, scaling, nucleation, mean field behavior and other dynamical phenomena. Examples of such systems include the following: the Earth's fluid mantle; the Earth's geodynamo; earthquake faults; surface-forming, erosion and other geomorphic processes; river networks; volcanic complexes; ecological and other biological systems in rivers, estuaries and oceans; and turbulent eddies in the atmosphere and oceans. This special session will seek to explore the (possibly) common origins of these self-organizing processes, as revealed by the dynamical phenomena in each system. We are particularly interested in papers and research whose goal is to unify seemingly disparate phenomena into a common physical and analytical framework.

**Conveners:** Donald L. Turcotte, Department of Geological Sciences, Cornell University, Snee Hall, Ithaca, NY 14853-1504 USA, Tel: +1-607-255-7282, Fax: +1-607-254-4780, E-mail: turcotte@geology.cornell.edu; John Rundle, Colorado Center for Chaos & Complexity, University of Colorado, Boulder, CO 80309 USA, Tel: +1-303-492-5642, Fax: +1-303-492-5070, E-mail: rundle@cires.colorado.edu

### **NG03 Linking Observations to Models in Geomorphology and Hydrology** (Joint with A, B, H, T)

Data in geomorphology and hydrology encompass a remarkable range of scales in space and time. This diversity is a particular problem for those interested in understanding the larger scale and/or long-term dynamics of geomorphic processes, because many questions of scaling, resolution and sampling need to be solved before we can make use of all the pertinent data. This problem is exacerbated by the fact that within the framework of process-based geomorphology and hydrology, data tend to be acquired at small spatio-temporal scales. The purpose of the session is to address these scaling questions. We welcome papers that link regional scale data, process-based understanding, and modeling with field observations such as rainfall data, hydrographs, cosmogenic isotope measurements, streamflow chemistry, bedrock erosion-rate estimates and others. Studies that incorporate the non-linear variability and stochastic nature of geomorphic processes, links between different process domains, and the biases introduced by measurement resolution, into physically based models of landscape behavior are particularly encouraged.

**Conveners:** John Wainwright, Dept. of Geography, King's College London, Strand, WC2R 2LS London, UK, Tel: +44-207-848-2487, Fax: +44-207-848-2287, E-mail: john.wainwright@kcl.ac.uk; Colin P. Stark, LDEO of Columbia University, Route 9W, Palisades, NY 10964, USA; Tel: +1-845-365-8742; Fax: +1-845-365-8156; E-mail: cstark@ldeo.columbia.edu

### **NG04 Nonlinearity and Complexity in the Biogeosciences** (Joint with B, H, OS)

Many different kinds of complexity arise from the interaction of biological and geophysical systems. The dynamics within and between each of these systems can span across many spatial and/or temporal scales. This special session will explore nonlinearities, chaotic behavior, emergent phenomena, persistence and the complex feedbacks within and between biological and geophysical systems. Observational and theoretical submissions are welcome. Of particular interest are those submissions that integrate across different disciplines. Topics appropriate to this special session are many, but examples include the quantification and comparison of ordering statistics in biological systems to geophysical systems (e.g. comparing leaf veins to drainage networks), the comparison of extreme event statistics in ecological and geophysical systems (e.g. actual forest fires compared to earthquakes, landslides, and cellular automata models), and the study of long- and short-range persistence in the biogeosciences. Both oral and poster submissions

are welcome.

**Conveners:** Bruce D. Malamud, Dept. of Geography, King's College London, Strand, WC2R 2LS London, UK, Tel: +44-207-848-2466, Fax +44-207-848-2287, E-mail: [bruce@malamud.com](mailto:bruce@malamud.com); Sarah F. Tebbens, College of Marine Sciences, University of South Florida, 140 7<sup>th</sup> Ave., South St. Petersburg, FL 33701 USA, Tel: +1-727-553-1538, Fax: +1-727-553-3966, Cellular: 727-804-2361, E-mail: [tebbens@marine.usf.edu](mailto:tebbens@marine.usf.edu).

#### **NG05 General Earthquake Models: Current Status and Results (Joint with T)**

General earthquake models (GEM) represent an emerging new field of geophysical research focused on modeling and interpreting the behavior of earthquake fault systems. Rapid advances are being made today as a direct result of recent developments in modern computational hardware and software, the evolving information technology and digital communications infrastructure, and the rapidly growing quantity and quality of solid earth geophysical data sets, from GPS and broadband seismic networks, to interferometric SAR. For this session, papers are solicited that examine the interaction of these computer models, in their various current incarnations, with the available data, and what particular problems are currently being worked on with these models and simulations. We anticipate papers that focus on what the current GEM-type models have already told us, what questions are being studied at the present time, and what is both necessary and possible for the future application of these models to geophysical data sets. One such example might be the application of these models to stress transfer or remote triggering, although there are, of course, many other possibilities.

**Conveners:** Kristy Tiampo, CIRES, University of Colorado, UCB 216, Boulder, CO 80309-0216 USA, Tel: +1-303-492-4779, Fax: +1-303-492-5070, E-mail: [kristy@fractal.colorado.edu](mailto:kristy@fractal.colorado.edu); Terry Tullis, Dept Geological Science, Brown University, Providence, RI 02912-1846 USA, Tel: +1-401-863-3829, Fax: +1-401-863-2058, E-mail: [terry\\_tullis@brown.edu](mailto:terry_tullis@brown.edu); Andrea Donnellan, JPL, MS 126-347, 4800 Oak Grove Dr, Pasadena, CA 91109-8099 USA, Tel: +1-818-354-4737, Fax: +1-818-393-5471, E-mail: [donnellan@jpl.nasa.gov](mailto:donnellan@jpl.nasa.gov).

#### **NG06 Visualization and Analysis of Very Large Geophysical Data Sets (Joint with A, G, GP, H, OS, T)**

Very large, multivariate data sets such as those obtained by remote sensing and those generated by simulations are common in the geosciences. Key features of these data include the simultaneous measurement of many quantities nearly continuously in time and space, nonlinear relationships, and phenomena existing at multiple scales of spatial and temporal resolution. Traditional data analysis and visualization techniques focus on one quantity at a time so maps and time series can be easily visualized. This session is a forum for presentation and discussion of techniques that reveal high-order nonlinear relationships within and between multiple scales of resolution, and their evolution across time and/or space in large data sets. Techniques of interest may include, but are not limited to novel graphic displays, animation, dimension reduction, visualization tools for decompositions (e.g. wavelets), nonlinear magnification, and other scientific visualization methods. Case studies and examples from all areas of geoscience are welcome.

**Conveners:** Amy Braverman, Mail Stop 169-237, Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109-8099, USA, Tel: +1-818-354-6168 Fax: +1-818-393-4619, E-mail: [amy@jrd.jpl.nasa.gov](mailto:amy@jrd.jpl.nasa.gov); Kristy Tiampo, CIRES, University of Colorado, UCB 216, Boulder, CO 80309-0216 USA, Tel: 303-492-4779, Fax: +1-303-492-5070, E-mail: [kristy@fractal.colorado.edu](mailto:kristy@fractal.colorado.edu)

#### **NG07 Predictability, Data Assimilation, and Ensemble Forecasting (Joint with A, OS)**

Operationally, it is impossible to disentangle predictability from issues associated with data assimilation and ensemble forecasting. The primary aim of this session is to explore the interplay between these three areas given the reality of imperfect models in geophysical sciences. While submissions on any aspect of the above areas are welcome, we encourage presentations on topics such as the relative roles of model error and initial condition error on limiting predictability, the utilization of flow-dependent uncertainty information contained in short-term forecasts when performing data assimilation, the interpretation of probabilistic information in ensemble forecasts using imperfect models, etc.

**Conveners:** Leonard Smith, Oxford University, 24-29 St Giles', Oxford, OX1 3LB, UK, Tel: +44-1865-270-517, Fax: +44-1865-270-515, E-mail: [lenny@maths.ox.ac.uk](mailto:lenny@maths.ox.ac.uk); James Hansen, Earth, Atmospheric, and Planetary Sciences, Room 54-1721, Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge, MA 02139, USA, Tel: +1-617-253-5935, E-mail: [jhansen@mit.edu](mailto:jhansen@mit.edu).

### **NG08 Nonlinear Structure of Geophysical Processes Before and After Catastrophic Events** (Joint with A, H, S)

The prognosis of natural disasters is difficult without understanding the inherent dynamical regularities of the underlying geophysical processes. At the same time, the very complicated though nonrandom character of the dynamical behavior of natural disasters do not allow the successful use of traditional approaches in time series analysis and prognosis. From this point of view, the nonlinear structure of geophysical process dynamics becomes important. We solicit papers that apply modern methods of differentiation and filtering of natural processes having different time scales; time series analysis and concepts for detecting nonlinear structure in the dynamics of natural processes both before and after catastrophic events; quantitative studies of the nonlinear structure of geophysical processes; and finally, studies aimed at forecasting natural disasters and constructing suitable model equations for real complex dynamics.

**Conveners:** Tamaz L. Chelidze, Teimuraz N. Matcharashvili, Institute of Geophysics, 1 Alexidze Str., Tbilisi 380093, Georgia, Tel: +995-32-94-35-91, Fax: +995-32-33-28-67, E-mails: tamaz@geopht.acnet.ge and [tnmat@hotmail.com](mailto:tnmat@hotmail.com)

## **PUBLIC AFFAIRS**

### **PA01 Natural Hazards, U.S. Energy Policy, and Climate Change: Making National Decisions in a Global Environment**

Policy makers in the White House and U.S. senate are grappling with the twin problems of making the country more resilient to natural hazards and implementing a coherent energy strategy. Scientific uncertainty regarding the magnitude and extent of future climate change requires that energy and natural hazards policies for the U.S. have a long-term, global aspect. An improved scientific understanding of the magnitude and extent of nature's extreme events should underpin an improved policy response towards natural disasters. A successful energy policy also must take into account what scientists know and what policy makers need to know regarding the consequences of a changing energy supply today and in the future. For example, will energy policies developed in the near future exacerbate extreme weather and climate events? In the future, the U.S. energy infrastructure will become increasingly interconnected and potentially more vulnerable to disruption as a result of extreme natural events, like earthquakes, hurricanes, floods, severe weather, and space weather. Senators John Edwards (D-NC) and Ted Stevens (R-AK), co-chairs of the Congressional Natural Hazards Caucus, will address what they are doing to make the nation more resilient to natural hazards. Vice-President Dick Cheney will discuss the Bush Administration's energy policy proposal. All three speakers will comment on how geophysical sciences can and should inform their efforts to implement an energy policy that does not leave the nation's energy infrastructure exposed to natural hazards. This would be a first day, 5:30-6:30 evening slot.

**Conveners:** Peter Folger, AGU, Washington DC, USA, E-mail: [Pfolger@aug.org](mailto:Pfolger@aug.org); Tel: +1-202-777-7509, and Jack D. Fellows, UCAR, Boulder Colorado, Tel: +1-303-497-8655, E-mail: [jfellows@ucar.edu](mailto:jfellows@ucar.edu)

### **PA02 Showcase Sessions with a Natural Hazards Research and Policy Focus**

The Science of Abrupt Climate Change and the Implications for Public Policy. In the past few decades, the research community has focused great attention on gradual physical changes in global and regional climate regimes. Recently, however, there has been a growing awareness that the earth's climate system can shift abruptly from one climate state to another. Significant attention is now being focused on this issue, but many major gaps in the understanding of abrupt climate changes still exist. The rate, magnitude, and regional extent of these abrupt transitions to different climate states could have far-reaching implications for society and ecosystems. This potential provides strong motivation to better understand the impacts of abrupt climate change and the need for modifications to public policy to deal with these changes. This session will bring together a broad range of scientists investigating abrupt climate change as well as those investigating the societal and ecological impacts of these changes to discuss the current understanding of abrupt climate change, assess proposed mechanisms for such changes, and discuss their potential impacts on society.

**Conveners:** Richard Alley, Pennsylvania State University, 204A Deike Building, University Park, PA 16804-3000, Tel: 814-863-1700, E-mail: [ralley@essc.psu.edu](mailto:ralley@essc.psu.edu); Alexandra R. Isern, Ocean Studies Board, National Research Council, 2101 Constitution Ave. NW, Washington, D.C. 20418, Tel: 202-334-2742, E-mail: [aisern@nas.edu](mailto:aisern@nas.edu); Peter Folger, AGU, Washington DC, Tel: 202-777-7509, E-mail: [pfolger@agu.org](mailto:pfolger@agu.org); and Jack D. Fellows, UCAR, Boulder Colorado, Tel: 303-497-8655, E-mail: [jfellows@ucar.edu](mailto:jfellows@ucar.edu)

## **PALEOCEANOGRAPHY AND PALEOCLIMATOLOGY**

### **PL01 Milankovitch and Climate - 25 Years Later** (Joint with U, A)

In commemoration of the 25th anniversary of the historic paper by Hays, Imbrie, and Shackleton on the "Pacemaker of the ice ages", we propose an all-day oral session to be jointly sponsored by the AGU committees on Global Change and Paleoceanography and Paleoclimatology and the Ocean and Atmospheric Sciences

Sections. The publication of Hays et al. paper was a watershed event in the history of paleoclimatology that resulted in a greatly increased acceptance of the role of orbital insolation variations on the Pleistocene glaciations. Subsequent work confirmed these findings, expanded the influence to the pre-Pleistocene, and provoked a host of climate modeling studies that have attempted to explain the linkages associated with the orbital pacemaker. The proposed format for the sessions will be a mixture of 20-minute invited talks in and contributed abstracts (an additional poster session is also possible). We request that at least the morning be an all-Union session. The sessions will focus on a broad spectrum of topics related to orbital insolation forcing and climate, including a retrospective element, advances in the field (both observations and modeling, both Pleistocene and pre-Pleistocene), and possible linkages with higher frequency fluctuations.

**Conveners:** Thomas J. Crowley, Dept. of Oceanography, Texas A&M University, College Station, Texas 77840, Tel: 979-845-0795, Fax: 979-847-8879, E-mail: [tcrowley@ocean.tamu.edu](mailto:tcrowley@ocean.tamu.edu); Warren Prell, Dept. of Geological Sciences, Brown University Providence Rhode Island, Tel: 401-863-3221, Fax: 401-863-2058, E-mail: [warren\\_prell@brown.edu](mailto:warren_prell@brown.edu)

#### **PL02 Amplitude and Phasing of Tropical Temperature Signals During the Quaternary**

Detailed reconstructions of past tropical temperatures are crucial for our understanding of the sensitivity of the climate system to radiative perturbations, as well as for any assessment of the importance of tropical climate variability on global climate change. This session solicits papers on the temporal evolution of tropical ocean and continental temperatures during the Quaternary, both on orbital and millennial timescales. The questions to be addressed include, but are not limited to, 1) What are the regional amplitudes of maximum glacial cooling in the tropics derived by various proxy parameters, including faunal indicators, alkenone thermometry, groundwater, foraminiferal and coralline geochemical indicators, and snow line reconstructions?; 2) When did the most prominent changes in temperature occur? and, 3) What is the phase relation between indicators of local/regional temperature change and other parameters indicative of local/global climate change, both in the time domain (e.g., the last deglaciation) and the spectral domain?

**Conveners:** M. Kienast, Dept. of Earth and Ocean Sciences, University of British Columbia, 6270 University Blvd., Vancouver, B.C., V6T 1Z4 Canada, Tel: (604) 822-6836, Fax: +1-604-822-6091, E-mail: [kienast@unixg.ubc.ca](mailto:kienast@unixg.ubc.ca); D. W. Lea, Dept. of Geological Sciences, University of California, Santa Barbara, CA 93106-9630, USA, Tel: 805-893-8665 or 805-893-7182, Fax: 805-893-2314, E-mail: [lea@geol.ucsb.edu](mailto:lea@geol.ucsb.edu); Y. Rosenthal, Institute of Marine and Coastal Sciences, and Dept. of Geology, Rutgers, The State University, 71 Dudley Road, New Brunswick, NJ 08901-8521, USA, Tel: 732-932-6555 x250, Fax 732-932-8578, E-mail: [rosentha@imcs.rutgers.edu](mailto:rosentha@imcs.rutgers.edu)

#### **PL03 Interpreting the Sea Level Record: Advancements from Ocean Drilling**

Changes in sea level are a primary feature of the earth system and these changes are the architects of our continental margins. Sedimentary sequences from both carbonate and siliciclastic environments record sea level through the presence of regional stratal discontinuities that are believed to be globally synchronous in nature. The response of a given sedimentary system to eustatic variations differs due to subsidence rate, rate of sediment supply, abundance of carbonate versus siliciclastic sediment, local energy regimes, compaction history, and the physiography of the depositional surface. Because of this complexity, precise dating and detailed investigations of stratigraphic successions at well-chosen locations is required. The Ocean Drilling Program has devoted various legs to sea level investigations. Scientific results from these legs provide the primary mechanism to advance our understanding of eustasy and its influence on sedimentary architectures. This session will compare and integrate the results from the Ocean Drilling Program legs devoted to sea level investigations. The aim is to describe the current state of knowledge concerning the record of sea level in various depositional environments including the rates, amplitudes, and mechanisms of eustatic change.

**Conveners:** Alexandra R. Isern (Ocean Studies Board, National Research Council, 2101 Constitution Ave. NW, Washington, D.C. 20418, (202) 334-2742, [aisern@nas.edu](mailto:aisern@nas.edu)); Flavio Anselmetti (Geological Institute, Swiss Federal Institute of Technology, Zurich, Switzerland, 8092, 41-1-632-6569, [flavio@erdw.ethz.ch](mailto:flavio@erdw.ethz.ch)); Ken Miller (Department of Geology, Rutgers University, Piscataway, NJ, 08854, (732) 445-3622, E-mail: [kmg@rci.rutgers.edu](mailto:kmg@rci.rutgers.edu)); Gregor Eberli (RSMAS, University of Miami, 4600 Rickenbacker Causeway, Miami, FL, 33149, (305) 361-4678, [geberli@rsmas.miami.edu](mailto:geberli@rsmas.miami.edu))

#### **PL04 Transient Climate Events in the Geological Record**

Transient climate events have been the focus of much investigation in the past decade due to the possibility that such events are the most likely candidates for modelling the impact of human activities on the modern Earth climatic system. This session will endeavour to document transient climate events in the >pre-Quaternary= geological record and illustrate in detail how these events have had a profound impact on the climate and biotic evolution in Earth systems. The talks will primarily focus on >high-resolution records from the oceanic and/or atmospheric reservoirs.

**Conveners:** Darren R. Gröcke, Department of Geology, Royal Holloway University of London, Egham Hill, Egham, Surrey TW20 0EX England, Tel: +44 (0) 1784 414 038, Fax: +44 (0) 1784 471 780, E-mail: [d.grocke@gl.rhul.ac.uk](mailto:d.grocke@gl.rhul.ac.uk); James Zachos, Earth Sciences Department, University of California, Santa Cruz, California 95064 USA, Tel: +1-831-459-4644, Fax: +1-831-459-3074, E-mail: [jzachos@emerald.ucsc.edu](mailto:jzachos@emerald.ucsc.edu); Heather Stoll, Departamento de Geología, Universidad de Oviedo Arias de Velasco s/n, Oviedo, Asturias 33005 SPAIN, Tel: +34 985 102 934, Fax: +34 985 103 103, E-mail: [heather.stoll@asturias.geol.uniovi.es](mailto:heather.stoll@asturias.geol.uniovi.es)

#### **PL05 Paleoclimates of the Western Pacific Marginal Basins**

Sediment of the western Pacific Marginal basins monitor a variety of climate processes and provide a wealth of paleoclimate information on diverse timescales. This special session will provide an ideal opportunity to synthesize results from recent international cruises to the region aboard R/V Sonne, ODP Leg 184, IMAGES WEPAMA cruises aboard Marion Dufresne, and other vessels. Climate themes important in the region include variability in the Kuroshio Current, the influence of sea level and climate change on Indonesian through flow, the impact on the maritime continent on glacial-interglacial climate, terrestrial-marine climate teleconnections, low-latitude to high-latitude climate teleconnections, Late Cenozoic development of the Asian Summer and Winter Monsoon, Millennial scale climate of the western Pacific, and Warm Pool variability. Submissions of observational and modeling studies of the region on various timescales are welcome.

**Conveners:** Min-Te Chen; Institute of Applied Geophysics; National Taiwan Ocean University Keelung 20224, TAIWAN; Tel: 886 (2) 2462-2192 x6503; 6504; Fax: 886 (2) 2462-5038; E-mail Address: [mtchen@mail.ntou.edu.tw](mailto:mtchen@mail.ntou.edu.tw); Joseph D. Ortiz; Lamont-Doherty Earth Observatory of Columbia University; P.O. Box 1000; 61 Route 9W; Palisades, NY 10964-8000; Tel: (845) 365-8715; Fax: (845) 365-8155; E-mail: [jortiz@ldeo.columbia.edu](mailto:jortiz@ldeo.columbia.edu)

#### **PL06 Last Glacial Maximum Circulation Revisited**

The Last Glacial Maximum (LGM, around 21 kyr BP calendar) is one of the best targets for a comprehensive study of Earth's extreme climates, in particular for the study of climate change processes and model development. The aim of this session is to bring together different approaches (new proxy calibration, data and modeling studies) to establish the basis for a state-of-the-art knowledge on LGM circulation and dynamics. Contrasting results from different proxies have sustained the debates on the glacial ocean intermediate and deepwater geometry and chemical and physical properties. Modeling studies, using a wide range of approaches and model complexity, have been used to gain insight into the glacial ocean circulation and its stability. Contributions on ongoing studies in preparation for this undertaking are solicited. This session will help to prepare the next EPILOG (Environmental Processes of the Ice Age: Land, Oceans, Glaciers) workshop on LGM ocean circulation and dynamics. EPILOG has been initiated within IMAGES (International Marine Global Change Study) to facilitate international collaboration for a better knowledge of the Last Glacial Maximum Climate.

**Conveners:** Elisabeth Michel, Laboratoire des Sciences du Climat et de l'Environnement, CNRS-CEA, Domaine du CNRS, Allée de la Terrasse, 91198 Gif-sur-Yvette Cedex FRANCE, Tel: 33 1 69824327, Fax: 33 1 69823568, E-mail: [elisabet@lsce.cnrs-gif.fr](mailto:elisabet@lsce.cnrs-gif.fr); Delia Oppo, Geology & Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543

#### **PL07 Paleoclimate and Paleoceanographic Records in the Mediterranean Sea**

Sediments of the Mediterranean Sea provide a particularly rich record of changes in regional and global paleoclimate and paleoceanography. These changes have occurred at a variety of scales and thereby reveal different aspects of the processes that participate in the evolution and modification of world climate. Alternations of organic-carbon-rich sapropels and Anormal@ sediments appear in exposed sections from the late Miocene, become common in Pliocene deep-sea sequences, and continue into the Holocene. The sapropels record paleoceanographic changes that are linked to orbital climate cycles, and they have also been considered possible analogs for Mesozoic black shales. Temporal and geographic differences in sapropel occurrence indicate regional overprinting and sometimes amplification of the global processes, and sapropels of the same age differ systematically in deep-water and margin paleosettings. In addition, Pleistocene sub-orbital variations in North Atlantic and Indian Ocean paleoceanography have been telecommunicated to the Mediterranean Sea and appear in its sediment records. Furthermore, laminated sections exist in some settings and yield special histories of annual and near-annual alternations in paleoclimate. This session will provide a forum for describing, comparing, and interpreting Neogene and Quaternary paleoclimatic and paleoceanographic records from cored sediments and outcrop sections in the Mediterranean area and relating these records to global processes. It will also welcome fresh overviews of the similarities and differences between Mediterranean sapropels and Mesozoic black shales to help understand processes involved in accumulation of organic-carbon-rich sediments in general.

**Conveners:** Philip A. Meyers, Dept of Geological Sciences, 425 East University Ave., Ann Arbor, MI 48109-1063, Tel: 734-764-0597, Fax: 734-763-4690, E-mail: [pameyers@umich.edu](mailto:pameyers@umich.edu); Alessandra Negri, Istituto di Scienze del Mare, Universita di Ancona, Italy, E-mail: [anegri@popcsi.unian.it](mailto:anegri@popcsi.unian.it)

**PL08 Lacustrine Paleoclimatology: Linking Modern Processes with the Stratigraphic Record**

Climate affects lakes both directly and indirectly through a diverse array of processes. Similarly, the stratigraphic signature of climate variability is influenced by a variety of depositional and post-depositional processes. Thus, a unique climatic interpretation of the stratigraphic record is often impossible. Here we consider studies that try to understand and constrain the climatic interpretation of lacustrine sedimentary records by incorporating studies of lacustrine and climatic processes. We seek contributions from the PEPI transect (the Americas) and elsewhere that include empirical or modeling studies of lake energy and hydrologic budgets or groundwater-lake interactions, studies based on modern calibration data sets, or laboratory studies that consider physical, chemical, and/or biotic variation.

**Conveners:** Sherilyn C. Fritz, Department of Geosciences, University of Nebraska, Lincoln, NE 68588-0340, [sfritz2@unl.edu](mailto:sfritz2@unl.edu); and Geoffrey O. Seltzer, Department of Earth Sciences, Syracuse University, Syracuse, NY 13244-1070, [goseltze@mailbox.syr.edu](mailto:goseltze@mailbox.syr.edu).

**PL09 Antarctic Glacial Evolution: The Marine Geologic Record**

The last few years have seen several expeditions to the Southern Ocean (here broadly defined as the ocean between the Southern Capes and Antarctica) that are now yielding remarkable results. ODP Legs 177, 178, 188, and 189, the Cape Roberts Project, the Italian-Australian WEGA Cruise 2000, various Palmer and Polarstern cruises, etc., all provided high-quality sedimentary records of Antarctic cryogenic evolution. We propose to schedule a Special Session (or several sessions, depending on number of submissions) that deals with this evolution as reflected in Southern Ocean and continental-margin sediments, and on million-year to centennial time scales. Abstracts dealing with all aspects of this research, and including all methodologies, such as geochemical, geophysical, paleomagnetic stable-isotopic, paleontologic, and sedimentologic methods, are welcome. We aim to provide a venue for the exchange of ideas and opinions for researchers engaged in Southern-Ocean studies. Abstracts resulting from dissertation or thesis research are particularly welcome.

**Conveners:** Detlef A. Warnke, Dept. of Geological Sciences, California State University, Hayward, CA 94542-3088, Tel.: 510-885-4716, Fax: 510-885-2526, E-mail: [dwarnke@csuhayward.edu](mailto:dwarnke@csuhayward.edu); Gabriel Filippelli, Dept. of Geology, Indiana University - Purdue University Indianapolis, 723 W. Michigan St., Indianapolis, IN 46202-5132, Tel.: 317-274-7484, Fax: 317-926-7966, E-mail: [gfilippe@iupui.edu](mailto:gfilippe@iupui.edu)

**PL10 Millennial-Scale Climate Variability of the Last 80,000 Years (IMAGES)**

The members of the SCOR Working Group 117 on millennial climate variability in conjunction with the IMAGES program, would like to propose a special session to be held during the AGU meeting in December, 2001. The working group was established in 2000 to facilitate a synthesis of global records of millennial-scale climate variability of the last 80,000 years. Such a goal requires advances in chronology, data collection, proxy development, and modeling of the ocean, atmosphere and cryosphere. A special session would therefore have a wide interest for members of AGU, certainly in Ocean Sciences, but also in related areas of PP, SIP, Atmospheric Sciences, Climate Change, and consequently Union. For this reason, we propose the special session for OS, but will also consider your suggestions regarding cross listing the session or holding it under the Union heading. The session would be chaired by Michael Sarnthein (University of Kiel), Jim Kennett (UC Santa Barbara) and me. I can serve as the contact person, and my information is listed below. The session will focus on recent advances in chronology, proxy data, and modeling studies that help to provide a synthesis of decadal to millennial variability in the earth system during the last 80 kyr. We will encourage papers that present high resolution results from terrestrial, marine and ice sheet locations, particularly those with annual-layer or other detailed chronologies. Evidence constraining the spatial and temporal variability in C-14 production rate and reservoir ages, errors associated with U-series dating, and efforts to constrain and model C14 as a paleoceanographic tracer during climatic extremes will also be included. Special emphasis will be placed on studies that seek to develop a better understanding of telecommunication processes on sub-orbital time scales, through evaluation of spatial homogeneity or heterogeneity, or frequency analysis of robust cyclicities to determine leads and lags.

**Conveners:** Jerry McManus, 121 Clark MS #23, Department of Geology and Geophysics, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, 508 289-3328 Office, 508 289-2175 Fax, E-mail: [jmcmamus@whoi.edu](mailto:jmcmamus@whoi.edu); Michael

Sarnthein (University of Kiel), Jim Kennett (UC Santa Barbara)

#### **PL11 Glacial/Interglacial Changes in the Carbonate Chemistry of the Deep Ocean**

The mechanism that causes atmospheric CO<sub>2</sub> to change between glacial and interglacial periods remains a mystery. New observational constraints presented over the last ten years, e.g. ice core gases and isotopes, have narrowed the range of options. One of the most important missing pieces is a picture of how the CO<sub>3</sub><sup>=</sup> ion content of the deep ocean has changed. In this session we hope to learn about new proxies for deep sea CO<sub>3</sub><sup>=</sup> and the state of CaCO<sub>3</sub> preservation/dissolution on the sea floor. Contributions that explore the link between deep sea CO<sub>3</sub><sup>=</sup> and atmospheric CO<sub>2</sub> are also invited.

**Conveners:** J. R. Toggweiler, GFDL/NOAA, Princeton University, E-mail: [jrt@GFDL.NOAA.GOV](mailto:jrt@GFDL.NOAA.GOV); W. S. Broecker, Lamont-Doherty Earth Observatory, Columbia University, E-mail: [broecker@ldeo.columbia.edu](mailto:broecker@ldeo.columbia.edu)

#### **PL12 Modes and Mechanisms of Late Holocene Ocean and Climate Variability**

High-resolution Holocene paleoclimate records document quasiperiodic events recurring roughly every 1500 years. The most recent of these oscillations was the Little Ice Age (ca. 1300-1850 AD) and the Medieval Warm Period (ca. 800-1200 AD), for which there is abundant terrestrial paleoclimate evidence documenting significant departures from modern climate. Less well-known are the surface and deep paleoceanographic changes related to these events. This special session seeks to assemble presentations of very high-resolution, well-dated records of surface and deep ocean temperature, nutrient, and circulation variations associated with the LIA and WMP intervals so that we may better document the ocean's role in century- and millennial-scale Holocene climate variability during the Holocene. Well-dated terrestrial paleoclimate records spanning the late Holocene are welcome. Presentations addressing the possible mechanisms of late Holocene ocean and climate variability are also solicited from the modeling community.

**Conveners:** Peter B. deMenocal, Lamont-Doherty Earth Observatory of Columbia University, Geoscience 211, Route 9W, Palisades, NY 10964, Tel: +1-845-365-8483, Fax: +1-845-365-8165, E-mail: [peter@ldeo.columbia.edu](mailto:peter@ldeo.columbia.edu); Lloyd Keigwin, Woods Hole Oceanographic Institution, USA, E-mail: [lkeigwin@whoi.edu](mailto:lkeigwin@whoi.edu)

#### **PL13 Reconstructions of 19th Century Climate**

There is great potential to generate reconstructions of climate for the 19th century at fine spatial and temporal scales. Nineteenth century historical climate data exist for many parts of the world, and there is a wealth of high-resolution proxy data, such as from tree rings and corals, for this century as well. Many proxy records that extend only to the early 19th century have not been fully exploited because of their short length. However, this relatively dense network of historical and paleoclimatic data presents the opportunity to reconstruct regional climate at a fine scale for this century, over many parts of the world. Obtaining a high-resolution record of climate for the 19th century for much of the globe will play an important part in our understanding of the current and future climate. The 19th century is of particular interest because it contains climate events and/or characteristics not found in the 20th century (e.g., the conclusion of a period of relatively cold conditions -and some of the coldest years in centuries- for parts of North American and Europe; repeated droughts in the U.S. Great Plains; a high occurrence of hurricanes in the Atlantic), as well as fluctuations in solar irradiance and several highly explosive volcanic eruptions. The goal of this session is to pull together researchers who have studied the climate of this century in order to start generating a more complete picture of the climate of the 19<sup>th</sup> century, which appears to have been quite different, in some respect, from the 20th century.

**Conveners:** Connie Woodhouse, NOAA Paleoclimatology Program, 325 Broadway E/GC, Boulder, CO 80305 USA, Tel: (303) 497-6297, Fax: (303) 497-6513, E-mail: [Connie.Woodhouse@noaa.gov](mailto:Connie.Woodhouse@noaa.gov) or [woodhous@ngdc.noaa.gov](mailto:woodhous@ngdc.noaa.gov); Henry Diaz, NOAA/ERL Climate Diagnostics Center, Mail Code: R/CDC1, 325 Broadway, Boulder, CO 80303, Tel: (303) 497-6649, Fax: (303) 497-7013, E-mail: [hdiaz@cdc.noaa.gov](mailto:hdiaz@cdc.noaa.gov)

#### **PL14 Paleoceanography and Paleoclimatology: Observations and Modeling**

This general session seeks contributed papers on all topics within the fields of paleoceanography and paleoclimatology. Studies focusing on any combination of data interpretation, proxy calibration, and modeling are welcome. Spatial scales of interest for this session will include regional- and basin-scale studies to global, and temporal scales of interest will range from the Holocene to the Precambrian.

**Conveners:** Robert B. Dunbar, Geological and Environmental Sciences, Stanford University,

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