

Digital Atlas of Mexico Provides Accessible Climate Information

Modern geomatic technologies—and particularly geoscientific, digital, and online multimedia cartography—represent one response to the growing demand for climatic information by the scientific community and general users.

The Digital Climatic Atlas of Mexico (DCAM) fills the need to have readily accessible climate information about Mexico, Central America, and adjacent areas in preconfigured or user-configured georeferenced maps. The atlas provides information about the continental and oceanic climate, bioclimatic variables, and socioeconomic indicators (Figure 1).

Included in the atlas are long-term monthly means for air temperature; maximum and minimum air temperature; and precipitation (48 maps), sea surface temperature (SST), winds, and chlorophyll *a* concentration (36 maps). The atlas also includes the monthly anomalies of SST and chlorophyll *a* concentration for the previous 12 months (24 maps). In addition, the atlas includes 19 maps of bioclimatic parameters, which are useful for ecology studies; climate change projections of mean temperature and precipitation from two Intergovernmental Panel on Climate Change (IPCC) models for different years and scenarios (216 maps); and 48 maps of socioeconomic indicators such as total population, population density, gross domestic product (GDP), GDP spatial density, and IPCC A2 scenarios for these indicators for each decade from 2010 to 2100.

Access to the maps is based on menus with a hierarchical structure, providing users with easy access to the desired information. The information in the atlas is continually upgraded by adding more variables and updating those already included.

Features and Configuration of the DCAM

The atlas—part of the Information System for Biodiversity and Environment (Sistema de Informática para la Biodiversidad y el Ambiente), a multidisciplinary project of the Universidad Nacional Autónoma de México—was conceived to support scientific research, governmental and private activities, and geoscience education. The information is presented by means of two options: a map server and online maps. The atlas also offers files in Keyhole Markup Language (KML) format, which can be displayed in Google Earth™, Google Maps™, and Google Mobile™; and Web Map Service (WMS) protocol, an international standard that allows users to combine maps from the atlas with other kinds of information. The map data also can be downloaded in GeoTIFF metadata format.

The map server allows users to configure maps within a few seconds at different scales, combining images of climatic information with vector layers such as national,

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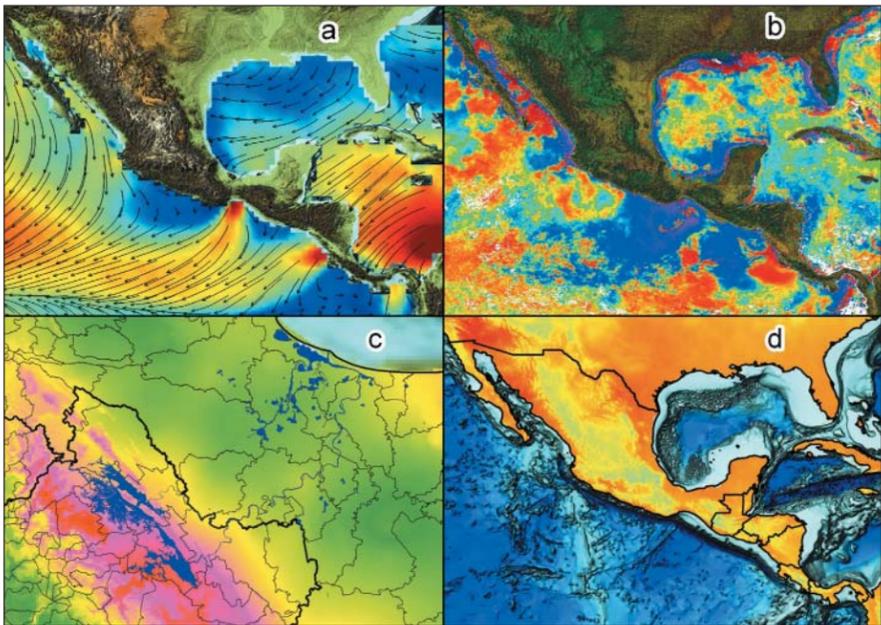


Fig. 1. Examples of maps from the Digital Climatic Atlas of Mexico. (a) January long-term monthly mean of 10-meter winds. (b) Anomaly of chlorophyll *a* concentration for January 2009. (c) Climatological precipitation for the rainiest month of the year over the Papaloapan basin (primarily in Veracruz), including state borders (bold lines) and county borders (thin lines). (d) August long-term monthly mean temperature and bathymetry from the General Bathymetric Chart of the Oceans.

Satellite Observations From the International Polar Year

To realize the benefit of the growing number of international satellites to the scientific objectives of the 2007–2008 International Polar Year (IPY), the Global Interagency IPY Polar Snapshot Year (GIIPSY) was established in November 2005 to develop a consensus on polar science requirements and objectives for IPY that could best and perhaps only be met using the Earth-observing satellites. Requirements focused on all aspects of the cryosphere and ranged from sea ice and ice sheets to permafrost and snow cover. Individual topics included how best to develop high-resolution digital elevation models of outlet glaciers using stereo-optical systems, measure ice sheet surface velocity using interferometric synthetic aperture radar (InSAR), and repeatedly measure sea ice motion using optical and microwave imaging instruments.

Because of this foresight, several IPY science objectives were well met using satellite observations, allowing a wealth of valuable data to be collected on cryospheric processes (Figure 1). Further, the framework for coordinating these remote sensing efforts serves as a valuable model for future coordinated efforts to monitor cryospheric dynamics.

IPY Space Task Group: Mission and Acquisition Objectives

Linking the GIIPSY science community to the international space agencies was facilitated through the IPY Space Task Group (STG). Although the IPY has ended, the STG has been continuing its activities. As of today, STG membership includes

representatives from the national space agencies of Brazil, Canada, China, France, Germany, Italy, Japan, Russian Federation, United Kingdom, United States, and both the European Space Agency (ESA) and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the latter two of which alone represent 26 nations.

The STG was established for the purpose of space agency planning, processing, and archiving of IPY Earth observation legacy data sets. The operating strategy for the group has been to satisfy IPY science requirements in a fashion that distributes the acquisition burden across the space agencies while recognizing the operational mandates that guide the activities of each agency.

The STG has met in full session five times. The first meeting was held in January 2007 at World Meteorological Organization headquarters, where based on GIIPSY recommendations [Drinkwater *et al.*, 2008], the group adopted four primary data acquisition objectives for its contribution to the IPY. These are (1) pole-to-coast multifrequency InSAR measurements for ice sheet surface velocity, (2) repeated fine-resolution synthetic aperture radar (SAR) mapping of the entire Southern Ocean sea ice cover for sea ice motion, (3) one complete high-resolution visible and thermal infrared snapshot of circumpolar permafrost, and (4) pan-Arctic high- and moderate-resolution snapshots of freshwater (lake and river) freeze-up

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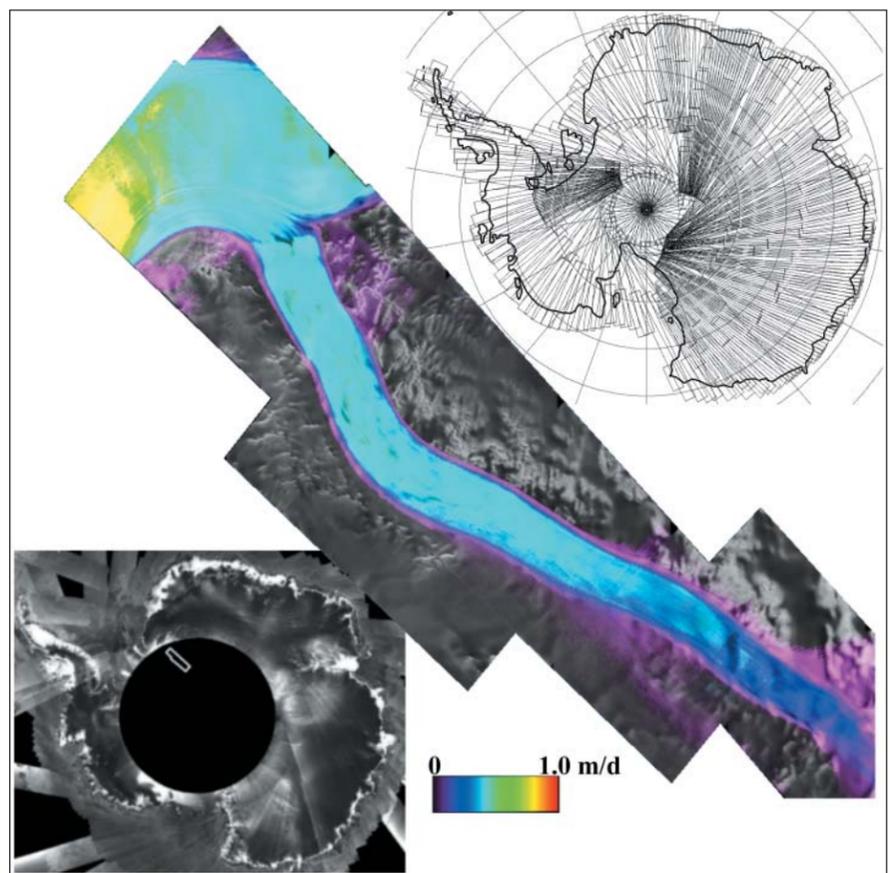


Fig. 1. (middle) The first complete ice velocity map along the entire 250-kilometer length of Antarctica's Recovery Glacier tributary (taken in 2008–2009 using TerraSAR-X). Velocities are measured in meters per day. (bottom left) Location of the ice velocity map, shown by the white box within the Japanese Phased Array Type L-band Synthetic Aperture Radar (PALSAR) 2009 image mosaic. (top right) Additional coverage using the Canadian RADARSAT 2. This coverage, along with data from the European Space Agency advanced synthetic aperture radar, completed observations of Antarctica during the IPY. Images courtesy of Canadian Space Agency, German Aerospace Center, and Japan Aerospace Exploration Agency.

EOS

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state, and county borders; rivers and basins; and so forth. The map server has the capability to display data from a specific location with a computer mouse or to download an entire layer and its associated metadata. Information in the online maps, which are based on the Adobe Flash™ multimedia platform, is the same as that on the map server, though without the option to add or remove layers and to zoom at different scales. The advantages of the online maps option are that it is easier to handle, the maps are displayed faster, and it has a transparency feature that allows for visualizing climatic variables with topography.

The maps were produced with state-of-the-art computing techniques to enhance

physiographic features. The user-friendly interface of the map server is faster than many similar systems due to the parallel processing of each request. The map server allows for adding or removing vectorial layers without the need to generate a new image, and it keeps recent images in the computer random-access memory (RAM). Another feature of the map server is that the code configuring each image is generated dynamically, allowing for a number of map options.

The DCAM data and data products originate from a number of different sources, including the Mexican National Weather Service, Mexican National Institute of Statistics and Geography, U.S. National Oceanic and Atmospheric Administration, NASA, the WorldClim

database, the General Bathymetric Chart of the Oceans (GEBCO), and IPCC. For each variable, the best available information has been chosen, with corresponding references described in the atlas's documentation.

DCAM was developed using open-source software (GeoServer) for the map server and can incorporate other environmental, geographical, or socioeconomic information. DCAM code is portable and can be implemented for other regions of the world.

For more information, visit <http://uniatmos.atmosfera.unam.mx>.

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and breakup in the visible and infrared spectrums.

STG Projects

The STG has made substantial progress toward these acquisition objectives. A high-resolution radar image of South Pole was captured for the first time since 1997 as part of the Canadian RADARSAT 2 campaign to image all of Antarctica, complementing activities by Germany, Italy, Japan, and ESA to acquire SAR image composites at multiple frequencies of both of the great polar ice sheets. The STG also worked to plan and acquire the first pole-to-coast InSAR data sets for measuring surface velocity on both ice sheets (Figure 1). Velocity data are essential for estimating the ice flux from the ice sheets into the oceans and understanding controls on ice stream motion.

The Constellation of small Satellites for the Mediterranean basin Observation (COSMO-SkyMed), an Italian SAR constellation, contributed to observations of the Wilkins Ice Shelf by monitoring disintegration events and ice movement. ESA and Canada have cooperated on coordinated SAR campaigns to fill gaps in Arctic and Antarctic sea ice cover where either station masks or onboard recorder times have usually precluded routine coverage. Using Satellite Pour l'Observation de la Terre (SPOT) stereo data, the French IPY SPIRIT project (SPOT 5 Stereoscopic Survey of Polar Ice: Reference Images and Topographies) is creating optically derived, high-resolution digital elevation models (DEMs) of the perimeter regions of ice caps and ice sheets. These highly detailed DEMs are the most extensive, high-precision DEMs of polar ice caps and the margins of the polar ice sheets yet acquired.

Operational satellite data were used during IPY to study continuously the dynamics and chemistry of the polar atmosphere, known to be highly sensitive to anthropogenic impacts and thus to climate change.

The acquired data permit information retrieval from all layers of the Earth's atmosphere, from the troposphere at the surface up to the mesosphere (about 50 kilometers in altitude). For example, real-time systems to monitor polar winds have been implemented at sites in both polar regions that receive direct broadcasts of satellite data to meet numerical weather prediction needs for timeliness. It is equally important to generate long-term products for studies of recent climate change. In this regard, historical advanced very high resolution radiometer data have been reprocessed to generate a 25-year record of wind, cloud and surface properties, and radiation. Regarding atmospheric chemistry, polar ozone depletion, a phenomenon stirring public concern and emphasizing the vulnerability of the polar stratosphere, is studied in detail using atmospheric sensors on the fleet of Earth-observing platforms, e.g., Envisat and Meteorological Operational satellite programme (MetOp) MetOp-A.

Developing Coordinated Products

The STG sought to identify key IPY-era science objectives addressable with satellite instruments and then to acquire the data sets needed to meet those objectives. Because a major international campaign of coordinated Earth observations from space had not been previously attempted, participants agreed that developing and then executing plans for acquisitions was a challenge.

The wealth of data collected is a testament to the success of the STG framework. Consequently, in February 2009 the STG chose to step beyond data acquisition and investigate coordinated product development. These efforts are devoted to producing SAR polarization image mosaics of Antarctica, SAR image mosaics of Greenland, interferometrically derived velocity fields at various frequencies for Greenland and Antarctica, and the distribution of

high-resolution SPOT DEMs. The approach is similar to the acquisition phase where the burden of geophysical product development will be distributed among different partners.

The STG has been a unique mechanism for informing the space agencies about GIIPSY science requirements. In turn, the STG has been an important venue for coordinating acquisition and processing of important amounts of satellite data while distributing the data acquisition load among the participating agencies. Continuing an STG activity can be of service by linking the broader cryospheric science community to space agency offices responsible for mission planning, data acquisition, and product development.

Eventually, a key future goal is to secure collections of spaceborne "snapshots" of the polar regions through the development of a virtual Polar Satellite Constellation [Drinkwater et al., 2008]. A natural vehicle for adopting lessons learned from GIIPSY/STG into a more encompassing international effort is the Global Cryosphere Watch, recently proposed by the World Meteorological Organization to support the science goals specified in the Integrated Global Observing Strategy Cryosphere Theme [World Meteorological Organization, 2007].

Space agency IPY data portfolios and a complete list of contributors to this paper can be found at http://bprc.osu.edu/rsl/GIIPSY/index_files/STGDATA.htm.

References

- Drinkwater, M. R., K. C. Jezek, and J. Key (2008), Coordinated satellite observations during the IPY: Towards achieving a polar constellation, *Space Res. Today*, 171, 6–17
- World Meteorological Organization (2007), Integrated Global Observing Strategy Cryosphere theme report: For the monitoring of our environment from space and from Earth, *WMO/TD-No. 1405*, 100 pp., Geneva, Switzerland.

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NEWS

Hubble 3D: A Science and Hollywood Collaboration Made (Nearly) in Heaven

Just 2 days after the 2010 Academy Awards® ceremony in early March bestowed Oscars® for motion picture achievements, NASA deputy administrator Lori Garver touted a new film about the Hubble Space Telescope, *Hubble 3D*, for best drama, special effects, screenplay, actors and actress, and director and producer. The 43-minute IMAX and Warner Brothers Pictures production, which opened in theaters on 19 March, is an example of the ability of Hollywood and the science community to partner in providing a dynamic educational and entertaining product, according to a number of people associated with the film.

Sharing the red carpet at the Smithsonian National Air and Space Museum in Washington, D. C., with astronauts and others to mark the world premiere, Garver said the film shows the drama of the astronauts' efforts to repair the telescope while traveling 17,000 miles per hour and performing grueling space walks (see Figure 1). "We have literally opened our eyes on the universe through this telescope," she said. "This is a taxpayer-funded agency, and we are giving back to the public the very story that they paid for."

The film, narrated by actor Leonardo DiCaprio, tells the story of the nearly 20-year life of the Hubble Space Telescope. *Hubble 3D* includes jaw-dropping three-dimensional (3-D) computer models based on Hubble imagery, and it focuses on the dramatic May 2009 STS-125 space shuttle crew servicing mission, which increased the telescope's capacity by more than 70 times and extended its usefulness out to 2017. STS-125 was the final planned space shuttle mission to Hubble, though several astronauts at the premiere expressed hope that perhaps a future visit to help with Hubble's safe deorbit also might be an opportunity to further extend the life of the telescope.

Hubble 3D incorporates astronaut training shots, tense moments repairing Hubble, humorous snapshots of everyday life on board the shuttle, and technically challenging computer imagery, including a sequence that allows viewers to vicariously travel through a 15-light-year-wide canyon of dust and gas in the Orion nebula.

Shuttle pilot Gregory Johnson said, "The fact that you can fly through the universe

like what is done in the movie will inspire some of the kids, and I think that would be this movie's greatest legacy." Shuttle mission specialist K. Megan McArthur added that Hubble "brings the mystery of the universe to everyone. People are mesmerized by the beauty of these images."

Filming Challenges

Film director and producer Toni Myers and photography director James Neihouse worked with the astronauts for months prior to launch to train them in filmmaking, and they developed a shopping list of scenes the shuttle crew needed to shoot during the mission (e.g., key moments during space walks). In addition to the 5000 feet of IMAX film in the cargo bay camera bay (which, as expected, yielded just 8 minutes of 3-D imagery), the astronauts also used high-definition digital cameras and handheld cameras.

Myers said that although the film turned out pretty much as expected, there were some difficult moments, including the rapidly changing light with shuttle *Atlantis* circling Earth every 90 minutes. She said "ulcer number 29" was learning there was condensation in the middle of the camera lens, a situation that was corrected. Shuttle commander Scott Altman added that a big challenge was trying to meet the demands of filming and getting the right shots without negatively affecting the mission.

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Fig. 1. Filmed by the astronauts with the IMAX® 3D Cargo Bay Camera during the fifth and final space walk of the STS-125 mission, astronaut John Grunsfeld (on the shuttle arm) passes a new cover to Andrew Feustel (to the left). ©2010 Warner Bros. Courtesy of NASA.

Educational Value of the Film

Anthropologist Richard Leakey, who attended the premier and is working on an upcoming IMAX film, told *Eos* that *Hubble 3D* is a “wow experience.” He said, “It has always fascinated me how insignificant yet hugely significant this planet is, and the film just banged into me.” Noting that many people are convinced that humans are a special creation, he added, “Set against the scale of 100 billion galaxies, the arrogance of humans, *Homo sapiens*, appalls me.” Leakey said the film and other outreach efforts by scientists could help further science education. “A lot of scientists have got to get off their precious academic thrones and spend a little time learning to popularize, learning to simplify, and learning to enthrall the younger generation,” he told *Eos* in a private interview.

Although Hollywood and science once were considered somewhat of an awkward pairing because of Hollywood’s reputation for not getting the science right, Edward Weiler, associate administrator of NASA’s Science Missions Directorate, told *Eos* that signing off to put the IMAX camera on the shuttle was an easy choice. “I knew that this would turn into something that would excite the American people.” Weiler said he hopes American youngsters, who are growing up with computer animations and video games, see the film. “And I hope their parents remind them that, hey, this is real. This isn’t make-believe. If you become an engineer or scientist, someday you could be doing that, and not on a computer screen but in reality. If we get anything out of this film, it’s to get American kids back into engineering and science and to get excited about the real world, not just the animated world.”

Film publicist Warren Betts said director Ron Howard’s acclaimed *Apollo 13* film marked a turning point toward a better relationship between Hollywood and scientists. “From that moment on, it became easier to bring NASA and the science community together with Hollywood on movies, not just documentaries but on movies that have science and technology themes in them.” Betts told *Eos* that Hollywood can make the public aware of, and excited about, important science. His message to scientists: “Please always open your mind and try to work with Hollywood because the film industry today is a totally different animal than what it might have been 40–50 years ago.”

Shuttle mission specialist Michael Massimino noted that the film was a nice collaboration between Hollywood and science and is a good way to share the astronauts’ amazing view from space. “When you poke your head out on a space walk and you see the Earth in front of you, this is so beautiful. How do I describe it? How can I share it with people? And that’s a wonderful thing about this movie. I have a great way to share it. This is what it looks like. Only moviemakers in Hollywood can bring that to people in that special way,” he said.

Massimino told *Eos* that when he took his hard-to-impress teenage children to see the movie *Avatar* recently, the *Hubble 3D* trailer played first. When they saw Massimino on the big screen, “that just blew their minds,” he said. “We finally got them excited about what Dad does for a job. That was very gratifying. The space shuttle launch didn’t do it, but the IMAX movie did.”

For more information, visit <http://www.imax.com/hubble/>.

—RANDY SHOWSTACK, Staff Writer

Eos Seeks Three Editors

AGU seeks dynamic scientists with a broad perspective on geophysics and high editorial standards to serve as editors of *Eos*, AGU’s weekly newspaper of the Earth and space sciences.

Eos seeks editors to cover atmospheric/ocean sciences (including climate and global change), solid Earth sciences, and space sciences. Editors must be committed to fast-paced deadlines and will be appointed for a 3-year term.

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- making recommendations to enhance the vitality of *Eos*.

To be considered for one of the editor positions, send your curriculum vitae with a letter of interest explaining why you want to be an *Eos* editor via e-mail to EosEditorSearch@agu.org. To nominate a highly qualified colleague, send a letter of recommendation to the same e-mail address. **The deadline is 9 April 2010.**



EOS-10020

G E O P H Y S I C I S T S

Honors

Rita Colwell, distinguished professor at University of Maryland and the Johns Hopkins University’s Bloomberg School of Public Health, and director of the U.S. National Science Foundation from 1992 to 2004, has been selected as the 2010 Stockholm Water Prize laureate. Her citation indicates that her “numerous seminal contributions towards solving the world’s water and water-related public health problems, particularly her work to prevent the spread of cholera, [are] of utmost global importance.” Colwell’s “pioneering research on the prevention of waterborne infectious diseases has helped protect the health and lives of millions,” a 22 March news release notes, adding that Colwell “has shown how changes in climate, adverse

weather events, shifts in ocean circulation and other ecological processes can create conditions that allow infectious diseases to spread, and through that link she has led the ability to craft preemptive policies to minimize outbreaks.” HM King Carl XVI Gustaf of Sweden is the patron of the prize, which includes a \$150,000 award.

Kenneth H. Nealson has been awarded the 2010 American Society for Microbiology’s D. C. White Research and Mentoring Award “for applying new and innovative approaches to environmental microbiology.” The society’s news release notes that Nealson, Wrigley Professor of Geobiology at University of Southern California, Los Angeles, is a founding father of geobiology, a pioneer of the bioluminescence field, and a key member of the astrobiology community.

LETTER

Comment on “Examining the Scientific Consensus on Climate Change”

In the 20 January 2009 issue of *Eos* (90(3), 22–23), P. T. Doran and M. K. Zimmerman gave some interesting data about scientists’ responses to the question of whether they think human activity is a significant contributing factor to changing global temperatures. The statements given in the article are in fact “scientific” in that they are cautious. In my opinion, they miss the point.

While scientists are yet discussing the importance and potential magnitude of human influence, the public expects an answer to this simple question: “Would the

warming be stopped or even reversed if the requested rigorous actions were taken?” Scientists have carefully avoided answering that blunt question, but most of the public and the politicians, at least in my country, are convinced that an overwhelming majority of scientists is answering “yes.”

A strange situation! Is any scientific organization daring enough to answer the public with a “yes” or a “no”?

—KARL RAWER, Albert-Ludwigs-Universität Freiburg, Freiburg, Germany; E-mail: 19041913rawerkarl@web.de

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MEETING

Site Selected for Colorado Plateau Coring

Colorado Plateau Coring Project Workshop, Phase 2: 100 Million Years of Climatic, Tectonic, and Biotic Evolution From Continental Coring; Albuquerque, New Mexico, 8–11 May 2009

A workshop was convened in New Mexico to plan for the Colorado Plateau Coring Project (CPCP) and identify the target site for initial coring. The giant continental and near-shore to shallow marine epicontinental basins of the American Southwest are particularly well exposed on the Colorado Plateau and its environs and contain a rich record of early Mesozoic (~251–145 million years ago) strata. This time period was punctuated by two major mass extinctions and is notable for the evolutionary appearance of the modern biota and its apparent dramatic climate changes.

Classic studies of these basins, their strata, and their fossils have made this sequence instrumental in framing the context for the early Mesozoic world. Ambiguities in temporal resolution, uncertainties in global correlations with other early Mesozoic strata, and major doubts about latitudinal position still hamper testing of competing climatic, biotic, and tectonic models for the evolution of western Pangea.

A scientific drilling experiment is essential because the most continuous sections in outcrop are either inaccessible in vertical cliffs or are weathered and geochemically altered, making observations and sampling at the appropriate level of detail impossible. Characteristic shallow bedding attitudes and facies changes also compromise scientists' ability to determine superposition in sections compiled over long distances.

Thirty-seven researchers from nine countries participated in the CPCP workshop and

focused discussion on the initial phase of a coring plan for the American Southwest. In a 2007 workshop, participants identified five major stratigraphic packages on and near the Colorado Plateau as key coring targets (see Figure S1 in the electronic supplement to this *Eos* issue (http://www.agu.org/eos_elec/)): Early to Middle Triassic (~251–230 million years ago) Moenkopi Formation; Late Triassic (~230–201 million years ago) Chinle Group; latest Triassic to approximately Middle Jurassic (~203–160 million years ago) Glen Canyon Group; Middle to approximately Late Jurassic (~160–155 million years ago) San Rafael Group; and the Late Jurassic (~155–145 million years ago) Morrison Formation. These targets involve three long (~1-kilometer) cores and two shorter cores designed to recover the critical early Mesozoic transitions.

The Triassic section (Moenkopi Formation and Chinle Group) at Petrified Forest National Park, northern Arizona, was identified in the workshop as the initial target for coring. The Petrified Forest core, about 460 meters in length and HQ gauge (~6.4 centimeters in diameter), will provide a robust reference section where geochronologic, magnetostratigraphic, environmental, and paleontologic information can be registered to a common thickness and unambiguous superposition of observations. Several levels in this section of Triassic strata have recently yielded high-precision uranium-lead (U-Pb) zircon dates; these and further age dates

ABOUT AGU

Vithanage Receives 2009 Natural Hazards Focus Group Award for Graduate Research

Meththika Vithanage has been awarded the Natural Hazards Focus Group Award for Graduate Research, given annually to recent Ph.D. recipients for outstanding contributions to natural hazards research. Vithanage's thesis is entitled "Effect of tsunami on coastal aquifers: Field studies and tank experiments." She was formally presented with the award at the Natural Hazards Focus Group reception during the 2009 AGU Fall Meeting, held 14–18 December in San Francisco, Calif.

Vithanage received her B.S. in natural resources from Sabaragamuwa University of Sri Lanka in 2002 and an M.S. in environmental science from the University of Peradeniya, Sri Lanka, in 2005. In 2009, she attained a Ph.D. in hydrogeology under the supervision of Karsten Jensen and Peter Engesgaard in the Department of Geology and Geography at University of Copenhagen, Denmark. Her research interests include groundwater flow modeling,



Meththika Vithanage

density-dependent flow and solute transport modeling, and water quality analysis.

will provide an age-calibrated chronostratigraphic framework to link data from numerous outcrop studies and address questions concerning early Mesozoic biotic and environmental change. It is anticipated that drilling could commence as early as fall 2010. The core will be logged on site and then shipped to a core slabbing service facility, with ultimate storage at the Rutgers University Core Repository.

The workshop was supported by the International Continental Scientific Drilling

Program and the U.S. National Science Foundation and was hosted by the New Mexico Museum of Natural History and Science.

—JOHN W. GEISSMAN, Department of Earth and Planetary Sciences, University of New Mexico, Albuquerque; E-mail: jgeiss@unm.edu; PAUL E. OLSEN, Lamont-Doherty Earth Observatory of Columbia University, Palisades, N. Y.; and DENNIS V. KENT, Department of Earth and Planetary Sciences, Rutgers University, Piscataway, N. J., and Lamont-Doherty Earth Observatory of Columbia University

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POSITIONS AVAILABLE

Atmospheric Sciences

Research Positions. Nanyang Technological University (NTU) in Singapore is offering the following research positions.

Postdoctoral Fellow, Urban Canyon and Boundary-Layer Modeling

We are seeking suitable researcher with an interest in urban canyon and boundary-layer modeling of the Singapore environment.

This work is part of five-year collaboration with the Center for Environmental Sensing and Modeling (CENSAM), established under the auspices of the Singapore-MIT Alliance for Research and Technology (SMART).

Research Associate/Scientist, Data Assimilation

We are seeking suitable candidate for adapting data assimilation codes to a mesoscale NWP model (COAMPS) to assimilate Doppler radar wind and reflectivity data.

Job and application details can be found at <http://www1.spmis.ntu.edu.sg/~sunshine/WeatherWeb/html/job.html>. Contact: Dr. Teo Chee Kiat, ckteo@ntu.edu.sg.

Biogeosciences

Multiple Positions in Geomicrobiology/Geobiology Assistant/Associate/Full Professor. The Geomicrobiology Laboratory of State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences-Beijing (CUGB), invites applications for tenure track/tenured assistant/associate/full professor positions in the following areas but other areas will also be considered:

1) Mineral-microbe interactions: Preference will be given to candidates with strong background and interest in biogeochemistry, mineral/microbe interactions, biological weathering, and biosignatures preserved in ancient rock records. Those who aim to understand geochemical interactions at nanoparticle-mineral, water-nanoparticle, and water-nanoparticle-mineral, and nanoparticle-microorganism interfaces are particularly encouraged to apply.

2) Environmental bioremediation of contaminated water and soil resources: Both organic and inorganic contaminants will be of interest. Preference will be given to those who employ both advanced experimental techniques and sophisticated models

to investigate speciation, sorption/desorption, and redox reactions under various potential abiotic and biotic remediation scenarios.

3) Bioenergy: This position includes microbially enhanced oil recovery, microbial production of natural gas in abandoned oilfields and coalfields, and biological production of ethanol and other bio-fuels from specialized bioenergy crops and other organic materials.

The positions will be available beginning in September 2010 and come with a competitive salary and startup package.

Opportunities exist for collaboration with faculty in Geomicrobiology, Oceanography, Earth Sciences, Energy and Mineral Resources, Paleobiology, Hydrology, Environmental Studies, and other related fields. Responsibilities will include the development of a rigorous research program and teaching and advising at both the graduate and undergraduate levels. The candidate will teach the undergraduate Geology/Biology curriculum, as well as upper-level undergraduate and graduate courses in his or her field of specialty.

Candidates should electronically submit a letter of application describing their research and teaching interests, curriculum vitae, and the names and contact information for three references to Dr. Hongchen Jiang (jianghc@cugb.edu.cn). China University of Geosciences-Beijing is an Affirmative Action/Equal Opportunity Employer and encourages applications from around the world.

NSF Post-Doctoral Fellowships in Tropical Ecosystem & Global Change Science. Starting date Summer 2010. An NSF-funded Partnership for International Research and Education (PIRE) in the Amazon, based at U. of Arizona, invites applications for postdoctoral fellowships. We seek outstanding self-motivated scientists (U.S. citizens or permanent residents) to combine research on Amazon forest response to climatic variability with an opportunity to coordinate an international education and training program (including an intensive field course in the Amazon).

Fellowships offer exceptional opportunities to collaborate with a broad inter-disciplinary team of American and Brazilian scientists, and will be offered in two project areas:

(1) Experimental studies to give insight into the future of Amazon forests by investigating effects of drought and light on tropical tree seedling recruitment, with manipulations conducted both in the field and in the model tropical forest of U. of Arizona's unique Biosphere 2 facility (www.b2science.org). Backgrounds in ecology, physiology, or ecophysiology desired.

(2) Observational studies on scaling photosynthesis from leaf traits to landscapes, combining ecophysiology, ecosystem-scale eddy fluxes, and remote sensing (including automated multi-spectral cameras and satellites) to understand forest

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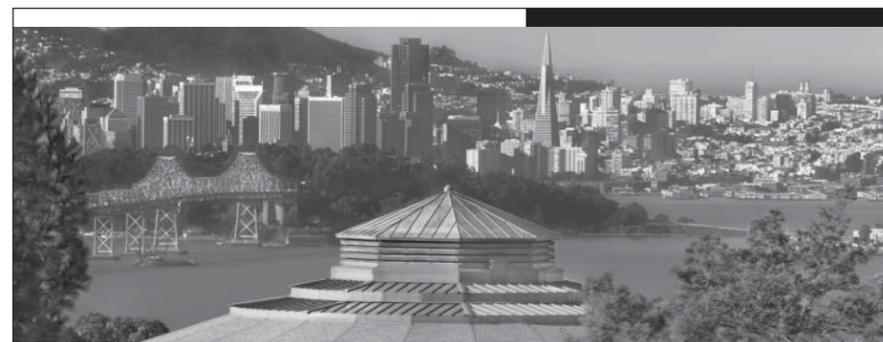
der

Software Engineers to Support GOES-R Weather Satellite System

AER, Inc. seeks motivated individuals to work as part of a team developing complex scientific codes for a next generation meteorological satellite ground system for the GOES-R Program. Successful applicants will interact closely with scientists to design, develop, test and integrate software applications to produce environmental products from satellite instrument data. The position requires both new software development and ability to adapt/extend existing science codes. New development will be done in C++. Existing codes are in C/C++ and FORTRAN 90. Job requires supporting all phases of the software lifecycle including: requirements analysis, design, coding, unit test, I&T, documentation & maintenance.

Required: MS or BS degree in the physical sciences, mathematics or computer sciences plus a minimum of 3 years experience in relevant fields (advanced degrees may be substituted for work experience). Minimum 3 years experience C++ programming. Demonstrated ability to successfully develop quality scientific codes for science or engineering applications. Strong technical and communication skills, teamwork, problem solving and customer interaction skills in a fast-paced R&D environment.

Please apply online at <https://jobs-aer.icims.com/jobs/intro>. AER offers a competitive wage and benefit package and is an EEO/AA employer. AER, Inc. is headquartered in Lexington, Massachusetts.



Senior Geophysicist

The Geophysics Department within the Earth Sciences Division at Lawrence Berkeley National Laboratory has an opening for internationally recognized senior scientist with expertise in seismic modeling, migration and full wave form inversion. An established track record of funding and technical leadership in these areas is essential for this position. The candidate accepting this posting will be expected to maintain and grow a vigorous research program in fundamental subsurface science and contribute solutions to the United States Department of Energy mission critical problems in Energy and Environment. These include carbon sequestration, geothermal resource development, fossil energy, environmental site characterization and remediation. Expertise in large scale computing paradigms in seismology is required, along with skills in high performance computing and a willingness to work with other earth scientists on collaborative and multi-disciplinary projects. Further an ability to work other scientists in fields outside of earth sciences, including biology and medical imaging, is welcomed but not essential for this position.



For details about this position and to apply, please go to: <http://jobs.lbl.gov/LBNLCareers/details.asp?jid=240788p=1> and follow the online instructions to complete the application process.

LBNL is an Equal Opportunity/Affirmative Action Employer.

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phenology and variation across the Amazon. Strong quantitative and programming skills required.

The fellowship is \$42,000/yr plus health insurance, offered on an equal-opportunity basis. Apply at: <http://www.amazonpire.org/>, or contact Amazon-PIRE investigators Scott Saleska (saleska@email.arizona.edu), Alfredo Huete (ahuete@ag.arizona.edu), or Travis Huxman (huxman@email.arizona.edu).

Post-Doctoral Research Associate: Methane Isotope Biogeochemistry of a Subarctic Wetland. Starting date Summer 2010. The Dept. of Ecology & Evolutionary Biology and Biosphere 2 (at University of Arizona) seek a creative Ph.D. scientist with strong background in instrumentation and biogeochemistry to join an interdisciplinary team investigating the microbial ecology of methane in a subarctic wetland being transformed by climate change. The candidate will deploy and interpret data from new field instruments to measure isotopes of CH₄ and CO₂, collaborating with a team measuring the meta-genomics and -transcriptomics of the microbial community. We seek to discover how microbial metabolism scales to ecosystem fluxes of CH₄, and how this changes with climate.

This 3-year project is at Abisko field station in northern Sweden. It is an exceptional opportunity to learn new techniques and to make major contributions to problems of both scientific and societal interest using cutting-edge technology. A strong science background relevant to methane isotope biogeochemistry, including field deployment of instrumentation, is required.

The University of Arizona is an equal-opportunity employer, providing competitive salary and benefits. Apply at: <https://www.uacareertrack.com/> (job number 44956). Contact: Dr. Scott Saleska (saleska@email.arizona.edu) or Dr. Patrick Crill (patrick.crill@geo.su.se). See <http://www.eebweb.arizona.edu/faculty/saleska/>.

Hydrology

Full-Time Director of the Center for Watershed Science. The Illinois State Water Survey within the Institute of Natural Resource Sustainability at the University of Illinois is seeking a full-time Director of the Center for Watershed Science. The Director will lead a very successful and productive watershed science center covering research, data collection, and public service.

Required Education and Experience: Ph.D. preferred with at least 10 years of relevant work experience; consideration will be given to outstanding applicants with Masters Degrees. Please refer to <http://www.sws.uiuc.edu/jobs/joblist.asp> for the full position announcement.

To ensure full consideration, please create your candidate profile at <http://jobs.illinois.edu>

Apply to Host a Speaker!**Ocean Leadership Distinguished Lecturer Series**

Apply now to host an Ocean Leadership Distinguished Lecturer at your institution during the 2010-2011 academic year. The Consortium for Ocean Leadership's U.S. Science Support Program offers the Distinguished Lecturer Series to bring the exciting scientific results and discoveries of the Integrated Ocean Drilling Program to students at the undergraduate and graduate levels and to the geosciences community in general.

Diatom Oozes: Archives of Past Climate Change and Habitats for Microbial Life

Ivano Aiello,

Moss Landing Marine Laboratories

The Chicxulub Structure: What an Impact!

Gail Christeson, University of Texas at Austin

Life in the Vast**Subseafloor Basaltic Aquifer**

James Cowen, University of Hawaii at Manoa

The Ice Age-Climate Experiment

Timothy Herbert, Brown University

In Situ Stress and Pore Pressure from Riser Drilling: NanTroSEIZE Stage 2

Demian Saffer, Pennsylvania State University

Changing Perspectives of Hotspots, Seamount Chains, and Ocean Plateaus

William Sager, Texas A&M University

Applications are due June 1, 2010 and are available by applying online at www.oceanleadership.org/DLS.



1201 New York Avenue, NW, Fourth Floor
Washington, DC 20005
202-232-3900; cmeth@oceanleadership.org

and upload a letter of application, CV, with your email address included, names, addresses, phone numbers, and email addresses of three professional references must be received by April 30, 2010. Interviews may be conducted before the closing date. All requested information must be submitted for your application to be considered.

For further information regarding application procedures, you may contact Hannah Dorsey (217)333-4978 or hdorsey@illinois.edu.

The University of Illinois is an Affirmative Action/Equal Opportunity Employer.

Postdoctoral Research Associate Position in Ecohydrology. Princeton University's Civil and Environmental Engineering Department solicits applications for a postdoctoral or more senior researcher to conduct field-based and modeling research into plant water use, soil evaporation, and plant water stress in tropical dryland savannas. The position will be based at the Mpala Research Center (MRC) in central Kenya (www.mpala.org), focused on dynamic characterization of plant water use and plant water stress in dryland ecosystems. The successful applicant will have experience in some combination of flux measurement methods, plant ecophysiology, and stable isotope techniques. Starting salaries will range between \$42,000 and \$45,000.

Initial appointment will be for a 1-year term beginning in the summer/fall of 2010, with possibility of extension up to 3 years depending on performance. Additional information about the position can be found at <http://caylor.princeton.edu>. Interested applicants should submit an application including CV and statement of research interest through <http://jobs.princeton.edu> position #1000214. Princeton University is an equal opportunity employer and complies with applicable EEO and affirmative action regulations.

Ocean Sciences

Research/Faculty Position in the Area of Physical Oceanography. The department of Physical Oceanography at CICESE in Ensenada, Baja California, Mexico, announces a research/faculty position in the area of Physical Oceanography. We seek candidates with a Ph.D., capable of conducting independent research in physical oceanography and with a strong record leading or participating in research projects and peer reviewed publications. We are particularly interested in candidates who can strengthen our program in ocean-atmosphere interaction and use models to advance fundamental understanding and predictability of the ocean-atmosphere system. Candidates should have the ability to conduct an active, extramurally funded, research program.

Successful candidates are expected to teach oceanography or meteorology courses at the graduate level and supervise graduate students.

Applicants should submit electronically a CV and statement of research and teaching interests together with names of three references to Alejandro Pares-Sierra (apares@cicese.mx), chair of the Search Committee. The review process will begin in April 2010.

Successful candidate is expected to begin working at CICESE during fall 2010.

Solid Earth Geophysics

Research Fellows and Post-Doctoral Research Associates. The Institute of Earth Sciences (IES) seeks applicants for tenure-track research fellows (assistant or associate fellows) and postdoctoral research associates in earth sciences. IES is an institute of Academia Sinica (Taipei), and is the most important earth science research institute in Taiwan. The existing research fields include seismology, tectonophysics, paleomagnetism, neotectonics, high-pressure mineral physics, petrology and petrogenesis, geochemistry, cosmochemistry, paleoclimatology, etc. IES is well equipped with advanced analytical instruments and computing facilities for geochemical and geophysical research.

Several on-going projects are focused on the island of Taiwan, one of the best natural

laboratories for active tectonics. However, many faculty members extend their areas of study to other corners of the world. Numerous international cooperative programs are being engaged. The faculty members do not have teaching duties but are allowed to take a small teaching load in universities. They have close collaboration with university professors and undertake direction of thesis work. For the new faculty positions we invite applications from outstanding candidates of all fields, and particularly encourage those who have expertise in seismology and isotope geochemistry.

For the postdoctoral positions the fields are open, but innovative research will be most regarded. For inquiry and more detailed information about IES, please visit <http://www.earth.sinica.edu.tw>.

Candidates must have an earned doctorate in earth science or related fields. Successful candidates are expected to have demonstrated research excellence and to develop strong research programs. Applicants should send a detailed vitae/resume including a full list of publications, three or more names of references with addresses (postal, telephone and e-mail) to Director, Institute of Earth Sciences, Academia Sinica, Taipei 11529, Taiwan. (Questions can be directed to Miss Sharon Wang shewen@gate.sinica.edu.tw). Review of applications will begin immediately and continue until the positions are filled.

Interdisciplinary/Other

Communications Officer, MIT Global Change Program. To facilitate external communications, manage the dissemination of public information, and coordinate outreach. The MIT Joint Program on the Science and Policy of Global Change at the Massachusetts Institute of Technology is devoted to the integration of social science, natural science and policy analysis as applied to global

environmental issues, primarily climate change (<http://globalchange.mit.edu/>).

We seek a multifaceted writer/editor, webmaster, and public information officer to promote the program's research and activities; develop and implement plans and manage resources for communications efforts in support of the program's mission; work with program directors to produce newsletter content for sponsors; work with researchers to translate technical findings into high-lights for public release; manage electronic and print publications; and organize participation in educational activities. This is a new, full-time, staff position for one year with possibility of extension depending on performance.

Requirements: a bachelor's degree in a relevant discipline; excellent writing and interpersonal skills; supervisory experience; understanding of publishing tools and website management; ability to work independently and with a diverse interdisciplinary group; ability to prioritize and meet deadlines. Advanced degree and experience communicating complex concepts to lay audiences preferred. Familiarity with global change issues and demonstrated understanding of climate science and economic/policy analysis is highly desired; willingness to learn is essential. Apply at: <http://tinyurl.com/MITJPCcommunicator>.

Faculty and Laboratory Director Position. The University of Wisconsin-Madison invites applications for a tenured position emphasizing environmental chemistry, funded through the State Laboratory of Hygiene (the state public health laboratory in Wisconsin). The successful candidate would direct the Environmental Health Laboratory Division of the Wisconsin State Laboratory of Hygiene.

With a tenure home in the Department of Civil and Environmental Engineering, the successful

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**Ocean Dynamics and Prediction Research
Naval Research Laboratory**

The Naval Research Laboratory has openings for Ph.D. researchers to advance capabilities in ocean data assimilation and probabilistic forecasting. This includes optimization of underwater, airborne and satellite observing systems, representation of ocean processes affecting temperature, salinity, and mixed-layer depth, uncertainty analysis in coupled systems, and ensemble and probabilistic ocean forecasting. High priority efforts presently include targeting ocean glider observations, representing probability in ocean/acoustic systems and satellite-observed surface heat fluxes. This long term work is developing cutting edge capabilities that transition to operational forecast centers.

This is an excellent opportunity to work with some of the best modelers and data analysts in the ocean community. The Naval Research Laboratory has access to the major supercomputer sites in addition to excellent local computer resources. The laboratory is collocated with the Naval Oceanographic Office, which is the largest national operational forecast center for oceanography.

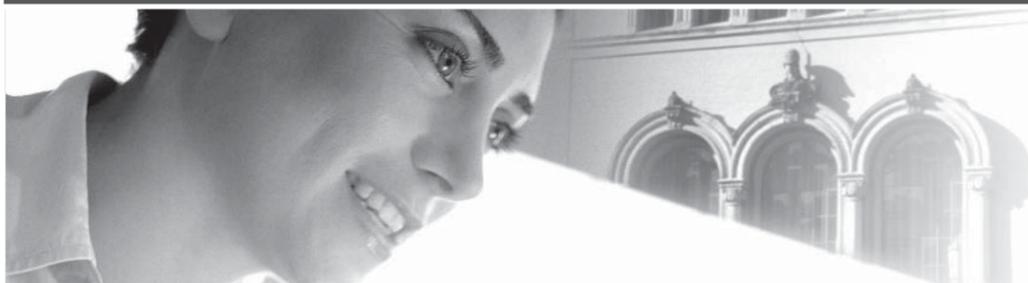
An overview of some research projects and systems developed within the NRL oceanography division is available at www7320.nrlssc.navy.mil/projects.php.

We are seeking candidates for both post-doctoral and full-time positions. Annual salary ranges from \$61,000 to \$101,000 depending on experience. Applicants must be a US citizen or permanent resident at time of application. NRL is an equal opportunity employer. Send resume and references to:

Charlie Barron via e-mail: charlie.barron@nrlssc.navy.mil
NRL Code 7321
Stennis Space Center, MS 39529

University of Bergen

is a city university. Parts of the campus are in fact situated in the town centre. We have about 15.000 students and nearly 3200 employees. UiB is renowned for its research which holds a high European standard and we have three Centres of Excellence (CoE). The University of Bergen has a strong international profile which entails close co-operation with universities all over the world.

**Two postdoctoral fellow positions at the Geophysical Institute / Bjerknes Centre for Climate Research (University of Bergen, Norway)**

The following two positions in climate modelling are available (under usual reserve of available funding):

- 1) Postdoctoral fellow in earth system modelling
- 2) Postdoctoral fellow in ocean carbon cycle modelling

The term of employment for each position is 2 years. The candidates will work with coupled biogeochemical-physical ocean general circulation models and earth system models (model hindcasts, future scenarios). Candidates must have strong computational skills and have an interest in interdisciplinary earth system research.

For more details on the positions and requirements of candidates, please see www.jobbnorge.no:

POSITION 1: Idnr. 65800

POSITION 2: Idnr. 65801

For further information about the position, please, contact Professor Christoph Heinze at the Geophysical Institute and the Bjerknes Centre for Climate Research, e-mail: christoph.heinze@gfi.uib.no / phone +47 55 58 98 44.

Closing date for applications: 18 April 2010

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candidate is expected to actively participate in the Environmental Chemistry Group within the department. Details of position, the required qualifications, and application instructions can be found at the following website: http://www.ohr.wisc.edu/pvl/pv_063766.html. For full consideration, applications should be submitted by April 16, 2010. EEO/AA.

Lecturer/Senior Lecturer in Palaeoclimate Modelling. The Quaternary Research Group in the School of Geography, Politics and Sociology at Newcastle University seeks to appoint a Lecturer/Senior Lecturer in Palaeoclimate Modelling, tenable from September 2010. This appointment is

designed to enhance our research standing and reinforce our existing international reputation in the fields of environmental change and Quaternary research. The successful candidate will have a record of research and publication commensurate with the level of appointment. They will also be expected to make a contribution to undergraduate and postgraduate teaching and to undertake supervision of postgraduate students.

Although we are seeking applications from anyone with expertise in palaeoclimate modelling we particularly welcome applications from candidates with a background in atmospheric or earth sciences and with expertise in modelling Quaternary climate change.

For further details and application form please visit our website <http://www.ncl.ac.uk/vacancies/jobs/> and search with reference "B315A (GPS)". Informal enquiries may be made

to the Head of Geography, Dr. Stephen Juggins (Stephen.juggins@ncl.ac.uk), or Prof. Darrel Maddy (darrel.maddy@ncl.ac.uk).

Modeling Postdoc. The Sierra Nevada Research Institute (SNRI) at the University of California, Merced seeks a postdoctoral associate with experience in environmental modeling and data assimilation. The position is for high impact research on climate-carbon feedbacks using new atmospheric models and data assimilation methods in a Linux environment. Position includes \$45,000 + benefits and access to the SNRI Yosemite Field Station. For more information and to apply, email a cover letter and resume to Elliott Campbell (ecampbell3@ucmerced.edu). The University of California at Merced is an affirmative action/equal opportunity employer and is supportive of dual career couples.

Positions in Ocean Waves and Seismic Noise Analysis and Modelling. The French Institute for Marine Research (Ifremer) Brest, France, is expanding its activities in the field of sea state modeling, for diverse geophysical and engineering applications, as part of the project IOWAGA funded by the European Research Council. The project will provide best estimates of sea-state related parameters for coastal engineering, remote sensing, seismic noise, air-sea fluxes. To develop this activity, two positions are open.

1. Post-doctoral researcher to investigate the quantitative links between seismic noise records at the global scale, in collaboration with IPG Paris, and numerical modelling of sea states performed at Ifremer with specific adjustment for estimating the microseismic noise source. Potential candidates

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Atmospheric Sciences and Global Change
Pacific Northwest National Laboratory

PNNL is seeking brilliant minds, from senior scientists to post-docs and support staff. Join a world-class science program, studying the role of clouds and aerosol processes on climate, and the effect of human decisions on greenhouse gas emissions and climate.

We're growing rapidly in support of our mission to transform the nation's ability to predict climate change and its impacts. PNNL scientists are combining modeling with an extensive worldwide field observational system to advance our understanding of the Earth system on regional and global scales.

The result: new insights that help leaders manage risks and cope with climate impacts while meeting society's energy demands.

Want to Apply?
View job openings at www.pnl.gov/atmospheric/jobs.stm.

Pacific Northwest National Laboratory (PNNL) is an Affirmative Action / Equal Opportunity Employer and supports diversity in the workplace.



International Project Office Co-ordinator: GHRST (Global High Resolution Sea Surface Temperature)
National Centre for Earth Observation (NCEO)

This appointment is full-time, fixed-term for 3 years
Grade 7 – £36,715 to £45,155 per annum

NCEO requires a capable scientist with project management experience to run the international GHRST Project Office. The project aims to produce a scientifically definitive record of sea-surface temperatures.

The post holder will support the activities of the GHRST international partnership, and will develop detailed scientific and technical plans to deliver its objectives.
The post holder will work closely with the NCEO and its partners, and will report regularly to the European Space Agency.

You will have:

- a PhD in Oceanography or a related area of climate science
- strong scientific capability and maturity e.g. as evidenced by a track record of postdoctoral research
- the ability to deal with complex technical and managerial problems independently and effectively
- demonstrated ability to lead and motivate a distributed team

Experience in international co-ordination would be an advantage.

Informal enquiries: contact the Director, NCEO, Professor Alan O'Neill on +44(0)118 378 8317 or email alan.oneill@nceo.ac.uk

Closing date: 6 May 2010

To formally apply please visit www.reading.ac.uk/jobs or contact Human Resources, University of Reading, Whiteknights, PO Box 217, Reading RG6 6AH. Telephone +44(0)118 378 6771 (voicemail)

Please quote reference number PM10012

We value a diverse workforce and welcome applications from all sections of the community



INTEGRATED OCEAN DRILLING PROGRAM

CALL FOR APPLICATIONS:

The Integrated Ocean Drilling Program is accepting applications for scientific participation on three drilling expeditions of the *JOIDES Resolution* in the Eastern Pacific and Atlantic Oceans: Costa Rica Seismogenesis Project (CRISP), Superfast Spreading Rate Crust 4, and Mid-Atlantic Ridge Microbiology.

Costa Rica Seismogenesis Project Expedition (CRISP) (15 March – 16 April 2011): This expedition is designed to understand the processes that control nucleation and seismic rupture of large earthquakes at erosional subduction zones. It is based on a part of IODP Proposal 537-Full5. Scientific objectives include constraining the nature of the upper plate, the subsidence history of the upper plate as a proxy for tectonic erosion along the plate boundary megathrust, and the presence and impact of fluids migrating through the upper plate.

Superfast Spreading Rate Crust 4 Expedition (16 April – 19 May 2011): Based on IODP Proposal 522-Full5, this expedition aims to understand the accretion of oceanic crust formed at a superfast spreading rate at the East Pacific Rise. Previous drilling in Hole 1256D penetrated 1250 m into the igneous crust (including 345 m of sheeted dikes and 100 m of gabbro). This new expedition will deepen Hole 1256D into gabbro to complete characterization of an entire upper to mid-oceanic crustal section. The primary objectives are to (1) test models of mid-ocean ridge accretion, (2) constrain magmatic, hydrothermal, and tectonic processes, (3) determine the nature of layer 3 and the 2/3 boundary, and (4) constrain the magnetic properties of the lower crust.

Mid-Atlantic Ridge Microbiology Expedition (September–November 2011): Based on IODP Proposal 677-Full, this expedition will examine the microbiology of a sediment pond and the underlying young, cold, and hydrologically active flank of the Mid-Atlantic Ridge. Drilling operations at three sites will include sediment/basalt coring, basement logging, and installation of three long-term seafloor observatories. The primary science objectives are to investigate (1) the nature of microbial communities in young ridge flanks and their role in crustal weathering, and (2) the origin of deep-seated microbial communities.

The current expedition schedule is available at <http://iodp.tamu.edu/scienceops/>. The schedule provides links to the individual expedition pages, including planning information and the original project proposals.

APPLICATION DEADLINE: 15 May 2010
Scientists interested in participating must apply to the appropriate IODP Program Member Office (<http://www.iodp.org/program-member-offices>) by **15 May 2010**.

Applications of nominated scientists will be forwarded from the IODP Program Member Offices to the United States Implementing Organization (USIO). The USIO will work with the expedition chief scientists and IODP Program Member Offices to maximize the scientific impact and balance IODP member staffing participation.




Max-Planck-Institut für Meteorologie



The Max Planck Institute for Meteorology (MPI-M), a multidisciplinary centre for Climate and Earth System research located in Hamburg, Germany, invites applications for a

Scientist in Climate Dynamics (m/f) – SAS2010-07.2 –

He/she is sought to lead a junior research group on the topic of climate dynamics in coordination with the department head (Bjorn Stevens) and the leader of the global modeling group (Marco Giorgetta). Candidates with at least two years of post-doctoral experience in climate system modeling (broadly interpreted, so as to include the analysis and design of numerical experiments) are particularly encouraged to apply.

The successful candidate will be expected to design a research program to explore the behavior of the MPI-M-s contribution to CMIP5 simulation, as well as leverage institutional projects such as COMBINE, EUCLIPSE and IMPLICC. Willingness to explore questions related to departmental initiatives, such as controls on planetary albedo, and or climate sensitivity as a function of atmospheric processes, is also desired. The position offers the opportunity to guide PhD research, as well as a small budget to support the group's activities.

Requirements:

- A PhD in Meteorology, Atmospheric Sciences, or related fields
- Above-average programming skills (FORTRAN, Unix shell scripts, visualisation)
- Experience in climate modelling and/or climate data analysis
- Good knowledge of the English language (skills in German are welcomed)

The position is offered for four years, starting July 2010 or soon thereafter, with payment according to a civil service position (TVöE E13) with extensive social security plans included. Salary can be commensurate with experience given the constraints of German employment law. The conditions of employment, including upgrades and duration, follow the rules of the Max Planck Society for the Advancement of Sciences and those of the German civil service.

The Max Planck Institute for Meteorology seeks to increase the number of female scientists and encourages them to apply. Handicapped persons with comparable qualifications receive preferential status.

For further information, please contact Prof. Bjorn Stevens (bjorn.stevens@tzmaw.de). All applications (including a cover letter, a curriculum vitae, copies of scientific degrees, and the names and contact information of three references), received **before 30 April 2010** will receive full consideration.

Max Planck Institute for Meteorology
Administration (SAS2010-07.2)
Bundesstraße 53
20146 Hamburg
Germany

Via E-Mail: applicationmpim@tzmaw.de (pdf-attachments max. 2 MB only).

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must have a Ph.D. in geophysics (oceanography or seismology), or physics. Duration of contract is 18 months minimum.

2. Scientist/engineer to work on wave numerical model development (WAVEWATCH III) and hindcast database management, both in close collaboration with NOAA/NCEP.

Candidates must hold a masters or Ph.D. in coastal engineering, physics or oceanography. Fluency in Fortran and UNIX is required. Duration of contract is 18 months minimum, and probably 36 months.

For both positions, applications must be submitted via e-mail, with a complete overview of education and previous practice (CV), list of publications (if any), as well as names and addresses of 2 scientific references. Applications and inquiries should be sent to Dr. Fabrice Ardhuin (ardhuin@ifremer.fr). All applications received before April 1st will be considered. The positions are open until filled, but the expecting start date for both is May 1st 2010.

Strong Motion Seismology Professor Position. Assistant or Associate Professor in Strong Motion Seismology at the University of Puerto Rico at Mayagüez. The Puerto Rico Strong Motion Program (PRSM) under the Civil Engineering and Surveying Department of the University of Puerto Rico at Mayagüez is seeking applications for an assistant or associate faculty position in the area of strong motion seismology or engineering seismology. The rank of assistant or associate professor will be determined based on the applicants' qualification and experience.

Salary depends upon the rank and can be increased with external funding. The current basic salaries for Assistant and Associate Professor are \$67,308 and \$75,144, respectively. The position will be open until filled.

Candidates must have a Doctor in Philosophy degree in this or an associated qualified area at

the time of appointment. Working knowledge of Spanish is highly desirable. Responsibilities for this position will mainly be developing and conducting basic and applied research in strong motion seismology and associate areas, providing guidance to the strong motion program, developing experimental initiatives in the field, supervising graduate students, enhancing the academic program in related areas, and collaborating with the Puerto Rico Seismic Network of the Geology Department. Experience with seismic zonation, ANTELOPE Environmental Monitoring System, EARTHWORK, experimental and analytical methods to determine seismic wave velocity profiles, and with OBS is strongly desirable. He/she will be also developing and teaching graduate and undergraduate courses in related areas. Other duties are related to the inherent university regulated responsibilities of the position.

Interested candidates must submit a C.V., a transcript, and names, phone number and e-mail address of three references to: Ismael Pagán-Trinidad, Chairman, Civil Engineering and Surveying Department, P. O. Box 9000, Mayagüez, Puerto Rico 00681-9000, USA. Currently, the PRSM has over 100 digital seismic stations distributed along the main and surrounding islands of Puerto Rico, British Virgin Islands, US Virgin Islands, and Dominican Republic including sixteen instrumented structures, and twelve joint stations with accelerographs and broad-band seismographs. The remaining stations consist of 13 internet connected stations, 49 modem connected stations, and 27 stand alone accelerographs. More details about the strong motion program are available at website (<http://prsm.uprm.edu/>). The PRSM is funded by the University of Puerto Rico and the Government of Puerto Rico. The University of Puerto Rico is an equal opportunity employer.

STUDENT OPPORTUNITIES

Ph.D. Research Assistantship in Physical Hydrology. Position available at Colorado State

University for research on subsurface and surface flow processes in intermittent and ephemeral stream systems of the Sonoran Desert, Arizona.

The successful applicant will join an interdisciplinary team of researchers working on stream classification and process-based study of the geomorphic, hydrologic, and ecologic functions of desert streams. Full position description available at: <http://warnercn.colostate.edu/~skamp/ResearchAssistantship.pdf>.

Ph.D. Studentship in Lithospheric Flexure & Seismic Anisotropy. Applicants are sought for a 3-year Ph.D. studentship at Curtin University in Perth, Western Australia, on the topic of lithospheric flexure and seismic anisotropy. A stipend of \$25,000 + fees is available. Applicants should possess a strong mathematical background and some programming experience, and should hold or expect to receive a first-class degree in geophysics, physics, mathematics, engineering or geodesy. Please send a CV to Dr. Jon Kirby, j.kirby@curtin.edu.au, and visit www.cage.curtin.edu.au/~jfk/PhD.html for further details.

SERVICES, SUPPLIES, COURSES, & ANNOUNCEMENTS**Air Quality and Remote Sensing Course.**

NASA's Applied Remote Sensing Education and Training (ARSET) Group will be holding a training workshop from May 24th-May 28th 2010 at the University of Maryland Baltimore County (UMBC). The workshop will cover the basics of air quality remote sensing with an emphasis on how to access, visualize and interpret satellite products. Participants will engage in hands-on activities using various visualization and analysis tools.

Session 1 (May 24, 25, 26) will focus on atmospheric remote sensing of aerosols and trace gases. Using hands-on activities, participants will learn about various satellite products from the MODIS, OMI, and CALIOP instruments. Ground based products from the AERONET will also be discussed. This session will be limited to 30 participants.

On May 27 and May 28 (ending at noon) there will be two separate sessions available:

Classified cont. on page 132

Neutron Science Senior Scientist

Neutron Sciences Directorate at Oak Ridge National Laboratory invites applications for Senior Scientists in the areas of Energy Materials, Environmental Geosciences, Nano-Structured Materials, and Biological Systems.

We seek candidates who are internationally recognized authorities in neutron scattering sciences with a distinguished record of research and a demonstrated ability to conceive, lead, and conduct advanced research and development. Although outstanding candidates from all relevant disciplines are invited to apply, areas specifically targeted for development are energy materials (including photovoltaics, catalysis, and solid-state materials), environmental geosciences (including carbon sequestration and chemistry in extreme environments), nanostructured materials (including soft matter, polymers, and self-assembly), and biological systems (bio-energy, bio-membranes and structural biology). Candidates are expected to build programs and partnerships that will deliver outstanding science in these areas and drive the development of innovative scientific methods, tools, and technologies for neutron research.

For more information about the position or to apply visit:
http://jobs.ornl.gov/neutron_science.shtml

neutrons.ornl.gov



Real Science. Real Life.



USC Viterbi
School of Engineering

**University of Southern California****Chair, Sonny Astani Department of Civil and Environmental Engineering**

The Viterbi School of Engineering (VSoE) (<http://viterbi.usc.edu>) of the University of Southern California invites nominations and applications for the position of Chair of the Sonny Astani Department of Civil and Environmental Engineering (<http://www.usc.edu/cee>).

The Astani Department has 20 tenured/tenure track faculty (15 in civil engineering and 5 in environmental engineering), 2 senior lecturers, 10 research faculty and about 40 part-time lecturers. The faculty includes two chaired professors, five Young Investigator and Early Career awardees, and a number of fellows of professional organizations. The Department has about 280 undergraduate students enrolled in ABET-accredited undergraduate programs, including a B.S. in Civil Engineering (with specializations in building science, construction engineering, environmental engineering, structural engineering or water resources) and a B.S. in Environmental Engineering. The Department offers strong graduate programs at the masters and Ph.D. levels, with current enrollments of about 140 masters students and about 60 Ph.D. students; concentration areas include coastal/water resources engineering, construction engineering, construction management, earthquake engineering, environmental engineering, geotechnical engineering, structural engineering, structural mechanics and transportation engineering.

In November 2007, the Department was the beneficiary of a \$17 million pledge (<http://viterbi.usc.edu/news/news/2007/cee-announcement-main.htm>) from Mr. Sonny Astani, the largest ever bestowed on a department of civil and environmental engineering, to meet the challenges of megacities and those who live in them (<http://viterbi.usc.edu/assets/053/56844.pdf>). The Astani Department is home to the Center on Megacities (<http://megacities.usc.edu>), studying the complex and interconnected urban systems of megacities through interdisciplinary expertise in science and engineering, and the Foundation for Cross-Connection Control and Hydraulic Research (<http://www.usc.edu/dept/fccchr>), developing and testing countermeasures and devices for preventing contaminants and pollutants from flowing backwards into potable drinking water supplies. The faculty has close working collaborations with other engineering departments in the Viterbi School as well as with the USC Keck School of Medicine, the USC School of Architecture and the USC School of Public Policy, Planning and Development, and participates in USC's CREATE, the Department of Homeland Security's first center of excellence, (<http://www.usc.edu/dept/create>).

The USC Viterbi School of Engineering is among the top tier engineering schools in the world. It counts 168 full-time, tenure-track faculty members, and is home to the Information Sciences Institute (ISI), two National Science Foundation Engineering Research Centers, the Department of Homeland Security CREATE Center, and an Energy Frontiers Research Center (EFRC) supported by the Department of Energy. The School is affiliated with the Alfred E. Mann Institute for Biomedical Engineering, the Institute for Creative Technologies, and the USC Stevens Institute for Innovation. USC Viterbi faculty members conduct research in leading-edge technologies with annual research expenditures typically exceeding \$160 million.

We seek an individual who can provide strong, dynamic and innovative leadership to advance excellence in research, teaching and service to the professional community. In addition to a proven record of scholarly achievement, the candidate must also possess technical leadership, a commitment to civil and environmental engineering education, and effective management and interpersonal skills. The candidate should have an earned doctorate in civil or environmental engineering or in a closely allied field and be eligible for a tenured full professor appointment.

The position is available starting July 1, 2010. Interested candidates should submit contact information, a curriculum vitae, and a cover letter describing their technical qualifications, leadership and future vision. This material should be submitted electronically at <http://www.usc.edu/cee/chairsearch.htm>. Early submission is strongly advised and encouraged. All application material will be held in the strictest confidence. Other inquiries can be directed to:

Chair Recruitment Committee,
Sonny Astani Department of Civil and Environmental Engineering
Attention: J. Alvarado
OHE 200, Mail Code 1450
University of Southern California
Los Angeles, CA 90089-1450 USA
email: engrinfo@vsoe.usc.edu

USC values diversity and is committed to equal opportunity in employment.
Women and men, and members of all racial and ethnic groups are encouraged to apply.

UCL Department of Earth Sciences

3 Research Associates

The post-doctoral appointments will be full time on UCL Grade 7. The salary range will be £31,778 - £38,441 per annum, inclusive of London Allowance.

The appointments will be based in the Mineral Physics group of UCL Earth Sciences, whose aim is to understand the dynamics and evolution of the deep Earth and planets.

The posts are funded by NERC for two years in the first instance.

Research Associate in Experimental Mineral Physics – Reference Number 1130991

The post focuses on the role of nickel in iron and iron alloys, particularly its effect on material properties at extremes of pressure and temperature, in order to better understand Earth and planetary cores using experimental methods. Experience of diamond anvil cell measurements and working with high pressure apparatus is desirable.

Research Associate in Computational Mineral Physics (1) – Reference Number 1131741

The focus of the role is the same as given for the post above (reference 1130991) but will use computational methods rather than experimental. Experience of *ab initio* calculations, using codes such as VASP, is desirable.

Research Associate in Computational Mineral Physics (2) – Reference Number 1131752

The post focuses on understanding thermal processes in the Earth's mantle, particularly the thermal conductivity of silicate minerals, using computational methods. Experience of *ab initio* calculations, using codes such as VASP, is desirable.

If you have any queries regarding vacancy references 1130991 or 1131741 or the application process, please contact Prof. Lidunka Vocablo, email: l.vocablo@ucl.ac.uk, tel: 020 7679 7919. For queries for vacancy reference 1131752 or the application process, please contact Prof. John Brodholt, j.brodholt@ucl.ac.uk, tel: 020 7679 2622.

For further, specific details about the vacancies and how to apply on line please go to <http://www.ucl.ac.uk/hr/jobs/> and search on the relevant Reference Number.

Closing date for all posts: 11th April 2010 (applications to be received by 17:00).

University College London Taking Action for Equality.

Classified

cont. from page 131

Session 2A will provide a more in-depth coverage of remote sensing of the atmosphere. Participants will learn details of the MODIS aerosol retrieval algorithm and how to use, access and interpret information from additional sensors such as MISR, OMI, and time permitting AIRS and PARASOL.

This session will also provide an overview of some of the MODIS land products.

Session 2B will focus on air quality applications that use NASA satellite products in decision support frameworks and the basics of U.S. air quality policy.

Sessions 2A and 2B together will be limited to a total 50 participants.

Attendees can register for:
Sessions 1 and either 2A or 2B: \$170,

Session 1 Only: \$120,
Session 2A or 2B: \$60.

Priority in reservations for either session 2A or 2B will be given to those attending session 1.

Instructors for this workshop are Richard Kleidman, Ana Prados and Sundar Christopher.

To register please go to: <http://www.umbc.edu/trainctr/engineering/arsset-workshop.html>.

This activity is funded by the NASA Applied Sciences Program and it is open to students, researchers, policy makers, health, and other professionals. UMBC is located near the city of Baltimore in Baltimore County.

For additional information contact Richard Kleidman at nasa.gov or Ana Prados, Aprados@umbc.edu.

Archean Environment: the Habitat of Early Life. (ArchEnviron) is a Research Networking

Program of the European Science Foundation (www.esf.org). In its final year, the program will organize the following activities.

Analysing the Archean, a 4-day short course on the field, petrological and geochemical methods used to investigate conditions at the surface of the early Earth and controversies of the first part of Earth history. Invited teachers include Don Lowe, David Catling, Minik Rosing, Norm Sleep, Euan Nisbet, Hiroshi Ohmoto, Simon Poulton, Steve Mojzsis and Brian Windley. This course will be held in Utrecht, the Netherlands, from June 28-July 1.

Field conference in the Eoarchean complexes of West Greenland. This conference, organized by Martin Whitehouse and Minik Rosing and held July 15-27, will visit the Isua Supracrustal Belt, the gneiss terranes of Nuuk Fiord, and Akalia Island, and will include 2 conference days in Nuuk.

Field trip in Iceland. ArchEnviron will sponsor several participants on the CAREX field trip in Iceland on June 15-18, 2010 (www.carex-eu.org). Participants will interact in a field setting to deploy instruments, demonstrate the use of selected technologies, compare methodologies, and exchange research experience. Study sites include hot spring area and a glacier.

Scientific drilling in the Barberton Greenstone Belt, South Africa. ArchEnviron will provide financial support for several junior researchers to participate in this ICDP project during August 2010 (<http://barberton.icdp-online.org>).

Applications to each project are open to all candidates, but preference will be given to those from participating ArchEnviron countries. Full information about each activity, and details of the application procedures, are given on <http://archenv.geo.uu.nl/> and on www.esf.org/archenviron.



MISIP '10

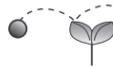
Misasa International Student Internship Program

Jul.01 - Aug.11

The Institute for Study of the Earth's Interior (ISEI), Misasa, Japan, is accepting applications for international student intern program. The annual Misasa International Student Intern Program for advanced undergraduate (3rd to 4th year) and master's course students has been planned to promote international collaborative research and education. During the intern program, students will work closely with ISEI faculty members and their research groups on currently active research projects. Researches at ISEI generally fall into one of the following areas:

- (1) Analytical Planetary Chemistry
- (2) Experimental Planetary Physics

Applicants are encouraged to contact ISEI faculty member(s) for more information. It is hoped that through this program, the participants will acquaint themselves with the state-of-the-art research facilities and activities at ISEI, and gain advanced scientific research experience. At the conclusion of the program, an intern symposium will be held for all the participants to deliver oral presentations of their work in English.



- Number of participants: about 10.
- Travel expense and daily allowance will be fully covered, and accommodation in the Misasa guesthouse will be provided.
- All application materials must be received by **May 9, 2010 (12 pm, JST)**.
- The application should be prepared using the provided form (see website).
- Notification of acceptance will be made by the middle of May, 2010.
- For inquiries concerning the intern program, please contact Director Eizo NAKAMURA (misip10@pheasant.misasa.okayama-u.ac.jp).



Website :

<http://www.misasa.okayama-u.ac.jp/>

Institute for Study of the Earth's Interior
Okayama University, JAPAN



EARTH
OBSERVATORY
OF SINGAPORE

An Institute of Nanyang Technological University

The Earth Observatory of Singapore (EOS) is a Research Centre of Excellence, funded by Singapore's National Research Foundation, Ministry of Education, and Nanyang Technological University. Research at EOS focuses on understanding Southeast Asia's dynamic oceans, atmosphere and tectonic plates and characterizing the tectonic, volcanic and climatic processes responsible for geohazards. These scientific characterizations will promote forecasts of natural processes that will aid governments, communities and businesses to anticipate and adapt creatively to these environmental challenges, as well as develop and implement visionary policies.

We invite dynamic and competent individuals to fill the following positions:

POST-DOCTORAL FELLOWS

- Tectonic Geodesy
- Neotectonics
- Paleoseismology
- Volcanic Geology
- Petrology
- Geochemistry
- Atmospheric Science
- Seismology
- Earthquake Engineering

TECHNICAL

- Field Engineer
- GPS Analyst
- Geochemistry Laboratory Manager

EDUCATION & OUTREACH

- Science Writer / Editor
- Science Illustrator
- Earth Science Educator

More information about the Observatory and these job opportunities can be found at www.earthobservatory.sg/careers

Interested applicants are invited to submit a full CV, including academic qualifications, research records, work samples and names and contact details of two referees, to: eos_humanresources@ntu.edu.sg

Selection will commence immediately.

RESEARCH SPOTLIGHT

Highlighting exciting new research from AGU journals

Colored dissolved organic matter traces ocean circulation

Chromophoric dissolved organic matter (CDOM) is dissolved organic material in the oceans that is optically measurable. It affects the color of the ocean, light penetration, photochemical reactions, and biological activity in the oceans. Nelson *et al.* made the first ship-based large-scale observations of the distribution and dynamics of CDOM in three major ocean basins. They found that their field observations of CDOM in the



A view off the R/V Roger Revelle, a ship used in this study of dissolved organic matter.

surface are consistent with satellite observations of CDOM.

The researchers also considered the sources and sinks of CDOM and the ways in which ocean circulation affects the distribution of CDOM, which is produced by decaying organisms in the ocean, transported by ocean circulation, and bleached by the Sun. In addition, the scientists related CDOM to apparent oxygen utilization, a measure of biological activity. They found that CDOM distributions were strongly related to apparent oxygen distributions in the Pacific and Indian oceans, though not in the Atlantic. They explain this through a variety of factors relating to circulation and CDOM production. Overall, the authors determined that CDOM, which can be measured through satellite observations, is a useful tracer of changes in biogeochemistry and ocean circulation. (*Geophysical Research Letters*, doi:10.1029/2009GL042325, 2010)

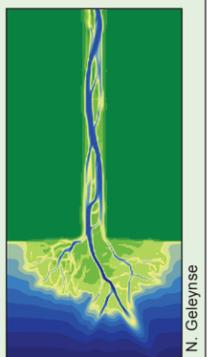
Deep-ocean billows observed

Ocean wave mixing in the deep ocean is important to ocean circulation, but detailed observations of turbulent mixing at the ocean floor are rare. To take a more

Model details river delta transformation

Various factors determine the dynamics of river delta systems. To examine in detail how river deltas form and transform, Geleynse *et al.* developed a high-resolution physics-based computer model. Their model provides a detailed description of the formation of delta distributary networks, taking into account boundary sedimentary composition, transport of multiple sediment fractions, and feeder channel dynamics. They found their simulated delta system to show a striking similarity with findings from field and laboratory studies. (*Geophysical Research Letters*, doi:10.1029/2009GL042000, 2010)

Simulated river delta.



detailed look at deep-ocean wave patterns, van Haren and Gostiaux designed moored temperature sensors to observe overturning above the sloping side of the Great Meteor seamount, an underwater tablemount in the Canary basin. They observed a turbulent mixing pattern with puffy, billowing structures called a Kelvin-Helmholtz billow train. Kelvin-Helmholtz instabilities have been previously observed in the laboratory, in the atmosphere, and near the surface of the ocean; this is the first reported detailed observation of these structures in the deep

ocean. The researchers observed patterns with as many as 10 billows forming a train. The observations show how internal ocean waves break above the slopes of the ocean bottom, creating turbulent mixing in the deep ocean. The authors note that this kind of turbulent mixing is important in stirring up sediments and returning nutrients to the water column and could be significant for ocean circulation. (*Geophysical Research Letters*, doi:10.1029/2009GL041890, 2010)

—ERNIE TRETAKOFF, Staff Writer