

# NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



Website: [www.ncgeolsoc.org](http://www.ncgeolsoc.org)

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Retired, K-12 education

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Consultant

Ray Sullivan,  
[sullivan@lucasvalley.net](mailto:sullivan@lucasvalley.net)  
Emeritus, San Francisco State  
University

## MEETING ANNOUNCEMENT

**DATE:** October 29, 2008

**LOCATION:** Orinda Masonic Center, 9 Altarinda Rd., Orinda

**TIME:** 6:30 p.m. social; 7:00 p.m. talk (no dinner) Cost:  
\$5 per regular member; \$1 per student or K – 12  
teachers

**SPEAKER:** **Dr. Laura Rademacher**  
Univ. of the Pacific, Stockton

### *The impact of wildfires on the California landscape*

Over a hundred years of fire suppression policy in the United States has led to increasingly severe wildfires. A warming climate may exacerbate this problem. In 2004 alone, more than 8 million acres burned in 40 states. As a result, there is a growing interest in understanding how wildfires affect watershed processes. I will present research on the post-fire evolution of soil properties, water quality, and biogeochemical cycles after recent California wildfires.

**Biography:** **Dr. Laura Rademacher** earned a BS degree in Geology & Geophysics (with Environmental Studies) at the University of Wisconsin - Madison. She went on to graduate school at U.C. Santa Barbara where she studied groundwater flowpaths, chemical weathering rates, and climate change patterns as determined using multiple environmental tracers, and received her Ph.D. in 2002. Dr. Rademacher then spent one year as a post doc at the University of Illinois at Urbana-Champaign working on the uranium geochemistry of environmental systems. Afterwards she moved to Los Angeles, where she taught for two years at Cal State University Los Angeles. In 2005 she moved to Stockton and began teaching at the University of the Pacific where she her interests include biogeochemical cycles, the hydrology of the critical zone, and the impact of human activities on coastal processes.

# NCGS 2008 Calendar

**Wednesday October 29, 2008**

***The impact of wildfires on California landscapes***

Dr. Laura Rademacher, Univ. of the Pacific,  
Stockton

7:00 pm at Orinda Masonic Center

**Tuesday, November 4, 2008**

***AAPG Distinguished Lecturer (Early Date!)***

***Relation Between Volcanism, Tectonism, and Hydrothermal Activity Along the Global Mid-Ocean Ridge System***

Dr. Susan Humphris, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

7:00 pm at **Lafayette Community Center**, Manzanita Room, 500 St. Mary's Road, Lafayette; See map:

<http://maps.google.com/maps?f=q&hl=en&geocode=&q=Lafayette+Community+Center,+Lafayette,+CA&ie=UTF8&ll=37.870856,-122.106428&spn=0.035436,0.05785&z=14>

**Monday November 17, 2008 (Rescheduled Date!)**

***AAPG Distinguished Lecturer – He's Back!***

***A Geologist's Introduction to Permeability Averaging and the Effects of Scale on the Permeability of Heterogeneous Rocks***

Dr. Jim Jennings, Shell International Exploration and Production, Houston, Texas. See attached flyer;

1:30 **Chevron; Chevron Park, Building C, Room C2187**; Non-Chevron attendees should contact Beverly Reynolds to request a security badge at (925) 842-2710 or [beverlyreynolds@chevron.com](mailto:beverlyreynolds@chevron.com)

**Wednesday November 19, 2008**

**CANCELED**

***Our Regular Monthly Meeting Has Been Canceled Due to the Number of Alternate Events This Month (AAPG Distinguished Lecturers)***

**Wednesday January 28, 2009**

***Geophysical vignettes from the wine country: implications for the northward continuation of the East Bay fault system*** - Dr. Victoria E. Langenheim, U.S. Geological Survey, Menlo Park, CA

7:00 pm at Orinda Masonic Center

**Wednesday February 25, 2009**

***Mammoths, Meteorites, and Supernovae*** - Dr. Richard B. Firestone, Lawrence Berkeley National Laboratory, (Note: Dr. Firestone is co-author of "Cycle of Cosmic Catastrophes" - See:

<http://www.innertraditions.com/Product.jmdx?action=displayDetail&id=2139&searchString=1-59143-061-5> or <http://www.amazon.com/Cycle-Cosmic-Catastrophes-Stone-Age-Changed/dp/1591430615>

7:00 pm at Orinda Masonic Center

**Wednesday March 15, 2009**

Greg Stock; Greg is the Geologist for Yosemite National Park. He will be speaking about rockfalls or glaciers in the Park.

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## Upcoming NCGS Field Trips

**November 15, 2008** **Earthquake at UCB? - See Attached Flyer** ***The Hayward Fault, Campus Retrofit and the Seismological Laboratory***  
Drs. Peggy Hellweg, Doris Sloan, Christine Shaff, and Craig Comartin, UCB

Do you have a place you've wanted to visit for the geology? Let us know. We're definitely interested in ideas. For those suggestions, or for questions regarding, field trips, please contact Rob Nelson at: [rlngeology@sbcglobal.net](mailto:rlngeology@sbcglobal.net)

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## Peninsula Geologic Society

### Upcoming meetings

For an updated list of meetings, abstracts, and field trips go to <http://www.diggles.com/pgs/>. The PGS has also posted guidebooks for downloading, as well as photographs from recent field trips at this web address. Please check the website for current details.

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## Association of Engineering Geologists San Francisco Section

### Upcoming meetings

Meeting locations have been rotating between San Francisco, the East Bay, and the South Bay. For further meeting details go to: <http://www.aegsf.org/>. Posted meeting include:

- November 13, 2008; J. David Rogers; *The Importance of Common Sense in Failure Investigations*; Joint AEG – ASCE Geotechnical Meeting; Spenger's in Berkeley.
- December 9, 2008; Jeramy Decker, Kiewit Pacific, on digital tunnel scanning and mapping technologies.

**Thirty-five Hayward Fault  
Computer Simulations**  
U.S.G.S. News Release for the  
**Third Conference on Earthquake  
Hazards in the Eastern San  
Francisco Bay Area**  
**Science, Hazard, Engineering, and Risk**  
California State University, East Bay  
Hayward Campus  
October 22-24, 2008

<http://earthquake.usgs.gov/regional/nca/simulations/hayward/>

In 2008 the USGS led a [collaborative effort](#) with [URS Corporation](#), [Lawrence Livermore National Laboratory](#), [Stanford University](#), and the [University of California at Berkeley](#) to create computer simulations of large, anticipated earthquakes on the Hayward and Rodgers Creek faults. The most recent large earthquake on the [Hayward fault](#) was in 1868, 140 years ago. Because the past five large earthquakes on the Hayward fault have been about 140 years apart, the Hayward and Rodgers Creek faults are the most likely faults to produce a large earthquake in the Bay Area. These computer simulations of scenario (or anticipated) earthquakes provide detailed pictures of what shaking we should expect in such earthquakes. These computer models capture the shaking at length scales larger than about 300 ft (100 m), so they do not include the effects of very thin, soft sediments, such as Bay Mud around the perimeter of San Francisco Bay. For areas with these thin, soft sediments the shaking would be stronger than what is shown in the animations.

The computer simulations include a total of seven earthquake scenarios: three magnitude 6.8 scenarios with different starting locations (epicenters), three magnitude 7.0 scenarios with different starting locations, and one magnitude 7.2 scenario. The next large earthquake on the Hayward fault will likely fall in the range of magnitude 6.8-7.0. The magnitude 6.8 and magnitude 7.0 scenario earthquakes provide detailed examples of the type of shaking we should expect in such an event. The magnitude 7.2 scenario earthquake, while possible, is a much less likely event involving simultaneous rupture of both the Hayward and Rodgers Creek faults.

## So. Cal Earthquake Scenarios

Another U.S.G.S. earthquake scenario, slightly less disastrous than what could be expected in the Bay Area (lacking the tsunami which is likely to accompany a major Hayward earthquake) has been relayed by Kathleen Burnham. She has had the chance to review it and thought members might like to see a concise and thoroughly researched earthquake scenario. See: <http://pubs.usgs.gov/of/2008/1150/>.

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## And Now For Something Completely Different!!

Thanks to a friend of Kathleen Burnham's (a non-geologist who has given it a good review – the friend, not Kat!) this has come to our attention just as “we were going to press” (So it hasn't been fully peer reviewed!). If you have a free evening (or just a bit of free computer time) in the very near future you might want to check out a series of YouTube videos from **geologist Tenaya Hurst**. Teneya, a **Geo-AnthropActress**, is staging “**A Sexy Geological Cabaret**” that “teaches geologic concepts with comparisons to personal relationships” (We'll let you figure it out). The live production is currently at the Stage Works Theatre at 533 Sutter St. (near Powell) in San Francisco until mid November 15 at 10:30 PM (Thursdays, Fridays, and Saturdays only). We've watched the first YouTube segment of a slightly older version and it is definitely a bit of fun, but we can't yet guarantee the rest! Check the link: [http://www.youtube.com/watch?v=KLOH\\_yPkTP0](http://www.youtube.com/watch?v=KLOH_yPkTP0) . For tickets to the live show go to: <http://www.tenayahurst.com/>

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## Friends of the Pleistocene

### Second Announcement - 2008 Pacific Cell Fieldtrip November 14-16, 2008

**Organizers and Leaders:** Tom Rockwell, Mike Oskin, Kim Le, Becky Dorsey, Susanne Janecke, Warren Sharp, Kate Fletcher, Lewis Owen, Caitlin Lippincott, Eldon Gath and George Jefferson

**Focus:** Cross-correlation of Quaternary dating techniques, slip rates, and tectonic models in the western Salton Trough. **Register now at the official 2008 FOP website:** <http://www-rohan.sdsu.edu/~fop/>

The cost of the trip will be \$35, which includes all camping-related fees (porta-potty rentals, other), copious amounts of beer for Thursday, Friday and Saturday evenings, and an all-new 2008 FOP T-shirt (currently under design). We will be dry-camping in the Anza Borrego area, and several of the stops will involve long and (hopefully) hot hikes, so please plan accordingly. A 4x4 high-clearance vehicle is strongly encouraged for Friday's plans. Car-pooling, both to the campground and along the trip, will also be strongly encouraged.

**Day 1: Friday - The southern Clark strand of the San Jacinto fault.** Will start off with a long and rigorous hike to examine spectacular offsets along the fault in Rockhouse Canyon, so Friday is not for the weak-kneed. But if you make it, you will be subjected to fault-zone geomorphology that will stick you in the eye. In the afternoon, we will visit the southern Santa Rosa slip rate site and discuss rates based on various dating techniques, dissipation of slip to the south, discussions on lifetime slip-rates versus their latest Quaternary slip rates. Have slip rates varied due to changing fault structure? ...and other controversial topics.

**Day 2: Saturday - Evolution of the San Jacinto Fault.** We will examine the evidence for the Early Quaternary age of the San Jacinto fault zone. Implications of fault arrays in mud-rich basins for paleoseismic studies. Crossing active faults-what is the evidence and how do they do this? Implications of ramps and flats on strike-slip faults. Fault youth and fault maturity: is this a useful model?

**Day 3: Sunday - The Elsinore Fault, Lake Cahuilla history, Fish Creek basin stratigraphy.** Continued discussions on derivation of slip rates based on various dating techniques, including cosmogenic  $^{10}\text{Be}$ , U-series, OSL, soils. Dating soils via U-series on pedogenic carbonate. Dating Lake Cahuilla shoreline deposits with Optically-stimulated luminescence - how close do you get with OSL? The implications of clast provenance and fan morphology combined

with various dating techniques in estimating slip rates.

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## Fault Monitoring

This Week in SCIENCE

September 12 2008

Seismic receivers along and near faults are continuously receiving a variety of noise in between large earthquakes. **Brenguier *et al.*** show how this noise can be used to infer changes in the properties of faults with time. By studying 5 years of seismic data near Parkfield, California, along the San Andreas Fault and correlating noise at different receivers, the authors identified local variations or trends in seismic properties along the fault with time. Large reductions in the seismic velocity along the San Andreas Fault occurred after two large earthquakes, including the Parkfield quake in 2004--changes which persisted. Thus, it is possible to observe slow changes in fault properties with time.

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## A Century in Yosemite

This Week in SCIENCE

October 10 2008

In the early-20th century, Joseph Grinnell, a founder of ecology, and his colleagues surveyed small-mammal diversity across an elevational transect of 60 to 3300 meters in what is now the Yosemite National Park in California, USA. Their surveys were highly detailed and well-documented, and the data, backed by specimens, field notes, and photographs, have been retained in the Museum of Vertebrate Zoology. Nearly 100 years later, **Moritz *et al.*** resurveyed small-mammal diversity across the Yosemite transect. The results reveal a clear community-scale response to climate warming, with low-elevation species expanding upward and high-elevation species contracting. This century-scale record provides hard evidence for substantial changes in response to past climate change, including the range collapse of some high elevation species. Species diversity has, however, been retained, despite range fluctuations, which suggests the importance of protected landscapes for retaining diversity through migratory responses to climate change.



# 2008-09 AAPG Distinguished Lecture

## Abstract

**SUSAN E. HUMPHRIS**

Woods Hole Oceanographic Institution,  
Woods Hole, Massachusetts



*Funded by the AAPG Foundation*

## Relation Between Volcanism, Tectonism and Hydrothermal Activity Along the Global Mid-Ocean Ridge System

Just over 30 years ago, scientists exploring the global mid-ocean ridge system made the spectacular discovery of black smokers—hydrothermal chimneys made of metal sulfide minerals that vigorously discharge hot, particulate-laden fluids into the ocean. These chimneys are the surface manifestation of convection of seawater through the oceanic crust and water-rock reactions that produce hot, hydrothermal fluids that discharge at the seafloor. This hydrothermal circulation process plays an important role in regulating the chemistry of seawater, building mineral deposits, and supporting chemosynthetically-based ecosystems.

Early studies focused on hydrothermal systems on the fast-spreading East Pacific Rise, where shallow magma lenses beneath the ridge crest provide heat to drive convection of seawater through the oceanic

crust. Ten years later, studies of the slow-spreading Mid-Atlantic Ridge revealed much larger mineral deposits – a surprising result given the lower magma delivery rate and heat availability.

Through the use of different deep-submergence technologies, this talk will explore the characteristics of vents and their associated communities along the mid-ocean ridge, and the varying relations between volcanic and tectonic processes at sites on ridges of different spreading rates. It will focus in particular on how one active hydrothermal system has constructed a large mineral deposit on the Mid-Atlantic Ridge, and how recent experiments at that site have shed light on the role tectonics and faulting play in the evolution of long-lived hydrothermal systems.

## Susan E. Humphris

### Education:

1977 PhD, MIT/WHOI Joint Program, Chemical Oceanography  
1972 BA (1st Class Hon.), University of Lancaster, U.K., Environmental Sciences

### Experience:

2004-present Chair, Geology & Geophysics Department  
2000-04 Director, Deep Ocean Exploration Institute, WHOI  
1998-present Senior Scientist, WHOI  
1992-98 Research Specialist, WHOI  
1986-92 Dean, Sea Education Association  
1979-86 Scientist, Sea Education Association  
1976-78 Postdoctoral Researcher, Imperial College, London, UK

### Publications and Awards

Over 80 publications in various scientific journals including Science, Nature, Journal of Geophysical Research, Geology, Geochimica Cosmochimica Acta, Earth & Planetary Science Letters, and

Chemical Geology. Co-creator of the award-winning Dive and Discover website (<http://www.divediscover.whoi.edu>)

### Selected Publications:

Humphris, S.E., Herzig, P., Miller, D.J., and the Leg 158 Shipboard Scientific Party, 1995. The subsurface nature of an active seafloor hydrothermal system, 26°N, Mid-Atlantic Ridge. *Nature*, 377, 713-716.  
Humphris, S.E. and Cann, J.R., 2000. Constraints on the energy and chemical balances of the modern TAG and ancient Cyprus seafloor sulfide deposits. *J. Geophys. Res.*, 105, 28,477-28,488.  
Humphris, S.E. and Tivey, M.K., 2000. A synthesis of geological and geochemical investigations of the TAG hydrothermal fluid: Insights into fluid flow and mixing processes in a hydrothermal system. In: Dilek, Y., Moores, E., Elthon, D. and Nicolas, A. (eds): *Ophiolites and Oceanic Crust: New Insights from Field Studies and the Ocean Drilling Program*. Boulder, CO, Geological Society of America Special Paper 349, p. 213-235.

- Humphris, S.E., Fornari, D.J., Scheirer, D.S., German, C.R. and Parson, L.M., 2002. Geotectonic setting of hydrothermal activity on the summit of Lucky Strike Seamount (37°17'N, Mid-Atlantic Ridge). *G-cubed*, 3(8), 1049, doi: 10.1029/2001GC000284
- Humphris, S.E., Halbach, M. and Juniper, K., 2003. Low-temperature alteration: Fluxes and mineralization. In: Halbach, P.E., Tunncliffe, V. and Hein, J.R. (eds.) *Energy and Mass Transfer in Hydrothermal Systems*, Dahlem University Press, Germany, 163-181.
- Humphris, S.E. and Bach, W., 2005. On the Sr isotope and REE composition of anhydrites in the TAG seafloor hydrothermal system. *Geochim. Cosmochim. Acta*, 69, 1511-1525.
- DeMartin, B., Reves-Sohn, R., Canales, J.P. and Humphris, S.E., 2007. Kinematics and geometry of detachment faulting beneath the TAG hydrothermal field, Mid-Atlantic Ridge. *Geology*, 35, 711-714.
- Humphris, S.E., Reves-Sohn, R.A., Singh, T. and Edmonds, H.N., 2008. Exploration of hydrothermal vents on the Gakkel Ridge, Arctic Ocean, using autonomous underwater vehicles. In: Collins, K. and Griffiths, G. (eds): *Proc. of International Workshop on AUV Science in Extreme Environments*. London: Society for Underwater Technology, pp. 129-136.
- 1991 Massachusetts Marine Educators Award for Dedicated Service and Outstanding Contributions to Marine Education
- 1992 Ocean Drilling Program Distinguished Lecturer
- 1999 J. Seward Johnson Chair in Oceanography, WHOI
- 2003 Massachusetts Marine Educators' Nap J. Bonaparte Service Award

#### **Professional Memberships:**

American Geophysical Union  
 American Association for the Advancement of Science

#### **Interests:**

Susan Humphris studies hydrothermal activity along the global mid-ocean ridge system. Her ultimate objective is to assess the role of hydrothermal fluxes in global geochemical mass balances. This involves combining two lines of research: (i) investigating the volcanic and tectonic controls on the distribution and characteristics of hydrothermal activity at ridges of different spreading rates, and (ii) unraveling the geochemistry of seawater-rock reactions within hydrothermal systems.

These interests have resulted in Susan spending more than three years at sea on various oceanographic research ships, including the drilling ships *Glomar Challenger* and *JOIDES Resolution*. She has completed many dives in the submersible, *Alvin*, and has used the remotely-operated vehicle *Jason* and autonomous

underwater vehicles for scientific work in the Atlantic, Pacific, Indian and Arctic Oceans. Susan was also the co-creator of the award-winning *Dive and Discover* website (<http://www.divediscover.whoi.edu>) to bring oceanographic research expeditions in near real-time to students and the general public. The backbone of the site is a series of educational modules that address basic science concepts central to marine science and research being conducted at sea. When a cruise is taking place, the site provides daily updates on the progress of the cruise through still and video images from the seafloor and of shipboard operations, graphical representations of a wide variety of oceanographic data, explanations about the technology being used, and general information about life at sea and the scientists, engineers, and mariners that make oceanographic research possible.



# 2008-09 AAPG Distinguished Lecture

## Abstract

**JIM JENNINGS**

Shell International Exploration and Production  
Houston, Texas



*Funded by the AAPG Foundation*

## A Geologist's Introduction to Permeability Averaging and the Effects of Scale on the Permeability of Heterogeneous Rocks

Most naturally occurring porous media exhibit some degree of spatial permeability variation, usually referred to as heterogeneity. Few rocks are homogeneous, although some are more variable than others. One of the consequences of heterogeneity is scale dependence. That is, the permeability of a large volume of rock, often called the "effective permeability," will in general be different than the permeabilities of smaller volumes within it.

In this presentation I will use published measurements to illustrate the effects of scale on permeability. Then I will outline some important theoretical predictions concerning effective permeability and show how these theories offer a powerful framework for understanding the behavior of heterogeneous rocks. Finally I will suggest a permeability averaging method that can be used to reconcile observations at different scales and to predict effective permeability for reservoir modeling purposes.

## Jim Jennings

### Education

- 1983 Ph.D., Petroleum Engineering, Texas A&M University
- 1981 M.S., Petroleum Engineering, Texas A&M University
- 1978 B.S., Petroleum Engineering, University of Wyoming

### Experience

- 2007-present Principal Reservoir Engineer, Shell International Exploration and Production, Houston, Texas
- 2000-07 Research Scientist, Bureau of Economic Geology, The University of Texas at Austin, Texas
- 1995-2000 Research Associate, Bureau of Economic Geology, The University of Texas at Austin, Texas
- 1998-95 Senior Research Engineer, ARCO Exploration & Production Technology, Plano, Texas
- 1986-88 Reservoir Engineer, Standard Alaska Production Company, Anchorage, Alaska
- 1983-86 Project Engineer, Standard Oil Production Company, Warrensville, Ohio

### Publications and Awards

- 2006 Editor, Advances in reservoir characterization reprint volume, Society of Petroleum Engineers
- 2003 Visiting Professor, Shell International Exploration and Production, Rijswijk, The Netherlands
- 2002 Outstanding Technical Editor, Society of Petroleum Engineers
- Authored or co-authored over 40 journal and conference proceeding papers.
- Five publications relevant to the lectures
- Zhang, Liying, Nair, Narayan, Jennings, J. W., Jr., and Bryant, S. L., 2005, Models and methods for determining transport properties of touching-vug carbonates: Society of Petroleum Engineers, Paper No. SPE 96027.
- Lucia, F. J., Kerans, Charles, and Jennings, J. W., Jr., 2003, Carbonate reservoir characterization: Journal of Petroleum Technology, v. 55, no. 6, p. 70-72.
- Jennings, J. W., Jr., and Lucia, F. J., 2003, Predicting permeability from well logs in carbonates with a link to geology for interwell permeability mapping: Society of Petroleum Engineers Reservoir Evaluation & Engineering, v. 6, no. 4, p. 215-225.
- Jennings, J. W., Jr., Lucia, F. J., and Ruppel, S. C., 2002, 3D modeling of stratigraphically controlled

petrophysical variability in the South Wasson Clear Fork reservoir: Society of Petroleum Engineers, SPE Paper No. 77592.

Jennings, J. W., Jr., Ruppel, S. C., and Ward, W. B., 2000, Geostatistical analysis of permeability data and modeling of fluid-flow effects in carbonate outcrops: Society of Petroleum Engineers Reservoir Evaluation and Engineering, v. 3, no. 4, p. 292-303.

#### **Professional Memberships**

American Association of Petroleum Geologists

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## **CLIMATE SCIENCE: Wetter or Drier?**

Editors' Choice: Highlights of the recent literature  
May 16 2008; H. Jesse Smith

One expected result of global climate warming is an overall increase in precipitation. Not every place will receive more rain--some will receive less, even though the average should increase. Certain changes are already apparent in various regions, such as a greater frequency of extreme rainfall events and a higher number of rainy days. Another potential change that could have important effects is an increase in prolonged dry spells. Groisman and Knight have compiled rainfall data covering the last 40 years from more than 4000 carefully selected stations across the conterminous United States, in order to determine if this pattern already has begun there. They find that it has. More precisely, they show that the mean duration of prolonged dry spells in the warm season has increased significantly, and that the return period of 1-month-long dry episodes over the eastern United States has decreased from 15 years to between 6 and 7 years. This pattern could be hazardous for terrestrial ecosystems and agriculture. *J. Climate* **21**, 1850 (2008).

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## **CLIMATE SCIENCE 1000 Years of Hurricanes**

Editors' Choice: Highlights of the recent literature  
September 5 2008

Julia Fahrenkamp-Uppenbrink

The natural variability of hurricane activity is poorly known, not least because the historic record for hurricanes extends back only about 130 years. As a result, there has been controversy over whether hurricane activity will change--or is already changing--as a result of global warming. Sediments may hold clues to hurricane activity over longer time scales, but few studies have yielded sedimentary records of hurricane activity at annual resolution. Besonen *et al.* have now obtained an annually resolved lake sediment

International Association for Mathematical Geology  
Society of Petroleum Engineers

#### **Professional Interests**

Carbonate reservoir characterization  
Applications of statistics and geostatistics in reservoir analysis and modeling  
Modeling flow in porous media and scaleup of fluid flow properties  
Applications of Fourier transform methods in analysis and modeling of spatial statistics

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record from Lower Mystic Lake in Boston, Massachusetts, that covers the past 1000 years. The record contains anomalous features--unusually thick layers in which coarse sediments and terrestrial, organic detritus are overlain by progressively finer sediments--that are indicative of strong flooding. Comparison with the historic record shows that 10 out of 11 of these features occur in years when category 2-to-3 hurricanes struck Boston. The authors use this correlation to determine centennial-scale changes in hurricane frequency. Further records of this type from other locations will help to relate these patterns to other paleoclimate indicators. *Geophys. Res. Lett.* **35**, L14705 (2008).

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## **GEOPHYSICS: Sensing Supershear**

Editors' Choice: Highlights of the recent literature  
September 5 2008; Brooks Hanson

Recent observations, supported by experiments, have indicated that some earthquake ruptures transiently exceed the local speed of sound along the fault zone. This "supershear" can explain enhanced shaking from these quakes; thus, supershear ruptures are critical in assessing seismic risks. Many of the details of how ruptures accelerate to above the sound speed and then decelerate, in some cases repeatedly, as a rupture progresses are unclear, as most supershear ruptures have been inferred by data inversions. Vallée *et al.* were able to observe these dynamics more directly in the 2001 Kokoxili earthquake ( $M = 7.8$ )--which ruptured 400 km along the Kunlun fault in northern Tibet--thanks to an array of seismometers in Nepal that were nearly parallel to the rupture. Their data show that the earthquake, which began in the west, accelerated to above the shear wave velocity after ripping 175 km eastward, at a bend in the fault. Rupture speeds nearly reached the compressional (p) wave velocity before decelerating at another bend. Much of the high-frequency seismic energy from the quake was radiated during these transitions.

*J. Geophys. Res.* **113**, B07305 (2008).

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# NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



NCGS FIELD TRIP IN COMMOMERATION OF 1868 HAYWAED EARTHQUAKE

## FIELD TRIP – EARTHQUAKE AT UCB? THE HAYWARD FAULT, CAMPUS RETOROFIT, AND THE SEISMOLOGICAL LABORATORY

Saturday November 15, 2008

**Leaders: Peggy Hellweg, Doris Sloan, Christine Shaff, and Craig Comartin  
University of California at Berkeley**

Have you walked through an offset stream channel? Sat on a shutter ridge? The Hayward Fault runs right through UCB's Memorial Stadium and the uphill edge of the campus. Join the Berkeley Seismological Laboratory's Peggy Hellweg, to walk the trace of the fault and learn about its past and present. On our way back Christine Shaff and Craig Comertin will provide an insider's tour of the retrofit activities on campus. Finally, at the Seismolab, Peggy will give an introduction to its earthquake monitoring activities and seismological research.

**THIS FIELD TRIP WILL BE LIMITED TO 40 PEOPLE.**

\*\*\*\*\* **Field Trip Logistics** \*\*\*\*\*

**Time & Departure:** November 15, 2008, 8:30 am, North Gate Entrance (The public is allowed to park in the "Lower Hearst" structures and weekends and people can purchase a permit from the machines there).

**Cost:** \$15/person (includes guidebook, lunch, refreshments, soft drinks)

\*\*\*\*\***REGISTRATION FORM (Hayward Fault at UCB Field Trip)**\*\*\*\*\*

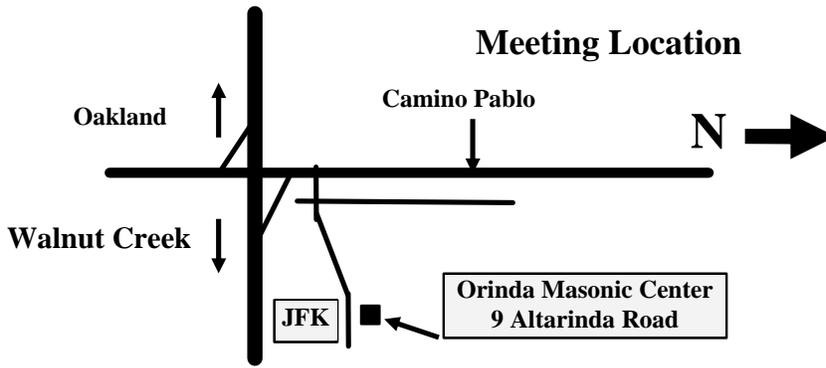
Name: \_\_\_\_\_ E-mail: \_\_\_\_\_

Address: \_\_\_\_\_ Phone (day): \_\_\_\_\_ Phone  
(evening): \_\_\_\_\_

Lunch: Regular: \_\_\_\_\_ Vegetarian: \_\_\_\_\_ (Please check one) Check Amount: \_\_\_\_\_

Please mail a check made out to "NCGS" to:  
**Tridib Guha  
5016 Gloucester Lane,  
Martinez, CA 94553**

Questions: e-mail: [tridibguha@sbcglobal.net](mailto:tridibguha@sbcglobal.net) Phone: (925) 370-0685 (evening) (925) 363-1999 (day)



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