



Seismological Society of America

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Media Advisory for Annual Meeting Seismological Society of America 2010

*Embargoed: Contents not for release until 12:01 a.m. the day of session.
All times Pacific Daylight Time.*

*All sessions will be held at the Marriott Downtown Waterfront Hotel in Portland, Ore.
Press may receive complimentary registration at the Ballroom Lobby.*

Wednesday, April 21

Characterizing the Next Cascadia Earthquake and Tsunami

8:30 a.m. – Noon, Salon F

The Pacific Northwest is vulnerable to extreme ground shaking and tsunamis generated from great earthquakes along the Cascadia subduction zone, which stretches from Northern California to Vancouver Island. This session reports the latest research on the seismic potential of the area and explores the idea of temporal clustering of earthquakes in the prehistorical record.

- Onshore and offshore paleoseismic data suggest a more frequent recurrence of rupture than previously thought for much of Cascadia. The next Cascadia event is most likely to be a segmented rupture along one or both of the faults southern segments. Time-dependent failure analysis suggests the likelihood of an event by 2060 of ~25 percent for the northern margin and ~80 percent for the southern margin. Conditional probabilities for the next 50 years are 10-15 percent, and 25-45 percent respectively. Chris Goldfinger, Oregon State University, gold@coas.oregonstate.edu; 541-760-1559.
- Supercycles of earthquake clusters, some borrowing unreleased energy from previous cycles, may explain some enigmas about the history of major seismic activity in the Cascadia subduction zone. Chris Goldfinger, Oregon State University, gold@coas.oregonstate.edu, 541- 760-1559.
- A statistical analysis on the turbidite event record lends support to the idea that M 9 megathrust quakes along the Cascadia subduction zone occur in cycles of clusters, separated by unusually long time periods. The analyses suggest a median intracluster interval of 260 years and the intercluster interval of 1,759 years. Ivan Wong, URS Corporation, ivan_wong@urscorp.com.
- This talk explores the consequences of applying a clustering model to the earthquake record in the Pacific Northwest.



Roland LaForge, Fugro William Lettis Associates, r.laforge@fugro.com

Monitoring for Nuclear Explosions

8:30 a.m. – 3:45 p.m., Salon E

Seismology has new visibility with policymakers and the general public in the context of current evaluations of the Comprehensive Nuclear Test Ban Treaty (CTBT). This robust session reports on developments in monitoring for compliance with nuclear treaties.

- Jofi Joseph, senior advisory to the Under Secretary of State for Arms Control and International Security, is invited to give a luncheon address on issues associated with the CTBT.

Evolution of Slow Slip and Tremor

2:15 – 5:45 p.m., Salon F

Not all natural deformation activity is sudden and violent, as in earthquakes. Episodic, slow, smooth movement of faults, accompanied by low-level seismic wave tremors, can now be detected with modern geodetic and seismic instruments. How these ‘slow slip phenomena’, which happen over days and weeks, are related to sudden, great earthquakes is the subject of much study and may lead to improved estimates of where and when the great earthquakes will occur.

- Episodic Tremor and Slip (ETS) has now been observed along the northern Cascadia Margin for more than 15 years. More recent densification of GPS coverage and the introduction of Gladwin borehole strainmeters (BSM) as part of the Plate Boundary Observatory have allowed more detailed monitoring of the evolution of the slip surface during prolonged ETS events. Herb Dragert, who first identified slow slip events in Cascadia, reports on a study that examines in detail the along-strike migration of the May 2008 ETS as determined from the GPS and BSM observations. GPS sites overlying the 30 km depth contour of the subducting plate interface show the slip to initiate west of northern Puget Sound and then propagate bi-directionally to the northwest and the south at ~8km per day. Shear strain time series at regional BSM sites confirm this steady expansion of the slip zone. Herb Dragert, Geological Survey of Canada, hdragert@nrcan.gc.ca.
- Seismic recordings combined with eyewitness reports and geotechnical studies of the Oct. 11, 2009, Nile Valley, Wash., landslide provide new clues as to what happens before, during and after a landslide of this type. Landslides may show



precursory patterns that seismic monitoring can detect, potentially saving lives. Kate Allstadt, U. of Washington, Seattle, allstadt@uw.edu, 607-725-8211 (cell).

- Water levels at Port Angeles, Wash., drop during slow slip events, according to a study of hourly water level records from NOAA tide gauges between 1997 and 2009. Researchers compared base line water levels at five sites in Washington and documented millimeters of relative displacement. The next step is to review 100 years of tidal records to extend the existing record of slow slip events back in time before GPS technology was available. Sequoia Alba, University of Oregon, salba@uoregon.edu, 541-221-2534 (cell).
- Recent studies have established the influence of loading from ocean tides on the generation of low-frequency earthquakes in subduction zones. This poster looks at tidally-induced stresses on the San Andreas Fault near Parkfield, Calif. Amanda Thomas, University of California, Berkeley, amthomas@berkeley.edu, 770-314-3716 (cell).

Engaging Students and Teachers in Seismology – Case Studies

4:15 – 5:45 p.m., Salon E

This session reports on unique and successful programs that engage K-12 and college students to learn about seismology.

- During a 2009 home football game at Boise State University's Bronco Stadium in Idaho, more than 30,000 fans unwittingly took part in an experiment to record seismicity resulting from the stomps, cheers and general movement during a game. The primary goal was to give the 20 students and faculty experience deploying equipment and an opportunity to work with a unique data set. The broadband instruments recorded microearthquakes following touchdowns, kickoffs and interceptions. Andrew Nies, Boise State University, andrewnies@us.boisestate.edu, 208-559-4374
- Citizen science: An innovative program, the Quake-Catcher Network (QCN), is developing the world's largest, low-cost strong-motion seismic network by utilizing sensors in and attached to volunteer internet-connected computers. A central mission of the Quake-Catcher Network is to provide scientific educational software and hardware so that K-12 teachers, students, and the general public can better understand and participate in the science of earthquakes and earthquake hazards. Jesse Lawrence, Stanford University, jflawrence@stanford.edu, 650 – 868-5527 (cell)



**Special Town Hall Meeting: Portland, Oregon
6:45 – 9 p.m.**

To what extent can recent earthquakes in Haiti and Chile inform us of what to expect in the Pacific Northwest? Both earthquakes offer stark lessons in the survivability of earthquakes when societies prepare for these inevitable events but avoidable disasters. Is the Pacific Northwest prepared for the large Cascadia earthquake that will likely happen within our lifetimes? Top scientists and policymakers will provide analysis on the vulnerability of Oregon's schools, bridges, buildings and lifeline infrastructure to damage from severe ground motion and tsunamis.

Thursday, April 22

**Operational Earthquake Forecasting
8:30 a.m. – Noon, Salon A**

The public needs information about future earthquakes. The goal of operational earthquake forecasting – quantifying the likelihood that a seismic event will occur in the near term – is to provide communities with information about seismic hazards that can be used to make decisions in advance of potentially destructive earthquakes. This session reports on the status of the science of earthquake forecasting.

- What is operational earthquake forecasting and how does it differ from alerts to the public about other hazards? Gordon Woo, Risk Management Solutions, United Kingdom, woo@rms.com
- In the aftermath of the April 2009 (m 6.3) L'Aquila earthquake, Italian authorities appointed an international commission to consider the value of both prediction (stating an exact time, location and magnitude of an earthquake) and forecasting (giving the probability of an earthquake) methods of earthquakes. In this presentation, the chair of the international commission will use the commission's findings and recommendations as the basis for speculation on future enhancements and refinements to operational earthquake forecasting in Italy, California and elsewhere. Tom Jordan, University of Southern California and head of the Collaboratory for the Study of Earthquake Predictability, tjordan@usc.edu.
- U.S. and international governments are reconsidering their automatic alert and activation levels, as well as response procedures. The proposed Earthquake



Impact Scale (EIS) is based on two complementary criteria. One, based on the estimated cost of damage, is most suitable for domestic events; the other, based on estimated ranges of fatalities, is generally more appropriate for global events. Both simple and intuitive color-coded alerting criteria are presented. David Wald, U.S. Geological Survey, wald@usgs.gov.

- Case study: The state of operational earthquake forecasting in Italy, pre- and post-2009 L'Aquila earthquake. Warner Marzocchi, Istituto Nazionale di Geofisica e Vulcanologia (INGV), warner.marzocchi@ingv.it
- A report on recent efforts by the Collaboratory for the Study of Earthquake Predictability, which is testing and evaluating short-term earthquake forecasts in four different testing centers around the globe. Danijel Schorlemmer, USC, ds@usc.edu

Near-Surface Deformation Associated with Active Faults

8:30 a.m. – Noon, Salon F

Seismic hazard assessments rely on an accurate understanding of the likely recurrence of earthquake behavior. Seismologists use a range of tools to examine the changes to the Earth's surface and near-surface from active faults. Tools, such as remote sensing technology, help document evidence of past earthquakes and current seismic creep.

- There is debate as to the seismic hazard associated with the New Madrid Seismic Zone (Central U.S.), which generated giant earthquakes in 1811 and 1812. Some investigators interpret GPS data as evidence that no strain is being accumulated across the faults, suggesting far less seismic hazard in the area than previously thought. This presenter argues that there are observable GPS motions at the surface. Moreover, he suggests several models that allow significant strain at depth, while limiting deformation of the Earth's surface. Oliver Boyd, U.S. Geological Survey, olboyd@usgs.gov, 901-678-3463.

Earthquake Debates

1:30 – 5 p.m., Salon F

Ever-evolving understanding of earthquake behavior is challenging long-held ideas. Seismologists will debate important issues in earthquake science, including whether Gutenberg-Richter behavior in a large region suggests similar behavior on individual faults. As seismologists create more complex programs that simulate the occurrence of earthquakes, is there a limit to their value in developing hazard assessments?



Friday, April 23

State of Stress in Intraplate Regions

8:30 a.m. – Noon, Salon G

This session reports on the latest research on the causes of intraplate (within the plate) earthquakes, which occur far from plate boundaries and continue to be poorly understood.

New Madrid Seismic Zone:

- One of the most exciting discoveries to be made within the New Madrid Seismic Zone (NMSZ) in recent years is the possibility that non-volcanic tremors may be occurring within this intraplate fault system. Usually associated with subduction zones or the San Andreas Fault, the characteristics of non-volcanic tremors within the New Madrid fault system are critical parameters that potentially reflect strain within the fault zone. This speaker reports preliminary data from the array and initial findings. Charles Langston, University of Memphis, clangston@memphis.edu.
- With the retreat of the glaciers from the North American continent, the decrease in surface weight on the Earth's crust led to slow, ongoing uplift -- or glacial rebound -- of the land and the return flow of mantle material back under the area. This process can generate enough stress to generate a M6.8 earthquake every 500 years or a M7 earthquake every 1,000 years in the New Madrid Seismic Zone. Although these magnitudes are significantly less than previously published estimates for the sizes of the principal 1811-12 New Madrid earthquakes, they are consistent with values determined in a new study presented in this talk. Sue Hough, U.S. Geological Survey, hough@usgs.gov.

Man-induced earthquakes?

- On June 2, 2009, the USGS reported a M 2.8 earthquake located 1.6 km northwest of Cleburne, Texas, in a region of active gas development and related waste fluid disposal. The town has no historical seismicity and has no previously reported active faults. As part of an undergraduate senior research project, a Southern Methodist University team deployed seismometers to observe and locate the subsequent earthquakes. Ashley Howe, Southern Methodist University, amhowe@smu.edu, 214-558-2903 (cell)

Seismicity of North American plate:

- Greater integrative lithospheric strength correlates with lower rates of continental crustal seismicity and with lower maximum earthquake magnitudes, according to



a new study. (Poster) Walter Mooney, U.S. Geological Survey,
mooney@usgs.gov

- A new study that maps the density structure of the North American (NA) upper mantle shows a pronounced negative anomaly (-50 to -400 mgal) beneath western NA and the adjacent oceanic region, and positive anomalies (+50 to +350 mgal) east of the NA Cordillera. These structures correlate with the tectonically-active western region and the stable eastern region, respectively. The close correlation of large scale features of the mantle anomaly map with the topographic map confirms that a significant amount of the topographic uplift in western NA is likely due to buoyancy in the hot upper mantle. Walter Mooney, U.S. Geological Survey, mooney@usgs.gov

Lessons from January 2010 Earthquakes in Haiti and Offshore Northern California

8 – 8:30 a.m., Salon A, E, F and G

- A field reconnaissance was conducted in Haiti Jan. 26 through Feb. 3, 2010, by a five-member team with expertise in seismology and earthquake engineering. This study has revealed a number of factors that led to catastrophic losses of life and property. Soil liquefaction, ground motion amplification, triggered landslides and rockslide, and soil embankment failures were observed to be significant factors contributing to extensive damage in Port-au-Prince and elsewhere. The historic pattern of prior earthquakes in Haiti indicates that a strong earthquake with M7 or larger could strike southern Haiti near Port-au-Prince at any time. Walter Mooney, U.S. Geological Survey

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