

Inland Geological Society

December 2010

Newsletter of the Inland Geological Society

Volume 26 No. 12

This Meeting:
Wednesday,
December 1st

Time:
Social: 6:00pm
Dinner: 6:30pm
Lecture: 7:00pm

Location:
LSA Associates
1500 Iowa Ave
Suite 200
Riverside, CA
92507
(Map on Pg. 4)

Coming to
Dinner?
Please RSVP:
By Friday 11/29
(951) 782-3295
dlass@
waterboards.ca.gov

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December Speaker:

Dr. Susan Hough
Seismologist, United States Geological Survey



Haiti Earthquake Groundmotion

Abstract

The catastrophic extent of damage and the high death toll from the 12 January 2010 Mw7.0 Haiti earthquake was primarily a consequence of high population density and poor construction. First-person eye-witness surveys reveal extreme structural vulnerability, suggesting that many structures sustaining serious damage or collapse in shaking that was only moderate in intensity. To explore the extent to which local geological site conditions contributed to the damage, we deployed strong-motion instruments in Port-au-Prince. A total of nine stations were deployed between late January and mid-April, 2010. Analysis of M3.5-4.5 aftershocks events recorded across the urban array reveals, as expected, amplification of ground motions at sites within the Cul de Sac Valley, which underlies most of the city. The strongest amplifications, however, are observed at two sites along a foothill ridge in the Petionville District. The steepness of the topography as well as direct estimates from surface-wave techniques indicate that the ridge is characterized by higher shallow impedance than the surrounding region. The observed amplifications, which reach factors of 4-5 relative to a hard-rock reference site for frequencies ranging from a few to 10 Hz, thus cannot be explained by traditional near-surface sediment-induced amplification. The amplification factors, predominant periods, and variability of response are consistent with predicted amplification associated with SH-wave diffraction within a narrow ridge. I also consider the distribution of

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damage. The overall damage pattern throughout Port-au-Prince is complex, and reflects a number of factors including structural vulnerability and distance from the mainshock rupture. In the relatively affluent Petionville region, however, damage was generally not as severe as in other parts of the city. Considering the distribution of damage interpreted by DLR (German Remote Sensing Data Center) from optical imagery, a swath of unusually high damage corresponds with the extent of the ridge where high amplifications are observed. The results suggest that, in general, amplified damage is associated with especially steep small-scale topographic features. Damage does not correlate with steepness per se: damage was not amplified on steep slopes in the larger hills to the south. A microzonation map for Port-au-Prince will thus need to incorporate topographic effects as well as traditional site response.

Biography:

Dr. Susan Hough is a Seismologist at the United State Geological Survey. Her research interests include ground motions, remotely triggered earthquakes, historical earthquakes, and seismic hazard in South Asia and the Middle East. Through 2010, she has led the USGS effort to deploy seismometers in Haiti, working in partnership with the Haitian Bureau of Mines.

Susan Hough received her A.B. degree in geophysics with honors from the University of California at Berkeley in 1982, and her Ph.D. in Earth Sciences from Scripps Institution of Oceanography, U.C. San Diego, in 1987. She spent four years at Lamont-Doherty Geological Observatory in New York and joined the U.S. Geological Survey in Pasadena in 1992. She was elected Fellow of the American Geophysical Union in 2008.

She has written five books on earthquake science for a non-specialist audience; the most recent, on earthquake prediction, was published in January, 2010, as well as publishing many articles in both peer-reviewed and general-interest journals and magazines. She has served as Editor-in-Chief of Seismological Research Letters (2001-2006) as well as a contributing editor for GeoTimes Magazine. Links to her articles can be found at her USGS web page at <http://pasadena.wr.usgs.gov/office/hough>.

SPEAKERS WANTED

We are still looking for more speakers for future meetings.

Tell us what you have been working on!

**Are you a recent graduate? Here's your opportunity to shine!
Tell us about your senior project or thesis project.**

**Please contact Jon Smith, Steve Mains or Greg Johnson
to get your name in the schedule!**

Upcoming Meetings/Events

Rock & Gem Shows—Various locations

Various rock and mineral shows will be throughout So. California. To find one near you, visit www.rockngem.com/showdates.asp

2011 North American Environmental Field Conference and Exposition

The topic for this years' conference will be "Advances and Innovations in Environmental Site Characterization, Sampling, Monitoring & Remediation Technology". The event will be held **January 10-13, 2011** at the Hilton Resort & Spa on Mission Bay, San Diego, CA. For more info. and to register for the event, visit www.envirofieldconference.com/

SME—SoCal Section Christmas Party & GEM Fundraiser Event



The Annual SME Christmas Party and GEM Fundraiser will include speaker Alan S. Levy of Alan Levy and Associates, who will present a talk on the "Privatization Plans for an Inactive Copper-Cobalt Mine, Western Uganda in Africa". The event will be on **December 16, 2010**. For more info., visit www.smenet.org/

Los Angeles Basin Geological Society—LA Association of Petroleum Landmen Joint January Meeting



Don Gautier from the USGS is tentatively scheduled to present a talk on "Growth Reserves of the LA Basin". The meeting will be on **January 23, 2011** at The Grand at Willow Street

Conference Center. For more info, visit www.labgs.org.

IGS Meeting Schedule

January 6, 2011 (Thursday)

Bob Reynolds & Lloyd Sample, LSA Associates
SCE El Casco Substation: Construction excavation monitoring salvages an early Irvingtonian (middle Pleistocene) fauna and flora

February 2, 2011 (Wednesday)

Kent Norton, The Planning Center
CEQA basics or CEQA Q + A relative to geotechnical issues

March 3, 2011 (Thursday)

TBA

April 6, 2011 (Wednesday)

Dr. Alan L. Smith, CSU, San Bernardino
TBA

May 5, 2011 (Thursday)

TBA

June 1, 2011 (Wednesday)

TBA



IGS MEETING LOCATION:

**LSA Associates, Inc.
1500 Iowa Ave, Suite 200
Riverside, CA 92507**

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