2017 IRIS/SSA Distinguished Lecture Series

The Incorporated Research Institutions for Seismology (www.iris.edu) and the Seismological Society of America (www.seismosoc.org) are pleased to present two experienced speakers from the Earth Science research community for the 2017 IRIS/SSA Distinguished Lecture Series.

Dr. Stephen R. McNutt
Professor, Volcano Seismology
School of Geosciences
University of South Florida, Tampa

Shaking and Baking:
Using Seismology to Study Volcanoes

AND

Dr. John E. Vidale
Professor, Department of Earth and Space Sciences, University of Washington
Director, Pacific Northwest Seismic Network
Washington State Seismologist
Seattle, Washington

A Tale of Three Pacific Northwest Temblors:
One Big, One Deep and One Direct Hit

Our speakers are chosen each year for their interesting subject matter as well as their ability to convey scientific ideas to general public audiences. IRIS and SSA will cover the speaker's travel and lodging costs for large public venues and can also provide free seismology outreach materials. Please visit the IRIS website for more information about the 2017 series and the IRIS/SSA Distinguished Lectureship program: http://www.iris.edu/hq/programs/education_and_outreach/distinguished_lectureship

If you are interested in scheduling a speaker, please contact: Perle Dorr, lecture@iris.edu, 202-407-7004
2017 IRIS/SSA Distinguished Lecture Series

Dr. Stephen R. McNutt
Professor, Volcano Seismology
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Shaking and Baking: Using Seismology to Study Volcanoes

LECTURE ABSTRACT

Seismology is used to study volcanoes in several ways. Seismic tomography, similar to medical tomography, is used to probe beneath volcanoes for their velocity and attenuation structure. This reveals the size, shape and location of bodies of molten rock underground, such as magma chambers and conduits. Models have become more detailed over the years as techniques and data have improved.

One result of such studies is a model of the structure of the volcano. The model then provides a conceptual pathway to interpret the seismic activity that occurs prior to eruptions. A common pattern is an increase first in volcano-tectonic earthquakes caused by increasing pressure in the magma chamber communicated to faults in the rocks nearby. This is followed by low-frequency earthquakes, which are likely related to fluid processes involving magma or water and gases. Third, a continuous signal known as volcanic tremor occurs when magma reaches shallow levels near the vent. Explosions and strong eruption tremor are associated with the eruption. Deep earthquakes sometimes occur as stresses readjust after the removal of magma. Such patterns, together with understanding of physics, have enabled successful forecasts of eruptions over a range of sizes and types.

The strength and character of some eruption seismic signals also provides clues to make near-real time assessments of eruptions while they are in progress. For example, the strength of eruption tremor is proportional to the height of the ash column. Lava fountaining from fissures makes stronger tremor than fountaining of the same height from cylindrical conduits. Magma with more gases makes stronger seismic signals and more fine ash, which can influence the amount of volcanic lightning!

These are the types of questions that Professor McNutt will explore as he discusses how the movement of magma causes volcano shaking and baking.

SPEAKER BIO

Stephen (Steve) R. McNutt is a volcano seismologist who worked half time for the Alaska Volcano Observatory from 1991-2012. He currently coordinates volcano seismology research for the School of Geosciences at the University of South Florida. His research interests include studies of source and propagation effects for volcanic tremor, low-frequency events, and explosion earthquakes; volcanic hazards assessments in Alaska, California, and Central America; the mechanical behavior of volcanoes including periodicity of eruptions; the effects of earth tides, sea level variations, and tectonic stresses on triggering eruptive activity; volcanic infrasound; and volcanic lightning. From July 1999 to July 2007, he served as Secretary General for the International Association of Volcanology and Chemistry of the Earth's Interior. He has served on several committees for the National Academy of Sciences, including the US National Committee for International Union of Geodesy and Geophysics, the US National Committee for the Pacific Science Association, and the standing Committee on Seismology and Geodynamics. He received his B.A. from Wesleyan University in 1977, his M.A. from Columbia University in 1982, and his Ph.D. in volcanology from Columbia University in 1985.

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Sudden mayhem. Tremendous impact. Unpredictable disruption. Is it any wonder earthquakes reserve a dark corner in our nightmares?

The Pacific Northwest is vulnerable to several shades of shakes:

- giant coastal quakes,
- isolated, miles-deep pops, and
- rips that could tear Seattle’s downtown apart.

The University of Washington’s M9 Project, led by John Vidale, is making the repercussions of each type of quake clearer—and both less and more frightening. Vidale will share the latest research and prognoses, and offer insights on implementing early warning technologies in the Pacific Northwest, so we can gain a few seconds or even minutes before suffering the strongest shaking.

SPEAKER BIO

John Vidale is a Professor at the University of Washington, Director of the Pacific Northwest Seismic Network, and the Washington State Seismologist. He completed his undergraduate studies at Yale University and earned his Ph.D. from the California Institute of Technology. Before finally coming to Seattle and the University of Washington in 2006, Vidale worked at the University of California, Santa Cruz and the US Geological Survey, and taught for a decade at the University of California, Los Angeles (UCLA). While at UCLA, he was Director of the Institute of Geophysics and Planetary Physics. His honors include the American Geophysical Union’s Macelwane Medal (1994) and being named American Geophysical Union's Gutenberg lecturer in 2009. The College of the Environment at the University of Washington named Vidale the 2011 Researcher of the Year. Vidale’s research focuses on earthquakes, volcanoes, Earth structure, and the hazards of strong shaking. Professor Vidale is currently working on monitoring the earthquakes and volcanoes in Oregon and Washington, studying strange slow earthquakes and landsliding in earthquakes.