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Thorne Lay honored by Seismological Society of America

UC Santa Cruz professor has advanced understanding of deep Earth, earthquake processes and nuclear test monitoring

SAN FRANCISCO, Nov. 17, 2014 – An influential seismologist and community leader whose research has refined our understanding of the Earth’s deep interior, Thorne Lay will be honored by the Seismological Society of America with its highest honor, the Harry Fielding Reid Medal, which recognizes contributions to science and society, at the organization's annual meeting held April 21–23, 2015 in Pasadena, Calif.

“Thorne Lay has advanced our understanding of fundamental Earth processes while simultaneously serving the scientific community with astounding effectiveness,” said Charles J. Ammon, professor of geosciences at Penn State, who co-nominated Lay. “His exemplary leadership and service to the scientific community uniquely define him as deserving of this highest honor.”

Known for consistently contributing to advances in some of the most difficult problems in seismology, Lay’s broad scientific outlook is reflected by the breadth of his research contributions to the imaging and improved understanding of Earth’s interior, the study of earthquakes and the monitoring of nuclear explosions.

Lay’s pioneering work has shaped the current understanding of the structure and dynamics of Earth’s mantle and core. His graduate work at the California Institute of Technology in the late 1970s led to the discovery of a layered structure in the D” zone of the rocky mantle adjacent to Earth’s liquid metallic outer core, and the first modern, detailed description of this boundary region. Studying seismograms to decipher what anomalous signals reveal about the Earth’s interior, Lay’s work identified and characterized this “seismic discontinuity” in the lowermost mantle, or an abrupt change in the speed at which seismic waves pass through this region, and sparked research across the geosciences to understand the physical and chemical structure of D” and its implications for affecting Earth processes from the core to the surface.

Throughout his career, Lay has also been at the forefront of seismic analysis of earthquake processes, including the rupture characteristics of the largest earthquakes in



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the seismic record. His intimate connection to data has helped with the nature of his work – trying to understand something thousands of miles away, deep in the Earth’s interior or

on the other side of the planet. His early work focused on the characterization of large earthquake sequences and subduction zones, and he has published analyses of each of the great earthquakes of the last decade, providing important case studies for investigations of earthquake interactions, hazards, triggering of adjacent or distant earthquakes, and the fundamental rupture physics of how earthquakes occur.

While making significant advances in the understanding of Earth’s interior and earthquakes, Lay’s contributions to the field of nuclear explosion seismology have improved the operational capability of the U.S. government to monitor foreign nuclear tests and other seismic events. His publication record on nuclear monitoring topics spans 25 years, focusing on seismic waves recorded at a variety of distances, and addresses the basic understanding of critical wave propagation issues as well as practical work illustrating approaches to monitoring tasks, such as determining the explosive yield and discriminating among man-made and natural seismic events. Lay’s early papers, published while still a graduate student, influenced the debate within the United States government regarding the then-Soviet Union’s testing program and its adherence to treaty limitations.

In addition to his research accomplishments, SSA is honoring Lay for his service to the scientific community.

“Thorne Lay has made a significant impact on stimulating the research community to articulate and advance the relevance of seismology within the national science agenda,” said co-nominator David Simpson who is president-emeritus of the Incorporated Research Institutions for Seismology (IRIS), a consortium of institutions dedicated to seismological research. Lay served as chair of the IRIS Board of Directors from 2005 to 2007.

In this capacity, Lay has served on numerous key panels and committees, taking a lead role in interactions between the scientific and policy communities and contributing to the writing of numerous community proposals and influential reports to federal agencies. He led the effort to produce two National Research Council reports that focused on the seismic research needed to support improved monitoring of a Comprehensive Nuclear Test Ban Treaty (CTBT), which led to additional reports that defined the research and monitoring requirements for a CTBT. Lay served as the lead editor of the long-range science plan for the earth sciences, the 2009 National Science Foundation report, “Seismological Grand Challenges in Understanding Earth’s Dynamic Systems.” Lay chaired the National Academy of Sciences panel that produced the 2010 report, “New Research Opportunities in the Earth Sciences.” Lay is a prolific author or co-author of



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411 research publications, of which 286 are peer-reviewed papers, 120 are technical reports, book reviews and five books. He is co-author on a widely used textbook, *Modern Global Seismology*, which is dedicated to the undergraduate teaching of seismological theory and practice.

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The Seismological Society of America is a scientific society devoted to the advancement of earthquake science. Founded in 1906 in San Francisco, the Society now has members throughout the world representing a variety of technical interests: seismologists and other geophysicists, geologists, engineers, insurers, and policy-makers in preparedness and safety.