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Vedran Lekic honored with Richter Early Career Award

U of Maryland professor recognized by Seismological Society of America

SAN FRANCISCO, Jan. 6, 2013 – Since his early research on deep earthquakes, Vedran Lekic has repeatedly developed new ways of analyzing and modeling seismic data, leading to improved understanding of Earth's large-scale inner structure.

For his work, the Seismological Society of America (SSA) will honor the 31-year-old Lekic with its Charles F. Richter Early Career Award, which honors outstanding contributions to the goals of the Society by a member early in her or his career. He will receive the award at the SSA annual meeting on April 30, 2014 in Anchorage, Alaska.

While he was a doctoral student with Barbara Romanowicz at the University of California, Berkeley, Lekic created a new global seismic velocity model by developing a hybrid method for extracting the information contained in full waveforms without the need for commonly used approximations. Lekic's method made practicable very accurate modeling of waveform data, a task that would ordinarily require extraordinary computer time, resulting in higher-resolution images of the Earth's mantle structure, as well as some surprises.

The resulting global velocity model defined large-scale features of the Earth's structure and revealed key features that improved understanding of plate tectonics and continental evolution, such as the global presence of a low-velocity layer internal to lithosphere of continental plates and the presence of low-velocity bands beneath ocean basins that align with absolute plate motion and may be related to the formation of "hotspots" such as Hawaii and Tahiti within tectonic plates.

Lekic's postdoctoral research, with Karen Fischer at Brown University, tackled an imaging challenge on the regional scale: using the conversion of shear (S) to compressional (P) waves to image the bottom of the North American tectonic plate across Southern California. The resulting images mapped variations in plate thickness at unprecedented resolution and showed that thickness decreased abruptly within regions undergoing rifting, providing a new constraint for understanding a process that shapes continents.



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Lekic has authored 15 papers, covering the range of science: from global and regional seismology through planetary sciences. His breadth of research also includes contributions to the new field of neutrino geoscience, which explores subatomic particles (geo-neutrinos) emanating from the decay of radioactive elements (uranium and thorium) deep within Earth's interior. Lekic and colleague Edwin Kite systematically explored how observations of geo-neutrinos – which have the potential to map out the distribution of heat-producing elements within the Earth – can be related to different hypotheses for the origin of large low shear velocity provinces that dominate lower mantle structure.

In 2009 Lekic tackled another key issue. As seismic waves travel through the Earth, they lose energy, or attenuate in amplitude, as a result of a range of relaxation processes operating at the microscopic scale. How this attenuation depends on the frequency of the seismic waves is crucial for combining datasets measured at different frequencies, and for inferring temperature variations from attenuation. However, efforts at constraining this frequency dependence have been stymied by tradeoffs with the depth-dependence of attenuation; Lekic devised a method for eliminating this tradeoff, refining estimates of the average frequency dependence of attenuation in the Earth's mantle.

Lekic earned a bachelor's degree in astronomy and astrophysics and Earth and planetary sciences from Harvard University and a doctoral degree in Earth and planetary science from the University of California, Berkeley. In 2010-11, he was a National Science Foundation Earth Sciences Postdoctoral Fellow at Brown University.

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SSA 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 policymakers in preparedness and safety.