

Imag(in)ing the earth's interior

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Earthquakes, tsunamis, volcanic eruptions: all are dramatic consequences of plate tectonics with important societal impact. They remind us of the powerful internal forces that drive the motions of plates at the surface of the earth. In order to understand the internal dynamics of the earth and their evolution, seismic imagery, which uses seismic waves generated by natural earthquakes to illuminate the earth's internal structure, is an ever improving tool for mapping regions where upwelling and downwelling flow occurs at the present time and provide information for the development of models of the thermal evolution of the earth and understanding why our planet is the only one in our solar system to have plate tectonics.

I will explain how global mantle seismic imaging works, how it has improved in recent years owing to new capabilities for the computation of the seismic wavefield through the earth, what we have learned about the earth's interior structure and the challenges ahead of us to achieve the required sharpness of the images we can obtain.

Biography:

Dr. Barbara Romanowicz was born and educated in France, where she studied mathematics at the Ecole Normale Supérieure. She holds a PhD degree in Geophysics from the University of Paris 7. Between 1982 and 1990, as a researcher at the CNRS, she developed GEOSCOPE, a then state-of-the-art global network of digital seismic stations for the study of earthquakes and the structure of the earth's interior. In 1991, she was appointed Director of the Berkeley Seismological Laboratory and professor in the Department of Earth and Planetary Science at UC Berkeley. During her directorship (until 2011), she helped establish a joint real time earthquake notification system for northern California between the BSL and the US Geological Survey. Her research interests include the study of deep earth structure and dynamics using seismological tools, and recently, implementing numerical seismic wavefield computations in seismic tomography. She also has an interest in earthquake processes and scaling laws, the development of modern broadband seismic and geophysical observatories on land and in the oceans. Among honors received, she was elected to the US National Academy of Sciences in 2005 and has recently been appointed to the chair of Physics of the Earth Interior at Collège de France in Paris.