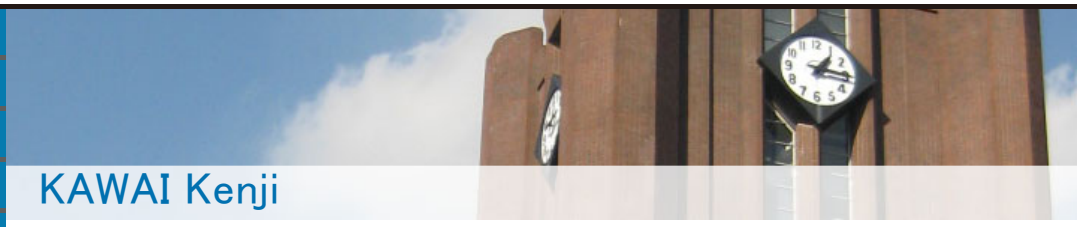

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Research Field

Global seismology, Study of Earth's deep interior

Research Subject

Waveform inversion, Earth's evolution, Earth's deep interior

Current Research

How is the Earth's interior? How has the Earth evolved? In order to answer these questions we study the Earth's deep interior. Analyzing observed seismic waveforms on the surface, we infer seismological structure (three-dimensional perturbation of density and seismic velocity) in the Earth. Then, we interpret the inferred seismological structure based on mineral physics, mineralogy, and petrology, providing information on temperature profile, spatial variation of chemical composition, and deformation and flow in Earth's deep interior. The final goal is to understand the Earth's evolution together with geological evidence remaining on the Earth's surface.

We have developed and applied a new method of waveform inversion. We inferred the lowermost mantle structure above the core-mantle boundary (CMB), which is one of the most important boundary layer in the Earth, with voxels and understood the fate of subducted paleo-plates and origin of hotspot volcanoes. Then, we interpreted the inferred seismological structure based on mineral physics and found the temperature profile in the lowermost mantle with a CMB temperature of 3800 K, which provides essential constraint on the Earth's evolution.

We are going to develop algorithms and software of computing synthetic seismograms, analysis of observed seismic waveforms and obtain new seismic data with installation of seismometers. On the other hand, in order to understand how the Earth has evolved as noted above it is inevitable to do interdisciplinary research with collaborative works with mineral physics, petrology, geology, geodynamics, and geochemistry. For this purpose, collaborators, not only who develop methods and analyze observed data but also who can do numerical simulation, experiment, and field work, are welcomed.

Keywords

Waveform inversion, Earth's evolution, Global seismology

Links

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