

Travel time anomaly of core phases along Japanese island

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Travel times of seismic core phases recorded by dense seismic array along Japanese island are investigated to look at the short scale variation of deep Earth structure. Core phases pass through the inner core and the outer core from the earthquake source to the station. The core phases, PKPdf, PKPab, PKPbc, share nearly the same path in the upper mantle and the crust, but sample different part of the lower mantle and the core.

Differential travel times are measured from bandpass filtered Hi-net records of deep focus earthquakes beneath South America by taking the cross correlation of waveforms. Observed differential travel times are compared with theoretical one predicted from existing 1D Earth seismic model.

PKPab-PKPdf anomaly is on average by 0.8 sec larger than the prediction from the IAPSEI model. PKPab-PKPdf differential travel time show distinct regionality. In the East and West Japan, the differential travel time anomalies are about 0.4 sec and 1.2 sec respectively. PKPbc-PKPdf differential travel time does not show distinct regionality, suggesting the origin of PKPab-PKPdf travel time anomaly is in the short scale variation of seismic velocity of the lower mantle.