

Fine-Scale Heterogeneities in the Lowermost Mantle Constrained by Broadband Tiltmeter Waveforms

Nozomu Takeuchi[1]; Kazushige Obara[2]

[1] ERI, Univ of Tokyo; [2] NIED

Japan is one of the regions where we have densest seismograph arrays in the world. Several previous studies elucidated fine-scale structures in the lowermost mantle by using these data (e.g., Yamada & Nakanishi 1998, GRL; Kito et al. 2004, JGR). However, they analyzed only the data from short period sensors, and detailed features in the broadband waveforms have not yet well studied. The National Research Institute for Earth Science and Disaster Prevention (NIED) deployed a tiltmeter array (Hi-net tiltmeter array), and it provides high-quality broadband waveforms with unprecedented station density (about 700 stations in Japan).

In this study, we analyzed the tiltmeter data to retrieve frequency dependency of differential travel times and relative amplitudes between S and ScS. We found small-scale (about 200 km scale) S-velocity heterogeneities in the sampled CMB region. We also found systematic differences in amplitudes between higher and lower velocity regions. The amplitude anomalies appear to be frequency independent, which suggests that they are not due to unelastic attenuations. At moment, we interpret that these are caused by focusing by low velocity anomalies extending for more than 1000 km from the CMB, which suggests a fine-scale plume.