

P-wave mantle tomography with a focus on the South Pacific superswell obtained from traveltimes and relative traveltimes data

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We collected approximately 1500 relative times of long-period P-waves by using a waveform cross-correlation from the broadband seismic waveform data at the ocean floor and islands in the South Pacific superswell region during 2003 to 2005 (Tanaka et al. in this session). We also collected 600 first arrival times by manual picking from the same waveform data.

A three-dimensional P-wave velocity structure of the whole mantle is obtained with a combination of these data and the ISC first arrival times. The tomographic image in the eastern area of the superswell is improved and different from that obtained with only the ISC data. The resultant structure shows plume like slow anomalies throughout the mantle of which details change depth by depth. At the depths greater than 1800 km, the slow anomalies observed in the western part of the superswell, i.e. the slow anomalies exist beneath the Society hotspot while there is no slow anomaly beneath the Marquesas, McDonald and Pitcairn hotspots. The slow anomalies beneath the Society hotspot extends to the Pitcairn hotspot at 1500km depth. In the upper mantle, There is a broad slow anomaly below the superswell in which strong anomalies are localized beneath the Society, McDonald and Pitcairn hotspots.

The distribution of the newly revealed slow regions approximately coincides with that found in the regional tomogram (Tanaka et al. in this session).