

# Temperature, water content and depth of the mantle discontinuity beneath the Tonga region

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Depth variations of the 410 and 660 km discontinuities beneath the Tonga and Vanuatu region are investigated by using converted and reflected phases (postcursors to direct P) from the discontinuities. Waveform data from 54 deep earthquakes are used which were recorded by the worldwide IMS-array and the dense seismic network of Hi-net and J-array in Japan. In the stacked waveforms, several postcursors caused by the mantle discontinuities are identified. The travel time difference between the direct P and postcursors is used to estimate the depth of the conversion and/or reflection point. Just above the 660 km discontinuity, anomalies of water content and temperature are estimated from the discontinuity topography and the P velocity variations.

Results in this study are as follows. (1) Detailed depth variations of the mantle discontinuities in the Tonga area are determined. The influence of the possible temperature anomalies (cold subducting slab and hot material) on the discontinuity topography is clearly found in the cross sections. The converted and/or reflected waves at the 410 km discontinuity are not identified in the stacked traces which have the piercing point to the 410 just inside the slab. (2) Water content and the temperature anomalies are estimated from the discontinuity topography. Variations of the water content and temperature anomalies seem to have a large correlation, implying the influence of the cold and wet slab in the subduction zone.