

Rapid lateral variation of P-wave velocity at the base of the mantle beneath the Western Pacific

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We examine P-wave velocity structure at the base of the mantle beneath the Western Pacific, where is the western edge of the Pacific Large-Low Velocity Province (LLVP), by using high-quality seismograms that are provided by the NECESSArray project. Forward modeling with the reflectivity method is conducted to explain the variation of P-wave travel times as function of epicentral distance near the core shadow zone after station and ellipticity corrections are applied. Additionally PcP-P travel times are also examined to enlarge the survey area. As a result, a rapid variation of P-wave velocity structure at the base of the mantle is detected. Thin (10 to 60 km thickness) and very low velocity (-2 to -6 %) layers at the base of the mantle are intersected with a 100 km thickness and high velocity (+3%) layer, and a slightly fast layer exists at the north of the region with the thin and low velocity layers. Their spatial separations are typically several hundred kilometers and it would be difficult to explain by only a thermal effect. These observations suggest that very complicated thermo-chemical reactions occur near the edge of Pacific LLVP.

Keywords: P-wave velocity, the base of the mantle, the Western Pacific