Velocity Structure of Oceanic Crust and the Characteristics of Moho of the Pacific Plate near Ogasawara Seamount

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Imaging structures within oceanic crust and Moho geometry using multichannel seismic reflection data has been difficult because of challenges in determining accurate velocities within oceanic crust. To obtain improved velocity models, we apply seismic attribute analysis to Common Mid Point (CMP) gathers. We calculate the instantaneous phase from the CMP gather, use the phase information for velocity analysis, and determine velocity models for oceanic crust. We apply this method to seismic reflection data acquired near Ogasawara seamount, and use the velocity models to determine depth to Moho, with the result of clear images of structures within oceanic crust and the Moho. From structures observed in the depth section and our velocity model, we estimate the velocity of Layer 1 (1500-4000m/s), Layer 2 (3900-5900 m/s), and Layer 3 (5500-7100 m/s). The interval velocity at the bottom of the sedimentary Layer 1 is high, probably because the sediment is indurated on the old Pacific plate. The interval velocity of Layer 3 from our reflection data is somewhat lower than that calculated using seismic refraction data. We can interpret a magmatic intrusion, which may be associated with emplacement of Ogasawara seamount, on the seismic profile enhanced by envelope. The Moho reflection near the seamount is complex; a few reflections can be observed as parallel to the Moho reflection on the seismic profile enhanced by instantaneous phase. From the seismic profile enhanced by instantaneous frequency, furthermore, the Moho reflection can be identified as low frequency reflection. The dominance in low frequencies suggests that acoustic impedance changes gradually at the Moho.