

Measurements of the elastic wave velocities under the high P-T conditions and estimation of the crustal composition

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The knowledge of rock composition is significant to understand the dynamics of the lithosphere in subduction systems. To estimate rock composition of the lithosphere, it is an effective method to compare the elastic wave velocities measured under the high pressure and temperature condition with the seismic velocities obtained by active source experiment and earthquake observation. Until now, various crustal rocks have been determined by means of high P-T measurements [e.g., Christensen and Mooney, 1995]. However, rock composition of the overriding plate is still poorly understood.

Due to an arc-arc collision in central Hokkaido, middle to lower crust is exposed along the Hidaka Metamorphic Belt (HMB), providing exceptional opportunities to study crust composition of an island arc. We collected rocks at Hidaka Mountains and have tried to simultaneously measure the travel times of the P and S waves through a rock sample under high P-T conditions using a piston-cylinder apparatus at Yokohama National University.

Comparing with the velocity profiles across the HMB (Iwasaki et al., 2004), we estimate that the lower to middle crust consists of amphibolite and tonalite, and the estimated acoustic impedance contrast between them suggests an existence of a clear reflective boundary, which accords well to the obtained seismic reflection profile (Iwasaki et al., 2014). And, we can obtain the same tendency from comparing measured V_p/V_s ratio and V_p/V_s ratio structure model (Matsubara and Obara, 2011).

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