

Ultrasonic measurements of P-wave velocity and S-wave velocity under high pressure and high temperature conditions in Oki-Dogo xenoliths, southwestern Japan

*Hirokazu Takahashi¹, Masahiro Ishikawa¹

1.Yokohama National University

Imaging the lithology of the deep crust of Japan arc provides a critical constraint for understanding its crustal evolution. Oki-Dogo Island is one of the most important xenolith localities because it is located in the most inner zone of the South-west Japan arc. Ultramafic (e.g. pyroxenite and dunite) and mafic (e.g. granulite and gabbro) xenoliths are abundant in the Oki-Dogo alkaline basalts whereas spinel lherzolite is a minor component (e.g. Abe et al., 2003). Takahashi (1978) proposed a deep crustal-mantle lithological model beneath the Oki-Dogo Island on the basis of petrologic studies on the mafic and ultramafic xenoliths. These xenoliths thus provide an excellent opportunity to investigate the deep crustal and mantle lithology beneath the most inner zone of the South-west Japan arc. In this study, P-wave velocity (V_p), S-wave velocity (V_s) and V_p/V_s have been measured in the laboratory for pyroxenitic xenoliths from Oki-Dogo Island, southwest Japan. Most of pyroxenitic xenoliths comprise orthopyroxene-abundant websterite, and olivine websterite. Simultaneous measurements of V_p , V_s and V_p/V_s were carried out at pressures up to 1.0 GPa and temperatures up to 600°C. V_p of websteritic rocks vary from 7.2-7.4 km/s at 1.0 GPa which corresponds to representative depth for lowermost crust or the uppermost mantle in Japan arc. In the light of rock velocity data, we discuss seismic structure and lithological imaging of the Japan arc. Sub-Moho V_p is intermediate (7.3-7.7 km/s) in places beneath Japan arc, and this study suggests that some intermediate V_p of Sub-Moho can be explained by websteritic pyroxenites.

Keywords: Elastic wave velocity, xenoliths, high pressure experiment