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SHEAR WAVE VELOCITY STRUCTURE IN THE CRUST AND UPPERMOST MANTLE BENEATH SYOWA STATION, EAST ANTARCTICA, USING MULTI-TRACE RECEIVER FUNCTION INVERSION OF BROAD-BAND TELESEISMIC WAVEFORMS (ABSTRACT)

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Receiver functions developed from teleseismic *P*-waveforms recorded on the broadband seismographs of Streckeisen seismometer (STS) at Syowa Station (69.0°S, 39.6°E), Enderby Land, Antarctica were inverted for vertical shear wave velocity structure beneath the station. By applying the source-equalization method (C.A. LANGSTON; J. Geophys. Res., **84**, 4749, 1979), detailed observed receiver functions up to 100 s from the *P*-arrival were obtained for total 32 earthquakes from May 1990 to January 1993 at three distinct back azimuths of 80°-90°, 140°-150° and 240°-250°.

A time domain multi-trace inversion (T. SHIBUTANI; Ph. D. thesis, Kyoto Univ., Kyoto, 1993) was utilized for the radial receiver functions to determine the structure assuming a crustal model parameterized by many thin, flat-lying, homogeneous layers. Inversion was made after five-iterations by varying both velocity and thickness of the layers. The initial velocity model was adopted by *Vp* structure determined by the refraction experiments conducted in the northern Mizuho Plateau in 1979-1981 (A. IKAMI *et al.*; Mem. Natl Inst. Polar Res., Ser. C (Earth Sci.), **15**, 19, 1984), with the constant poison ration of 1.73 in the crust and 1.80 in the uppermost mantle. Since the receiver functions are dominated by shear-converted phases, the inversion produces an estimate of shear wave velocity structure. The structure was sensitive for the layered thickness about 2 or 3 km, corresponding to the small Gaussian high-cut filter coefficient of 2. Lateral heterogeneity is identified by examining azimuthal variations in the vertical structure. The rays from the back azimuth of 80°-90° and 140°-150° travel mainly in the continental area, on the contrary, the rays from 240°-250° samples the oceanic area.

The result of 140°-150° has a gradual increase in the crust of the velocity from 3.0 km/s to 3.9 km/s. On the other hand, that of 240°-250° shows the existence of a high velocity zone in the upper crust (3.8 km/s) and a low velocity layer in the mid-crustal depth. The result of 80°-90° has an intermediate structure of the other two back azimuth. These distinct lateral variation is considered to be related to the evolution of the Lützow-Holm Complex, Enderby Land. The reasonable model for explaining the heterogeneity is that the uplift of gabbro into the crust under the condition of extensional stress in the back azimuths of 240°-250°. Another noticeable feature of the derived velocity models is that the crust-mantle boundary (Moho) has a thin transition zone of the depth between 38 and 40 km. The result is consistent with Moho depth derived from the previous refraction experiments in the northern Mizuho Plateau. The obtained shear velocity of the uppermost mantle yields a range from 4.0 to 4.4 km/s. There is, however, a possibility of significant trade-off between Moho depth and average velocity of the crust, resulting in a range of acceptable crustal thickness estimation.

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