PHASE VELOCITY OF RAYLEIGH WAVES GENERATED BY SEISMIC EXPLOSIONS IN PRINCE OLAV COAST, EAST ANTARCTICA

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Abstract: A refraction experiment with a 100 kg charge was carried out on the ice sheet of the Prince Olav Coast, East Antarctica by the 21st Japanese Antarctic Research Expedition (JARE) in 1980. Prominent Rayleigh waves were clearly recorded in a distance range of 2 to 8 km from the explosion point. The maximum period of Rayleigh waves was 0.7 s with a phase velocity of 1.8 km/s. A phase velocity of surface waves is considered to be most sensitive to the *P*- and *S*-wave velocity structures of ice layers to a depth of one-fourth of the wave length. Since the longest wave length of Rayleigh waves in the present experiment is estimated to be 1300 m for the maximum period of 0.7 s (1.8 km/s in phase velocity), *P*- and *S*-waves velocity structures of ice layers to a depth of 300 to 400 m may be inferred from the dispersion curves. Assuming velocity structures of ice sheet in the Mizuho Plateau based on the previous works of JARE, theoretical dispersion curves were calculated for three different velocity structures and they were compared with the observed ones. For example, the calculated phase velocities at the period of 0.4 s were 1.85 km/s for the highest velocity model, 1.7 km/s for the middle and 1.6 km/s for the lowest one and the observed phase velocity at the period of 0.4 s was 1.75 km/s. The velocity structure of *P*- and *S*-waves in the upper part of ice sheet estimated from observed dispersion curves of Rayleigh waves is three percents higher than those of the averaged one in the Mizuho Plateau. The *P*- and *S*-wave velocities from 100 to 1000 m in depth range from 3.7 to 4.0 km/s and from 1.8 to 2.0 km/s.

(Received April 4, 1983)