

Characteristics of PP and SS waves traversing and bouncing beneath the Antarctic continent

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We study the characteristics of PP and SS waves traversing and bouncing beneath the Antarctic continent. Waveforms of PP and SS waves observed at distances between 30 and 60 degree can depend on not only crust structure at the bouncing points, but also structure in the transition zone of the upper mantle through the nature of triplication. We thus expect that the observations of the PP and SS waves can provide new information of velocity structure beneath the Antarctic continent not well known yet.

At Station SYO, we observe PP waves from shallow earthquakes which occurred south of New Zealand. The distance ranges from 35 to 60 degree. The characteristics of the PP waves are as follows: (1) PP waves at the distance around 42 degree are simple with short duration, and their amplitude is a few times larger than that of P waves; (2) At distances around 44 degree, waveforms of PP waves tend to become complicated with apparently long duration and small amplitude relative to P waves; (3) For some earthquakes, precursors are observed 10 to 20 s ahead of large PP waves. These PP waves observed at SYO traverse and bounce beneath the eastern part of the Antarctic continent which is considered as a Precambrian craton. At Station SNAA, which is located about 40 degree west of SYO, complicated SS waves arrive early at distances around 43, while simple SS waves with large amplitude are observed at distances around 47 degree.

We discuss the observed characteristics of the PP and SS waves by calculating synthetic waveforms in the method of Wang (1999). When we use the isotropic PREM Earth model for a strike-slip point source at a depth of 10 km, we observe PP waves of large amplitude relative to P waves at distances of 36 and 43 degree, respectively. A transition from simple, short-duration to complicated, long-duration waveforms appears at a distance around 42 degree. We will further explore effect of Earth model on waveforms of PP and SS waves.