

S-wave structure of the northern Izu-Ogasawara arc

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Through the seismic surveys in the entire Izu-Ogasawara island arc since 2004, we obtained the structural similarities and differences of the arc crusts. One is a continental middle crust with P-wave velocity of 6.0-6.5 km/s and a heterogeneous lower crust. The lower crust is divided into the upper and lower parts, and these P-wave velocities are respectively 6.5-6.8 km/s and 6.8-7.4 km/s. The previous petrologic study (Tatsumi et al., 2008) shows that the upper part of the lower crust is restites produced by the differentiations of the middle crust. In short, the upper part of the lower crust is one of indexes for degree of the crustal growth. In the northern Izu-Ogasawara arc, four arc regions (frontal, current, remnant and rear arcs) and three basins (forearc basins, the Sumisu Rift and the Oligocene Rift) distribute. Although the upper part of the lower crust exists beneath the entire arc except beneath the forearc basin in the P-wave velocity model, each region should have structural differences in proportion to the degree of the crustal growth. We estimated the P-wave velocity model and a Poisson's ratio distribution profile, and found that the Sumisu Rift has the largest volume and the smallest Poisson's ratio (0.243) of the upper part of the lower crust in the entire arc. In addition, the upper part of the lower crust of the Oligocene Rift region between the remnant arc and the rear arc has relative large Poisson's ratio (0.260). Although the Poisson's ratios of the middle crust is less than 0.250 beneath the four arc regions, that beneath the Oligocene rift is relatively high, 0.250-0.260. The lower part of the lower crust has relatively large Poisson's ratio, 0.250-0.276. In particular, the lower part of the lower crust beneath the Oligocene Rift has not only high P-wave velocity of 7.0-7.5 km/s but also the highest Poisson's ratio of 0.276. Above situation suggests that the Sumisu Rift has been largely promoted the crustal growth among these regions and that the Oligocene Rift has been accreted mafic materials. On the other hand, the high Poisson's ratios of over 0.30 are not detected beneath the entire arc. This suggests that the there are no serpentinites beneath the entire arc except beneath the trench inner wall, which is outside of the resolved velocity structure.