Seismic experiment in the region of Off-Sanriku earthquake (2)

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Off Aomori, northernmost part of the Japan Trench, is a major seismogenic zone occurring great/large earthquakes of M7-8 such as the 1968 Tokachi or the 1994 Off-Sanriku earthquakes. The rupture processes of great/large earthquakes are explained by asperity model: Rupture initiated at hypocenters and main slips occurred in asperities (e.g. Yamanaka and Kikuchi, 2004). From many studies, the epicenters of great/large earthquakes located at the eastern edge of the asperities and the aftershocks occurred around the asperities (e.g. Nagai et al., 2001). To reveal the relationship between the seismicity pattern and crustal structure, a seismic survey off-Sanriku earthquake region was conducted by the Japan Marine Science and Technology Center (JAMSTEC: Japan Agency for Marine-Earth Science and Technology) collaborating with the Earthquake Research Institute, University of Tokyo and universities. The detail of the survey was reported in the last Joint Meeting (Miura et al., 2004). In this study, we will present the results of seismic lines of NS direction traveling the asperities of the 1968 Tokachi and the 1994 Off-Sanriku earthquakes.

The tentative velocity model of the seaward seismic line is as follows. Surface sedimentary layers with 1-2 km thicknesses are three layers of the P-wave velocity 1.5-1.9 km/s, 2.6-3.0 km/s and 3.5-3.9 km/s, respectively. Below them, there are four layers of island arc crust with the P-wave velocity of 5.0-5.5 km/s, 5.8 km/s, 6.2 km/s and 6.7 km/s, respectively. Three reflection events underlying them are interpreted as the interfaces of plate boundary, oceanic layer2-3 boundary, and Moho of oceanic crust, respectively. The depth of the plate boundary is about 23-km below sea level. Mantle wedge is not observed. The Conrad interface between the layers 6.2 km/s and 6.7 km/s is 18-km depth in the middle of survey line and ascends to both ends of the line. The structural characteristics are consistent with the results of previous studies. Hayakawa et al. (2002) show the velocity model landward of our survey line: The island arc crust is thicker and slower in northern part than those in southern part. The distribution of the thicker crust is coincident with the location of the asperities (Hayakawa et al., 2002). In our presentation, we will compare our results with previous studies of structural survey and seismicity, and mention the structural characteristics controlling the rupture zones.