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# Deep structure of subducted slab beneath the seismogenic zone of the 2011 off the Pacific coast of Tohoku Earthquake

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The coseismic rupture area of the 2011 off the Pacific coast of Tohoku Earthquake has estimated over the wide region from the coastline to near the Japan Trench [e.g., Ide et al., 2011]. Several kinds of studies, such as tsunami source inversion [e.g., Fujii et al., 2011], submarine topography [Fujiwara et al., 2011] and seafloor displacement observation [Sato et al., 2011; Ito et al., 2011; Kido et al., 2011], showed consistent results. However, the structural image just beneath the largest coseismic slip area was unclear since the observation areas of previous ocean bottom seismographs (OBSs) in this region were limited and there were few OBSs near the Japan Trench. The resolved area of Yamamoto et al. [2011] was limited to within about 100 km from the coastal line, and the main shock of the 2011 earthquake located out of resolved area. To understand the relationship between coseismic rupture behavior and structural heterogeneities, it is necessary to know the seismic velocity structure of the subducted slab crust and mantle near the trench axis.

Japan Agency for Marine-Earth Science and Technology has conducted the aftershock observation at outer rise from May 2011 to June 2011. From this observation, more than 1,000 earthquakes were detected [Obana et al., 2012]. These aftershocks included the relatively large ($M > 3$) earthquakes, and their travel time data were also obtained at land seismic stations. In addition, Tohoku University deployed some OBSs in the landward slope of Japan Trench at the same time [Suzuki et al., 2012]. Combining these OBS dataset and land seismic data, we could obtain the travel time data between the coastal area and outer rise area with high accuracy of hypocenter locations.

In this study, we perform a three-dimensional seismic tomography from Miyagi Prefecture to outer-rise region by tomoFDD [Zhang and Thurber, 2006]. For the preliminary analysis, we estimate the P-wave velocity structure by using a part of dataset. For initial velocity model, we adopted the three-dimensional model of Yamamoto et al. [2011] for landward slope area and one-dimensional model of Obana et al. [2012] for outer rise area. Our results indicate that the velocity of uppermost slab mantle from 143 degrees E to the trench axis is relatively slower than that in outer rise and coastal area. This result seems to be independence from initial velocity model from some test calculations. On the other hand, our present dataset has few OBSs on the landward slope near the trench axis. We will add the dataset of joint observation conducted by Universities (Hokkaido, Tohoku, Chiba, Tokyo, Kyushu, and Kagoshima), JAMSTEC, and Meteorological Research Institute to obtain more detail structural image.