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Precise aftershock distribution of the southernmost rupture area of the 2011 Tohoku-oki earthquake by OBSs

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The 2011 Tohoku-oki earthquake (MJMA = 9.0) occurred on the megathrust where the Pacific plate subducts below northern Japan arc on March 11, 2011. Many studies on slip distribution and source process of the main shock have been done, such as geodetic slip model [e.g. Ozawa et al., 2011], tsunami slip model [e.g. Fujii et al., 2011, Maeda et al., 2011], joint inversion of GPS, teleseismic, and tsunami observations [Simons et a., 2011] and rupture process [e.g. Yoshida et al., 2011]. They indicated the rupture area extends approximately 450 km in length and 200 km in width. The seismic experiment using airgun and Ocean Bottom Seismometers (OBSs) revealed that the southern end of the rupture of the 2011 main shock corresponds to the contact region of the Philippine Sea plate and the Pacific plate (Nakahigashi et al., 2012). Therefore revealing a crustal structure around the southern end of the rupture area is indispensable to understanding a seismogenic process. Furthermore, information about the Vp structures and Vp/Vs ratios is needed for a better understanding of large earthquakes that occur as a result of stress-concentration on the plate boundary.

Aftershock observations using OBSs was carried out immediately after the occurrence of the 2011 Tohoku-oki earthquake, and precise aftershock distribution over the whole source area was estimated (March 15th-June 18th, 2011) [Shinohara et al., 2012]. In this study, we estimate precise hypocentral distribution around the southern end of the rupture area using additional date (June 28th-Sep. 13th, 2011) obtained by the aftershock observation by OBSs, and understand a source process of the 2011 Tohoku-oki earthquake.

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Keywords: 2011 Tohoku-oki earthquake, aftershock activity, Ocean Bottom Seismometers (OBSs), crustal structure, Philippine Sea plate, Pacific plate