

Evidence of Tohoku-oki earthquake in the deep sea sediment

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A study on differences in bathymetric data between before and after 2011 Tohoku-Oki earthquake revealed a large coseismic displacement of the overriding plate, and a seafloor elevation in the Japan Trench axis (e.g. Fujiwara et al. 2012). Detail sub-seafloor structures around the axis obtained after the earthquake image offscraped trench and incoming sediments due to compression during coseismic slip in the plate interface close to the trench (Kodaira et al. 2012, Nakamura et al. 2013). Strasser et al. 2013 suggests that a large scale slump of the wedge toe significantly impacted the geometry and evolution of the plate boundary in the axis of Japan Trench based on data from sediment samples. Kawamura et al., 2012 and Tsuji et al., 2013 also point out that the coseismic displacement of the wedge. These recent researches indicate that remarkable co-seismic deformation and displacement occurred in the toe of slope near to the trench in the case of 2011 Tohoku earthquake. Thus geological evidences for the phenomenon should be recorded in the sediment around the trench axis. We have conducted research cruises to collect surface sediments in order to seek such features as evidences for 2011 and past Tohoku earthquakes. Piston cores were collected from the trench axis and the landward slope in Japan Trench by R/V "Mirai" and R/V "Sonne" in 2012. Intervals in the upper several ten-cm consisting of turbidite units which have been formed just after the earthquake were recovered from the trench axis. This discovery demonstrated that the trench axis is one of the feasible areas to reconstruct Tohoku earthquake history. As ensuring, the older turbidites were also recovered in the area. Contrarily debrite and inclined strata were recovered from the surface of landward slope near to the trench. Those lithologies could be evidences for the wedge displacement or slope failure induced by 2011 or past earthquakes. In the landward slope of Japan Trench, the elongated terrace developed in water depth of 4,000-6,000m is another interesting area to seek evidence related to Tohoku earthquakes. We collected sediment samples from the depth widely using R/V "Natsushima". Frequent thin turbidite occurrences were identified in the several cores. Ductile deformations, probably induced by slope failures, recognized in three cores. Those features could be regarded as evidences of past-other Tohoku earthquakes. Thus it is worth researching farther in these deep-sea areas of Japan trench to document the Tohoku earthquake record. Documentation spatiotemporal distribution of such geological evidences will improve our understanding of Tohoku earthquakes.

Keywords: 2011 Tohoku-oki earthquake, Japan Trench, deep sea sediment