Structure of the incoming Pacific Plate subducting into the central part of the Japan Trench: Results from the repeated ocean bottom seismograph observations after the 2011 Tohoku-Oki earthquake

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Since the occurrence of the 2011 Mw 9.0 Tohoku-Oki earthquake, seismicity within the incoming/subducting Pacific plate has been active near the axis of the Japan Trench and trench-outer rise region. This active intra-plate seismicity, which includes several M7-class earthquakes, is characterized by normal-faulting focal mechanisms with trench-normal tensional axes. Seismicity observations using ocean bottom seismographs have been conducted repeatedly in the Japan Trench area after the 2011 earthquake. These passive seismicity observations would provide structure information of the incoming Pacific Plate subducting into the Japan Trench. Results from the traveltime tomography by using the data consisting of 120 stations and more than 8000 events in total show the seismic velocity changes in the incoming Pacific plate with the approach toward the trench axis. The P-wave velocities within the oceanic mantle reduced from 8.2-8.5 km/s at the 90 km east of the trench axis to 7.5-8.0 km/s beneath the trench axis. The P-wave velocity reduction is observed down to a depth of about 20 km below the oceanic Moho and might relate to the bending-related hydration/alteration of the oceanic plate prior to the subduction. We also investigated anisotropy and Q structures by using the OBS data. We will discuss the structures heterogeneities and their relationships with hydration/alteration of the Pacific plate in the trench-outer rise region by combining the results from these analyses.

Keywords: oceanic plate, outer rise