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P-wave velocity structure in the southernmost source region of the 2011 Tohoku earthquakes, off the Boso Peninsula

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The Japan Trench (JT) is a plate convergent zone where the Pacific Plate (PAC) is subducting below the Japanese island. In the southern end part of the JT, there is a trench-trench-trench type triple junction. The Philippine Sea plate (PHS) is subducting northwestward from Sagami Trough and the PAC is subducting westward beneath the PHS from Japan and Izu-Bonin Trenches. The deep seismic structural information is important to understand the evolution of the triple junction. In 2008, a seismic experiment was conducted using ocean bottom seismometers and controlled sources comprising ariguns and explosions in the off-Ibaraki and Boso Peninsula. This region is the southern edge of the rupture zone of the 2011 off the Pacific coast of Tohoku Earthquake. We estimated the heterogeneous velocity structure beneath the landward slope of the southernmost JT by 2-D ray tracing. The crustal structure in the southern part of the profile is more heterogeneous than that of the northern part beneath the seismic survey profile. The subducting PHS is imaged beneath the southern part of profile. However, we could not obtain the distinct image of contact zone of PHS and PAC. It is conceivable that the contact zone of PHS and PAC has large heterogeneity resulting from strong deformation. We infer that the termination of the rupture of the 2011 Tohoku Earthquake and the large afterslip in the collision region are caused by this strong heterogeneity.