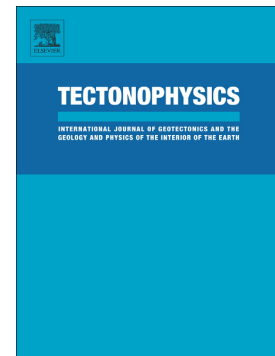


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Geometry and spatial variations of seismic reflection intensity of the upper surface of the Philippine Sea plate off the Boso Peninsula, Japan

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Abstract

In the region off the Boso Peninsula, Japan, the Pacific plate is subducting westward beneath both the Honshu island arc and Philippine Sea plate, while the Philippine Sea plate is subducting northwestward beneath the Honshu island arc. These complex tectonic interactions have caused numerous seismic events occurred in the past. To better understand these seismic events, it is important to determine the geometry of the plate boundary, in particular the upper surface of the Philippine Sea plate. We conducted an active-source seismic refraction survey in July and August 2009 from which we obtained a 2-D P-wave velocity structure model along a 216-km profile. We used the velocity model and previously published data that indicate a P-wave velocity of 5.0 km/s for the upper surface of the subducting Philippine Sea plate to delineate its boundary with the overriding Honshu island arc. Our isodepth contours of the upper surface of the Philippine Sea plate show that its dip is shallow at depths of 10 to 15 km, far off the Boso Peninsula. This shallow dip may be a result of interference from the Pacific plate slab, which is subducting westward under the Philippine Sea plate. Within our survey data, we recognized numerous seismic reflections of variable intensity, some of which came from the upper surface of the Philippine Sea plate. An area of high seismic reflection intensity corresponds with the main slip area of the Boso slow slip events. Our modeling indicates that those reflections can be explained by an inhomogeneous layer close to the upper surface of the Philippine Sea plate.

Keywords

Philippine Sea plate, Plate boundary, Seismic refraction survey, Boso slow slip event, Ocean Bottom Seismometer (OBS), Traveltime mapping

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