

Focal mechanisms of the double seismic zone in the Pacific plate, off Boso: Change before and after the 2011 Tohoku EQ

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1. Introduction

The Pacific plate and the Philippine Sea plate subduct off the Boso Peninsula, where many seismic events such as 1923 Taisho EQ, 1677 Enpo EQ, and slow slip events occurred. It is important to investigate seismic structures and seismicities at this region. Terada et al. (JpGU, 2016) revealed a 3D seismic structure and seismicity using data from land and ocean bottom observations. They showed a double seismic zone in the Pacific plate off the Boso Peninsula. This presentation shows focal mechanisms of the double seismic zone, and discusses stress state of the Pacific plate, especially, before and after the 2011 Tohoku Earthquake.

2. Data and analysis

The used data are waveform data from Hi-net by NIED, 2009-2010 ocean bottom observations by the R/V Hakuho-maru (KH09-3, etc.), and the aftershock survey of the 2011 Tohoku EQ using ocean bottom seismometers (2011/3/15-6/30). We select events in the double seismic zone, and pick polarities of the P wave first motions. The depth of the selected events are about 70-140 km. We calculate emergent azimuth and dip of each event-receiver pair using the 3D structure determined by Terada et al. (JpGU, 2016), and search optimal focal mechanisms using a grid search method.

3. Results

Many focal mechanisms before the 2011 Tohoku EQ have down dip compression for the upper surface events, and down dip extension for the lower surface events. This stress state may represent an unbending of the Pacific plate at the depth. On the other hand, many mechanisms after the 2011 Tohoku EQ have down dip compression for both upper and lower surface events. This may indicate that a stress change occurred at the depth of the Pacific plate, because the 2011 Tohoku EQ moved the Pacific plate downward at the shallower part, and compressed the deeper part of the plate.

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Keywords: double seismic zone, focal mechanism, the Pacific plate, off the Boso Peninsula, the 2011 Tohoku Earthquake, stress state