

## A Study on Seismicity before and after the Tohoku Earthquake around its Southern Boundary Using Dense OBS Array Data

NAKATANI, Yukihiro<sup>1\*</sup> ; MOCHIZUKI, Kimihiro<sup>1</sup> ; SHINOHARA, Masanao<sup>1</sup> ; YAMADA, Tomoaki<sup>1</sup> ; HINO, Ryota<sup>2</sup> ; ITO, Yoshihiro<sup>3</sup> ; MURAI, Yoshio<sup>4</sup> ; SATO, Toshinori<sup>5</sup>

<sup>1</sup>Earthquake Research Institute, The University of Tokyo, <sup>2</sup>International Research Institute of Disaster Science, Tohoku University, <sup>3</sup>Disaster Prevention Research Institute, Kyoto University, <sup>4</sup>Graduate School of Science, Hokkaido University, <sup>5</sup>Graduate School of Science, Chiba University

The southern boundary of the 2011 Tohoku earthquake, the source area of the largest aftershock, and a subducting seamount are located around off Ibaraki in the Japan Trench subduction zone. It is important to evaluate the spatial and temporal distribution of seismicity which provides key information about the seismic energy release. However, the seismicity is not well constrained due to a large distance offshore from the onshore network. Therefore, estimating seismic energy release off Ibaraki by using ocean-bottom seismometer (OBS) data is essential to understand the characteristics of the main shock rupture propagation. In this study, we estimated seismicity distribution around off Ibaraki region before and after the 2011 Tohoku earthquake using dense OBS array data.

It is difficult to apply methods that have been designed for on-land seismic stations due to the large ambient noise and effects of thick seafloor sediments. Furthermore, conventional manual picking is difficult because of the occurrence of many aftershocks. We therefore applied a semblance analysis to OBS waveform data with theoretical P-wave travel-time table obtained by the construction of an original 3-D P-wave velocity structure model.

To evaluate the validity of event identification and the accuracy of the epicenter distribution, I conducted comparisons of our epicenters with the JMA epicenters and synthetic tests using theoretical waveforms with several different sets of signal-to-noise ratio and focal depths.

As results of epicenter determination by the semblance analysis, we found that a lot of earthquakes occurred in the vicinity of the frontal region of the subducting seamount after the 2011 Tohoku earthquake. Next, there exists an along-strike density contrast of seismicity, and the inactive region possibly corresponds to the seismically quiet band previously revealed by a seismic observation. Furthermore, we applied the semblance analysis to OBS waveform immediately after the main shock and estimated the spatial and temporal transition of detailed seismicity. We found that the seismicity around the subducting seamount was activated after the largest aftershock rather than between the occurrences of the main shock and the largest aftershock. It puts constraints on the southern boundary of the 2011 Tohoku earthquake.

Keywords: dense OBS array data, seismicity, the southern boundary of the 2011 Tohoku earthquake