

## Epicenter determination by back-projecting onshore and offshore seismic data along the Japan Trench

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In the Japan Trench subduction zone, we have to pay attention to the uncertainty of hypocenters, especially in focal depths, listed in the existing catalog due to a large distance between hypocenters and the onshore seismic network. In addition, there is a significant reduction in the number of detected events over months after large earthquakes, such as the 2011 Tohoku earthquake. In order to overcome these problems and to understand seismic energy release associated with large earthquakes, it is essential to automatically determine hypocenters by also using offshore seismic data.

Therefore, we have investigated changes in seismicity before and after the 2011 Tohoku earthquake around its southern limit by back-projecting offshore seismic array data. Previous results suggest the large coseismic slip zone of the Tohoku earthquake may not have extended off Ibaraki.

In this study, we try to improve the method for epicenter determination by combining the back-projection results from both onshore and offshore seismic array data, and to discuss the seismic energy release in the source area of the Tohoku earthquake over a wider range. We used the NIED Hi-net data from stations located in the eastern Japan along the Pacific coast as the onshore array, and the 1-Hz ocean bottom seismometer (OBS) data deployed off Ibaraki as the offshore array. We applied a semblance analysis to each array data, and then identified the epicenter from both back-projected semblance values. As preliminary results, we determined some epicenters with higher accuracy even of earthquakes away (~40 km) from the OBS array. These results indicate that it may be possible that we can put some constraints on the extension of the rupture area of the Tohoku earthquake over a wider range by investigating seismicity and its temporal changes. We continue to develop and improve our method so that the method is applicable to continuous waveform data.

Keywords: back-projection, semblance, onshore and offshore seismic array