

## Seismic anisotropy at the northern part of Kanto and Tohoku regions

Takashi Iidaka<sup>1\*</sup>, Kazushige Obara<sup>1</sup>, Toshihiro Igarashi<sup>1</sup>, Jun Muto<sup>2</sup>, Bunichiro Shibazaki<sup>3</sup>

<sup>1</sup>Earthquake Research Institute, University of Tokyo, <sup>2</sup>Tohoku Department of Earth Sciences, Tohoku University, <sup>3</sup>IISEE, Building Research Institute

### 1) Introduction

Beneath Japan, the Pacific and Philippine Sea plates are descending toward west and north, respectively. The stress distribution of inland of Japan is expected to be complex. The seismicity around Japan is related to the stress field caused by the plate subduction. It is very important to understand the stress field of Japan. The stress field in the shallow crust in Japan has been studied previously, with Kaneshima (1990) reporting that the maximum stress axis in northeastern Japan had a WNW-ESE orientation, parallel to, and potentially controlled by, the subduction direction of the Pacific Plate.

Shear-wave splitting is an ideal tool for determining the orientation and form of the stress field in an area. Shear-wave splitting in the crust is related to the orientation of faults or cracks, and it is thought that propagating cracks are preferentially aligned parallel to the orientation of the maximum stress axis, in turn meaning that the polarization direction should also be parallel to the maximum stress axis [Crampin, 1981]. Then, the shear-wave splitting method was used to understand the stress field in the northern Kanto and Tohoku regions.

### 2) Data

We analyzed crustal earthquakes at depths of <30 km during this study. Those earthquakes are from Jan. 1, 2000 to Mar. 10, 2011. The dataset consists of earthquakes that occurred before the 2011 Tohoku earthquake. The seismic stations operated by the National Research Institute of Earth Science and Disaster Prevention (NIED), the Japan Meteorological Agency, and the University of Tokyo are used.

### 3) Results

The shear-wave splitting results for earthquakes prior to the 2011 Tohoku earthquake are laterally variable. However, some interesting characteristics were found of the map of the polarization directions. The polarization directions which were observed at the seismic stations located in the western part of Japan suggested that the polarization direction with WNW-ESE. The direction is consistent with that of regional stress field which are caused by the subduction of the Pacific plate. However, the polarization direction with the north-south direction was found at the easternmost seismic stations of the northern part of Kanto and Tohoku regions. The direction is clearly inconsistent with the direction of the regional stress field. But, the characteristic, that the E-W and N-S polarization directions were observed at the western and eastern parts of the region, respectively, was as same as the result of Iidaka and Obara (2013), which was observed in the southern part of the Tohoku region. The cause of the lateral variation was researched considering the mechanism of subduction.

Keywords: Shear-wave splitting, crust, subduction