

Triggered seismic activity in Yonezawa-Aizu area —Space time change of focal mechanism—

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Triggered seismic activity started 7 days after the 2011 off the Pacific coast of Tohoku Earthquake. The activity still continues at present, though the level is becoming lower. The northern extension of the Tanagura Tectonic Line is presumed to pass through this area. Its configuration, however, is not clear, because the Cenozoic igneous rocks cover the surface. In the present study, we tried to estimate the configuration (the strike and the dip) of the fault from focal mechanisms. Focal mechanisms were determined using the polarity of P-wave first motion for earthquakes with magnitude greater than 3.0 that occurred by Oct. 31, 2015 and were recorded at the Hi-net stations. We read the P-wave first motion on the display, and selected precise data. 100 mechanism solutions obtained with sufficient accuracy using more than 20 polarity data were used to estimate the fault configuration.

Most of the solutions were reverse fault or reverse with strike slip component types. We selected a nodal plane whose strike was close to that of the epicenter distribution or similar to adjacent events from a couple of nodal planes. In case of reverse faults, the plane with gentle dip was selected. We regarded the nodal planes thus selected as fault planes. The strike and the dip of the faults revealed the following characteristics. 1) The strike was NW-SE in the central part of the area (middle and the SW edge of the Otoge Caldera), and was N-S or NNE-SSW directions in other area. 2) From the center to the southern edge of the area, each hypocenter clusters had the predominant fault strike and the dip. 2) In the northern part of the area, the strike was similar, but the dip direction was different among events. These characteristics show that the strike of the faults is close to that of the Tanagura Tectonic Line in the center to the south part, and in the other part of the area is similar to the faults distributed over the Tohoku District.

Previous studies suggest that the flow of fluid may be the cause of the triggered activity. If there is a flow of fluid or a change of fluid pressure, the focal mechanisms are expected to change. We checked a temporal change of focal mechanisms in the area of 37.76-37.78°N, 139.97-40.02°E, where earthquakes continually occur. We read the polarity of P-wave first motion for the events with magnitude larger than 2.0. The area was divided into four regions, and the polarity data were plotted on one focal sphere projection for each region for every month. The distribution of polarity data mostly corresponded to the reverse fault type, and the change of polarity distribution was small in the western region. On the other hand, in the eastern regions many of monthly polarity distributions indicated strike slip fault with NW-SE tension, and the distribution sometimes changed to reverse fault type, suggesting the change of fluid condition.

Keywords: triggered earthquake, focal mechanism, Tanagura Tectonic Line