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Seismic activity and attenuation structure in fukushima-yamagata prefectural border area

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In Fukushima - Yamagata prefectural border area, seismicity suddenly became active after off the Pacific coast of Tohoku earthquake (here after we call it 2011 Tohoku earthquake). We estimated distribution and focal mechanisms of earthquakes that occurred in the time period before and after the 2011 Tohoku earthquake to clarify causes of the seismicity activation. We used seismograms which are observed at the Hi-net stations operated by National Research Institute for Earth Science and Disaster Prevention. Earthquakes with M ≧ 2.0 in the Hi-net catalogue from July 3 , 2002 to March 10 , 2011 and from April 1 , 2011 to August 31 , 2011 were analyzed in this study. As a result, hypocenters which occurred after the main shock were distributed into five clusters they were located at different region from those where earthquakes occurred before the main shock. It is known that there are active faults near the study area. A fault plane estimated from a northwestern cluster ' s hypocenters shows similar strike and dip of that of an active fault. Further, fault planes estimated from another clusters ' hypocenters seems to have a conjugate relationship with the fault plane of the active faults. In addition, we observed that hypocenters in some certain clusters moved to lateral and vertical direction with approximately constant speed. Most earthquakes have the thrust-type focal mechanisms during the study period. Q value is considered to be a sensitive parameter to temperature and existence of fluid in the crust. We estimated Qp/Qs value by taking velocity amplitude spectral ratio between P and S waves to evaluate the affection of magma or fluid to earthquake occurrence. We used 898 spectra of 152 earthquakes which were observed by 9 stations nearby source region to calculate average Qp/Qs value on the ray path by Takaoka et al. (2013) ' s method. As a result, ray paths from the hypocenters to stations within 20km showed high Qp/Qs values, while paths from the hypocenters to the far stations showed low Qp/Qs values. This result might indicate that high attenuation region exists in a shallow part nearby source region.

Keywords: Q value, attenuation, In Fukushima - Yamagata prefectural border area, seismicity, off the Pacific coast of Tohoku earthquake