

Characters of induced earthquakes with normal faulting in southern Abukuma based on a temporal aftershock observation

AOYAGI, Yasuhira^{1*}, UETA, Keiichi¹

¹CRIEPI

A lot of inland earthquakes with normal faulting were induced to southern Abukuma region by the 2011 off the Pacific coast of Tohoku Earthquake (Mw9.0). We carried out temporary seismic observation in the region to examine the characteristics of induced earthquakes with normal faulting. As results of tomographic inversion analysis, high P-wave velocity anomaly corresponds well with the surface distribution of the metamorphic rocks, whereas low velocity predominates in the granitic rocks. The hypocenters distribute mainly in the low velocity zone, therefore the occurrence of the induced earthquakes may be controlled by the geological structure. Extreme high seismicity is observed in the western side of Itozawa fault, along which surface rupture appeared at the earthquake (M7.0) on April 11th, in contrast with low seismicity in the eastern side. The dip of the seismicity boundary is nearly vertical at shallow depth than 10 km, changing to 60W at the deeper depth. On the contrast low angle (35 SW) seismic plane dips in the western part of the Yunodake fault. Therefore the deeper part of the Itozawa fault and the Yunodake is possible to convergent. Focal mechanisms suggest that normal faulting is dominant in Abukuma area, while the direction of T-axes is variable. The fact suggests that the principal stress σ_2 is nearly equal to σ_3 , and both orientations are horizontal. The induced earthquakes may be occurred at the existing weak plane which is perpendicular to the local orientation of σ_3 .

Keywords: The 2011 Tohoku-Oki earthquake, Induced earthquake, Normal fault, Aftershock observation, Crustal structure