

Seismicity Activation around the Kurobe Dam Reservoir in Oct. 2011

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After the March 2011 Tohoku-Oki earthquake, seismicity activation was observed wide range of beneath the Hida mountain area. However, another significant seismicity occurred around the Kurobe dam reservoir in October 2011. It was initiated by M3.9 earthquake followed by two magnitude larger than 5.0 quakes and the activity lasted for a couple of weeks. No active earthquake faults have been recognized, and no significant seismic activities or magnitude larger than 5 events have been observed previously except the ones observed in 1960s due to filling of the reservoir. The question is if the seismicity observed in October 2011 was related to the dam reservoir. To address question, we will examine the stress state of the area before and after the seismicity. As a first step of the study, we relocated 222 earthquakes observed in this area from March to November 2011. Then we analyzed 24 focal mechanisms to etch the shape of fault line. The results showed the epicenters moved 1.5 km eastward and two major faults, one with strike between 160 and 175 degrees, and another with strike between 180 and 195 degrees, were illuminated. Next we calculate the Coulomb failure function(ΔCFF) if the seismicity can be explained by static stress change due to the seismic activity occurred in March. The results indicate that although M5.4 and M5.2 events were possibly triggered by M3.9 and M5.4 events respectively, and the successive aftershocks were triggered by both M5.4 and M5.2 events, It might be difficult to trigger M3.9 earthquake just because of the static stress change due to the seismicity in March 2011. To figure out other causes which can trigger M3.9 event, we examined a dynamic stress triggering and found there was about 8kPa dynamic stress change due to a remote earthquake. As the next step, we will examine if there is any significant pore pressure change so that the seismicity can be triggered by such a small stress change.

Keywords: Seismic activity, Coulomb failure stress change, Dynamic stress change, Pore water pressure, Shear wave anisotropy, Hida mountains