

Characteristic of foundation disaster on the Nagano-Niigata border earthquake

NAKANO, Takayuki^{1*}, Mamoru Koarai¹, Kosei Otoi¹, Tomokazu Kobayashi¹

¹GSI of Japan

An inland earthquake with $M=6.7$ occurred on 12 March 2011, around Nagano-Niigata prefecture border. No persons were killed in this earthquake, but many slope collapse, ground deformation and damage of structures occurred around hypocentral region. As a global distribution of these damages concentrated on a particular area, the authors analyzed the relationship between follows: slope collapse, ground deformation, landform, geology, estimated location of earthquake source fault and region of interference fringes detected by InSAR; combining a field survey, photographic interpretation and GIS analysis.

The result shows that a large number of slope collapse and ground deformation occurred around Shinano (Chikuma) River and mountainous region on the left bank of the river. The road deformations and cracks are gravity sliding of road fill for the most part. Some parts of the deformation may be a tectonic deformation, example of the deformation in surface earthquake fault site reported by Kurosawa et al. (2011) and in camping site of Daigonji Highland in Tokamachi City. Furthermore, landslide and gravity sliding concentrated along Miyanohara fault in Ooidaira district and Kameoka district, Tsunan Town. This event suggested that slope collapse and ground deformation concentrate in and around active fault when great earthquake happen in the immediate vicinity of the active fault, even if it isn't active.

These damaged areas overlap with the area of hanging wall of the reverse fault and the crustal deformation area of main shock ($M=6.7$) and maximum aftershock ($M=5.9$) detected by InSAR. This phenomenon corresponds with a conventional view which a large number of damage occur in hanging wall of the reverse fault, and it suggests that a large number of damage may concentrate in the crustal deformation area detected by InSAR.

Keywords: the Nagano-Niigata border Earthquake, slope collapse, ground deformation, InSAR, active fault