

Estimation of ground movement by the 2011 Earthquake in Hamadori, Fukushima Prefecture on April 11, from the Geomorphic

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In the previous work, authors developed the new method to estimate the ground deformation of 1m order quantitatively and easily used high resolution periodical DEM, applied the technique of the image matching analysis - Patent No.4545219. And we showed the result of measurement of displacement of the mass movement due to the earthquake with high accuracy by using this technique. In the present study, we applied the same technique to the area where the surface rupture appeared due to 2011 Earthquake in Hamadori Fukushima Prefecture on April 11, and tried the extraction of wide area ground deformation. The topographical data used in this research is two times of 2mDEM by the airborne laser survey immediately after the disaster in 2006 and 2007, and April 26 in 2011. The slope angle map where the angle of gradient in the grid point had been shown by gray-scale was used for the digital geomorphological image used for the image matching analysis. The software improved to use MPIV described with MATLAB for three dimensional analyses was used for the image matching. When 2mDEM is used, the displacement magnitude that can be extracted by the digital geomorphological image matching is about the 1/10 grid size or more.

As a result of the investigation, tendency to the relative subsidence on the west side area of Idozawa Fault was found in the entire region, and the surface earthquake fault was found along the West segment of Idozawa Fault. In northern part of study area, some surface earthquake fault has corresponding possibility to the boundary of the moving mass movement. The horizontal displacement near the surface earthquake fault is small in the central part of the West segment of Idozawa Fault. Moreover, in the mid zone of the west segment and the east segment of Idozawa fault, the direction and the magnitude of surface displacement is different in each small area, and southward transitional displacement and right-lateral movement stepped over the fault was found. In the previous study, there is no evidence of clear surface rupture in the mid zone of two segments. However it is possible that the sites where the small ground surface displacement was found by existing investigations are corresponding to the places where the direction and the magnitude of displacement of the ground change suddenly. In the future, an unconfirmed surface deformation may be discovered in the area where a big distortion is assumed.

Keywords: active fault, DEM