

GIS analysis on geomorphological features of slope failures triggered by the Noto Hanto Earthquake in 2007

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After the Noto Hanto earthquake, on March 2007, Geographical Survey Institute took 1:10,000 scale-aerial photographs¹⁾ along the coast line near the epicenter. The aerial photographs were interpreted, the earthquake-induced slope failures were identified, and published their distribution on the disaster condition map by Geographical Survey Institute, through the Web mapping system of "Denshi Kokudo"²⁾. Based on the map, we counted 65 slope failures but they include two slope failures identified not by the aerial photographs but by the satellite image (ALOS/AVNIR-2 image). Judging from only the aerial photographs were interpreted, almost all slope failures seem to be classified into the type of small shallow failures.

To understand the geomorphological features of the slope failures, we overlaid 65 slope failures on the data of slope angle and profile curvature, calculated from 50m-grid digital elevation model (DEM) published by the Geographical Survey Institute. According to the slope failure area ratio frequency graphs in slope angle and profile curvature, the most frequent ratio was recorded at the class of 30-35 degree and 0.4-0.6, respectively, and the frequency suggests that the slope failures tended to occur at steep or convex slope in profile.

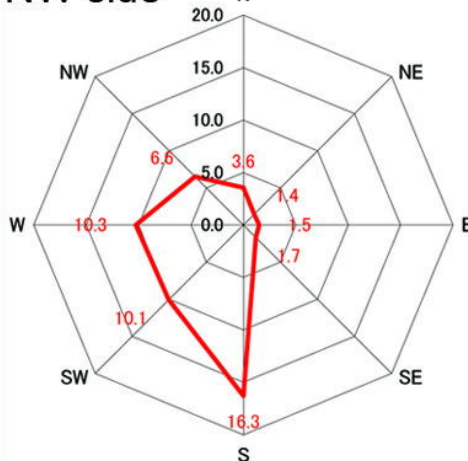
We overlaid 65 slope failures on the landslide data base³⁾ published by National Research Institute for Earth Science and Disaster Prevention (NIED). It was found that the number of slope failures occurred on the mountain slope is three times more than that on the existing landslide sites.

Four sites surface ruptures related to the earthquake fault were reported by Prof. Sato's research group⁴⁾ in Earthquake Research Institute, Univ. of Tokyo, Prof. Ishiwatari's research group⁵⁾ in Kanazawa Univ., and the research group⁶⁾ in Active Fault Research Center of National Institute of Advanced Science and Technology, but no spatial relation was not found between the estimated earthquake fault line and slope failure distribution. It is difficult to discuss the spatial relation because aerial-photographs coverage area is narrow in the present time. Furthermore, in advance, the slope failures were divided into NW side and SE side of the estimated fault line, the frequency of slope failure and slope failure area ratio were investigated on slope aspect calculated from 50m-grid DEM. As shown in the figure, both sides show the slope failures tended to occur from south to southeast aspect and it was found this anisotropic aspect is no relation about the estimated fault line.

References

- 1) http://www1.gsi.go.jp/topographic/bousai/photo_h19-noto/photo-area.html
- 2) <http://zgate.gsi.go.jp/notojishin/notojishin.html>
- 3) http://lweb1.ess.bosai.go.jp/jisuberi/jisuberi_mini/index.asp
- 4) <http://www.eri.u-tokyo.ac.jp/topics/noto20070325/satou0329.html>
- 5) http://earth.s.kanazawa-u.ac.jp/2007_notohanto-earthquake/2007_notohanto-earthquake.html
- 6) <http://unit.aist.go.jp/actfault/katsudo/jishin/notohanto/report/070403.html>

NW side



SE side

