

## Landslides distribution nearby earthquake source fault of the Chuetsu-offshore earthquake, Niigata Prefecture in 2007

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In this study, we conducted aerial photograph interpretation and field investigations of landslides induced by the Chuetsu-offshore earthquake (M6.8) in 2007, in the Nishiyama hill and its surrounding area. In this paper, we discussed and summarized the topographical and geological characteristics of the landslides, and relationship between the landslide distribution and earthquake source fault.

A total of 18 landslides were collected in the study area. All of these landslides were distributed within the area where the ground acceleration is larger than 500 gal or the seismic intensity is larger than Intensity 6 Lower (JMA scale). In the study area, 6 landslides occurred on westward slopes, showed the most dominant direction of landslides. However, there is no clear tendency between the slope inclination, crown elevation with the length, width and the area of these landslides.

In the study area, 12 landslides in total 18 occurred in the area where is composed of alternation of sandstone and mudstone. The landslide numbers and area averaged by geological distribution area, showed the largest value in alternation of sandstone and mudstone distributed area, and lowest value in mudstone area. Meanwhile, 66% of the total landslides occurred on dip-slope structure. These geological characteristics of earthquake-induced landslides have a same tendency resulted from the Chuetsu earthquake (Has *et al.*, 2008).

We analyzed the relationship between the source fault and the length, width, area and run-off distance of landslides induced by the Chuetsu-offshore earthquake and the Chuetsu earthquake. In the case of the Chuetsu-offshore earthquake, the length, area and slip distance of the landslides are decreasing with the distance from source fault. However, there is no clear relationship between the distance from source fault and landslide width, compared to that of length and area of landslides. Most of the landslides, 14 of total 18 (about 80%), occurred in the area distance within 15 km from the source fault, and this area include whole of the landslides those length larger than 90 m.

In the case of the Chuetsu earthquake in 2004, the whole area of the Imo River basin, where the most landslides concentrated, is included within the area distance 15 km from the source fault. We analyzed the landslides in an area of 127 km<sup>2</sup> including the Imo River and the Asahi River, although it not including all of the landslides induced by the earthquake. The analyzing results showed that 34% of whole landslides in the study area occurred within the distance 8 km from the source fault, 73% of whole landslides occurred within the distance 10 km from the source fault. The landslides occurred within the distance 8-10 km from the source fault occupying 39% of the whole landslides in the study area. Meanwhile, in the area within 10 km from source fault include the whole landslides those lengths exceed 270 m.

According to the analysis of landslide distribution in surface projection of source fault, about 50% of whole landslides occurred in the source fault projection area in the case of the Chuetsu-offshore earthquake, while 77% in the case of the Chuetsu earthquake.

Summarized from above results, in the case of the Chuetsu and the Chuetsu-offshore earthquake, Niigata Prefecture, which occurred in Tertiary sedimentary rock distributing region, the earthquake-induced landslides tend to occur in area which composed of alternation of sandstone and mudstone rather than mudstone, and occur on dip-slopes rather than reverse dip-slopes. And the number and magnitude of landslide seems to decrease with the distance from source fault, and the landslides mainly occur within the rectangle area of surface projection of source fault.

Reference