

## Study on slope failure along thin sand layer as slip surface by the 2004 Niigata-ken Chuetsu Earthquake

# Hiroshi Kameya[1]; tetsuo kanai[2]; Jianliang Deng[3]; Yukika Tsutsumi[4]; Junichi Koseki[5]

[1] Core Lab,Oyo Corp.; [2] oyo; [3] Civil Engineering, Univ. of Tokyo; [4] IIS, Univ. of Tokyo; [5] Institute of Industrial Science, Univ. of Tokyo

2004 Niigata-ken Chuetsu Earthquake triggered many landslides in the sedimentary rock area. It is pointed out that a fair number of the landslides included the slide-planes which were parallel to the bedding-plane or consisted of the weak thin-layer of the stratum. As these types of landslides often exist in the Green Tuff region in the Tohoku district in Japan, these landslides can be treated as the typical hazard pattern in this area. Among these landslides, the rock slides which do not exhibit clear surface topography must be predicted by the underground structure. The authors investigated the landslide which occurred in Yokowatari-area of Oziya city by the site-investigation, sampling and laboratory test. Thin weak tuffaceous sandstone layer (form 1 to 3cm width) distributed as the slip surface of the land-slide. The authors made an outcrop on the base of the side-wall of the slide area, sketched the geology of the outcrop and cut out the block-samples included the tuffaceous sandstone layer. The figure shows the geology around the tuffaceous sandstone layer. The characteristics of this layer are as follows,

- a. the thickness is not uniform.
- b. weak and weathered
- c. there are many cavities which are assumed as the water-flow pass.
- d. the under surface of the taffaceous sandstone is relatively smooth and it is estimated that the slide occurred along this under surface.

As the geotechnical engineering, this layer can be treated as weak sand layer sandwiched by fairly hard siltstones. The samples which include the sand layer parallel to the shear direction or in 60 degrees to the compression direction have been tested as the direct shear tests or triaxial compression tests. The slope-analysis using the strength parameter by laboratory tests can explain the failure condition in the earthquake. The authors will suggest the investigation methods to detect and evaluate the thin sand layer witch cause the slope failure.

