



## **Large landslides of sedimentary rocks induced by typhoon 14 in 2005: from a view point of long-term slope deformation**

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Typhoon 14 hit Kyushu Island on September 6 in 2005, inducing many large landslides which killed 22 people. Particularly, along the Mimi River in central Kyushu, where precipitation reached about 1000 mm within two days, four large landslides occurred with volumes from 330 thousand cubic meters to approximately 3.3 million cubic meters. Geological and geomorphological investigation elucidated that these landslides occurred under a similar geomorphological condition and that they were preceded by slope deformation that could be identified from aerial photographs. This area is underlain by the Shimanto Group of Cretaceous age, which consists mainly of sandstone and mudstone. All of these four landslides occurred on slopes just below a knick line, which lies 200-250 m above the riverbed. Ridges that descend valleyward incline 10 to 30 degrees above the knick line and 40 or more degrees below it. The knick line can be traced along the Mimi River more than 10 km across geological boundaries, suggesting that it was made by long-term denudation process probably resulted from the increase of uplift rate in a geological time. In addition, three of the landslides had scarplets on top of the slide mass before the landslide of this time. The other one, the largest one, had clearly defined landslide scarp and the landslide body had been cut by the Mimi River at its foot. The facts that the large landslides located just below the knick line and that scarplets or landslide scarp had been made before the slide of this time indicate that slope deformation already began in the landslides of this time because the slopes nearby the Mimi River had been under gravitationally unstable state since the erosion rate increased. Mass rock creep structures, which were observed within the landslides, also indicate the previous slope deformation.