



## **Morphological analysis of slope development by using airborne laser scanner data in Ribira, Hokkaido**

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We analyzed the slope development in an area of hard sedimentary rock by using precise digital elevation model (DEM) data. The study area is Ribira, Hokkaido, in Japan, where many landslides were induced by the rainstorm of Typhoon 10 from 9th to 10th, August, 2003. We applied airborne laser scanner to the area and obtained high resolution DEM data with a mesh size of 1m. By using the DEM data, we characterized the topography in the area and analyzed the distribution and the morphology of landslides that occurred in the past.

As a remarkable topographic feature in the study site, we found continuous knick lines that separate gentle upslope and the steep downslope by numerically processing the detailed DEM data. These knick lines are denudation fronts, below which many landslides are concentrated. The geometrical locations of the knick lines are affected by the bedrock geology; they are almost along the main ridges in most of the alternating beds of sandstone and mudstone (sandstone dominant) and alternating beds of mudstone and sandstone (mudstone dominant), while they still stay away from the main ridges in the area of siliceous tuff which is resistant against landslide and erosion. The characteristics of landslides were also strongly dependent on geology; many deep-seated landslides occurred in the area of mudstone-dominant alternating beds, while shallow landslides are dominating in the areas of sandstone-dominant alternating beds and siliceous tuff except for near the boundary with underlying sedimentary rocks. These facts suggest that the denudation front has been retreated by many shallow landslides in the area of sandstone-dominant alternating beds and by fewer but deeper landslides in the area of mudstone-dominant alternating beds; both types of landslide retreated the erosion front in a comparative rate.