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Surface features of paleo-landslides analyzed by LiDAR topographic data

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Despite massive landslides have been reported frequently in active volcanic province causing collapse of volcanic regions, many of the landslides are recently occurring events. This work presents the existence of two largest deep-seated paleo-landslides of a volcanic and active extensional tectonic regime in northern Taiwan by means of high resolution LiDAR-derived DEM. The LiDAR topographic data reveal numerous regional scale landslides and clear landforms commonly observed in landslides. The sliding process of the two largest landslides may also relate to the regional normal faulting, which cuts off the toe of the slope of sliding area. The reconstructed paleo-morphology of the slid area before landslide is derived from the undisturbed dome-shaped topography from nearby hill slopes of the same volcanic cone. The morphology illustrates very gentle slope profile in the sliding area and the cut-off slope situated in the toe caused by normal faulting may play an important factor of slope instability. The total removed volume of these two paleo-landslides is about 800x106 m3, calculating from the difference between the current LiDAR and the reconstructed DEMs. The error of the removed volume could be estimated from the inconsistency between the reconstructed DEMs derived from different methods. The incision of creeks is obtained from the difference between the current LiDAR DEM and the envelope surfaces of the DEM. The current creek profiles show that the maximum amounts of incision are situated in the lower middle part of the sliding area, implying the effect of normal faulting as an important factor for trigging landslides and for topographic evolution. The maximum amount of incision could be as high as 15 m, which indicates the observed event(s) from the LiDAR topographic data as ą§paleoąĺ landslide(s). This study demonstrates the LiDAR technique as a power tool for landslide analysis of various

categories.