



Assessment of the evolutionary dynamics of stream controlled hillslopes in the high mountains of Taiwan by analysis of multitemporal DEMs based on high accuracy survey data

D. Wenske (1), C.-H. Jen (2), M. Böse (1), and J.-C. Lin (3)

(1) Institute of Geographical Sciences, Freie Universität Berlin, Malteserstr. 74-100, D-12249 Berlin, Germany (wenske@geog.fu-berlin.de), (2) Department of Geography, National Kaohsiung Normal University, 116, Ho-Ping 1st Rd, Kaohsiung, Taiwan (jenchh@gmail.com), (3) Department of Geography, National Taiwan University, No. 1, Sec. 4, Roosevelt Rd., Taipei 106, Taiwan (jclin@ntu.edu.tw)

The high mountains of Taiwan belong to the earth's most dynamic landscapes. Landslides and debris flows frequently occur due to high rates of tectonic uplift, earthquakes and violent weather conditions including typhoons. In the Tachia catchment numerous translational landslides occur frequently as a result of seismic events and typhoons. The reaction of landslide activity to earthquakes and typhoon rainfall is complex and therefore hard to predict (Lin et al. 2006).

This study focuses on the evolution of a selection of stream controlled and highly active slopes within the time period of two years. From April 2008 until November 2009 a repeated surveying of active slopes on a half year basis is done to acquire high accuracy point data for DEM generation. The results presented here are based on measurements from April and November 2008.

The choice of the interpolation method and cell size for the DEM generation in respect to slope characteristics and the specific needs in analysis of a multitemporal dataset turned out to be the most critical problem to be assessed. The accuracy of the interpolation method is relevant for both, the quantitative and the qualitative analysis of the acquired survey data.

A comparison of the first two datasets revealed a significant noise in the survey data due to the fact that the survey of the almost inaccessible slopes is done manually by reflectorless laser distance measurements over large distances. Adding up to the error caused by the noise of the survey data is the error caused by the chosen interpolation method. A first estimation of the resulting overall error and its influence on the comparative analysis of the datasets was done. It reveals that the observed changes are within the error margins in case of the minor active slopes. In contrast, it turned out that the change on highly active slopes can be quantified using the applied method.

Based on the results of the first qualitative analysis the valley floors seem to have widened considerably in parts of the study area during the last period of typhoon activity in summer 2008. Only a comparison with the measurements to be done in 2009 will show whether the widening of the valley floors under current conditions turns out to be a general trend.

References

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