Geophysical Research Abstracts
Vol. 14, EGU2012-5000-2, 2012
EGU General Assembly 2012
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Variations of Geomorphic Signatures after a Major Typhoon

C.-M. Tseng (1), P. Tarolli (2), and C.-W. Lin (3)

(1) Department of Land Management and Development, Chang Jung Christian University, Taiwan (cmtseng@mail.cjcu.edu.tw), (2) Department of Land and Agroforest Environments, University of Padova, Italy (tarolli.paolo@gmail.com), (3) Department of Earth Sciences, National Cheng Kung University, Taiwan (chingwee@mail.ncku.edu.tw)

In August 2009, in Taiwan, Typhoon Morakot, characterized by a cumulative rainfall up to 3000 mm in about three days, triggered thousands of landslides and debris flows, and according to government reports, more than 600 people were dead or missing, and the economic loss was estimated at hundreds million of USD. The availability of detailed LiDAR surveys before and after this relevant event offers a great opportunity to deeply investigate the topographic signatures of a major typhoon, thus providing a way to better understand the earth surface processes and the landscape evolution in a region affected by these phenomena, and where the uplift rate is significant. We considered 11 small catchments with an area ranging from $0.9 \sim 5.1$ km2, located in the Southern Taiwan, affected by a different degree of erosion (totally affected by significant landslides and not affected by any erosion) during the Typhoon Morakot. For each of these catchment 1 m Digital Terrain Model (DTM) was derived by LiDAR data, before and after Morakot, for a total of 22 high resolution DTMs. Different analyses were then carried out: we considered the spatial distribution of curvature and roughness index of residual topography. The results indicate that catchments deeply affected by the typhoon present: i) a significant evidence of landform curvature and ii) surface roughness changes based on statistics. The possibility to make these analysis and obtain these information, immediately after an intense event, really represent a strategic tool for a first quantification of the processes that affected and significantly changed the earth surface, and provide a quick preliminary view on which part of the investigated landscape is more affected by these processes.