Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)
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HDS06-17 会場:102B 時間:5 月 23 日 14:45-15:00

河川の下刻による大規模な重力変形
Large scale gravitational slope deformation related to fluvial dissection of a paleosurface

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Understanding the processes that lead to gravitational slope deformation and subsequent landslides can provide information about evolving landscapes. In order to shed lights on this topic, we conduct analyses of landscape by geological and geomorphological field investigations, DEM analysis, high-resolution satellite imagery interpretation in the upstream Dahan River and the Chishan River catchments in tectonically active mountain range in Taiwan. We completed inventory of gravitational slope deformation. Mapping was performed by visual interpretation of high-resolution images and/or field investigations and based on precursory topographic features. The precursory topographic features include scarplet or landslide scarp and hummocky surface. The distribution of the gravitational slope deformations shows that most of the gravitational slope deformations occur on slopes at or above the convex slope breaks bounding rims of low-relief paleosurface remnants in high altitudes. The analysis of longitudinal river profile shows knickpoint cluster at the edge of the low relief remnants, indicating the low-relief paleosurfaces have been eroded by retreating of knickpoints in relation to river rejuvenation in response to base-level lowering associated with tectonic uplift of the areas. Corresponding to the incision, the low-relief paleosurfaces can tend to gravitational unstable by undercutting and destabilizing the toes of adjacent hillslopes. Some of these unstable slopes led to catastrophic deep-seated landslides during heavy rainstorms with significant volume of landslide masses, shaping landscape relief. Mass rock creep structures within the source areas of the landslides evident the long-term slope development. Besides, these larger landslides are more effective in high altitudinal zone. This suggests that the larger landslide, which might be controlled by the local relief, is one of the major geomorphic processes for the long-term landscape evolution in tectonically active mountains. We include also chronological development of the landscape in the upstream Dahan River catchment. The results might be useful for future simulation of knickpoint propagation and its effects on paleosurface dissection and for quantitative assessment of landslide hazard disaster mitigation.

キーワード: 重力変形, 河川の下刻, 古地形面
Keywords: gravitational slope deformation, fluvial dissection, paleosurface