



Anthropogenic features and hillslope processes interaction

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Topography emerges as a result of natural driving forces, but some human activities (such as mining, agricultural practices and the construction of road networks) directly or indirectly move large quantities of soil, which leave clear topographic signatures embedded on the Earth's morphology. These signatures can cause drastic changes to the geomorphological organization of the landscape, with direct consequences on Earth surface processes (Tarolli and Sofia, 2016). To this point, the present research investigates few case studies highlighting the influences of anthropogenic topographic signatures on hillslope processes, and it shows the effectiveness of High-Resolution Topography (HRT) derived from the recent remote sensing technologies (e.g. lidar, satellite, structure from motion photogrammetry), to better understand this interaction. The first example is related to agricultural terraces. In recent times, terraced areas acquired a new relevance to modern concerns about erosion and land instability, being the agricultural land mostly threatened by abandonment or intensification and specialization of agriculture, resulting in more landslide-prone bench terraces, or heavy land levelling with increased erosion. The second case study discusses about the role of agricultural and forest roads on surface erosion and landslides. The third case study investigates geomorphic processes in an open pit mine. In all case studies, HRT served as the basis for the development of new methodologies able to recognize and analyze changes on Earth surface processes along hillslopes. The results show how anthropogenic elements have crucial effects on sediment production and sediment delivery, also influencing the landscape connectivity. The availability of HRT can improve our ability to actually model anthropogenic morphologies, quantify them, and analyse the links between anthropogenic elements and geomorphic processes. The results presented here, and the creation and dissemination of HR datasets might allow the transfer the knowledge of geomorphic processes from the scientific to the practical world. Thus, it may allow an improved understanding and targeted mitigation of geomorphic changes during anthropogenic development and help guide future research directions for development-based watershed studies.

References

Tarolli, P., Sofia, G. (2016). Human topographic signatures and derived geomorphic processes across landscapes, *Geomorphology*, 255, 140–161, 10.1016/j.geomorph.2015.12.007.