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Terrestrial Laser Scanner survey of a small headwater basin in the Dolomites

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Airborne LIDAR technology has led to a dramatic increase in terrain information. LiDAR-derived high-resolution Digital Terrain Models (DTMs) are now widely available, and have opened avenues for hydrologic and geomorphologic studies (Tarolli et al., 2009). In general all the main surface processes signatures are rightly recognized using a DTM grid cell size of 1 m or 0.5 m. Having said that some sub-meter alterations of surface morphology in the high-altitude headwater catchments, still are not recognized using this resolution. These are such signatures related to the hillslope flow directions changing due to trail path and grazing activity. The possibility to detect in detail such signatures means also to find a way to better understand and mapping the surface and shallow landsliding susceptibility in alpine regions. Terrestrial Laser Scanner (TLS) was proven to be a useful tool for detailed field survey. The acquired elevation data with TLS allows to derive a centimeters high quality DTMs. In this work we present an example of such application. A TLS survey was carried out in a couple of day, in October 2011, in the Rio Cordon catchment, in Dolomiti Regions (central Italian Alps). The Rio Cordon catchment has a surface of 5 km2, the survey was focused on the portion where the main erosion and landsliding processes occur, corresponding at about half of total basin surface. The aim of this work is to describe the issues related to a TLS survey in a wilderness high altitude region, and test the capability of centimeter DTMs in recognizing the signatures related to hillslope flow directions changing. The method can be considered as a useful tool to interactively assist the interpreter/user on the task of soil erosion and shallow landslide hazard mapping.

References

Tarolli, P., Arrowsmith, J.R., Vivoni, E.R. (2009). Understanding earth surface processes from remotely sensed digital terrain models, Geomorphology, 113, 1-3, doi:10.1016/j.geomorph. 2009.07.005