



Preliminary results of topography and slope analysis of unstructured cloud of 3D data points

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Landslide and rockfall hazard assessment can be improved by using new digital documents such as unstructured cloud of 3D data points typically collected from ground based Lidar. The geomorphologic theories and methods that were developed before the computer ages are now being updated and improved. They yields new insights for landslide and rockfall hazard assessment. The analysis of topography reflects the mechanical and structural features of the slope. Unstructured cloud of 3D data points can serve as a basis for surface reconstruction by means of triangle. Thanks to the lower Schmidt-Lambert stereonet, a color representing the dip and the direction of dip can be assigned to each triangle of the surface. This kind of representation permits a very simple analysis providing quick information for slope hazard assessment, and have shown to be very efficient. The main problems which must be solved before performing slope and topography analysis are: (1) Data storage and access, as a typical Lidar survey (scan) can collect more than one million points; (2) Tetrahedrization of data points; (3) 3D Surface extraction of the resulting tetrahedrization and (4) 3D surface representation according to dip and direction of dip.

The above mentioned points are typical problems of 3D computer graphics and constitute an active research area. Most of them are more or less solved, but the challenge is to integrate them for a specific geological given problem, the main goal being to produce a set of tools which are easy to understand and manipulate (user-friendly) and which can handle very large data-set on current non-specialized hardware. Among these four points, the tetrahedrization is the most difficult to achieve, because of, firstly, the large amount of data, and secondly the difficulty to perform a tetrahedrization on 3D data. The Randa rockfall site, located in Valais, Switzerland, is used as a case study to highlight the capabilities of the method.