



Geomorphological and geostructural characterisation of Veny Valley (Courmayeur, Italy) using an integrated field-based, Lidar and Remote Sensing techniques

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The current work aims to understand the geomorphological setting of the Veny Valley (Mont Blanc – Aosta Valley – Italy) through traditional field survey and new method of remote sensing, ortophoto and a high resolution DEM LIDAR. A new field survey with support of pocket pc and integrated GPS was performed and enhanced the very extensive geological-geomorphological knowledge of the Veny Valley. A geomorphology map was created with digital- and field- survey data, with a specialized legend for high mountain environments. Traditional and digital data (ortophotos and DEM LIDAR) have been compared to evaluate the best solutions for geomorphological mapping. Combination of data (mainly with LIDAR) was used to describe, to recognize and to analyze the geomorphological associations of landforms in each sector of the Veny Valley. From structural point of view previously studied regions within the project area with large quantities of data were integrated and compared with areas without pre-existing field data. Contemporaneously, DEM LiDAR images were processed to include hillshade, slope, and aspect maps, and these were mapped for further structural analysis. LiDAR images were imported into Coltop 3D (Swiss software for structural analysis) to analyse potential failure surfaces in the Peuterey Area. The Coltop 3D data were then analysed for stability using the Markland test. The software allowed, through back-analysis, the determination of main areas of potential gravitational movements. Using the combined data derived from field, terrestrial and aerial photogrammetric, DEM, and Coltop analyses these sources a 1:15000 morpho-neotectonic map of the dynamics of the area was created. The application of this innovative methodology has allowed the integration of the data and their geomorphological interpretation. The remote sensing technologies and their availability, applied in this work, showed to be able to afford the usual field-based approach in the safe analysis of stability conditions in mountainous areas. A GIS system was set up to store and to manage data, each layer being used to interpret the landforms. The evolution of each sector in the Veny Valley was reconstructed by using the most important elements as keys for interpreting the relationships between landforms and bedrocks, glaciers evolution and landslides activity. Integration of all collected data inside a Geographic Information System allowed to understand the complete geomorphological-structural setting of the Val Veny area. The use of new technologies supported the integration of the data collected and their geomorphologic interpretation. The results demonstrate the usefulness of these innovative methodologies such as LIDAR.