



The generation of High resolution LIDAR DTM and DSM for detecting and monitoring unstable areas

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Airborne Laser Scanning (ALS) represents a new and versatile technology for the automated generation of Digital Elevation Models (DEM). The possibility to retrieve accurate data about both the terrain morphology (even in highly vegetated areas) and the vegetation cover height and density, makes this technology particularly suitable for geomorphology and morphometric studies on landslide prone areas. The basic components of a LIDAR system are a laser scanner emitting pulses at high frequency and recording the reflected multiple signals. The position and orientation of the aircraft is determined using a phase differenced kinematic GPS respect to ground stations located at a known position within the survey area. The orientation of the aircraft is controlled and determined by the INS. The accuracy of the 3D points strongly depends on the GPS/INS integrated system while the ground resolution from the frequency of the scanner. The 3D point cloud is then filtered and classified as ground, vegetation, structures, etc., in order to obtain Digital Terrain Model, depicting only the ground, and DSM, which also includes buildings and trees. Both models quickly provides useful and accurate information for carrying out land assessment and management analysis of landslide areas. The extraction of DTM and DSM in sloping, vegetated and urban areas is a complex procedure which should provide reliable results preserving the higher number of the measured 3D points. The quality of the post-processing is then a fundamental aspect which can be aided by the use of dedicated algorithms and the support of ancillary data such as digital orthophotos. Some example of DSM and DTM extracted from an high resolution (density up 10 points for a square meter) LIDAR survey carried out in January 2005 on complex urban and rural areas around the town of Napoli in Italy are shown. A discussion on the performance vs accuracy requirements of LIDAR DEM for detecting and monitoring unstable areas is also provided.