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1 Assessment of Deep Gravitational Slope Deformations (DSGSD) by a hierarchical approach using Landsat images types and SRTM data

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There is general agreement across the scientific communities about an unmet need for a high-resolution, landscape modelling. It has not been possible to construct such models from long-time existing sources. Identification and mapping of landforms in geomorphology are based on geological and geomorphological survey and interpretation of topographic maps and aerial photos. These traditionally techniques are affected by a high degree of uncertainty. Considerable enhancement for morphometric interpretation can be obtained through generation of a synthetic stereo pair, by means of the integration of spectral data with Digital Elevation Model. The Shuttle Radar Topography Mission (SRTM) data set presents a unique opportunity to obtain a cloud-transparent instantaneous snapshot of imagery in different areas, together with collocated topographic information, which can be used to visualize and characterize different landforms in geomorphology and generally in earth sciences.

Some landforms, as DSGSD (Deep Seated Gravitational Seated Deformations) have a well defined evidences recognizable by topographic surface observation and deriving

from their morphologic characterization.

DSGSD are mass movements whose starting point and evolution are conditioned by a “scale factor”. Generally in a DSGSD the slide surface is not always well clear and have a depth comparable with the entire slope. Our method of analysis is based on the observation of the sackung type, a rock flow moving by a slow creep mechanism well dispread in all over the Italian Alps and calcareous Apennines. A slope affected by a sackung has an high energy relief and an upper part characterized by tensional structures. Trenches, double ridges and counterslopes are the superficial evidences of the mass movements scarp edges. Sagging, cambering and a widespread landsliding are the evidences of compressional stress deformation in the lower part of the slope.

The SRTM data set in synergy with other remote sensing data sets, such as Landsat 7, can be used to derive a number of major (but not all) parameters constituting a significant part of the different DSGSD consistently at the time period during which the SRTM data set was collected (February 2000). In this research Landsat 7 provides the basis for passive optical mapping of DSGSD morphologic features. The coverage and moderate spatial resolution (30m) offered by Landsat 7 are a necessary complement to the SRTM imagery and the combined use of both systems would allow for greater accuracy than either could provide independently. Although earlier applications of previous Landsat missions have met with mixed success for geomorphologic mapping, more sophisticated methodologies combined with advances in the ETM+ sensor will facilitate the mapping objective. In addition to an improved signal/noise ratio in the multispectral bands and higher spatial resolution (60m) in the thermal band, the ETM+ sensor also provides a panchromatic band with 15m spatial resolution.