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1 Spatial modelling of the morphometric parameters on Deep Gravitational Slope Deformations (DSGSD) in the Piemonte region (Italy)

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Deep Seated Gravitational Slope Deformations (DSGSD) are a particular category of mass movement conditioned by a “scale factor”, in which long-lasting small-scale movements prevail. As a consequence, the dimensions and the typical surface evidences characterize this kind of landforms. As a result from a nationwide distribution analysis of DSGSD, the Alps range of the Piemonte region (Italy) encloses at least the 41% of the total amount of the studied cases. The high distribution values are the results of specific geologic and geomorphologic conditions. To model the distinctive topographic signature our study starts using the IFFI GeoData Base (a nationwide landslide DB) in a vector polygon format, with the shape related to the area of the events (property of ARPA Piemonte). Our methodology is direct towards the automatic analysis of the geomorphologic parameters which characterize the signature of the DSGSD (relationship between the slope, the curvature and the relief), starting from a SRTM DEM. From SRTM analysis we point out the distribution degree that

quantify the DSGSD occurrence as a topographic signature. The degree varies from a low value, that corresponds to a terrain without indication of DSGSD, to a high value that correspond to a terrain generated by DSGSD. The SRTM data set, were then used in synergy with Spectral Mixture Analysis (SMA) of Landsat ETM+, to classify individual mixed pixels according to the distribution of spectrally pure end member fractions and provides a tool for discrimination and classification of the topography. While the coverage and moderate spatial resolution (30m) offered by Landsat ETM+ are a necessary complement to the SRTM analysis and the combined use of both systems allowed for greater accuracy than either could provide independently, the high accuracy of the IFFI dataset is the key point to quantify how the DSGSD affect topographic relief. Model sensitivity to input data error propagation can be highlighted by the errors generated in GIS spatial analysis environment and evaluated to specify the form and the acceptable limits of accuracy of input data sets in order to describe topography attributes.