



## The statistical signature of Earth-Surface Processes

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Understanding Earth-surface processes relies on modern digital terrain representations, and depends strongly on the quality and resolution of the topographic data. From digital terrain data it is possible to derive topographic attributes, that are useful in recognizing different topographic signatures. The challenge then is to relate these signatures with different processes such as slope instabilities, floods, tectonic and volcano activity, and to understand the effect of human activity. In this work we considered two similar headwater alpine catchments located in the Eastern Italian Alps, and affected by several surface processes. Within the study area several field surveys were conducted during the past few years including high resolution LiDAR survey. Recent campaigns have provided new detailed data of field-mapped alluvial and colluvial channels, channel heads, and landslide scars. A high resolution Digital Terrain Model (DTM) of 1 m served as the basis upon which local slope and landform curvature were computed. The probability density function (PDF) of these topographic attributes, and the slope-curvature (SC) relation were derived for one catchment using a window area approach of 100 m size, over different morphologies. The different surfaces were then classified based on their characteristic PDF and SC relation. The second catchment served for the validation of the methodology. The results suggest that the proposed approach could be used as a useful tool for the automatic classification of different landscapes over large areas when high resolution topography is available.