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Assessing the impact of input data quality on the modelling of shallow landslide susceptibility

Thomas Zieher (1), Martin Rutzinger (1,2), and Clemens Geitner (1)

(1) Institute of Geography, University of Innsbruck, (2) Institute for Interdisciplinary Mountain Research, Austrian Academy of Sciences

Shallow landslides are a widespread phenomenon in mountain regions of the world often posing a serious threat to human living. Hence many recent studies aim at assessing landslide susceptibility in space and time involving various kinds of models (i.e. heuristical, statistical or physically-based). Among others these models commonly require for digital terrain models (DTM) and their derivatives as well as detailed landslide inventories as input data. On the basis of a detailed multitemporal landslide inventory covering three selected communities in Vorarlberg (Austria) focussing on shallow landslides (i.e. debris slides with a maximum scar depth of 1-2 m) and two series of airborne laser scanning data the impact of (i) the DTM used, (ii) varying spatial resolutions and (iii) the influence of different algorithms for the calculation of derivatives are discussed. The distributions of slope, measures of curvature and topographic indices as well as more complex neighbourhood indices (e.g. landform elements derived by the GRASS-tool r.geomorphon) are evaluated within landslide scar areas. In addition the sensitivity of an expert-based approach to the various input data is assessed in ROC-space. Results show that the time of acquisition and spatial resolution of the DTM are essential factors for the quality of the resulting susceptibility map while the algorithm used for the calculation of derivatives plays a minor role.
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