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Exploring the transferability of statistical susceptibility models for mass movements

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Risk assessment related to mass movements in larger areas requires the transferability of susceptibility models proven to be useful on the catchment scale. Conceptionally, physically based models should be easily transferable to every study area as they represent the physical processes governing the activity of mass movements – their use, however, is hampered by the difficulty to map, area-wide, the spatial distribution of the numerous physical parameters required. Statistical models make use of statistical relations between the spatial distribution of geofactors and the spatial distribution of past mass movements (based on the assumption that future events are supposed to occur under the same conditions as in the past). Most of the geofactors used for these models are more or less easily derived from existing maps, aerial photos or from digital elevation models.

This paper explores factors influencing the transferability of statistical models. Theoretical considerations are complemented by results of case studies dealing with debris flows and snow avalanches in study areas of different size (10-360 km^2) and location (Northern Alps, Dolomites, Pyrenees). The 'certainty factor', one of the favourability functions, is used for grid-based susceptibility modelling; the model results are validated using independent starting zones. The case studies indicate that 'training areas' used to estimate the parameters of the statistical models should be chosen carefully with respect to their geofactor composition in order to ensure optimal transferability.