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Scenarios of future landslide susceptibility - incorporating changes in land cover and climate

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Land cover and precipitation are dynamic variables amongst preparatory and triggering factors for landslides. Therefore, the future spatial distribution of landslide occurrence is particularly determined by these two factors. However, with changes in land cover and precipitation also the future distribution of elements at risk is altered, which in combination with a changed landslide susceptibility results in a change of the landslide risk. The emerging research question for this study is the analysis of the past and future landslide susceptibility in the periods 1962 – 2100, considering past and future changes in land cover and precipitation.
The study area Waidhofen/Ybbs is located in Lower Austria and covers an area of approximately 112km^2. The geological setting is combined of Flysch and the Northern Calcareous Alps. The land cover is mainly composed of forest and grassland as well as building area in the valley floors.
In this study logistic regression is applied to derive landslide susceptibility based on different land cover scenarios as well as on a climate change scenario. Based on precipitation data, land cover maps, derivatives of a DTM (e.g. slope, curvature) and a matching landslide inventory on shallow landslides available for the period 1962 – 2007, the respective landslide susceptibility was analysed. Various studies on this landslide type of the study area show that these are usually triggered by short but intense rainfall events occurring during summer. Consequently precipitation maxima values of each pixel for the given analysis period were taken. The extrapolation of the landslide susceptibility to the future was performed by applying the coefficients from past land cover and precipitation to future scenarios. The results for the analysis period 1962-2100 show a tendency towards an increasing susceptibility for Waidhofen/Ybbs; however this trend is not continuous over all time periods. For some scenarios this trend is much stronger from 2050 to 2100 than for the first future period analysed.