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Creation of an Austria-wide event database and evaluation of correlations between local scaled weather development and extreme events

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This study aims at identifying and describing weather situations that occur along with landslides, floods and heat waves. In this course we assemble a dataset that contains these hazards from 1950 onwards. We analyze them by the application of multivariate statistical methods and link them to local-scale, daily temperature and precipitation fields across Austria. Thereby this study attempts to contribute to a large cooperation initiated by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW), the Vienna University of Technology and the Central Institute for Meteorology and Geodynamics (ZAMG), which deals with the development of a warning system to protect the population from weather-induced threats.

The first part of this study focusses on assembling landslide, flood and heat wave occurrences from 1951 up to date, which is done by extracting these events from the Austrian weather-induced damage database VIOLA (ZAMG) and the 'Ereigniskataster der Wildbach- und Lawinenverbauung' (BMLFUW). The resulting 'event space' provides a comprehensive database that maps damage events caused by the above mentioned threats from 1951 to 2017 and covers the entire Austrian territory. Once established, the 'event space' is analyzed by multivariate statistical techniques for the detection of spatial-temporal clustering tendencies amongst the described hazards.

Dates and localities of landslides, floods and heat waves are used to set up and analyze hypotheses, which refer to daily based weather conditions that are likely to cause these events. These hypotheses are called Climate Indices (CIs) and have to be evaluated in various validation experiments. Daily based weather conditions are given by the SPARTACUS dataset (Hiebl and Frei 2016, 2017) containing daily temperature (minimum, average, maximum) and precipitation fields on a 1 km grid all across Austria. Examples for CIs are given by e.g. Guzetti et al. (2008) and Matulla et al. (2017).

By assembling the above described 'event space', by characterizing spatial-temporal hazard behavior and by establishing Climate Indices depicting weather situations, which are likely to cause floods, landslides and heat waves, this study contributes to the BMLFUW project mentioned in the beginning. Thereby we attempt to contribute to maintaining the high level of public protection under changed future climate conditions.

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