Geophysical Research Abstracts
Vol. 20, EGU2018-16434, 2018
EGU General Assembly 2018

Analysis of past and future meteorological trigger probabilities for torrential processes in Austria using regional climate projections from the EURO-CORDEX initiative

Martin Braun (1), Douglas Maraun (2), Matt Switanek (2), David Prenner (1), and Roland Kaitna (1)

(1) Institute of Mountain Risk Engineering, University of Natural Resources and Life Sciences, Vienna, Austria (martin.braun@boku.ac.at), (2) University of Graz, Wegener Center for Climate and Global Change

Torrential processes, which include floods, intensive bedload transport, debris floods and debris flows (as defined by the Austrian Standards ONR 841200) represent a severe hazard in mountain regions. Besides basic disposition (e.g. topography, geology) and variable disposition (e.g. seasonal sediment availability or hydrological pre-conditions), the occurrence of such hazards is mainly connected to meteorological triggers, either short, intensive rainfall events or long-lasting frontal precipitation.

We selected torrential hazards from the Austrian Event Database of torrential events, where the precise location and date of occurrence was known. We connected this data with daily rainfall data provided by ZAMG (Central Institution for Meteorology and Geodynamics) and HD (Hydrographic Service Austria) from the closest meteorological station that measured a corresponding rainfall event using a Bayesian approach. Connected with 28 regional climate projections from the EURO-CORDEX initiative we derive a span of potential changes of triggering rainfall probabilities until 2100. In total 7617 events and 1899 time-series from meteorological stations distributed over a region of approximately 80,000 km^2 were available for analysis. 2837 events (714 debris flows, 259 debris floods, 1399 intensive bedload transport events, and 465 torrential floods) were selected for further investigation. For the selected data historical conditional probabilities were investigated for the period 1961-2010 and corrected for modelled data for the same period. Subsequently, the conditional hazard probabilities were determined for the 28 future projections for the time periods 2021-2040, 2041-2060, 2061-2080, and 2081-2100 respectively. For all data the role of antecedent rainfall, triggering event rainfall, rainfall duration, and rainfall intensity was investigated for the four categories of torrential processes mentioned above.

We present results of the first analysis of long-term daily meteorological rainfall thresholds for torrential processes in Austria and show the influence of climate change on triggering conditions for three future time intervals. Our results contribute to an improved understanding of future torrential activity in the Alps and examines the role of rainfall conditions on different types of torrential hazards.