

Heavy Precipitation Events in Northern Switzerland

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Heavy precipitation events in the Alpine region often cause floods, rock-falls and mud slides with severe consequences for population and economy. Breaking synoptic Rossby waves located over western Europe, play a central role in triggering such heavy rain events in southern Switzerland (e.g. Massacand et al. 1998). In contrast, synoptic scale structures triggering heavy precipitation on the north side of the Swiss Alps and orographic effects have so far not been studied comprehensively.

An observation based high resolution precipitation data set for Switzerland and the Alps (MeteoSwiss) is used to identify heavy precipitation events affecting the north side of the Swiss Alps for the time period 1961-2010. For these events a detailed statistical and dynamical analysis of the upper level flow is conducted using ECMWFs ERA-40 and ERA-Interim reanalysis data sets. For the analysis north side of the Swiss Alps is divided in two investigation areas north-eastern and western Switzerland following the Swiss climate change scenarios (Bey et al. 2011). A subjective classification of upper level structures triggering heavy precipitation events in the areas of interest is presented. Four classes are defined based on synoptic-scale structures of the dynamical tropopause over Europe during extreme events in the northern part of Switzerland and its sub-regions. The analysis is extended by a climatology of breaking waves and cut-offs following the method of Wernli and Sprenger (2007) to examine their presence and location. In a next step the potential for an upper-level Rossby wave upstream precursor is investigated.

References

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