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## A 12-year radar-based climatology of daily and sub-daily extreme precipitation over the Swiss Alps

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### Abstract

The characterization of the alpine extreme precipitation is the basis to study the projected changes in frequency and intensity of heavy rainfall. We studied some climatological features of extreme daily and sub-daily precipitation in the Swiss Alps and surrounding regions, based on 12 years of data from rain gauges and CombiPrecip, a rainfall field with high spatial resolution (1 km<sup>2</sup>) produced by locally adjusting the radar precipitation map to the values measured by rain gauges.

We quantify the agreement between rain gauges and CombiPrecip concerning both the timing and the magnitude of the extreme events by cross-validation; overall, it increases with diminishing the severity of the extremes and increasing accumulation time. If the extremes represent on average the 10 most intense rainfall accumulations per year, in general 50–65% of rain gauges extremes are extremes also for CombiPrecip, 40–50% of CombiPrecip extremes are not extremes according to rain gauges, and CombiPrecip extremes are till 7% lower than rain gauges extremes.

The maps of our climatology prove that both daily and sub-daily extremes along the first alpine slopes exhibit very different climatological features with respect to the crest of the Alps and flat terrain. Generally, on the Alpine foothills precipitation extremes are more intense and they produce a larger fraction of the total yearly rainfall. Regarding the temporal clustering, extreme 1-hour precipitation is more clustered in time in the inner of the Alps, even though it is less frequent. The extremes exhibit a strong diurnal cycle in summer.

We will also present the preliminary results of the radar-based extreme value analysis which we are developing with the same data set, in order to derive the return periods of heavy rainfall with relative confidence intervals for any ungauged location in the Swiss Alps.