Severe storms in a mountainous Mediterranean regions: Uncertainties on extreme rainfall estimations

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In a recent study, Molinié et al. (xxxx) analyzed extreme rainfall in a Mediterranean and mountainous region ($200 \times 150\ km^2$), the Cévennes-Vivarais region (CéVi). It is shown that extreme rainfall in CéVi is associated to two different precipitation regimes. Extreme rainfall cumulated over 24 hours results from stratiform clouds on which the relief forcing is of primary importance (Yates (2006) and Anquetin et al. (2003) among others). At shorter accumulation periods, typically 1 hour, three specific regions of several 100 km^2 are stroke by the highest extreme rainfall rates. Extreme rainfall rates are defined as rainfall rates with low probability of occurrence, typically with higher mean return-periods than data lengths. It is then of primary importance to explore the extreme rainfall sensitivity to the estimation methods (tail fitting i.e. TF or excess fitting i.e. EF).

Maps of TF- and EF-estimated extreme rainfall display similar patterns but different intensities. The "measured" rainfall rate quantiles exhibit different patterns than those of the estimated extreme rainfall rates. This shows that:

1. an extreme value analysis is required in order to find out the most sensitive regions to highest rainfall rates;
2. Estimated Extreme rainfall intensities highly depend on the estimation method;

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Using criteria on the location and intensity, rainy events yielding intensities comparable to the estimated extreme ones have been found out in the databases. A geostatistical analysis of the rainfall fields allows to characterize their spatio-temporal structures. It is discussed in terms of storm organizations.

References:

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