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Extreme rainfall estimation in orographically complex ungauged locations

Giuseppe Formetta[1], Francesco Marra[2], Eleonora Dallan[3], and Marco Borga[3]
[1]Trento, Department of Civil, environmental and mechanical engineering University of Trento, Trento-Italy, Trento, Italy (giuseppe.formetta@unitn.it)
[2]National Research Council of Italy - Institute of Atmospheric Sciences and Climate (CNR-ISAC), Bologna, Italy
[3]Department of Land Environment Agriculture and Forestry, University of Padova, Padova, Italy

Quantifying rainfall volumes at varying duration and frequencies (e.g. design rainfall) and their uncertainty is crucial for a reliable design of water related infrastructures, such as flood retention reservoirs, urban drainage systems, spillways, culverts. This is of particular relevance in orographically complex area where extreme rainfall could trigger hydro-geological hazards.

Estimate of the design rainfall and its uncertainty is usually done at-site, i.e. at the position where the rain gauge is located and regionalization methods are required to provide estimates in ungauged locations.

In this work we exploit the potential of the Simplified Metastatistical Extreme Value (SMEV) statistical framework for the analysis of extreme rainfall based on ordinary events and not only the annual maxima and we evaluated the performances of two different regionalization methods (namely, regionalization of extreme rainfall quantiles and of the distribution function parameters). The performance of the two selected approaches is evaluated by leave one out cross-validation and traditional goodness of fit measures (i.e. percent bias, percent root mean square error, and Kling Gupta efficiency).

The study area is the Alto Adige Region located in the Italian Alps, where 57 rain gauges at sub-hourly and hourly time steps are analyzed.

Preliminary results show that accounting for elevation in the regionalization (Kriging) methods provides better performances and reduce the design rainfall uncertainty in ungauged locations.