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Climate change impacts on precipitation extremes, flows and flash floods in Mediterranean mesoscale catchments

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Abstract: Mediterranean meso-scale river catchments are submitted to extremes floods events linked to intense convective precipitation and local hydrologic features (karst, soil moisture, land use). The Mediterranean region is known to be one of the most affected areas by global warming, and it is likely that changes can be expected in the hydrological cycle. The aim of this study is to assess the climate change impacts on extreme precipitation events using a so-called “futurization” method, in which a transfer function is built by comparing the quantiles of distribution for both present and future climate precipitation. A number of historical flood events, previously chosen from an observational record, are “futurized” using the outputs from Regional Climate Models. This method have been developed and applied to the Lez catchment with ALADIN52 model by Harader, 2015. Strong uncertainties were found, linked to model simulation and soil moisture. In order to assess it, this analysis will be conducted in a multi-model approach, using outputs from the several RCMs running at 12 km horizontal resolution from the EURO-CORDEX project. The final objective is, once the future counterpart precipitation event is determined, these will be used as input to different hydrological models (ATHYS, TOPKAPI) on different catchments (Cevennes, Aude, Muga). The first stage of this work consists of a comparison of RCMs from EURO-CORDEX during the past period 1980-2010 and over France and Spain. Using the French and Spanish SAFRAN reanalysis as the reference, several metrics based on statistical analysis have been developed, in order to evaluate models in terms of their ability to reproduce hydrological features, but with particular emphasis on the precipitation extremes.

Keywords: Climate change, Precipitation extremes, Climate model, Hydrological model, Quantile, CORDEX.