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Seasonal predictability of fall heavy precipitating events over southern France

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The aim of this work is to quantify the seasonal predictability of the number of extreme (mean + 1 standard deviation) Heavy Precipitating Events (HPE) over southern France during the fall season (September to November). Four sets of Seasonal Forecast have been considered in this study over a 42 year period (1960-2001): UE ENSEMBLES project ECMWF (EC, 125 km) and Météo-France (MF, 310 km) dataset, Météo-France tilted and stretched over the Mediterranean Sea (MED, 50 to 310 km) and Météo-France with New Physics at Intermediate Resolution (NPIR, 155 km).
First, correlations are shown in order to assess the large-scale predictability. As a first diagnosis study, composites of several fields (Sea Surface Temperature to Geopotential at 500 hPa) are discussed to get an insight on the ability of the models to reproduce teleconnections between the tropics and Western Europe. Then, the predictability is evaluated with the help of three different methods making use of large-scale regimes (Velocity Potential + Stream Function at 200 hPa and Geopotential at 500 hPa) as HPE predictors, in comparison with a direct method taking the raw simulated precipitation rate into account. The first method has been designed prior to this study for rather high resolution simulations; it consists of a multi-step detection of HPE from synoptic-scale fields. The second method deals with analogue years taken into the respective simulated datasets in minimizing the distance from the considered year in terms of {VP+SF}200 regime occurrences; the actual forecast is the observations taken from the list of selected analogue years. And the third method is based on statistical adaptation (linear regression and discriminant analysis) from the large-scale {VP+SF}200 and G500 regimes. The best results shown in terms of ROC and economical value (both evaluated in cross validation mode) are obtained with the last method making use of {VP+SF}200 together with a discriminant analysis in a Model Output Statistics framework. They show that this method outperform the climatology. The added value brought by a Multi-Model approach (using three out of the four previous models) has also been assessed.