Statistical downscaling of synoptic environments for High Precipitations Events over southern France: an objective method of selection.

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The Cevennol precipitations events can bring on flash floods with serious societal impact over the french southern coast. Some studies have reported theses situations often match with strong synoptic forcing. This study aims at determining over long periods whether these synoptic conditions are necessary or not, and whether they reciprocally could help detect objectively these events even their analogues in future climate simulations. This study has been carried out by the french CYPRIM project.

As a preliminary step, we looked for the large scale patterns that usually come with the High Precipitations Events (HPE) over the present period. The data comes from the ERA40 reanalysis for the synoptic parameters (the 500hPa geopotential height (Z500) has been chosen for the classification), and the precipitations from the Meteo France rainfall gauges network, the period is between 1958 and 2001 for autumn seasons (September to December). From the rainfall data, a set of 220 HPEs is selected to characterize the extreme part of the precipitations. However, a larger set of a thousand significant precipitations days must be used to apply the dynamical clustering method that produced a 4 Z500 clusters classification. For the two classes representative of the major part of the HPEs, the composite analysis shows the existence of a strong cyclonic activity over the Atlantic forwarding effects over Spain and western Mediteranean, and also a strong ridge over central Europe that could point convergent lower level flows over the concerned region. The reciprocal standpoint is evaluated by selecting among all the whole period Z500 fields, the ones that are spatially correlated to the rainfall centroids. The result shows that the Z500 is discriminating 20 percent of the extreme situations, which is significant but not enough to build a criterion. Then, the lower level 925hPa moisture flux is sequentially added and brought the detecting potential of the algorithm up to 80 percent. This algorithm has been applied in climate simulations to identify synoptic environments favoring the HPEs (this study is described in the Nuissier, Joly contribution).