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Selection of a sub-ensemble of ensemble members for climate predictions according to user-needs

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Forecasts on sub-seasonal up to decadal scales are known to improve when multiple forecasts are combined into large ensembles. On the other hand, in some cases, some ensemble members may perform better. Moreover, in order to feed impact models, it is necessary to select the amount of information contained in the whole ensemble dataset.
Here we present a methodology, based on clustering techniques, whose main objective is to identify the most probable outcomes from an ensemble distribution associated to a given prediction. The K-means clustering algorithm is applied in a reduced phase space (obtained by EOFs decomposition) in order to condense the ensemble prediction information from the whole ensemble into an optimal sub-set of significantly different prediction scenarios. This technique is already used to characterize the most probable scenarios in an ensemble of weather forecasts and this approach, applied at a regional level, can also be used to identify the sub-set of ensemble members that best represent the full range of possible solutions for downscaling applications. The choice of the ensemble members is made flexible in order to meet the requirements of specific (regional) climate information products, to be tailored for different regions and user needs. Such limited subset is aimed to be both be accurate and reliable, i.e. representative of all the possible outcome and the uncertainty.
Here we would like to present a few cases studies in which univariate and multivariate sub-selection methods are explored and applied to different regions and lead times,in particular to the Euro-Mediterranean area.