



## New classification by weather type for precipitations and temperatures over France

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Two new weather types classifications, are produced by the operational services of Meteo-France, both For France, one for precipitation and another one for temperature. These classification developments took advantage of the results of the action COST733 through its inventory of existing classifications in Europe and methodologies and its details on applications of classifications and on the methods of validation oriented toward applications. This work was also inspired

from different experiments on climate model downscaling that involve the use of weather types classifications. While this latter classification methodology tended to rely on a combination of principal components (PCA) from on one hand a large scale parameter and on the other hand a local ones, the originality of our new proposed classification method is in the use of canonical correlation analysis (CCA) applied to this two groups of parameters.

This new classification is made available at a daily rate from 1958 to present for both temperature and precipitation. It associates using the CCA method a large scale parameter coming from ERA40 (1958-2001) or the operational model of ECMWF (2002-present) and a local parameter from observed station precipitation or temperatures. The results of the CCA enables to select first the most relevant large scale parameter among eighth options (MSLP, Z700, Z500, TPW850, Z2PVU, Swirl 850, 850 and moisture advection 700) and also the field for this parameter. Then, scores are used to select an appropriate number of canonical variables which are the subject of these classifications.

Several classification methods have been performed, first the Nearest Neighbour methods (k-means) and then a three level mixed method: k-means - hierarchical clustering (HCA) - k-means with selection of stable groups in repeated experiences. Moreover, several methods have been implemented to select the optimal number of classes. Different divisions of seasons have been tested and it is finally a cut into two seasons which was chosen and was carefully adjusted to the change of season. The best classification is selected, first by known statistical methods for assessing the performance of a classification, but also by its ability to discriminate, for the precipitation or temperatures fields over France, the mean anomalies of the different classes and the anomalies in the variability or in the frequency of rain / no rain situations and of the extremes.

The main goal is to have a classification showing the well known and stable large scale structures over Europe and also the best homogeneity within - and best differences between - classes for precipitations or temperatures over France.