EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-556, 2009
9th EMS / 9th ECAM

9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

Multivariate weather regimes in the Mediterranean, a perspective to increase Heavy Precipitating Events predictability using medium range ensemble forecasting?

B. Joly, P. Arbogast, L. Descamps, and C. Labadie
METEO FRANCE, CNRM, TOULOUSE, France (bruno.joly@meteo.fr)

South-eastern France is a region subject to very Heavy Precipitating Events (HPEs). They have been identified to often occur in some Large Scale recurrent Circulations (LSCs) which may play a significant role in triggering or maintaining the extreme convective processes (Nuissier et al., 2007). A previous study (within the French national CYPRIM Project, ACI-INSU) based on the classification of the geopotential height for a thousand rainy days extracted from the French southeastern regional raingauges network showed the existence of two different patterns associated with the HPEs and the importance of the coincidence of low-level ingredients. However, by design these patterns cannot be considered as objective features describing the whole large scale variability as weather regimes methods can do. Then, we intend to generalize these results by investigating a classification based on a multivariate atmospheric state vector rather than on a single parameter (the geopotential height at 500 hPa). This is also motivated by previous studies (Vautard et al. 1988, Vautard 1990) which have shown that weather regimes are linked with the low frequency variability sources and then could set up a framework to explain nonlinear transitions from low frequency to high variability events.
We build a pseudo-state vector as a 25 parameters vector, the parameters being selected as the most correlated with daily rainfall. The number of classes is chosen using an hybrid method combining dynamical and hierarchical clustering. It leads to a 8-classes classification. Then the connections between the clusters and the HPEs shows that two clusters concentrate more than 70% of the HPEs. The composite analysis at different levels shows a good agreement with the CYPRIM patterns. Furthermore, a simple correlation analysis to the centroids of these two clusters shows they significantly discriminate the HPEs compared to the non-HPEs part of the data. Thus we explore the opportunity to determine transfer functions of some parameters related to the event (daily rainfall amount, HPEs occurrence probability) from relative positioning to the clusters.
Then we suggest the implementation of these functions on the ensemble forecasts of two HPEs cases of the 2008 autumn over southern France. We compute some extrapolated indexes from the climatological results and compare them to the observations. We would like to assess the predictability potential of the HPEs at 3-4 days range through a better identification of sub-synoptical ingredients favoring these events.