



Spatial and Temporal Patterns of Northeastern Spain Temperature Change and their Relationships with Atmospheric and SST Modes of Variability over the period 1950-1998

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This contribution aims both to characterise spatial and temporal temperature patterns over North-eastern Spain (1950-1998) and their coupled modes of variability with the large-scale atmospheric circulation anomalies and sea surface temperatures (SST) of Western Mediterranean.

In order to identify spatial patterns of daily mean temperature variability over the studied area, a Rotated Principal Component Analysis (RPCA) with a VARIMAX rotation and a cluster analysis have been applied to monthly averages of daily mean temperature, by using the 22 monthly adjusted records of daily mean temperatures taken from the NESAT v2 dataset. Besides of latter, the following datasets have been used in this study: The North Atlantic Oscillation (NAO) and Southern Oscillation (SOI) indices time series have been taken from Climatic Research Unit (CRU) dataset and other relevant North Hemisphere teleconnection patterns from National Center for Environmental Prediction (NCEP). The SST time series have been obtained from the 5° x 5° gridded dataset (HadSST1) for the Western Mediterranean Basin (40°-45° N, 0°-5° E) at CRU and from the observational time series of L'Estartit (Gerona, Spain). Relationships between North-eastern Spain temperature time series and atmospheric SST anomaly patterns have been assessed by employing Pearson's correlation coefficients on the same month and one-month lag correlation, as well as by applying a Multiple

Linear Regression to those indices with significant correlations within the estimated temperature spatial patterns.

Four spatial patterns of variability have emerged from RPCA: Mountain (MOUNT), Western Basin (WB), North-western (NW) and Littoral (LIT). From November to January, MOUNT and WB are the prominent patterns of temperature variability over North-eastern Spain; meanwhile NW and LIT are the characteristic patterns of summer and spring variability.

Entire regional warming over North-eastern Spain has been mainly associated with the MOUNT and WB patterns during wintertime; meanwhile spring and summer warming has been mainly contributed by LIT. On the other hand, MOUNT and WB patterns are highly correlated to East Atlantic/Western Russia (EA/WR), NAO and Polar/Eurasian (POL) throughout November-January, explaining between the 30% and 20% of the total variance for that months. Between March and September highlights the prominent role played by LIT and in lesser extent by NW on the estimated regional warming. At the same time, the highest and statistically significant correlations between the LIT pattern and both SSTs time series of Western Mediterranean have been estimated for summer months (0.80 for August). This relationship also appears during the spring months, although it reaches lower correlations (between 0.4 and 0.6) than for summer. Finally, East Atlantic-Jet (EA-Jet) of June explains the 34% of July total variance.