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MOnthly TEmperature DAtabase of Spain 1951-2010: MOTEDAS (2): The Correlation Decay Distance (CDD) and the spatial variability of maximum and minimum monthly temperature in Spain during (1981-2010).

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One of the key point in the develop of the MOTEDAS dataset (see Poster 1 MOTEDAS) in the framework of the HIDROCAES Project (Impactos Hidrológicos del Calentamiento Global en España, Spanish Ministery of Research CGL2011-27574-C02-01) is the reference series for which no generalized metadata exist.

In this poster we present an analysis of spatial variability of monthly minimum and maximum temperatures in the conterminous land of Spain (Iberian Peninsula, IP), by using the Correlation Decay Distance function (CDD), with the aim of evaluating, at sub-regional level, the optimal threshold distance between neighbouring stations for producing the set of reference series used in the quality control (see MOTEDAS Poster 1) and the reconstruction (see MOREDAS Poster 3).

The CDD analysis for Tmax and Tmin was performed calculating a correlation matrix at monthly scale between 1981-2010 among monthly mean values of maximum (Tmax) and minimum (Tmin) temperature series (with at least 90% of data), free of anomalous data and homogenized (see MOTEDAS Poster 1), obtained from AEMEt archives (National Spanish Meteorological Agency). Monthly anomalies (difference between data and mean 1981-2010) were used to prevent the dominant effect of annual cycle in the CDD annual estimation. For each station, and time scale, the common variance r^2 (using the square of Pearson's correlation coefficient) was calculated between all neighbouring temperature series and the relation between r^2 and distance was modelled according to the following equation (1):

$$Log(r_{ij}^2) = b * \sqrt{d_{ij}}$$

(1)

being $Log(r_{ij}^2)$ the common variance between target (i) and neighbouring series (j), d_{ij} the distance between them and b the slope of the ordinary least-squares linear regression model applied taking into account only the surrounding stations within a starting radius of 50 km and with a minimum of 5 stations required.

Finally, monthly, seasonal and annual CDD values were interpolated using the Ordinary Kriging with a spherical variogram over conterminous land of Spain, and converted on a regular 10 km^2 grid (resolution similar to the mean distance between stations) to map the results.

In the conterminous land of Spain the distance at which couples of stations have a common variance in temperature (both maximum Tmax, and minimum Tmin) above the selected threshold (50%, r Pearson ~0.70) on average does not exceed 400 km, with relevant spatial and temporal differences. The spatial distribution of the CDD shows a clear coastland-to-inland gradient at annual, seasonal and monthly scale, with highest spatial variability along the coastland areas and lower variability inland. The highest spatial variability coincide particularly with coastland areas surrounded by mountain chains and suggests that the orography is one of the most driving factor causing higher interstation variability. Moreover, there are some differences between the behaviour of Tmax and Tmin, being Tmin spatially more homogeneous than Tmax, but its lower CDD values indicate that night-time temperature is more variable than diurnal one. The results suggest that in general local factors affects the spatial variability of monthly Tmin more than Tmax and then higher network density would be necessary to capture the higher spatial variability highlighted for Tmin respect to Tmax.

The results suggest that in general local factors affects the spatial variability of Tmin more than Tmax and then higher network density would be necessary to capture the higher spatial variability highlighted for minimum tem-

perature respect to maximum temperature. A conservative distance for reference series could be evaluated in 200 km, that we propose for continental land of Spain and use in the development of MOTEDAS.