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A New Homogenized Climate Database for the Pyrenees (1950-2012)

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For the first time, and supported by the new Climate Change Observatory in the Pyrenees (OPCC), three official meteorological services over the mountain range (Agencia Estatal de Meteorología, Météo France and Meteorological Service of Catalonia), a research center (Centre d'Estudis de la Neu i la Muntanya d'Andorra), and an academic institution (Zaragoza University) have developed a new monthly climate database, encompassing the period 1950-2012. The aim of the project: trying to evaluate the main features of climate change over this mountainous region of southwestern Europe.

The identification of long and continuous climate series and the homogenization process need special attention over mountainous areas, due to its geographical and historical singularity. This work focuses on the creation of a climate database of 66 monthly temperature series (both, maximum and minimum temperature) and 139 monthly precipitation series covering the specified period. Each series have been quality controlled and homogenized by HOMER script, developed in R language, which incorporates the latest methods and techniques on climate series homogeneity analysis, including outlier removing, pairwise detection, breakpoint selection and final adjustment (Mestre et al., 2013). Metadata recovery has been an important issue in the project, as definitive tool to confirm the breakpoints found. The evaluation of the goodness of the adjustments during the homogenization process has been carried by using a mixture of objective outputs: MDA (Minimum Detectable Amplitude), number of series highly correlated, and number of breaks per series.

The final database provides homogenized data series, jointly with a level of quality for each one of the series, allowing the identification of those of higher quality and more reliable for the assessment of climate change over the Pyrenees. As first results, it has been possible to confirm the warming rate trends, with slight differences depending on the season, and elevation and aspect of the sites. For precipitation, not so clear and global trends have been found, with different seasonal patterns and spatial particularities.

Mestre et al. (2013): HOMER: a homogenization software, methods and applications. Quarterly Journal of the Hungarian Meteorological Service (OMSZ), vol 117, n. 1 pp. 47-67.