



Observed trends and changes in Extreme Climate Indices over the Pyrenees (1959-2015)

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Over the last few decades, it has become increasingly evident that the frequency and intensity of extreme climate events have been changing, especially under the anthropogenically induced climate warming. Of singular interest, is the analysis of such changes over mountainous areas, as they are considered among the most sensitive ecosystems to climate change, and are being affected at a faster rate than other terrestrial habitats.

The project CLIMPY (Characterisation of the evolution of climate and provision of information for adaptation in the Pyrenees), under the umbrella of the Pyrenees Climate Change Observatory (OPCC), is a transboundary project that aims to perform a detailed analysis of recent trends in temperature, precipitation and snow cover in the Pyrenees, and their future projection. As a result, changes in the frequency, intensity, spatial extent, duration, and timing of weather and climate extremes due to climate change are among the more relevant objectives.

The present study consists in the calculation of 30 extreme climate indices (18 indices of air temperature and 12 of precipitation), proposed by the WMO, all over the Pyrenees, and encompassing the period from 1950 up to 2015. These indices are based on daily maximum temperature, minimum temperature and precipitation series, that have been selected after a strict quality control and homogenization analysis (ACMANTv4), in order to remove artificial shifts and trends that could mask the climatic signal.

The selected indices have been calculated at 55 locations, in the case of air temperature, and at more than 100 locations, in the case of precipitation (which has a greater spatial variability), with altitudes ranging from sea level up to 2,880 m asl. The analysis has been conducted with two perspectives: the temporal evolution of the indices and the spatial distribution over the Pyrenees. Although precipitation is highly variable and its trend or associated indices trends are seldom statistically significant, the results show, for instance, a decrease of 3.7% per decade of total precipitation in the southern slope of the Pyrenees, with a 95% confidence, while the total precipitation is found to slightly increase (without statistical significance) in the northern slope.

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