

Trends analysis of precipitation and temperature in the Alto Genil basin (Southeast Spain) from 1970 to 2010

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The last studies of climate change predict a trend to more arid conditions in most of Spain. These studies show a significant increment in seasonal and annual air temperature, a reduction in mean precipitation and a raising number of extreme events of both variables.

The historic data analysis is essential for identifying cycles, recent weather trends and to calibrate predictive models. In this work we analyses the recent historical climate in Alto Genil Basin. The system is located at SE Iberian Peninsula and includes an important part of the Sierra Nevada catchment. A high-resolution Spain02 dataset (~ 11 km) have been employed in this study. In accordance with the available data we have analyzed the period from 1970 to 2010 for daily precipitation and from 1970 to 2007 for daily temperature.

In order to detect cycles and climate trends we have analyzed the temporal, seasonal and spatial distribution of the precipitation and temperature variables. We have calculated and analyzed the accumulated deviations from the mean daily precipitation. This analysis has been also performed with monthly and annual series. A non-parametric Mann Kendall method has been applied to study trends.

In the period 1971-2007, the temperature has increased. The strongest trends appear since 1994. Between 1971-1993 the average temperature observed was 13.6°C , however from 1994 to 2007 the average temperature observed was 14.84°C . Seasonally, during the study period, the spring has been the season with biggest increment in temperature. These temperature increments are more significant during March, April, May, June, July and October. In the period 1971-2010 the Mann Kendall test does not show a clear trend for precipitation. It is mainly due to the series culminates in three exceptional hydrological years that mask the overall trend of the study period. For this reason, we have also performed a sensitivity analysis of the Mann Kendall analysis to the period of data considered. On the other hand, a cumulative deviation analysis indicates a downward trend in the period 1971-2007, being more important in topographically low areas. Finally, with regard to extreme events it has been an increase from 1994-1995 for both variables.

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