Assessment of climate change impacts on meteorological and hydrological
droughts in the Jucar River Basin

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Extreme natural phenomena, and more specifically droughts, constitute a serious environmental, economic and
social issue in Southern Mediterranean countries, common in the Mediterranean Spanish basins due to the high
temporal and spatial rainfall variability. Drought events are characterized by their complexity, being often difficult
to identify and quantify both in time and space, and an universally accepted definition does not even exist. This
fact, along with future uncertainty about the duration and intensity of the phenomena on account of climate
change, makes necessary increasing the knowledge about the impacts of climate change on droughts in order to
design management plans and mitigation strategies.

The present abstract aims to evaluate the impact of climate change on both meteorological and hydrologi-
cal droughts, through the use of a generalization of the Standardized Precipitation Index (SPI). We use the
Standardized Flow Index (SFI) to assess the hydrological drought, using flow time series instead of rainfall time
series. In the case of the meteorological droughts, the Standardized Precipitation and Evapotranspiration Index
(SPEI) has been applied to assess the variability of temperature impacts.

In order to characterize climate change impacts on droughts, we have used projections from the CORDEX
project (Coordinated Regional Climate Downscaling Experiment). Future rainfall and temperature time series for
short (2011-2040) and medium terms (2041-2070) were obtained, applying a quantile mapping method to correct
the bias of these time series.

Regarding the hydrological drought, the Témez hydrological model has been applied to simulate the im-
pacts of future temperature and rainfall time series on runoff and river discharges. It is a conceptual, lumped and
a few parameters hydrological model. Nevertheless, it is necessary to point out the time difference between the
meteorological and the hydrological droughts.

The case study is the Jucar river basin (Spain), a highly regulated system with a share of 80% of water use for
irrigated agriculture. The results show that the climate change would increase the historical drought impacts in the
river basin.

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