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WRF added value to capture the spatio-temporal drought variability

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Regional Climate Models (RCM) has been widely used as a tool to perform high resolution climate fields in areas with high climate variability such as Spain. However, the outputs provided by downscaling techniques have many sources of uncertainty associated at different aspects. In this study, the ability of the Weather Research and Forecasting (WRF) model to capture drought conditions has been analyzed. The WRF simulation was carried out for a period that spanned from 1980 to 2010 over a domain centered in the Iberian Peninsula with a spatial resolution of 0.088º, and nested in the coarser EURO-CORDEX domain (0.44º spatial resolution).
To investigate the spatiotemporal drought variability, the Standardized Precipitation Index (SPI) and the Standardized Precipitation Evapotranspiration Index (SPEI) has been computed at two different timescales: 3- and 12-months due to its suitability to study agricultural and hydrological droughts. The drought indices computed from WRF outputs were compared with those obtained from the observational (MOTEDAS and MOPREDAS) datasets. In order to assess the added value provided by downscaled fields, these indices were also computed from the ERA-Interim Re-Analysis database, which provides the lateral and boundary conditions of the WRF simulations.
Results from this study indicate that WRF provides a noticeable benefit with respect to ERA-Interim for many regions in Spain in terms of drought indices, greater for SPI than for SPEI. The improvement offered by WRF depends on the region, index and timescale analyzed, being greater at longer timescales. These findings prove the reliability of the downscaled fields to detect drought events and, therefore, it is a remarkable source of knowledge for a suitable decision making related to water-resource management.

Keywords: Drought, added value, Regional Climate Models, WRF, SPEI, SPI.

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