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Risk of drought for winter cereals in Castilla y León (N Spain) under current and future climate

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Due to the latitude of the Iberian Peninsula, it is repeatedly affected by significant drought episodes. This has been the case of the events observed in the years 1979-1983, 1992-1995, 2005, or 2016-2017. In the historical period, the occurrence of droughts in the Peninsula has been closely linked to the natural variability of the climate itself, which is modulated by multiple factors, such as the surface temperature of the oceans, the polar ice cover, the Oscillation of the North Atlantic or the stratospheric circulation itself (e.g. Lorenzo et al., 2011). Within the context of global warming, the projected increase in temperatures is expected to have a direct impact on the recurrence and severity of droughts on the Iberian Peninsula.

Therefore, the objective of this work is to study the relationships between climatic variables that indicate a high risk of yield loss of rainfed cereals affected by drought, and their projection in the immediate future. This work has been framed in the area of Castilla y León in the North Plateau of Spain.

The selected methodology consisted of the design of agrometeorological indices that allowed capturing the behaviour of the most relevant variables related to the response of the cereals to drought in the study area. For this purpose, meteorological station observations, observations in grid, and simulations of present and future climate generated by regional climate simulation models (EUROCORDEX RCMs, van Meijgaard et al., 2014), which were used to compute the indices after a bias correction. Finally, results maps were obtained.

A total of nine temperature and/or precipitation indices were designed and calculated for periods physiologically meaningful for the crop, both under present and future climate. A discussion of the potential consequences of the indices changes on winter cereal yields in Castilla y León was addressed.

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