



## **High-resolution meteorological drought projections for Europe using a single combined indicator**

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Among the climate disasters, drought is one of the most difficult to characterise because of its complex nature and variety of impacts. These issues can be reflected in possible biases when drought indicators are projected to the future. Many studies are based on indicators independently computed and then compared; though this approach is powerful, the conclusions might vary according to each indicator, thus possibly resulting in contradicting findings. In this study, we focus on the frequency, duration, intensity, and severity of meteorological drought events in Europe and their projection until the end of this century, using a single indicator derived from the rational weighting of the Standardized Precipitation Index (SPI), the Standardized Precipitation-Evapotranspiration Index (SPEI), and the Reconnaissance Drought Indicator (RDI). The combination of the different indicators is based on the predominance of the drought signal, thus avoiding possible contradictory results.

Future droughts have been studied for the periods 2041 to 2070 and 2071 to 2100, using an ensemble of the EURO-CORDEX high-resolution ( $0.11^\circ$ ) models that were bias-adjusted using the E-OBS observational dataset. Results show that meteorological drought events tend to be longer, more frequent and severe in southern Europe, especially in the period from 2071 to 2100 under the RCP8.5 scenario, while under the RCP4.5 scenario smaller but still significant drying trends are predicted. Both RCP4.5 and RCP8.5 project a wetting tendency for Northern and Central Europe, though in 2041-2070 individual model results can be contradictory for Central Europe. The combined indicator, which incorporates precipitation as well as minimum and maximum temperature, therefore, helps understanding future European drought patterns at regional level especially in climate change transition areas as Central and Eastern Europe.