



European drought climatologies for the period 1950 to 2012

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In the context of global climate change, characterized in particular by rising temperatures and more extreme weather events, drought is one of the most relevant natural disasters that has hit Europe frequently in the last decades. This paper presents climatologies of a set of drought indicators and derived drought characteristics at European scale for the period 1950-2012.

Following the definitions in Spinoni et al. (2013), we computed drought frequency, duration, severity, and maximum intensity on a grid with spatial resolution of $0.25^{\circ} \times 0.25^{\circ}$. Calculations have been based on three well-known drought indicators calculated for time scales of 3 and 12 months: the Standardized Precipitation Index (SPI), the Standardized Precipitation-Evapotranspiration Index (SPEI), and the Reconnaissance Drought Index (RDI). Indicators have been calculated on a monthly basis for the period 1951-2012, using statistical distributions fitted to a 30-year baseline period (1971–2000). Input data stem from the E-OBS (version 9.0) European grids ($0.25^{\circ} \times 0.25^{\circ}$) provided by the Royal Meteorological Service of The Netherlands (KNMI). Monthly precipitation data served as input for all indicators, while mean monthly temperature data were used to calculate Thornthwaite's potential evapotranspiration necessary to calculate SPEI and RDI.

On the basis of these indicators, we then quantified, on a monthly basis, the total European area under meteorological drought conditions from 1950 to 2012 and their intensity. We further sub-divided Europe into 14 regions according to geographical borders and climatic features and for each of them we computed linear trends of different drought characteristics (i.e. frequency, duration, severity, and intensity) for the entire period, and for the sub-periods 1951-1980 and 1981-2010. Results show that the Mediterranean, the Balkans, and Eastern Europe are characterized by increasing drought frequency, duration, severity, and maximum intensity, while Russia and Northern Europe are characterized by a decrease, in particular with respect to drought severity. Finally, the most relevant drought events per region are presented.

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