



Spatio-temporal seasonal drought patterns in Europe from 1950 to 2015

Jonathan Spinoni, Gustavo Naumann, and Jürgen Vogt

European Commission - Joint Research Centre, Ispra, Italy (juergen.vogt@jrc.ec.europa.eu)

Drought is one of the natural disasters with severe impacts in Europe, not only in areas which frequently experience water scarcity such as the Mediterranean, but also in temperate or continental climates such as Central and Eastern Europe and even in cold regions such as Scandinavia and Iceland. In this study the spatio-temporal patterns of seasonal meteorological droughts in Europe between 1950 and 2015 are investigated using the Standardized Precipitation Index (SPI) and the Standardized Precipitation-Evapotranspiration Index (SPEI). Since the focus is on the analysis of seasonal drought trends, indicators were calculated for 3 monthly accumulation periods. The input variables of precipitation and temperature were derived from E-OBS grids (v11-v12) at a spatial resolution of $0.25^{\circ} \times 0.25^{\circ}$. Seasonal trends of drought frequency and severity were analyzed for moderate (SPI or SPEI < -1.0) and extreme (SPI or SPEI < -2.0) events during the periods 1950-2015 and 1981-2015. For the moderate events, results of the SPI analysis (precipitation driven) demonstrate a significant tendency towards less frequent and severe droughts in Northern Europe and Russia, especially in winter and spring; oppositely, an increasing trend is visible in Southern Europe, mainly in spring and summer. According to the SPEI analysis (precipitation and temperature driven) Northern Europe shows wetting patterns, while Southern and Eastern Europe show a more remarkable drying tendency, especially in summer and autumn for drought frequency and in every season for drought severity. The evolution towards drier conditions is more relevant from 1981 onwards, both in terms of frequency and severity. This is especially true for Central Europe in spring, for the Mediterranean in summer, and for Eastern Europe in autumn. Extreme events follow similar patterns, but in autumn no spatially coherent trend can be found.