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# Observed evolution of drought episodes assessed with the Standardized Precipitation Evapotranspiration Index (SPEI) over the Czech Republic

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This paper investigates the spatial and temporal evolution of drought episodes assessed with the Standardized Precipitation Evapotranspiration Index (SPEI) over the Czech Republic. The SPEI were calculated from monthly records of mean temperature and precipitation totals using a dense network of 183 climatological stations for the period 1961-2010. The SPEI were calculated with various lags, 1, 3, 6, 12 and 24 months. The drought at these time scales is relevant for agricultural, hydrological and socio-economic impact, respectively. The study refers at the warm season of the year (April to September). The principal modes of variability of these five time scale SPEI were identified using the analysis of Empirical Orthogonal Functions (EOF). The explained variance of the leading EOF ranges between 71 and 61% as the time scale for calculating the SPEI increases from 1 month to 24 months. The explained variance of EOF2 and EOF3 ranges between 5 to 9% and 4 to 6%, respectively, as the SPEI is calculated for 1 to 24 months. Based on the spatial distribution of the EOF2 and EOF3 for all time scales of SPEI, which correspond to some extend to a regionalization previously used in other studies, we identified three climatically homogeneous regions, corresponding to the altitudes below 400 m, between 401 and 700 m and, above 700 m. These regions correspond to different land use types with mostly intensive agriculture, less intensive agriculture and limited agricultural production and mostly forested, respectively. For these three regions the frequency distribution of the SPEI values in 7 classes of drought category (%) were calculated based on station records in each region. The normal conditions represent around 65% out of the total values of SPEI for all times scales, in all three regions, while moderate drought and moderate wet conditions are almost equally distributed around 10.5 %. Differences in extremely dry conditions (5%) compared to extremely wet conditions (1.5 %) were observed when increasing the SPEI timescales. The drought is classified as local when covers up to 10% of the territory of the Czech Republic, widespread when covers 11–30% of the territory, very widespread when covers 31–50% of the territory and most extended when covers more than 50% of the country territory.
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