



Spatiotemporal Variability of the Meteorological Drought in Romania using the Standardized Precipitation Index

Sorin Cheval, Aristita Busuioc, Alexandru Dumitrescu, and Marius-Victor Birsan
National Meteorological Administration, Bucharest, Romania (sorin.cheval@meteoromania.ro)

Drought events occur over any geographical area, and may impact severely the environment and society. In terms of economic losses, droughts are one of the major natural hazards affecting Romania, so that the topic has been constantly approached. In general, the climatic projections over the 21st century display increasing temperatures and very likely declining summer precipitation (Busuioc et al., 2010), probably causing better drought conditions.

This study examines the variability of the droughts in Romania, aiming to characterize the droughts intensity, durations and frequency (a), to identify spatial and temporal patterns (b), trends (c), and potential triggering factors (d). Besides, we consider comparing the performance of different instances of the Standardized Precipitation Index (SPI) (McKee et al., 1993), such as time scale and probability distribution functions (gamma and Pearson type III), for retrieving drought characteristics.

Homogenous monthly precipitation amounts from 98 weather stations run by the Romanian Meteorological Administration covering the period 1961-2010 were the primary data for calculating 1, 3, 6, and 12-month time scale SPI. The Mann-Kendall statistics sustained the trend significance examination, while Empirical Orthogonal Function (EOF) analysis synthesizes the climate signal related to spatial and temporal characteristics of variability over Romania.

The SPI variability over Romania is mainly influenced by the large-scale mechanisms (e.g. North Atlantic Oscillation (NAO) and Atlantic Multidecadal Oscillation (AMO)) accounting for more than 50% from the observed variance, on second place being the Carpathians accounting for the highest influence in winter (11%). Thus, the Carpathians separate Romania in two major regions in terms of drought characteristics, namely outside and inside the mountainous arch. Significant trends towards dry conditions are noted at very few stations in winter, spring and summer, while trend to precipitation surplus cover extended areas in autumn. Further, preliminary analysis has demonstrated that NAO and AMO influence the characteristics of the meteorological drought over Romania, and qualify as possible predictors in water deficit studies. However, a stronger connection was found between the time series associated to SPI EOF1 and sea level pressure EOF1 over the region 5°E-45°E, 30°N-55°N.

The work has been financed by the research project Changes in climate extremes and associated impact in hydrological events in Romania (CLIMHYDEX), Cod PN II-ID-2011-2-0073, sponsored by the National Authority for Scientific Research.