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# Comparing four drought indicators in the Carpathian Region on a 0.1˚ x 0.1˚ regular grid for 1961-2010

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Drought is one of the major climate-related disasters in Europe and it shows an increasing frequency in the last 50 years. Due to climate change, land cover changes, and exploitation of soils, the Carpathian Region is one of the areas at highest drought risk in Europe. In this study we compared on a 0.1˚x0.1˚ grid four drought indicators: Standardized Precipitation Index (SPI), Standardized Precipitation-Evapotranspiration Index (SPEI), Reconnaissance Drought Indicator (RDI), and a modified version of Palfai Aridity Index (PaDI). SPI, SPEI, and RDI were computed at different time scales (3, 6, 12 months), PaDI at a 12-month scale only. The chosen period is 1961-2010. We calculated the indicators from temperature and precipitation gridded datasets retrieved in the frame of the CARPATCLIM project, implemented by JRC and a consortium of members from nine countries. It emerged that SPI performed well for drought purposes, especially SPI-3 and SPI-6. SPI only has precipitation data as input data: keeping in mind the global warming, also drought indicators which consider temperature both with precipitation, as SPEI and RDI, should be used. In fact, SPEI and RDI take into account the potential evapotranspiration (PET) that incorporates information about temperature. Using the JRC-MARS dataset only, for the whole Europe, RDI is similar to SPI for 3-6 months, whilst they differ quite significantly for 12 months. Here, we show how the 4 indicators are able to capture drought signals in the Carpathians using a high quality homogenized and harmonized gridded dataset, focusing the attention on the difference between using SPI and indicators based also on temperature, especially in hot summers. 1961-2010 climatologies for the above mentioned indicators, together with gridded comparisons are shown. A deeper view on how the drought indicators reacted to the documented drought of 1985 and to the summer heat wave of 2003 is presented.