



## Multi-model analysis of estimated future drought trends in the Carpathian Basin

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Due to global warming the frequency and intensity of different climatological extremes associated with both temperature and precipitation are projected to change substantially. Among the complex meteorological hazards possibly hitting the agricultural production, one of the most important impacts of climate change in the Carpathian Basin is related to the severe drought. In order to describe the temporal and spatial range of drought conditions, different types of drought indices can be used:

- (i) Precipitation indices are simple and require solely precipitation data, however, they are suitable for separating dry and wet periods, as well, as determining temporal variability. The standardized precipitation anomaly index (SAI) is used in the present study.
- (ii) Water balance indices consider other elements of the water balance besides precipitation, mainly evaporation as a function of temperature. Among them the Thornthwaite aridity index (TAI) is used.
- (iii) Recursive indices consider data from preceding period, thus characterize long time periods. Foley's anomaly index (FAI) is used here.
- (iv) Soil moisture indices are able to estimate loss in crop yields and water shortage. In the present study Ped's drought index (PNI) is used.

In this study recent past and century long future drought conditions are calculated for the Carpathian Basin from gridded monthly time series of different regional climate model (RCM) simulations accomplished for the entire period of 1951-2100 within the frame of the ENSEMBLES program. The horizontal resolution of all applied RCM experiments is 25 km, and they considered the SRES emission scenario A1B, which assumes a balanced use of fossil, nuclear, and renewable energy sources, and estimates the atmospheric CO<sub>2</sub> level to 532 ppm and 717 ppm by 2050 and 2100, respectively.

The results suggest significant drying in the region, especially in summer. Besides this, wetter winters are also likely to occur, therefore the society and the decision-makers need to adapt to the increased number of extreme events, and develop appropriate adaptation strategies.