



Comparison of agriculture-related climate mean and extremes for the 20th and the 21st centuries for the Carpathian basin

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Several climate extreme indices are analyzed and compared for the Carpathian basin (located in Central/Eastern Europe) following the guidelines suggested by the joint WMO-CCI/CLIVAR Working Group on climate change detection. These climate extreme indices are determined on the basis of daily maximum, minimum and mean temperature values, and daily precipitation amounts, and they are mostly suitable for further agriculture-related climate research. The statistical trend analysis includes the evaluation of 27 extreme indices, e.g., the numbers of severe cold days, winter days, frost days, cold days, warm days, summer days, hot days, extremely hot days, cold nights, warm nights, the intra-annual extreme temperature range, the heat wave duration, the growing season length, the number of wet days (using several threshold values defining extremes), the maximum number of consecutive dry days, the highest 1-day precipitation amount, the greatest 5-day rainfall total, the annual fraction due to extreme precipitation events, etc. In order to analyze the past trends, daily meteorological observations are used to calculate the time series of extreme temperature and precipitation indices for the 31 selected stations for the 20th century. Because of the lack of century-long meteorological time series, the analysis focuses mainly on the second half of the 20th century. However, the analysis is extended for the entire century in case of some stations, where sufficient data was available. The results suggest that similarly to the global and continental trends, regional temperature of Central/Eastern Europe got warmer during the second half of the 20th century. Furthermore, regional intensity and frequency of extreme precipitation increased, while the total precipitation decreased in the region and the mean climate became drier. In case

of the future trends (2071-2100), daily values of meteorological variables are obtained from the outputs of various regional climate model (RCM) experiments accomplished in the frame of the completed EU-project PRUDENCE (the horizontal resolution of RCMs is 50 km). Both scenarios A2 and B2 are used to compare agriculture-related climate parameters, and the past and future trends of the extreme climate indices for the Carpathian basin.