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Analysis of past and future trends of extreme precipitation indices for the Carpathian basin

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Several extreme precipitation indices are analyzed and compared for the Carpathian basin (located in Central/Eastern Europe) following the guidelines suggested by the joint WMO-CCl/CLIVAR Working Group on climate change detection. These climate extreme indices are determined on the basis of daily precipitation amounts. The statistical trend analysis includes the evaluation of 14 precipitation indices, e.g., 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 precipitation observations are used to calculate the time series of extreme precipitation indices for 31 selected stations in the region 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 regional intensity and frequency of extreme precipitation increased in the Carpathian basin, while the total precipitation decreased in the region and the mean climate became drier. In case of the future trends (2071-2100), daily precipitation values are obtained from the outputs of regional climate model (RCM) experiments of the swiss ETH institute, accomplished in the frame of the completed EU-project PRUDENCE (the horizontal resolution of the RCM is 50 km). Scenario A2 is used to compare precipitation time series, and the past and future trends of the precipitation indices for the Carpathian basin.