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Trends in summer hydrological droughts in Czechia with respect to the scaling hypothesis

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At the end of the 2000s, a project devoted to the investigation of hydrological drought occurrences in Czechia as a whole was carried out. A lot of outcomes have been left intact since then. Among others, one of the most important data sets originating from the project were the series of deficit volumes and drought durations derived by the threshold level method (TLM) from mean daily discharges measured at 118 stations, observing both pristine and influenced rivers for comparison. The purpose of the present study was to take these series and try to examine whether they exhibit some evidence of trends and, if so, what (increasing or decreasing) and where exactly. Due to the fact that the TLM approach was based on the 95th percentile of discharge, only summer periods (from April to October) were considered during the trend analyses. Special focus was on the scaling behaviour prior to the applications of tests for trend themselves. The significance of the Hurst exponent was evaluated via Monte Carlo simulation and the maximum entropy bootstrap combined with a maximum likelihood estimation method. Four tests for trend were subsequently used - the automatic block bootstrap Mann-Kendall test, the maximum entropy bootstrap Mann-Kendall test, an equivalent sample size modification of the Mann-Kendall test and the adjusted likelihood ratio test. Two hydrological periods were studied separately - the shorter one with larger number of stations (1961-2007) and the longer one with less number of stations (1931-2007). The second period contained one of the most drastic droughts experienced in Czechia as regards instrumental record and, therefore, enabled the recognition of changing directions of trends at some places detected in the first period. It was also found that some insignificant tendencies may become significant trends after the inclusion of further years. The influence of reservoirs is somewhat apparent as well.