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Combined Use of Graphical and Statistical Approaches for Analyzing Historical Precipitation Changes in the Black Sea Region of Turkey

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Abstract

Many statistical methods have been developed and used over time to analyze historical changes in hydrological time series, given the socioeconomic consequences of the changes in the water cycle components. The classical statistical methods, however, rely on many assumptions on the time series to be examined such as the normality, temporal and spatial independency and the constancy of the data distribution over time. When the assumptions are not fulfilled by the data, test results are not reliable. One way to relax these cumbersome assumptions and credibilize the results of statistical approaches is to make a combined use of graphical and statistical methods. To this end, two graphical methods of the refined cumulative sum of the difference between exceedance and non-exceedance counts of data points (CSD) and innovative trend analyses (ITA)-change boxes alongside the classical statistical Mann–Kendall (MK) method are used to analyze historical precipitation changes at 16 stations during 1960–2015 in the Black Sea region of Turkey. The results show a good match between the results of the graphical and statistical methods. The graphical CSD and ITA methods, however, are able to identify the hidden trends in the precipitation time series that cannot be detected using the statistical MK method. View Full-Text

Keywords: hydrometeorological time series; temporal changes; significance testing; classical trend tests; graphically-

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