



Wavelet based trend analysis of hydrological processes at different time scales

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Abstract

This study analyzes involved trends in stream flow and precipitation data at monthly, seasonal and annual time scales observed at six precipitation and four stream flow stations of Tampa Bay using non-parametric Mann-Kendall (MK) and Discrete Wavelet Transform (DWT) methods. The MK test and sequential MK analysis were applied to different combinations of DWT after removing the effect of significant lag-1 serial correlation to figure out components responsible for trend of the time series. Also, to find start point of changes in annual time series, the sequential MK test was used. The results showed that negative trend is prevalent in the case study; generally, short-term periods were important in the involved trend at original time series. So that, the precipitation data at three scales showed short-term periods of 2 months, 6 months and 2 years in monthly, seasonal and annual scales, respectively. In the most stream flow time series at three time scales, wavelet based detail at level 2 plus the approximations time series was conceded as the dominant periodic component. Finally, the results of Sen's trend analysis, applied to the original annual time series were also confirmed the results of the proposed wavelet based MK test in most cases.

Keywords: Trend analysis; Discrete wavelet transformation; Mann-Kendall test; Precipitation; Stream flow; Tampa Bay.