Effectiveness of some change-point detection methods when applied to synthetic hydrological time series

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When investigating the hydrological cycle one does not always have the luxury of perfect knowledge. Moreover, searching for possible causes for changes in the behaviour of hydrological variables can be like looking for a needle in a haystack. Statistical tools can help to restrict our search to certain parts of that haystack, provided we have some idea of the probability of not looking in the right place. This work considers change points in hydrological time series. Numerous papers have been published on non-stationarity in hydrological time series and several methods have been developed to solve the problems related to it, such as the detection and quantification of the change including change-point and trend. Change points τ in hydrological time series are often the consequence of human behaviour such as urbanization, deforestation, change on land-use and the construction of large water-related projects. Many techniques, both parametric and non-parametric, have been proposed to infer the position of τ, but most of them concentrate on detection of the presence of a change point and providing a specific value for its location on the basis of a given probability bound. In this research confidence distributions are used to find τ and express the uncertainty about its position. The results are compared to those of commonly used tests: a Cramér von Mises statistic-based test, Pettitt's test, and the Lee-Heighinian test. All methods are applied to a large number of simulated data series and the results are compared.