



Nonstationary frequency analysis of low-flow series considering both base-flow recession process and rainfall

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Abstract: The frequency analysis of low flows plays a key role in water resources management and planning. Due to the influence of climate change and human activities, the frequency spectrum of extreme hydrologic events would have changed over time. In order to implement hydrological frequency analysis under the changing environments, many nonstationary frequency analysis techniques have been developed recently. However, these methods are put forward mainly for analysis of floods rather than low flows. In this paper, a method incorporating the information of base-flow recession and rainfall into the nonstationary frequency analysis of low-flow series is carried out. The analysis presented in this study is based on 50 years of daily rainfall-runoff data from Huaxian gauging station of the Weihe River of northwestern China. The result shows that the method that establishes the link of low flows to base-flow recession process and rainfall is able to describe the frequency evolution of nonstationary low-flow series better than the method of trend analysis, thus providing important guidance to develop better techniques for the low-flow frequency analysis.