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Change of runoff and its major driving factors in the upper reaches of Dalinghe basin, China

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Abstract: It is generally believed that such an increase of population and development of Chinese society economy could result in global water resource shortage. The frequent human activity fuels the change of the underlying surface characteristics, and also changed the basin hydrological modality, resulting in frequent occurrence of floods and droughts. Since 2009, fifteen Chinese provinces' widespread drought made people feel helpless of the sudden change-point produced by the hydrological elements. Thus, in-depth analysis of hydrological factors trend and the causation are not only beneficial for watershed ecological environment construction, but also good for the settlement of regional drought, and have great significance to achieving sustainable development and water resources reasonable utilization. R/S method can reveal the hydrological characteristics and the variation points of the sequence, but can not explain the increasing or decreasing trend. Mann-Kendall could not only reveal time-series increasing or decreasing of the trend, but also could illustrate the extent of the changes trend, but could not reveal the hydrological time series future characteristics and trends. According to the advantages and deficiencies characteristics of R/S (range-standard deviation) and Mann-Kendall methods, the combination of the two methods are used for hydrological trend analysis of upper reaches of Dalinghe basin in China. The application of the watershed showed that, the combination of R/S and Mann-Kendall analysis method could reveal the variation of precipitation and runoff points better. The research results showed an inconspicuous trend of precipitation and obvious downward trend of runoff. This paper analyzes the asymmetry relationship between runoff and precipitation and the factors that produce this situation. The conclusion turns out that the heavily hydraulic project of water retention and human activities water extraction are the significant driving factors of runoff declining.

Keywords: R/S, Mann-Kendall, driving factor, Dalinghe basin, Human activity