

Nonstationarity effects of hydrometeorological extremes over Turkey

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Title

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Abstract

Under changing climate, the probabilities of hydrometeorological extremes can no more be assumed as stationary. Due to nonstationary climate conditions, we may observe an increasing, decreasing trends or a random shift in extreme events. These changes in probabilities may lead to the changes in return periods and return levels. In this study, we initially applied Mann-Kendall trend test for seasonal extremes of temperature, precipitation and stream flow to find their significance throughout Turkey from 1970 to 2015. In order to evaluate the impacts of non-stationarities on these significant stations, stationary and non-stationary forms of GEV (generalized extreme value distribution) and LN (lognormal distribution) functions are applied for different return levels of annual seasonal temperature, precipitation and stream flow extremes. The differences in return levels for both cases (with and without non-stationarity) are analyzed throughout Turkey. Future effects from non-stationarity are also assessed using ensemble climate model projections from CORDEX. It is found that the non-stationarity has important effect on determining the return levels for temperature and precipitation extremes particularly for minimum temperature in winter over eastern part of Turkey.