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Study of changes in precipitation extremes over the Eastern Mediterranean during 1961-2012

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Based on daily precipitation dates at 70 meteorological stations in the Eastern Mediterranean (EM), the spatial and temporal changes in precipitation extremes are analysed during 1961-2012. For each station, we computed 11 extreme climate indices recommended by the joint World Meteorological Organization (WMO) and Expert Team on Climate Change Detection and Indices (ETCCDI). The main objective of this study was to elaborate a climatology of extreme precipitation indices of the EM and to detect those changes in these precipitation indices along the study period. The results showed that the pattern of trends for the extreme indices was generally the same as that for the total annual rainfall (PRCPTOT). We detected a change to drier conditions because of a decrease in the PRCPTOT (3.1% per decade) throughout the study area. This annual rainfall decrease is statistically significant in 46% out of the total stations, mainly located in Syria, Israel, Jordan, north Libya and north Egypt. A statistically significant increase in the maximum number of consecutive dry days (CDD index) in 53% out of the total stations was detected, especially, in north and northwest Turkey, Cyprus, Greece, north Libya and north Egypt.
The analysis of seasonal time series for both monthly maximum 1 and 5-day precipitation (RX1day and RX5day) showed an overall increase of the extreme precipitation over the northern parts of the EM (especially in northern and western coasts of Turkey). We inferred that long wet spells in the EM might become shorter in all seasons, except in autumn. The correlations between these indices using the linear Pearson (product moment) showed a statistical positive correlation at the 0.01 level among all the extreme indices and the PRCPTOT (except for CDD).
Key words: Eastern Mediterranean, precipitation, extreme climate indices, trend analysis, spatial and temporal characteristics.