



## **Precipitation regimes of Turkey: redefining regions and evaluating long-term trends**

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Analysing precipitation variation patterns over Turkey is highly important to explain regional differences. Such analysis will greatly support Eastern Mediterranean climate change studies. In this study, spatial and temporal variability of annual precipitation over Turkey is analysed: (1) to redefine precipitation regime regions and (2) to evaluate long-term trends across the country. Monthly total precipitation data are used for 107 stations, spanning a common period of 40 years. Six precipitation regime shape classes are identified using cluster analysis: (a) marked December peak for the western (Marmara and Aegean) and southern (Mediterranean) coastal areas; (b) December peak with an extended wet spring for southeast Anatolia and interior parts of western Anatolia; (c) May peak for the eastern Anatolia and continental Black Sea regions; (d) April-May peak for central Anatolia; (e) May peak with a dry winter is restricted to northeast Anatolia; and (f) October peak for the Black Sea coastal region. Long-term trends in the monthly precipitation totals are examined with Mann-Kendall rank correlation test. Results are evaluated in each of regime regions. A clear decreasing trend is observed in winter months (D-J-F) for all regions except northeast Anatolia. This decreasing trend is strongest over the Mediterranean, Aegean and southwest Anatolia, respectively. Spring precipitation totals do not exhibit any significant trend. However at the monthly-scale, March and May precipitations show a decreasing tendency while April tends to increase for most stations. June has marked decreasing trend, which is most marked in Mediterranean and eastern inland regions. July and August have a slightly increasing trend for all regions. The Black Sea coast and northeast Anatolia have consistent but not significant increasing trends for autumn months (S-O-N). For other regions, October and November precipitation totals presents an increasing trend, which is most apparent in Mediterranean, Thrace and central Anatolia. These results demonstrate that Turkey has notable regional distinctions in terms of timing and amount of precipitation. The decreasing trend in winter should be considered with highest priority. Inevitably, water scarcity will arise as a big issue especially for Aegean, Mediterranean and southeast Anatolia due to the intense drying conditions in a changing climate.

**KEYWORDS:** Precipitation regimes; regionalisation; long-term trends; variability; Turkey.