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Spatial and temporal variability of daily precipitation concentration in the Mediterranean basin during 1975-2015

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Spatial and temporal variability of daily time series of precipitation from the whole Mediterranean basin has been analysed in order to study the daily precipitation concentration throughout the year. Daily precipitation data from the Global Historical Climatology Network-Daily database (GHCN-Daily) and the European Climate Assessment & Dataset (ECA&D) dataset of 233 meteorological stations has been analysed during the last four decades (1975-2015) in the Mediterranean basin. Based on the calculation of the Daily Precipitation Concentration Index (CI), using the Lorenz Curve concept, the high to moderate irregularity and rainfall concentration are the two very characteristic features of rainfall in the Mediterranean basin. The annual CI values range from 0.57 to 0.70 and the highest values are found in the western part of the Mediterranean along the French and Spanish coasts, Sicily in South Italy and eastern coastlands of Tunisia. The lowest annual precipitation CI values occurred in Turkey and inland areas of France and Spain. The strongest gradient in CI values occurred between west and south Spain, the north and southern coastlands of France and between north and south Tunisia. Generally, the application of the Mann–Kendall test has revealed spatially non-uniform significant patterns in CI trends over the Mediterranean. Only 7.3 % of stations over the Mediterranean basin have returned a statistically significant negative trend during 1975-2015, while 30.1% of the stations have detected a statistically significant positive trend during the study period. The statistically significant CI increasing has been mainly found in south France, northern coastlands of the Iberian Peninsula, Greece and Tunisia, whereas the statistically significant decreasing has been observed in Italy, northern coastlands of Algeria, Turkey and in the southern parts of the Eastern Mediterranean (e.g. Israel, Syria and Lebanon). These results can find that both of latitude and the distance from the sea can play the major role in spatial and temporal distributions of CI. The statistically significant positive CI trends might be a key point to detect vulnerable areas along the Mediterranean coast under climate change.