



Study of precipitation variability based on entropy and seasonality over the Eastern Mediterranean

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Using the entropy concept, spatial and temporal variability of precipitation time series are investigated over the Eastern Mediterranean to evaluate the variability and disorder associated with daily, monthly and annual time scales over the Eastern Mediterranean. Our database is formed by daily and monthly average rainfall data from 1961 to 2012 from 103 meteorological stations throughout Eastern Mediterranean. In addition, seasonality (SI) and individual seasonality rainfall (SI_i) indices are considered to define the seasonal contrasts and identify the rainfall regimes based on their monthly distributions. Finally, the STARS method and the Mann–Kendall test are used to evaluate the long-term persistence of step-change and monotonic trends in the variability of precipitation at 95% confidence level. Those results obtained when applying the entropy theory (Shannon Entropy Method) are very valuable for studying the spatio-temporal rainfall distribution and indicate that the precipitation entropy values are statistically and significantly correlated with latitude, i.e. entropy values increases from south (3.1) to north (4.3) over the Eastern Mediterranean. On the other hand, we observe a statistically significant inverse linear correlation between the SI values and geographical latitude. Furthermore, a statistically significant positive trend of SI is detected in more than half of the total stations. The STARS method points out that the most abrupt increase has mostly occurred in all stations since late 1970s.

Keywords: precipitation variability; entropy; seasonality index; individual seasonality index; Eastern Mediterranean.