Seasonal regimes of daily precipitation in Iran

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Seasonal regimes of daily precipitation over Iran and their associations to large-scale atmospheric circulation types are assessed using daily precipitation from a high-resolution gridded dataset, provided by the APHRODITE Water Resources project. This study covers the period 1961–2004 and is undertaken for each season (excluding summer) separately, mainly due to the strong seasonality of the precipitation regime in Iran. Regional modes of daily precipitation variability were isolated by applying a Principal Component Analysis (PCA), with Varimax rotation, to the subset of days when at least 10% of all selected grid-points over Iran recorded precipitation amounts above 5 mm. To characterize the dynamical features associated with each precipitation regime, composites of daily atmospheric fields are computed by only averaging days characterized by a strong positive phase in the rotated PC (scores above 1.5). In autumn and winter, Iran is divided into five precipitation regimes. In spring, only four precipitation regimes are identified. The analysis of the composites suggests that the spatial distribution of precipitation over Iran is largely governed by the geographical position of two synoptic systems: the mid-tropospheric trough over the Middle East and the Arabian anticyclone. It is shown that in almost all precipitation regimes, the trough, as a pre-conditioning factor, leads to regional-scale ascending motions, whereas the Arabian anticyclone induce low-tropospheric moisture transports from the southern water bodies into the cyclonic systems nearby Iran.