



Potential vorticity anomalies as precursors of extreme precipitation events in the Mediterranean region

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The achievement of a better understanding and characterisation of precipitation extremes is utmost for exposed and vulnerable areas such as the Mediterranean region, where these events can cause huge damages, losses and fatalities. The spatial complexity of the Mediterranean region as well as of the physical processes acting on the area led to numerous studies focused on specific events and/or specific sites. Here, a set of 108 daily time series (from 1961 to 2007) mostly covering the northern coastal areas of the Basin are used to identify common upper-level atmospheric factors that have contributed to precipitation extremes. An advanced statistical approach, developed in the frame of the Extreme Value Theory and able to deal with non-stationarities, is applied to get a classification of the stations into homogeneous areas and to characterise precipitation extremes. The upper-level atmospheric dynamics of extremes is investigated by analysing potential vorticity derived from ERA-40 reanalysis. In terms of precipitation extremes, stations can be classified into six homogeneous areas, although higher spatial variability affects estimated return levels in the western part of the region. For almost all areas, significant anomalies in the PV composites (one, two and even three days before the events) are estimated.