



NAO influence, Potential Vorticity, and Weather Typing associated with winter extreme precipitation in Spain

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We present an analysis of winter daily precipitation over Spain for the 1997 – 2006 period using 106 rainfall stations. Rainy days (extreme precipitation events) are defined for each station as those days with precipitation exceeding 2 mm/day (the 90th percentile of the winter daily distribution). Seasonal and monthly mean rainfall distributions at each station are fitted to a gamma density function and their parameters used in order to identify coherent regional rainfall regimes. Eight regions (R1 to R8) with a common rainy behavior are identified. The influence of the North Atlantic Oscillation (NAO) in the intensity and occurrence of extreme regional precipitation events is evaluated by means of seasonal and monthly correlation analyses. Extreme rainfall occurrence reveals significant variability depending on the NAO phase, the intensity is not significantly associated with the NAO, though. The role of the NAO in the occurrence of extreme rainfall episodes is explained in terms of its modulation of both the dynamical instability (characterized from the potential vorticity distribution at the 330 K surface) and the humidity sources availability (estimated from the occurrence of preferred circulation weather types (CWTs)).