

Extreme precipitation events over Northern Italy: the role of Rossby wave packets as dynamical precursors

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The connection between extreme events and Rossby wave packets (RWP) has been increasingly documented in recent years. Rossby waves modulate mid-latitude weather, generating main precipitation spells and controlling geographical area affected. In the Mediterranean region, several case studies of extreme precipitation event (EPE) reported, as a main triggering factor, a meridionally elongated upper-level trough (i.e a breaking Rossby wave) as part of an incoming RWP. In this study we investigate the RWP characteristics leading to a very large number of EPEs that occurred between 1979 and 2015 over Northern Italy. EPE cases (more than 800) are subdivided in three categories; this allows to test the hypothesis that different EPEs are driven by different RWP dynamical evolution, which in turn, controls the interplay between large-scale vs mesoscale precipitation. We also investigate the strong seasonality of the waveguide which produces, in Spring and Autumn, a peculiar positioning of the Rossby wave which favours EPEs over target area (N-Italy). This synoptic setting is in fact highly effective in focusing water vapour transport (atmospheric river) towards the main orographic barriers of the Apennines and the Alps.