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MM5 and WRF high resolution simulations of a heavy precipitation event over southern Italy

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A heavy precipitation event affected the Ionian areas of Basilicata and Apulia, in southern Italy, during 12 and 13 November 2004. Two rainfall maxima of about 250 and 145 mm occurred over two different coastal and nearly flat areas. The northern rainfall maximum was generated during the second half of 12 November; it resulted from two intense localized convective systems, the latter producing more than 100 mm in two hours. During the first hours of 13 November, convection moved eastward; a convective line generated weaker but long-lasting precipitation leading to the second rainfall maximum.

The event shared many of the features observed in other Mediterranean heavy precipitation episodes: the presence of a trough exhibiting cut-off low and advecting moist mid-tropospheric flow; the passage of a short-wave trough and the development of heavy precipitation in the region between the main trough and the ridge east of it; a warm and moist low-level jet occurring in advance of a surface cyclone; the presence of complex orography.

This study examines the results of different simulations obtained with 2 high-resolution mesoscale models, MM5 and WRF, implemented with Analyisis and Forecast data from the ECMWF global circulation model, and different numerical setup.

Although all the numerical experiments are able to reproduce quite well the precipitation event, a significant variability in the precipitation patterns is found, especially for the second phase of the event.

The differences in the modelled mesoscale features leading to precipitation, and in the convective line evolution are also explored.