

Sensitivity of the November 2004 Mediterranean cyclone and induced Bura flow in Adriatic Sea to macroscale dynamical factors

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The deep Mediterranean cyclone taking place from 11 – 15 November 2004 caused a range of severe weather events, among others Bura (Bora) wind gusts exceeding 60m/s along the Eastern Adriatic Coast. The event was analysed by a series of numerical experiments using the MM5 forecast model. Throughout the study Potential Vorticity Inversion (PVI) scheme was applied to modify the initial conditions and investigate the influence of upper-level dynamics on the surface cyclone depth forecast. It was shown that a cyclone formation and development are highly sensitive to modified upper-level Potential Vorticity (PV), and that a vigorous change in upper-level dynamics remarkably alternated the whole case to an excessive extent. Therefore, several different cores of the upper-level Potential Vorticity (PV) were isolated and experiments with their removal and intensification were done, shedding light on the associated PV perturbations relative contributions to the cyclone deepening.

Bura flow along the Eastern Adriatic Coast was analysed with a high resolution model domain nested into the PVI sensitivity simulations, allowing for the investigation of influence of macroscale intensity on consequent mesoscale processes. Results show the strong dependency of the Bura wind speed on upper-level dynamics intensity, outlining the predominant importance of macroscale forcing factor on Bura phenomena development.