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The upper-tropospheric forcing in the 10^{th} -12^{th} December 2003 storm over Calabria

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In this study we revisit an intense and destructive storm that occurred over Calabria, southern Italy, on 10^{th}-12^{th} December 2003. This event was already analyzed by two of the authors at synoptic and planetary scales, however in this work we investigate the mesoscale of the storm by the RAMS (Regional Atmospheric Modeling System) model.

Firstly it is shown that large scale moisture source was mainly from the Mediterranean basin, then RAMS simulations are discussed to focus on the mesoscale of the storm. More precisely we evaluate the roles of Calabrian orography and the surface latent heat fluxes by the factor separation technique.

Results show that the role of Calabrian orography, even if important, decreased during the event whilst the role of surface latent heat fluxes was less affected trough the entire event.

A prominent mid tropospheric through or cut-off low can be identified through this event prior and during the period of heavy rain. The upper-tropospheric level disturbance, associated with high potential vorticity (PV) values, consequence of a deep tropospheric intrusion of stratospheric air masses, coupled with the surface cyclone and reinforced the whole meteorological system which resulted in the heavy impact rainstorm over Calabria, mainly during 11^{th} and 12^{th} December 2003.