



## **Multi-approach analysis of a Mediterranean storm in complex orography: case study on 19-21 September, 2009**

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A Mediterranean storm developed on 19-21 September, 2009 has been observed by two radars located on the central Italy (i.e.: single polarization Monte Midia and dual polarization Il Monte radar). This storm produced a strong and intense surface precipitation with a maximum rain rate of approximately 70 mm/h. The storm has been investigated by a multi-approach analysis, focusing on both the meteorological and hydrological aspects using WRF model and Radar data. The numerical simulations have been performed using the new generation mesoscale model WRF. The model simulations have been used to test the following aspects: - the microphysical performance of the model, comparing the simulated hydrometeors contents of rain, graupel and snow with those retrieved by the Il Monte radar. Vertical profiles and horizontal distributions of the radar-derived and simulated microphysical quantities have been used for the comparison. In principle, this allows investigating the role of the WRF microphysical parameterizations and testing the better scheme to adopt for operational purposes. - the characterization of the planetary boundary layer (PBL) and the modeled parameterizations performances with different surface schemes by comparing model result with observations coming from different ground based instruments. - the impact of radar data assimilation to improve high resolution initial conditions; both reflectivity and radial velocity, with or without conventional observations like soundings and surface data, are ingested in the WRF model using 3D-Var assimilation technique. About the hydrological aspect a sensitivity analysis has been performed to evaluate the impact of the various modeling strategies of the CETEMPS distributed hydrological model (CHyM).