Multiple Doppler radar data assimilation with WRF 3D-Var: IOP4 of HyMeX campaign retrospective studies

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An analysis to evaluate the impact of multiple radar data assimilation on a Heavy Precipitation Event (HPE) and a Flash Flooding Event (FFE) observed during the HyMeX campaign, is performed.

During the first Special Observation Period (SOP1)of HyMeX project several Intensive Observing Periods (IOPs) were launched; among them some occurred in Italy. The IOP4 hit Central Italy (CI) target area on 14 September 2012, and it is chosen for this analysis. The event was characterized by a cut-off low over the Tyrrhenian Sea, enhanced by the Bora flow over the Adriatic Sea. Rain was persistent throughout the day and mainly along eastern coast reaching maxima of over 150-200 mm/24h. Although the event was forecasted by all models running during the campaign well in advance, some uncertainties remained until a few hours before the event regarding the exact location and amount of precipitation.

Data taken from three C band radars operational during the event have been assimilated using 3DVAR to improve high resolution Initial Conditions (IC). Several experiments using WRF model and different set of IC are performed to the aim of evaluate the impact of assimilating multiple radars. Moreover, sensitivity to the assimilation of both conventional and radar observations is investigated. Finally, a statistical evaluation using rain gauges data coming from DEWETRA platform is performed, comparing results for different indexes as ETS, FAR and FBIAS.