

High-resolution X-band polarimetric radar Observations during the HyMeX Special Observation Period in North-East Italian Alpine Region: a Hydrologic Support Tool

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This study focuses on a precipitation observation with the National Observatory of Athens X-band polarimetric weather radar (XPOL) over small mountainous basins (~64 km²) located in Alps, North Italy in the framework of Hydrological cycle in Mediterranean Experiment (HyMeX) 2012 observational period. Ground validation rainfall observations provided from a dense network of rain gauges, two disdrometers (i.e. one 2DVD and one Parsivel) and stream flow sensors installed at different locations. The experimental area is also covered from two operational C-band weather radars. Four storm events selected to explore differences between X-band and C-band rain estimation error statistics for varying spatiotemporal resolutions. Recent developed algorithms for attenuation and vertical reflectivity profile correction or radar data and rain microphysics were applied to XPOL data. A hydrological model is forced from hourly X-band, C-band and raingauge precipitation observations and the temperature data provided from the meteorological stations. The results are compared against the rainfall and micro-physics parameters measurements from the in-situ sensors for both stratiform and convective types of rain events. The simulations are compared with ground references to investigate the potential of using high-resolution rainfall input from X-band polarimetric radar for simulating the hydrologic response. The ARFFS (Adige River Flood Forecasting System) model used in this study is a semi-distributed rainfall runoff model. Results reveal that X-band observations offer an improved representation of orographic enhancement of precipitation, which turns to have a significant impact in simulating peak flows for flash flood warnings.