The HyMeX Special Observation Period in Central Italy: precipitation measurements, retrieval techniques and preliminary results

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The Mediterranean area concentrates the major natural risks related to the water cycle, including heavy precipitation and flash-flooding during the fall season. The capability to predict such high-impact events remains weak because of the contribution of very fine-scale processes and their non-linear interactions with the larger scale processes. These societal and science issues motivate the HyMeX (Hydrological cycle in the Mediterranean Experiment, http://www.hymex.org/) experimental programme. HyMeX aims at a better quantification and understanding of the water cycle in the Mediterranean with emphasis on intense events. The observation strategy of HyMEX is organized in a long-term (4 years) Enhanced Observation Periods (EOP) and short-term (2 months) Special Observation Periods (SOP).

HyMEX has identified 3 main Mediterranean target areas: North-West (NW), Adriatic (A) and South-East (SE). Within each target area several hydrometeorological sites for heavy rainfall and flash flooding have been set up. The hydrometeorological site in Central Italy (CI) is interested by both western and eastern fronts coming from the Atlantic Ocean and Siberia, respectively. Orographic precipitations play an important role due to the central Apennine range, which reaches nearly 3000 m (Gran Sasso peak). Moreover, convective systems commonly develop in CI during late summer and beginning of autumn, often causing localized hailstorms with cluster organized cells. Western fronts may heavily hit the Tiber basin crossing large urban areas (Rome), whereas eastern fronts can cause flash floods along the Adriatic coastline. Two major basins are involved within CI region: Tiber basin (1000 km long) and its tributary Aniene and the Aterno-Pescara basin (300 km long).

The first HyMeX SOP1.1 was carried out from Sept. till Nov. 2012 in the NW target area. The Italian SOP1.1 was coordinated by the Centre of Excellence CETEMPS, University of L'Aquila, a city located in the CI heart. The CI area was covered by a uniquely dense meteorological instrumentation thanks to a synergy between Italian institutions and NASA-GSFC. The following RADARs were operated: a Doppler single-polarization C-band radar located at Mt. Midia; the Polar 55C Doppler dual-polarization C-band radar located in Rome; a Doppler C-band polarimetric radar located at Il Monte (Abruzzo); a polarimetric X-band mini-radar in L'Aquila; a polarimetric X-band portable mini-radar in Rome; a single-polarization X-band mini-radar in Rome. DISDROMETERs were also deployed: 4 Parsivel optical disdrometers in Rome (at Sapienza, CNR-ISAC and CNR-INSEAN); 1 2D-video disdrometer in Rome; 3 Parsivels optical disdrometer respectively in L'Aquila (Abruzzo), Avezzano (Abruzzo) and Pescara (Abruzzo). Other INSTRUMENTS were available: 1 K-band vertically-pointing micro rain-radar (MRR), 2 Pludix X-band disdrometers, 1 VLF lightining sensor, 1 microwave radiometer at 23-31 GHz in Rome (at Sapienza); the raingauge network with more than 200 stations in Central Italy. Three overpasses in CI were also performed by the Falcon 20 aircraft equipped with the 95GHz cloud radar RASTA.

Analysis of the SOP1.1 main events in CI will be described by focusing on the raindrop size distribution statistics and its geographical variability. Intercomparison of rainfall estimates from disdrometers, raingauges and radars will be illustrated with the aim to provide a quality-controlled and physically consistent rainfall dataset for meteorological modeling validation and assimilation purposes.