



A data assimilation experiment of RASTA airborne cloud radar data during HyMeX IOP16

Gaël Saussereau (1,2), Olivier Caumont (1), and Julien Delanoë (3)

(1) CNRM-GAME (Météo-France, CNRS), Toulouse, France, (2) INSA Rennes, Rennes, France, (3) LATMOS, Guyancourt, France

The main goal of HyMeX first special observing period (SOP1), which took place from 5 September to 5 November 2012, was to document the heavy precipitation events and flash floods that regularly affect the north-western Mediterranean coastal areas. In the two-month campaign, around twenty rainfall events were documented in France, Italy, and Spain. Among the instrumental platforms that were deployed during SOP1, the Falcon 20 of the Safire unit (<http://www.safire.fr/>) made numerous flights in storm systems so as to document their thermodynamic, microphysical, and dynamical properties. In particular, the RASTA cloud radar (<http://rali.projet.latmos.ipsl.fr/>) was aboard this aircraft. This radar measures vertical profiles of reflectivity and Doppler velocity above and below the aircraft. This unique instrument thus allows us to document the microphysical properties and the speed of wind and hydrometeors in the clouds, quasi-continuously in time and at a 60-m vertical resolution.

For this field campaign, a special version of the numerical weather prediction (NWP) Arome system was developed to cover the whole north-western Mediterranean basin. This version, called Arome-WMed, ran in real time during the SOP in order to, notably, schedule the airborne operations, especially in storm systems. Like the operational version, Arome-WMed delivers forecasts at a horizontal resolution of 2.5 km with a one-moment microphysical scheme that predicts the evolution of six water species: water vapour, cloud liquid water, rainwater, pristine ice, snow, and graupel. Its three-dimensional variational (3DVar) data assimilation (DA) system ingests every three hours (at 00 UTC, 03 UTC, etc.) numerous observations (radiosoundings, ground automatic weather stations, radar, satellite, GPS, etc.).

In order to provide improved initial conditions to Arome-WMed, especially for heavy precipitation events, RASTA data were assimilated in Arome-WMed 3DVar DA system for IOP16 (26 October 2012), to begin with. There were two flights on 26 October and thus RASTA data were assimilated at 2+2 consecutive analysis times (06, 09, 12, and 15 UTC). This task involved a preliminary step to convert the original data into vertical profiles that are suitable for assimilation: the data were averaged to remove noise and match the model's resolution, they were converted to appropriate physical quantities and in a format that is readable by the DA system, etc.). The presentation will show the impact of RASTA data on Arome-WMed analyses and forecasts, both with respect to RASTA data and to independent data (either also assimilated or not).