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To cite this version:
Julien Delanoë, Jean-Paul Vinson, Christophe Caudoux, Marie Ceccaldi, Emmanuel Fontaine, et al.. An update on cloud dynamic and microphysics products derived from RASTA measurements during HYMEX-SOP1. 8th HyMeX Workshop, Sep 2014, La Valletta, Malta. pp.P2.14, 2014. insu-01140560

HAL Id: insu-01140560
https://hal-insu.archives-ouvertes.fr/insu-01140560

Submitted on 10 Apr 2015

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An update on cloud dynamic and microphysics products derived from RASTA measurements during HYMEX-SOP1

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Calibration
RASTA nadir reflectivity is calibrated using the ocean surface return technique (Li et al. 2005). We use data collected during the MT-Maldives campaign on the 22nd of December 2011 above Indian Ocean. This flight was especially dedicated to the calibration of the radar as the aircraft was flown in clear sky area.

Two radiosondes were available before and after the 1:30 hour flight. Figures a, b, c represent the relative humidity, temperature and pressure profiles respectively. These profiles are used to calculate the two way attenuation at 94 GHz presented in panel d. Note that HYMEX and MT-Maldives system configurations were similar and therefore we use the same calibration constants.

Figure e illustrates the normalized ocean surface echo (c0) as a function of the incidence angle once the nadir reflectivity has been calibrated and compared to simulated ocean returns for different wind speeds.

Products
One file per antenna (Instrument oriented)
- L0 data (netcdf): file containing Z and Doppler velocity uncorrected. 1.2 s horizontal / 60 m vertical
- L1 data (netcdf): file containing Z (calibrated) and Doppler velocity uncorrected. 1.2 s horizontal / 60 m vertical
- L2 data (netcdf): file containing Z (calibrated) and Doppler velocity (unfolded) radar gates are geo-located. Interpolation between upper/lower domain and correction of reflectivity near horizontal / 60 m vertical

Multi antenna products (variational technique)
- 3D cloud WIND: re-gridded data 1.2 s horizontal /120 m vertical
- Ice cloud microphysics (IWC etc) 1.2 s horizontal /120 m vertical

HYMEX context
The airborne 95GHz cloud radar RASTA was operated on-board the Falcon 20 during HYMEX SOP1 (September/October 2012). In addition to the radar state of the art in-situ microphysical probes, such as CDP, 2DS, CPI, PIP, and Robust probe were deployed to characterize bulk and individual hydrometeor microphysics. The underlying idea was to combine radar and in-situ measurements to infer cloud processes that originate precipitation. The spatially limited detailed cloud description using in-situ measurements can be extended to the area covered by the radar.

Related presentations and posters:
- M4.3 - Intercomparison and evaluation of 3-D wind fields derived from airborne and ground-based radars during HyMeX, O. Bousquet, J. Delanoë
- Th.I.6 - Convective and extreme rainfall during the development of two intensifying Mediterranean cyclones in the HyMeX campaign, E. Flamant, N. Kotronis, H. Lagouvardos, C. Clauot, J. Delanoë, E. Madonna, H. Wernli
- Th.I.7 - A data assimilation experiment of RASTA airborne cloud radar data during HyMeX-DOPT, O. Sacquet, J. Delanoë
- P2.1. Verification of Meio-NH forecasts of cloud structure and water content against remote sensing Observations, J.-F. Flamant, J. Delanoë