



Investigation of the vertical structure of clouds using coincident measurements from airborne W-band radar and C-band ground based radar during HyMex campaign in Central Italy

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Analysis methodologies involving simultaneous observations collected by remote sensing instruments with different acquisition characteristics, such as airborne- and ground-based weather radar measurements, offer an attractive chance of investigating the vertical structure of clouds and precipitation. During the first HyMeX Special Observing Period (SOP), running from 5 September till 6 November 2012, the ISAC-CNR Doppler polarimetric C-band radar Polar 55C located in Rome, provides volume observations of clouds and precipitation within a 120 km distance running specific scanning strategies to compare radar measurements with measurements collected by other precipitation measuring instruments located at selected sites within the Polar 55C coverage and to coincident measurements during instrumented flights. The Flacon-20 with cloud radar RASTA (multi beam W-band at 95 GHz) and microphysics sensors on board flew three times over Central Italy: on 15 October 2012 (IOP13), on 27 October 2012 (IOP16), on 31 October 2012 (IOP18). During the F20 flights, simultaneous Polar 55C radar measurements were performed: several volumes of PPI and different vertical sections (RHI scanning) intersected the F20 track.

The aim of this work is to investigate microphysical characteristics of clouds analyzing combined observations from airborne W-band radar and ground C-band polarimetric Radar (5.6 GHz). The analysis of returns, recorded by the two radars from the bottom and from the top of clouds at different wavelength measurements and at different spatial resolution allows to identify some microphysical characteristics and the vertical structure of cloud systems (such as melting layer location and thickness, liquid water content, ice particle presence) in order to improve the understanding of formation and development processes of cloud systems. Furthermore, the polarimetric capability of the C-band radar allows discriminating the nature of the hydrometeors in vertical sections obtained by oversampled RHI measurements, while high resolution vertical W-band observations allow investigating the hydrometeor at top of cloud systems.