

Analysis of co-located dual-polarization observations at C and X band in Italy

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X-band weather radars are increasingly being deployed as stand-alone sensors, to build specific networks or to complement the existing longer wavelength operational systems. In Europe the operational networks are mainly relying on C-band radars, many of which with dual-polarization capabilities. The scattering and propagation effects depend on the radar operating frequency, which may cause the same precipitating cloud to be seen in significantly different ways from C-band and X-band radars. The purpose of this work is to present an analysis of co-located dual-polarization measurements at C and X band in a variety of meteorological situations, aimed at assessing the reliability and the additional value of the shorter wavelength measurements.

One primary use of X-band dual-polarization radars is for rainfall estimation using the specific differential phase shift (Kdp). For this specific aim, measurements from two laser disdrometers are additionally employed to characterize the surface rainfall. Although the low level observations constitute the main focus of this study, higher atmosphere measurements will also be analyzed.

Data collected by C-band and X-band radar in Italy are considered for the analyses. In particular, a specific vertical scan (RHI) has been designed and operationally scheduled for the Arpa Piemonte ARX X-band radar (Vercelli), in the direction of the C-band system of Bric della Croce (Torino), located around 60 km west. This allows the analysis of a large amount of roughly co-located observations under a similar geometric view.