Differential Reflectivity Calibration for the Euskalmet Weather Radar

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Differential reflectivity (Zdr) data provide very valuable information, especially when combined with reflectivity (Z) data. Since Zdr is a very sensitive polarimetric variable, all radar operators monitor it and calibrate it if necessary.

The radome of the C-band weather radar property of the Basque Meteorology Agency (Euskalmet) was replaced in spring 2009. After that, biased data observed by the operator during the monitoring routines led it to ask for a calibration of Zdr. Although the software for the maintenance of the system allows establishing an offset bias to adjust it manually, it does not provide any option to measure it automatically. Therefore, it became necessary to develop some tools to do so.

Two techniques based on the use of natural scatterers such as precipitation were selected because of its reliability and economic constraints.

One is the most common option for calibrating Zdr. It uses differential reflectivity measurements collected at vertical incidence in light rain, rotating the antenna 360º in azimuth.

The other method relies on the assumption that Zdr decrease with increasing elevation due to increasing view angle. This method requires Zdr data from volume scans in almost any precipitation situation.

In this work, a selection of case studies was made among data collected in 2012 and 2013. Afterwards, all of them were statistically treated and plotted using the programmed tools in order to analyse the information and draw conclusions using only the convenient cases for each method. The calculated offset bias was applied using the maintenance software mentioned before so the operator of the radar could test it.

Finally, some additional requirements were found to properly perform the calibration. These are presented, as well as two comparable meteorological situations (one previous to the adjustment and another one subsequent to it) in order to show the enhancement achieved.