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## Dual-polarization C-band weather radar algorithms for rain rate estimation and hydrometeor classification in an alpine region

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**Abstract.** Dual polarization is becoming the standard for new weather radar systems. In contrast to conventional weather radars, where the reflectivity is measured in one polarization plane only, a dual polarization radar provides transmission in either horizontal, vertical, or both polarizations while receiving both the horizontal and vertical channels simultaneously. Since hydrometeors are often far from being spherical, the backscatter and propagation are different for horizontal and vertical polarization. Comparing the reflected horizontal and vertical power returns and their ratio and correlation, information on size, shape, and material density of cloud and precipitation particles can be obtained. The use of polarimetric radar variables can therefore increase the accuracy of the rain rate estimation compared to standard  $Z$ - $R$  relationships of non-polarimetric radars. It is also possible to derive the type of precipitation from dual polarization parameters, although this is not an easy task, since there is no clear discrimination between the different values. Fuzzy logic approaches have been shown to work well with overlapping conditions and imprecisely defined class output.

In this paper the implementation of different polarization algorithms for the new Austrian weather radar on Mt. Valluga is described, and first results from operational use are presented. This study also presents first observations of rain events in August 2007 during the test run of the radar. Further, the designated rain rate estimation and hydrometeor classification algorithms are explained.

Full Article in PDF (PDF, 3840 KB)

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