Experimental Investigation of an X-band Polarimetric Algorithm for Attenuation Correction and Microphysical Retrieval

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This paper investigates attenuation correction for X-band dual-polarization radar (XPOL) observations. In addition, an algorithm is developed for estimating raindrop size distribution (DSD) model parameters on the basis of attenuation corrected XPOL reflectivity and differential reflectivity data. The DSD model is assumed to be a three parameter “normalized” gamma distribution. Closely matched XPOL radar rays with longer wavelength (S-band) dual-polarization radar measurements (SPOL), taken during the International H2O Experiment (IHOP), are used to assess the proposed XPOL algorithms. The study explores the dependence of attenuation correction on the selection of oblateness-size relation (or axial ratio) and the maximum diameter limit and evaluates its error characteristics for different total path-integration attenuation cases. The XPOL estimated DSD parameters are evaluated against DSD retrievals derived from two existing SPOL algorithm.