Geophysical Research Abstracts,
Vol. 11, EGU2009-13839, 2009
EGU General Assembly 2009

Performance of rain reflectivity and differential reflectivity rainfall algorithms at X-band

L. Baldini, E. Gorgucci, and V. Romaniello
Istituto di Scienze dell'Atmosfera e del Clima, CNR, Roma, Italy

X-band weather radar systems present several advantages mainly related to their low cost and small size. The main drawback of these systems is the attenuation suffered by the electromagnetic wave propagating through precipitation that reduces the reliability of rainfall estimates based on power measurements. Dual-polarization techniques provide solutions to mitigate the impact of attenuation and have renovated the interest on X-band radar systems.

Different algorithms are available to estimate rainfall rate using the dual polarization radar measurements namely, reflectivity factor (Z_h), differential reflectivity (Z_{dr}), and specific differential phase (K_{dp}). At X-band, attenuation affects any radar parameter based on backscatter power measurements such as Z_h, while differential attenuation affects parameters based on differential power measurement such as Z_{dr}. that must be corrected prior to use in quantitative applications such as rainfall estimation. However, correction procedures could introduce additional errors that impact on rain estimation. The rainfall estimation obtained with attenuation corrected measurements can be even worse that that obtained from uncorrected measurements. Consequently, attenuation correction procedure must be performed only when needed. When using the X-band rain algorithm based on Z_h and Z_{dr}, the biases due to attenuation and differential attenuation nearly cancel each other and result in a small bias in the rainfall rate estimation. This paper investigates this property of X-band dual-polarization measurements.