Should interpolation of reflectivity data be performed in Z or dBZ?

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Interpolation of ground-based radar measurements is required when mapping data from its native spherical-polar coordinates to a Cartesian grid and may be also be used when constructing CAPPI displays or estimating echo top height. For reflectivity the question arises as to whether this processing should be performed in units of Z (mm⁻⁶ m⁻³) or dBZ. In the first part of this presentation, we use the triad-based approach introduced by Lakshmanan (2012) to quantitatively compare errors associated with linearly interpolating in Z and dBZ. This analysis shows that, on average, interpolation in Z is more accurate, particularly at high reflectivities and in the presence of strong reflectivity gradients. However, interpolation in dBZ is slightly more accurate for the purpose of estimating echo top height. In the second part of the presentation, we investigate how the choice of unit impacts gridded reflectivities and various derived fields, using more sophisticated objective analysis methods. We find that interpolation in dBZ leads to consistently lower reflectivities and a corresponding reduction in estimated rain rate, convective area fraction, and hail size. Based on these results, we recommend that Z be adopted as the standard unit for objective analysis of reflectivity data.

References:

Keywords: Objective analysis, Reflectivity factor