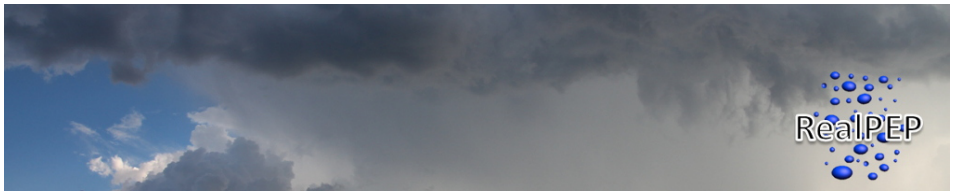

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Polarimetric radar QPE in aggregated snow

Monday, October 5, 2020 2:45 PM (20 minutes)

The inherent uncertainty in radar snow estimates comes from variability in snow size distributions, diversities among snow growth habits, and changes in particle densities. As a consequence, radar snow measurements are very challenging. However, the utilization of polarimetric radar data can address some of these problems. A novel polarimetric method for quantification of snowfall rate, based on the joint use of specific differential phase KDP and horizontal reflectivity factor Z, is introduced. Large 2D-video disdrometer snow dataset from central Oklahoma is utilized to derive polarimetric bivariate power-law relation for snowfall rate, S(KDP, Z) = γKDP^αZ^β. The relation is generalized for the range of particle aspect ratios from 0.5 to 0.8 and the width of the canting angle distribution from 0 to 40 degrees, and validated via analytical/theoretical derivations and simulations. The relation's multiplier is sensitive to variations in particles'aspect ratios and the width of the canting angle distribution, whereas the exponents are practically invariant to these changes. The novel approach is tested with operational polarimetric WSR-88D data. Radar estimates of S are compared to the ground measurements in several United States locations, exhibiting small bias. The results are encouraging and show good potential for the improvement in radar QPE of snow.

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