



The effect of variations in the microstructure of rain on the uncertainty in dual-frequency and dual-polarization microwave link rainfall estimation

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Rainfall estimation by research microwave links has been shown to be possible in a number of ways (e.g. single- or dual-frequency, etc.) in the recent literature. The uncertainty in rainfall estimates for different combinations of polarizations and/or frequencies, and for different link lengths is investigated. The results of these analyses can be used to determine which method and which frequency (pair) is most suitable for a link of a given length in the climatology under consideration.

We use time series of drop size measurements in combination with wind velocity data to compute range profiles of the rainfall intensity and attenuation for horizontal and vertical polarization at different frequencies. Analyses of uncertainties for these data are focused on the effects of inter- and intra-storm variation of the drop size distribution and the distribution of drop canting angles. The added value of using differential attenuation (the relative difference in attenuation between horizontally and vertically polarized signals or between signals of two different frequencies), in contrast to using single-polarization single-frequency attenuation, is examined.