Public Abstract

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DUAL-POLARIZATION RADAR
COUPLED WITH A DROP MOTION
AND EVAPORATION MODEL

Measuring spatial coverage of rainfall is important for several disciplines; unfortunately, rainfall data via rain gauges is very limited in spatial coverage. With respect to agriculture, knowledge of rainfall amounts is key to estimation of soil erosion, chemical leaching, irrigation needs, and crop yields. Rainfall amounts are also necessary for forecasting various physical hazards, including flash flooding, river flooding, and landslides. The best remote sensing tool available for rainfall estimation is radar, but this has many limitations, especially for locations far from the radar. Central Missouri is one such location and was the focus of this study. For this study a computer program was created to determine the effectiveness of radar rainfall estimation techniques in Central Missouri. Two groups of techniques were evaluated. The first group was conventional formulas. These were simple formulas based on combinations of three available radar parameters: reflectivity, differential reflectivity, and specific phase differential. The second group was designed specifically for this project. This group consisted of the “trace techniques”, where individual raindrops were traced back to the location where they interacted with the radar beam. In this process the program used high resolution model data to calculate horizontal drift and raindrop evaporation. The results from this study indicated a modest improvement in radar rainfall estimation performance from the introduction of raindrop evaporation; this improvement was on the order of 10%. The conclusion was made that the effects of raindrop evaporation were significant enough to warrant the inclusion of high resolution model data in the radar rainfall estimation process. Less conclusive were the effects of horizontal drift on radar rainfall estimation.