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A Preliminary Analysis of Precipitation Properties and Processes during NASA GPM IFloodS

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The Iowa Flood Studies (IFloodS) is a NASA Global Precipitation Measurement (GPM) ground measurement campaign, which took place in eastern Iowa from May 1 to June 15, 2013. The goals of the field campaign were to collect detailed measurements of surface precipitation using ground instruments and advanced weather radars while simultaneously collecting data from satellites passing overhead. Data collected by the radars and other ground instruments, such as disdrometers and rain gauges, will be used to characterize precipitation properties throughout the vertical column, including the precipitation type (e.g., rain, graupel, hail, aggregates, ice crystals), precipitation amounts (e.g., rain rate), and the size and shape of raindrops. The impact of physical processes, such as aggregation, melting, breakup and coalescence on the measured liquid and ice precipitation properties will be investigated. These ground observations will ultimately be used to improve rainfall estimates from satellites and in particular the algorithms that interpret raw data for the upcoming GPM mission's Core Observatory satellite, which launches in 2014. The various precipitation data collected will eventually be used as input to flood forecasting models in an effort to improve capabilities and test the utility and limitations of satellite precipitation data for flood forecasting. In this preliminary study, the focus will be on analysis of NASA NPOL (S-band, polarimetric) radar (e.g., radar reflectivity, differential reflectivity, differential phase, correlation coefficient) and NASA 2D Video Disdrometers (2DVDs) measurements. Quality control and processing of the radar and disdrometer data sets will be outlined. In analyzing preliminary cases, particular emphasis will be placed on 1) documenting the evolution of the rain drop size distribution (DSD) as a function of column melting processes and 2) assessing the impact of range on ground-based polarimetric radar estimates of DSD properties.