GPM rainfall estimates using ground radar observations and a Bayesian approach

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The Global Precipitation Measurement (GPM) mission provides a new generation of precipitation measurements from space. In particular, Dual-frequency Precipitation Radar (DPR), on board the GPM core observatory, has the advantage in precipitation retrievals compared to its single-frequency counterparts on Tropical Rainfall Measurement Mission (TRMM). However, it is still challenging for DPR to obtain instantaneous rainfall rate with higher accuracy, especially for widely varying rainfall types (e.g., hurricane, storms, etc). In this study, we propose a hierarchal Bayesian approach for improving the DPR rainfall retrievals and perform an initial experiment in Southeastern United States (US), where the US Weather Service Dual-Polarization Radar network is used to obtain locally accurate rainfall estimates for each event. The analysis presented here demonstrates the feasibility of this method for enhancing the DPR instantaneous rainfall product. In summary, this approach demonstrates the potential for enhancing the GPM rainfall product.