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Evaluating the Global Precipitation Measurement mission with Multi-Radar Multisensor.

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Characterization of accuracy and uncertainties in precipitation estimates derived from space-borne measurements is critical for many applications including water budget studies or prediction of natural hazards caused by extreme rainfall events. GPM precipitation level II and III estimates are compared to the NEXRAD-based precipitation estimates derived from NOAA/NSSL's Multi-Radar, Multisensor (MRMS) platform. The NEXRAD network has undergone an upgrade in technology with dual-polarization capabilities. These new polarimetric variables are being incorporated in MRMS to improve quality control of reflectivity data and to correct for partial beam blockages. The MRMS products, after having been adjusted by rain gauges and passing several quality controls and filtering procedures, are 1) accurate with known uncertainty bounds and 2) measured at a resolution below the pixel sizes of the GPM radar and radiometer observations. They are used by a number of NASA investigators to evaluate level II and level III satellite rainfall algorithms. Analysis of TRMM level II and III products serve as a benchmark to evaluate GPM precipitation estimates. Comparisons have been carried out at fine scale (e.g. instantaneous and 5 km for DPR) within a comparison framework developed to examine the consistency of the ground and space-based sensors in term of precipitation detection, characterization (e.g. convective, stratiform) and quantification. Specific error factors for passive (e.g. surface conditions for GMI) and active (e.g. attenuation of the radar signal, non uniform beam filling for DPR) sensors are investigated. Systematic biases and random errors quantified at the satellite estimation scale are useful for satellite-based Level III precipitation products. This cross-platform error characterization ultimately acts as a bridge to intercalibrate active and passive microwave measurements from the GPM core satellite to the constellation satellites. Future perspectives are presented.