



Rain Rate and DSD Retrievals at Kwajalein Atoll

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The dual-polarization weather radar on Kwajalein Atoll in the Republic of the Marshall Islands (KPOL) is one of the only full-time (24/7) operational S-band dual-polarimetric (DP) radars in the tropics. Using the DP data from KPOL, as well as data from a Joss-Waldvogel disdrometer on Kwajalein Island, algorithms for quality control, as well as calibration of reflectivity and differential reflectivity have been developed and adapted for application in a near real-time operational environment. Observations during light rain and drizzle show that KPOL measurements (since 2006) meet or exceed quality thresholds for these applications (as determined by consensus of the radar community). While the methodology for development of such applications is well documented, tuning of specific algorithms to a particular regime and observed raindrop size distributions requires a comprehensive testing and adjustment period to ensure high quality products. Upon application of these data quality techniques to the KPOL data, we have tested and compared several different rain retrieval algorithms. These include conventional Z-R, DP hybrid techniques, as well as polarimetrically-tuned Z-R described by Bringi et al. 2004. One of the major benefits of the polarimetrically tuned Z-R technique, is its ability to use the DP observations to retrieve key parameters of the drop size distribution (DSD), such as the median drop diameter, and the intercept and shape parameter of the assumed gammaDSD. We will show several such retrievals for different rain systems, as well as their distribution with height below the melting layer. From a physical validation perspective, such DSD parameter retrievals provide an important means to cross-validate microphysical parameterizations in GPM Dual-frequency Precipitation Radar (DPR) and GPM Microwave Imager (GMI) retrieval algorithms.