

BACKSCATTER ALGORITHM DEVELOPMENT AND TESTING USING THE NASA MICROWAVE LINK

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Backscattering measurements using the NASA 2.3 km microwave LINK will be used to test existing algorithms for rainfall retrieval. The LINK backscatter measurements will be compared to measurements from a ground-based network of disdrometers and rain gauges located under the LINK propagation path. By using this comparison technique single-frequency and dual-frequency radar retrieval algorithms for the drop size distribution (DSD) can be tested and improved. The algorithm development is particularly relevant to the ongoing TRMM and up coming GPM missions. The measurement system allows researchers to test algorithms under ideal conditions. When these algorithms are employed on satellite radars, ground truth is difficult if not impossible to obtain.

The backscatter measurements are obtained by using a stepped frequency radar in place of the LINK transmitter. The step frequency radar is being implemented by using a network analyzer in conjunction with transmit and receive amplifiers. The radar is operated at the two LINK frequencies of 25 and 37 GHz. The LINK receiving antenna is configured as a passive reflector by terminating the antenna in a short circuit. With the receiving antenna acting as a passive reflector, the radar receiver will measure backscatter from rain, as well as, path integrated attenuation (PIA). In this configuration, algorithms which require the PIA such as the forward and backward recursion algorithms can be checked in varying weather conditions. Algorithms which do not require the PIA such as the Hitschfeld-Bordan, the modified Hitschfeld-Bordan and the Self-Consistent Method can also be validated.

A brief account on algorithms will be given. Sources of error will be discussed. Finally modifications yielding smaller errors will be presented along with a discussion of their effects on the estimation of DSD parameters.

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