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Corresponding Author : Prof. Christian Kummerow (kummerow@atmos.colostate.edu)

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Title: A Simplified Microwave Rainfall Retrieval Algorithm and Its Error Model

Abstract:

While a large number of methods exist in the literature for converting microwave brightness temperatures into rainfall estimates, validation of these methods often consists of little more than a cursory comparison against ground measurements to conclude that there is general agreement between the two estimates. Missing from these comparisons is a quantitative assessment of the expected uncertainties in these rainfall products at time and space scales. The latter is the result of two factors. Sparse to nonexistent validation sites over most of the world's regions, and algorithms that appear sensitive to rainfall regimes, which in turn cause apparent inconsistencies against validation data collected from different locations. To make progress in this area, a simple Bayesian algorithm was developed that focuses specifically on uncertainties. The algorithm uses a priori database constructed from the Tropical Rainfall Measuring Mission (TRMM) radar data coupled with radiative transfer computations. Four sources of uncertainties are identified and dealt with. These are the uncertainties introduced by imperfect data from the TRMM radar used to construct the a-priori database; the uncertainty introduced by the inversion methodology; the uncertainty resulting from changes in regional and seasonal cloud properties; and the uncertainty introduced by any errors in the algorithm formulation. Results show that the inversion itself is the source of error at the pixel scale, but that changes in the cloud morphology/microphysics dominate the uncertainties at the seasonal and longer time scales.

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Co-Authors

No.	Title	First Name	Family Name	Organization
1	Dr.	Wesley	Berg	Colorado State University
2	Ms.	Jody	Thomas-Stahle	Colorado State University