Evaluation of Improvements to the TRMM Microwave Rain Algorithm

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ABSTRACT

Improvements made to the Version 5 TRMM passive microwave rain retrieval algorithm (2A-12) are evaluated using independent data. Surface rain rate estimates from the Version 5 TRMM TMI (2A-12), PR (2A-25) and TMI/PR Combined (2B-31) algorithms and ground-based radar estimates for selected coincident subset datasets in 1998 over Melbourne and Kwajalein show varying degrees of agreement. The surface rain rates are then classified into convective and stratiform rain types over ocean, land, and coastal areas for more detailed comparisons to the ground radar measurements. These comparisons lead to a better understanding of the relative performances of the current TRMM rain algorithms. For example, at Melbourne more than 80% of the radar-derived rainfall is classified as convective rain. Convective rain from the TRMM rain algorithms is less than that from ground radar measurements, while TRMM stratiform rain is much greater. Rain area coverage from 2A-12 is also in reasonable agreement with ground radar measurements, with about 25% more over ocean and 25% less over land and coastal areas. Retrieved rain rates from the improved (Version 6) 2A-12 algorithm will be compared to 2A-25, 2B-31, and ground-based radar measurements to evaluate the impact of improvements to 2A-12 in Version 6.

An important improvement to the Version 6 2A-12 algorithm is the retrieval of Q1/Q2 (latent heating/drying) profiles in addition to the surface rain rate and hydrometeor profiles. In order to ascertain the credibility of the new products, retrieved Q1/Q2 profiles are compared to independent ground-based estimates. Analyses of dual-Doppler radar data in conjunction with coincident rawinsonde data yield estimates of the vertical distributions of diabatic heating/drying at high horizontal resolution for selected cases over the Kwajalein and LBA field sites. The estimated vertical heating/drying structures appear to be reasonable. Comparisons of Q1/Q2 profiles from Version 6 2A-12 and the ground-based estimates are in progress. Retrieved Q1/Q2 structures will also be compared to MM5 hurricane simulations for selected cases. The results of these intercomparisons will be presented at the conference.

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