GPROF precipitation retrieval: Improving the Quality of Extreme Rainfall Estimates

The Global Precipitation Measurement (GPM) passive microwave operational precipitation retrieval (GPROF) for the GPM Microwave Imager (GMI) is modified to offer additional information on atmospheric conditions to its Bayesian-based algorithm. The modified algorithm is allowed to use large-scale environment to filter out a priori states that do not match the general synoptic condition relevant to the observation and thus reduce the difference between the assumed and observed variability in ice-to-rain ratio. Using the ground Multi-Radar Multi-Sensor (MRMS) network over the US, the results demonstrate outstanding potentials in improving the accuracy of heavy precipitation over land. It is found that individual synoptic parameters can remove 20-30% of existing bias and up to 50% when combined, while preserving the overall performance of the algorithm.