

Precipitation and Particle Size Retrieval Using AMSU Data

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Abstract

In May 1998, the Advanced Microwave Sounding Unit (AMSU) was launched aboard the polar-orbiting NOAA-15 satellite and has been providing data at frequency bands around the 54-GHz O₂ resonance lines the 183-GHz water vapor resonance lines, and a few other channels. Perturbation estimates in the 54-GHz and 183-GHz bands have been showing promise in estimating precipitation rate over the eastern U.S. NAST-M data in the 54-GHz and 118-GHz bands over hurricanes during the CAMEX-3 deployment have shown promise in distinguishing between different sizes of particles. Results from similar experiments using the AMSU-B channels are presented. Results from attempting rain rate retrievals using particle size distribution and perturbations and attempts to do global precipitation rate retrievals are also presented.

In May 1998, the Advanced Microwave Sounding Unit (AMSU) was launched aboard the polar-orbiting NOAA-15 satellite and has been providing radiance images at frequency bands near the 54-GHz oxygen and the 183-GHz water vapor resonance lines, and at window channels near 23.8, 31.4, 50, 89, and 150 GHz. Retrievals utilizing the 54-GHz and 183-GHz bands have shown promise in estimating precipitation rates over the eastern U.S. when the results are compared with concurrent NEXRAD data of comparable spatial resolution. The AMSU precipitation retrievals are trained using separate NEXRAD data as ground truth, so any systematic NEXRAD biases may be duplicated, although AMSU appears to be more sensitive to extremely light rain. In addition, analyses comparing certain 54, 89, and 183-GHz channels suggest a sensitivity to graupel particle size distributions in the tops of significant convective systems, which may be linked to vertical wind distributions.