## Abstract Title

Implementation of Passive Microwave Radiative Transfer Simulation Consistent with Various Multimoment Bulk Microphysics Parameterizations


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## Abstract Text


Passive microwave radiation interacting with cloud- and precipitation-related particles relies heavily on the microphysical assumptions (species, particle size distributions, and densities) in the radiative transfer process. Frozen hydrometeors, including snow and graupel particles, are especially important factors in determining the amount of scattering occurring in high-frequency channels. Recently, in order to simulate the realistic distribution of the frozen hydrometeors, several researchers have proposed various multimoment microphysics parameterization schemes (WDM6, Morrison, Thompson, and P3), ultimately aiming to gain more accurate surface rainfall intensity. Accordingly, the need for research on their effectiveness from the perspective of the passive microwave radiative signatures has increased. Herein, we created a new Mie scattering look-up table ensuring the same microphysical assumption as the model providing the input profile, and simulated microwave brightness temperatures (TBs) from 37 to 166 GHz channels. Furthermore, the simulated TBs were compared with the global precipitation measurement (GPM) microwave imager (GMI) observations for the tropical cyclone KROSA (2019). We found that P3 ice particles contribute to underestimating the scattering intensity at 89 GHz channel and above despite its sophisticated microphysical assumptions, while the Thompson snow particles contribute to simulating scattering signals similar to the observation. The study introduced a method for implementing a microphysical-consistent radiative transfer computation and successfully showed how various microphysical assumptions of clouds can change the passive microwave radiative signatures.



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