

Hail Size Distribution Parameterization: Theoretical Considerations and Application to Radar Retrievals

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Hail formation is one of the characteristic processes occurring within intense convective clouds and is usually associated with heavy rainfall and lightning activity. Hailfall can produce appreciable damage to buildings and automobiles. Therefore, understanding hail characteristics and the underlying physical mechanisms of development is of crucial importance to better represent them in models and to support society in general. A recent study has found that hail particle size distributions can be parameterized with an exponential function (Field et al., 2018), where the parameters are constrained from the hail water content alone. This parameterization is used, together with T-Matrix simulations, to propose a relation between the hail size and the respective backscatter cross-sectional area. The T-Matrix simulations are based on digital 3D scans of collected hail particles, so their shape is realistically reproduced. We propose that the new relation can be used to estimate the reflectivity of a hail volume, which can be applied to radar retrievals to better estimate hail characteristics and potentially improve nowcasting techniques.

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