

## Authors

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Graupel are soft and white millimeter-sized solid particles formed by riming in convective clouds. Although graupels do not have negative impacts at ground level nor for airplanes, graupels are interesting as an indirect indicator of other phenomena. In aviation meteorology, graupel observations are used as an indicator of icing conditions. The ice crystal-graupel collision charging mechanism is important in thunderstorm electrification process. Modern microphysic schemas of small-scale NWP models include graupel, and modelers are always looking for verifying observations.

Graupel is one of the hydrometeor types typically classified in dual-polarization schemas. We have observed the presence of narrow, a few kilometers tall graupel towers in hydrometeor classification products in association with thunderstorms outside of the traditional thunderstorm season.

Systematic identification of these towers is a challenge to radar measurement geometry. In this study, we compared different approaches to visualize hydrometeor classification data in cold-season thunderstorm cases. Catching a feature of small size, short lifetime and relatively fast movement is not easy.