3.1 Predicting ice particle shape evolution in a bulk microphysics scheme.

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A new bulk microphysics scheme that predicts the evolution of ice particle properties, including aspect ratio (shape), mass, number, size, density, and fall speed, has been developed, implemented into WRF (version 3.8.1), and tested. To predict the evolution of ice particle shape, ice is modeled using spheroids. Planar (columnar) particles are parameterized as oblate (prolate) spheroids. Microphysical processes (e.g. vapor growth, riming, melting) determine how ice particle shape and other ice particle properties evolve. By predicting ice particle shape evolution during riming, ice particles can transition from (non-spherical) unrimed ice to partially rimed ice, to (quasi-spherical) graupel in the microphysics scheme without the need for separate snow and graupel categories. Benefits of the microphysics schemes determined from recent tests using both idealized frameworks and real WRF simulations will be discussed along with capabilities of the model.