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A new 2-moment microphysical scheme for studying hail initiation and growth: schemes comparison

Marie Taufour[1] and Chien Wang[1,2]
[1]Université Paul Sabatier, observatoire midi pyrénées, laboratoire d'aérologie, France (marie.taufour@aero.obs-mip.fr)
[2]Center for Global Change Science, MIT

Southwestern France is an important wine region where hail-producing storms could cause considerable economic loss. To study the initiation and growth of hailstone, a new microphysical scheme based on the LIMA (Liquid, Ice, Multiple Aerosols, Vié et al., 2016) has been developed. The original LIMA only contains two-moment scheme for rain water, cloud water, and ice crystal. Whereas, the other ice hydrometeors are described by a single-moment scheme. The new scheme adds a full two-moment framework to snow, graupel, and hailstone, thus allowing a better representation of the microphysical processes than the original partial two-moment approach could offer. An idealized severe storm case has been simulated and have been used to evaluate the performance of the single-moment ICE3 scheme, the partial two-moment LIMA scheme, and the new full two-moment scheme in reproducing the evolution of observed hail-producing storm cases. The difference as well as similarity in modeled structures of the storms including hailstone development by different microphysics schemes and using different aerosol loadings are examined and will be presented.