Evaluating the new Aerosol–aware & Hail Thompson microphysics scheme on hailstorm and hail prediction

Hailstorms pose significant threats to lives and property as severe weather systems. In the latest release of the WRF model (version 4.5), a new Aerosol-Aware & Hail Thompson scheme (option 38) has been introduced to the microphysics family. This scheme offers advanced features for hail parameterization, predicting two-moment hail/graupel with variable ice density. Our study aims to utilize this new scheme to simulate a typical hailstorm that occurred on September 4, 2020, in Shandong Province, China. We will compare the performance of the new Thompson scheme with the WRF double-moment 7-class, the original Aerosol-Aware Thompson, and the National Taiwan University triple-moment schemes regarding hailstorm and hail prediction. The hail-related microphysical processes and properties across the four bulk schemes will be investigated. Specifically, we will assess the intensification, cold pool features, and propagation of the hailstorm, the location of hail events, and the maximum hail size against composite radar reflectivity. Our objective is to understand the capability of the new scheme in simulating and predicting hail and to comprehend the differences in hail simulation among the schemes.