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EFFECTS OF DIFFERENT REPRESENTATIONS OF AUTOCONVERSION THRESHOLD ON CLOUD-RESOLVING MODEL RESULTS

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ABSTRACT

Autconversion is a key microphysical process that often needs to be parameterized in atmospheric models using bulk microphysical schemes. Accurate parameterization of the autoconversion rate is especially important for modeling stratiform clouds with weak updrafts and for studying aerosol indirect effects. Although great progress has been made over the last few years in improving parameterization of the autoconversion process, the threshold behavior of the autoconversion process has been largely described by ad hoc functions (such as step function in Kessler-type parameterizations and exponential function in Sundqvist-type parameterizations). Furthermore, despite the striking differences among the commonly used ad hoc threshold functions, they have been used quite arbitrarily in modelling studies. In this work, we use a cloud-resolve model to investigate the effects of different representations of threshold functions on the simulated cloud micro- and macro-physical and radiative properties. Their influences on evaluations of aerosol indirect effects are also discussed.