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Direct Lagrangian tracking simulations of particles in vertically-developing atmospheric clouds[1] RYO ONISHI, YUICHI KUNISHIMA, Japan Agency for Marine-Earth Science and Technology — We have been developing the Lagrangian Cloud Simulator (LCS), which follows the so-called Euler-Lagrangian framework, where flow motion and scalar transportations (i.e., temperature and humidity) are computed with the Euler method and particle motion with the Lagrangian method. The LCS simulation considers the hydrodynamic interaction between approaching particles for robust collision detection. This leads to reliable simulations of collision growth of cloud droplets. Recently the activation process, in which aerosol particles become tiny liquid droplets, has been implemented in the LCS. The present LCS can therefore consider the whole warm-rain precipitation processes -activation, condensation, collision and drop precipitation. In this talk, after briefly introducing the LCS, we will show kinematic simulations using the LCS for quasi-one dimensional domain, i.e., vertically elongated 3D domain. They are compared with one-dimensional kinematic simulations using a spectral-bin cloud microphysics scheme, which is based on the Euler method. The comparisons show fairly good agreement with small discrepancies, the source of which will be presented. The Lagrangian statistics, obtained for the first time for the vertical domain, will be the center of discussion.

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