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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Diffusional growth of cloud droplets in homogeneous isotropic turbulence: DNS, scaled-up DNS, and stochastic model" *by* Lois Thomas et al.

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Responses to the 2nd comments f the Referee #2.

The reviewer clarifies his/her previous comments. Here are our responses.

1. The issue of the droplet growth equation. As in many studies, we apply a droplet growth equation as dr/dt = KS/r, that is, neglecting molecular, curvature, and solute effects. This is justified by the size of droplets we consider. The constant K does depend on molecular water vapor diffusivity and thermal conductivity, as well as local temperature. Lanotte et al. (2009) include such dependencies, but we do not think it

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is necessary, see discussion below eq. 1 in Vaillancourt et al. (2001). This is why K is taken as a constant in our simulations. The point is that droplets grow as they do in natural turbulent clouds in response to vertical velocity fluctuations in large eddies, of the scale meters and tens of meters.

2. This comment introduces cases A, B and C. A and B are real DNS with 1 and 10 m**3 domains, respectively, whereas C is the scaled-up DNS with a 10 m**3 domain. A and C are included in the paper, and the reviewer wonders about B. Unfortunately, 10 m**3 domain corresponds to a roughly 2000**3 DNS calculation and it is simply not possible. However, according to scaling in (9) in the paper, B would have about 4.6 higher TKE than A. C, the scaled-up DNS, would have slightly smaller TKE than B. Similar comparison is done for domains of 0.512**3 m**3 and 1.024**3 m**3, see Fig. 3 and its discussion.

We appreciate positive thoughts in the final paragraph of the second comment.

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