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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The validity of the kinetic collection equation revisited" *by* L. Alfonso et al.

Anonymous Referee #2

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General Comment

This work is essentially an extension of previous research on the validity of the kinetic collection equation (KCE, e.g., Drake 1972, Gillespie 1975 and Inaba et al., 1999) by examining the so-called breakdown time of KCE by applying Monte Carlo simulations to the stochastic collection with specific collection kernels. Although little new is provided, I recommend publication of this paper after some revision considering the following: (1) The issue of the stochastic incompleteness of KCE has been underinvestigated, and a new attempt will hopefully rekindle this important topic; (2) Although it is largely a reproduction of previous work, some results and the discussion shed new light on rain formation; (3) The analogy with other fields such as condensed matter physics and astrophysics is encouraging.

Specific Comments

1. In the middle of P13745, the authors state "As pointed out by Inaba et al., (1999), the time of the maximum depends on the functional form of the collision kernel. For other type of kernels

the maximum will be obtained for different exponents (?) of the total mass of the system MT ...". However, no estimates of ? are provided. I strongly suggest that values of ? are estimated and provided, for the kernels studied at least. Otherwise, it is hard for me to recommend publication of this paper, even considering the 3 points listed above.

2. The word "moment" has been used until P13742 without telling the moment is with respect to what size distributions, for example, to mass or size distributions? This should be fixed.

3. The generic words "deterministic laws" used in P13735, P13742 is better replaced with the KCE.

4. Under Eq. (13), P13741: be specific about the droplet size, and the sentence becomes "when the radius of the largest colliding drops is smaller than 50 um".

5. P13742, pls define N0.

6. P13743, MT should be the total mass of droplet population instead of the system?

7. P13744, suggest using a different symbol for the relative dispersion sigma_L as sigma has been often used to denote standard deviation. On the same page, the sentence "In order to check ..." is incomplete, and seems to belong to the first sentence of the following paragraph.

8. P13746, pls define xi. I do not understand the meaning and purpose of the paragraph "In order to perform ..." Please clarify or delete it.

9. In the last paragraph, the authors discuss the analogy of rain formation with the sol-gel phase transition. Other studies along similar lines, for example, McGraw and Liu (2003, Physical Rev. letter, Physical Rev E, 2004), should be compared and contrasted here.

10. The paper is not easy to read; pls improve English presentation.

11. The first reference (Aldous 1997) was published in 1999. Pls list it as a formal ref. instead of giving the website.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 13733, 2007.

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