

Interactive comment on “The effects of aerosols on precipitation and dimensions of subtropical clouds; a sensitivity study using a numerical cloud model” by A. Teller and Z. Levin

Anonymous Referee #1

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General Comments:

In this manuscript, the authors investigated the effects of increase in Cloud Condensation Nuclei (CCN), giant CCN, and Ice Nuclei (IN) on development of precipitation and cloud macro structure in mixed-phase convective clouds. The topic is directly related to the indirect effect of aerosol on climate, the latter is still one of the most uncertain factors in climate prediction. Therefore, this paper is well within the scope of ACP and will be an important contribution to the aerosol-cloud-climate research community. The manuscript is well written except that some essential information has been missing

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which is raised in specific comments below.

Specific Comments:

To properly simulate the effect of CCN, it is important to calculate the initial growth of aerosol particles precisely. Such information should be provided in more detail.

The following points should also be considered in revision:

1. In the title, “; a” should be changed to “: A”.
2. Page 7214, last sentence of second paragraph: Yin et al. (2000) paper should be referred since it is also a major contribution to the study of the effect of GCCN on convective clouds.
3. Page 7218, first paragraph: Most part of the text refers to changes in CCN properties but Figure 1 shows the initial aerosol distributions. How much fraction of aerosol is hygroscopic and can be considered as CCN? What chemical components are assumed for GCCN? Are they 100% water-soluble?
4. Page 7219, last sentence: The work by Yin et al. (2000) and Reisin et al. (1998) are irrelevant to artificial IN seeding.
5. Page 7227, 2nd paragraph: the sentence “In clean clouds, the large water drops produced by the few GCCN mainly contribute to the production of graupel particles” is contradictory with the statement that GCCN have no effect on precipitation in clean clouds.
6. The colour of Figure 5 is too light and the labels cannot be distinguished.
7. In Figs. 6-10, some of the labels of the vertical axis are incorrect, and the indexes are too small. Why Fig. 7(a) and (c) show the case for CCN number of 90 per cc while Fig. 7(b) and (d) show those for 100 per cc? Similar questions are also applied to Fig. 9 in which CCN concentration of 1350 and 1370 per cc are shown.

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