Atmos. Chem. Phys. Discuss., 9, C10327–C10329, 2010
www.atmos-chem-phys-discuss.net/9/C10327/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effect of hygroscopic seeding on warm rain clouds – numerical study using a hybrid cloud microphysical model" *by* N. Kuba and M. Murakami

N. Kuba and M. Murakami

kuba@jamstec.go.jp

Received and published: 1 February 2010

About chemical component of BGCCN

We would like to show the results of the simulations using (NH4)2SO4 as BGCCN. Figure shows accumulated surface rainfall for non-seeded case (red solid line) and for seeded case with hygroscopic particles (up to 25 micron, 970 cm-3) from flare (red broken line). For comparison, the results of the simulations using NaCl as BGCCN are also shown in black lines, which are the same as those shown in Fig. 12b. These results show that the hygroscopicity becomes weak by changing the chemical composition of CCN from NaCl to (NH4)2SO4, which decreases the number concentration of

activated droplets, and consequently increases the accumulated surface precipitation. Hygroscopic flare seeding leads to less positive effect in early stage and more negative effect in late stage. However, the conclusions would not change in qualitative sense even if we assume sulfate as BGCCN. The difference in chemical compositions (NaCl vs. (NH4)2SO4) is roughly correspondent to 20% difference in size of dry aerosol particles with the same chemical composition in term of critical supersaturation with respect to water. But natural variability in atmospheric aerosol size distributions (aerosol sizes and number concentrations) has larger effects than the difference in chemical composition does. Therefore, in the future, it is desired to evaluate the seeding effect by the numerical simulation using aerosol size distributions (or CCN activation spectra) observed in the target area.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24145, 2009.

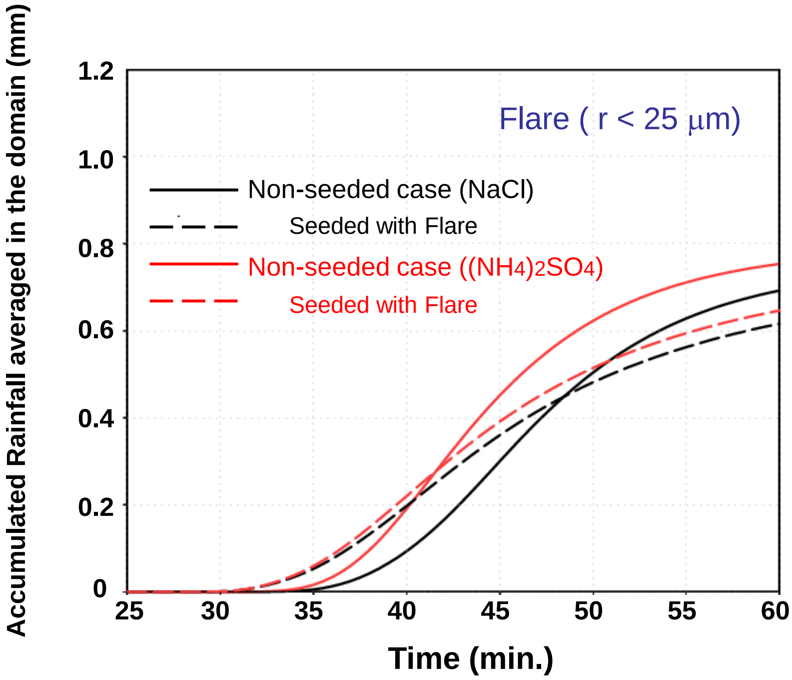
Flare (r < 25 µm)
Non-seeded case (NaCl)
Seeded with Flare
Non-seeded case ((NH4)2SO4)
Seeded with Flare
Accumulated Rainfall averaged in the domain (mm)
1.2
1.0
0.8
0.6
0.4
0.2
0
25
30
35
40
45
50
55
60
Time (min.)

Fig. 1.