

**Review of “Is increasing ice crystal sedimentation velocity in geoengineering simulations a good proxy for cirrus cloud seeding? By Gasparini et al.**

This is a well written paper. I have a few suggestions to help to clarify it, however.

Page 2, Sentence lines 19, 20: The idea that cirrus seeding does not influence the IC that nucleated at temperatures between 0 and -35 degrees seem wrong, since you state in abstract that ice seeding modifies liquid clouds.

Page 3, Line 27: what is the radius associated with a 2 m/s sedimentation velocity. This must be outside of the normal realistic range as shown in Fig 1.

Page 4, Line 6, 7: please explain why you consider this a “problem”. Were there inaccuracies within the calculation?

Page 4, line 28: replace: “decreases for about” to “decreases by about”

Page 5, line 6: “15-20% smaller radiation effect decrease: smaller than VELmax, but not smaller than VEL8. Please be specific.

Page 5, line 5: this seems to say that the total CRE is 1 W/m<sup>2</sup> during the day. Really?

Page 5, line 6-8: I’m not sre what you are saying here. cCRE in Table 3 is 4.35 W/m<sup>2</sup>. Is this 50% smaller than that in REF? Please add values for REF in Table 3.

Page 6 line 22: a lifetime of a couple of hours seems small. Are there observations to examine whether this number is reasonable?

Page 7 line 1, 2: In the model description section you need to specify how cloud cover is calculated. Is it just related to relative humidity?

Page 7: lines 4 – 6: “where the IC sedimentation velocity is restored to the reference values.” Doesn’t this assumption essentially change the removal treatment for cirrus? Is this a common assumption in models that alter the sedimentation velocity to simulate geoengineering?

Page 7, line 23: “in Vel2 all cirrus IC sediment regardless of their origin”. So you are not applying the 2 m/s sedimentation only to the added INP for geoengineering?

Page 8 lines 3,4: Are you surmising that these changes are responsible for increases in ICNC due to detrainment? i.e. you do not show this, so how do you know?

Page 8, line 8, 9: Why does an increase in convective activity lead to a decrease in CDNC?

Page 8, line 13-15: Why is CDNC higher in mixed phase cloud?

Page 8, line 31: “T anomalies follow cCRE anomalies” Not in general true, since you do not see warm pool anomalies.

Page 10: line 10: Why do change in tropical convection lead to a large number of small IC and an increase in ICNC?

Page 10, line 14: replace “on some climatic” with “for some climatic”

Page 11, line 24 – 26: Zhou and Penner, JGR, 2014 show different model assumptions that are used to describe the number of homogeneous and heterogeneous particles.

Page 11, line 28: what is the “inhomogeneity parameter for ice clouds”

Page 11: last line: what does “to which fraction of the total cirrus CRE this radiative anomaly corresponds” mean? The fraction due to liquid or mixed phase clouds?

Figure 2: Please explain why CRE is not the same as the net (all sky) results. Also, why does it switch from higher than net to lower than net?

Table 1: please write out what MLO means within the table (as well as in text).

Table 5: Please add a description of how  $\Delta_{mp}CRE$ ,  $\Delta_cCRE$ ,  $\Delta_{liq}CRE$  are computed within text.