Review of

Accelerated impact of airborne glaciogenic seeding of stratiform clouds by turbulence

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Glaciogenic cloud seeding is studied through numerical simulations of a case study of a shallow, stratiform cloud comprised of supercooled liquid water. WRF LES is employed for these simulations with a fast spectral bin microphysics scheme. Four simulations are undertaken to test the relative importance of turbulence generated by vertical winds shear (control vs enhanced) and the concentration of the released AgI seeding agent (control vs enhanced).

The primary conclusion highlights the importance of enhanced turbulence in accelerating glaciogenic seeding in comparison to enhanced AgI concentrations.

The paper is, in general, well-written with appropriate figures laid out in the logical manner. The literature review/introduction was particularly well done. I did find the writing to be fairly repetitive, especially with respect to the effect of turbulence through the results, enough so that I am specifically commenting about it. At other points, I thought some material was missing, as detailed below.

I respect and appreciate that the author readily acknowledges the inherit sensitivity of weather modification to the specific meteorology/event, what works in this case study may not work for a different event.

The majority of my comments pertain to further clarification of the work and assumptions rather than making new simulations. As such I consider the comments to be minor in nature.

Comments:

Why do you want to run in two different times, with the case study being in UTC and the simulations being in model time? This made it more difficult to go back and forth between the two. Does seeding at 2:00 MT correspond to ~ 8:00 UTC? Does this mean the simulations are spun up for two hours, rather than one? Given that 8:45 UTC is 16:45 CST, would the local time be around local dusk for January, which is why the visible image has no colour?

Figure 1: Given that the simulations only go up to 3 km, I'd rather see the MSLP and surface temperature rather than the 500 hPa geopotential height. In particular, I'd like to know more about the boundary layer stability and boundary layer dynamics, beyond "quiescent and stably stratified". Do we have warm air advection or cold air advection? The satellite

imagery suggests that this solid SLW cloud layer is moving up from the south, as discussed in the manuscript.

Figure 3: When and where was the sounding taken? Was this from the seeding aircraft or an upper air sounding?

I am confused between Figure 5, which has a steady cloud comprised of SLW, and Figure 7, which has ice going to the surface and Figure 8, which has the cloud water mixing ratio diminishing through the simulation. That is directly at odds with Figure 5. I assume that this is a consequence of this being 'the control simulation without natural ice simulation' while Figures 7 & 8 allow natural ice nucleation. This needs to be explained in much greater detail. Would a true 'control' run (i.e., no enhanced shear and no seeding at all) glaciate just like the NOSEED areas in Figure 7? Is the reflectivity in Figure 7 being caused by ice failing below the cloud deck? I assume this does not match reality. What does this suggest about the formation of ice in the simulations? It would be best not to gloss over this.

Line 245: magenta lines? The magenta line is at the inversion and is clearly visible at 4:00 MT.

I am 90% confident that SEED area refers to the two primary red streaks in Figure 7 and NOSEED refers to everything else. I think, however, a couple of arrows pointing to what you are calling SEED would be very helpful.

Given that there is no source of water (latent heat flux) in the simulations, it seems obvious to me that any enhancement of precipitation upwind will require less precipitation at some point downwind. (I.e., robbing Peter to pay Paul.) This is just a statement of the conservation of water. If the simulation was run longer and the domain was bigger, I would expect to see the same thing for the non-shear cases. Am I mistaken? Ultimately, I don't think you can really address this questions using LES simulations with periodic boundary conditions. Once the precipitation reaches the surface, it's gone.