Review of "In-cloud characteristics observed in US Northeast and Midwest non-orographic winter storms with implications for ice particle mass growth and residence time", by Allen and coauthors, egusphere-2024-3808.

Characterizing the horizontal scales and vertical motions in wintertime precipitating clouds, snow generation in snowbands and generating cells are an important research topic. This study aims to address these areas using a comprehensive data set from three IMPACTS field campaigns (east coast and Midwest US) and the more limited data from the PLOWS (Midwest US) campaign. The main takeaways for me are that the horizontal scales of updrafts are small compared to the broader regions of snowfall, vertical motions are more likely near cloud top, the updrafts are primarily associated with generating cells and snowbands, and the RH_i is close to 100%. What are not considered are the weaker updrafts, <0.25 m/s, that might well support much of the ice particle growth. A model could be used to estimate how much of the total water vapor mass upward flux is due to sub 0.5 m/s updrafts.

General Comments

Please comment on whether ice particle growth can largely be ignored outside of the strong updraft regions. Whether there is greater contributions to the total storm precipitation from the strong updrafts versus the weaker but more expansive regions.

Given the vertical velocity measurement accuracy, you are not measuring <20 cm/s updrafts. These can be significant in providing an upward flux of moisture for particle growth downwards.

Lines 220-221. precipitation size ice particles. According to the AMS Glossary of Meteorology, frozen precipitation: *Any form of precipitation that reaches the ground in frozen form, that is, snow, snow pellets, snow grains, ice crystals, ice pellets, and hail.* With 0.5 m/s threshold, how much precipitation would you be missing (percentage wise). Lines 423-424 These results show that the types of winter storms sampled by IMPACTS and PLOWS (extratropical cyclones, e.g., Nor'easters, Alberta clippers, and Great Plains cyclones) contain mostly weak vertical motions incapable of lofting precipitation-size ice.). Lines 423-424 These results show that the types of winter storms sampled by IMPACTS and PLOWS (extratropical cyclones, e.g., Nor'easters, Alberta clippers, and Great Plains cyclones) contain mostly weak vertical motions incapable of lofting precipitation-size ice.
Please comment on the size range of particles that may be lofted at 0.5 m/s. This would provide an upper limit for the sizes that may be lofted.

I suggest adding a figure showing the distribution of temperatures sampled for IMPACTS and PLOWS

Should the measured updrafts be called flight segments (which they are) or envelopes (how do you know)?

Are the TAMMS inlets subject to icing and therefore error?

Lines 450-456. This is superfluous and should be removed.

Minor Comments

37 gravity waves

44. timescale of snow. From when. From its nucleation through to ...?

47. begins to fall. It's always falling during its growth, because it has a terminal velocity. It may not fall through the updraft. So, fall>fallout

51. "fall" to "fallout"

Fall speed should be "terminal velocity". fall speed is the net (updraft velocity-terminal velocity).

197. Should be University of North Dakota and NCAR

202. Fig. 5. Note in the text that this figure will be discussed in more detail later

Fig. 5 If you're using all channels of the 2D-S probe, because of uncertainty in the sample volume of the particles in the bins for the small particles, it's an overestimate because some of the particles may be drops, shattering affecting the concentration and uncertainties in the sample volume for the small particles.

314. RH_{Water} >100% is extremely unlikely if not impossible, especially at these vertical velocities.

379-380. Saturation with respect to water not ice

399-407 This is an excellent paragraph

444. and aggregation

Figure 11 multiple ice growth. A better description is needed. Figure 11: <-22C

450-456. This is superfluous and should be removed.

463-470. This part of the paragraph is superfluous and should be removed.