

The authors have provided good responses to most of the reviewers' comments and have made appropriate changes to most of the manuscript. There remains some speculation that should be stated as such. Details are given in the comments below.

Some of the responses to reviewers' comments require clarification.

There are several instances where the English text could be improved upon. Many of the mistakes come from incorrect word use.

Comments on responses to the Reviewer 2's comments

Line 99 *Is the spatial resolution of 1km in the horizontal? If yes, what is the vertical resolution at the typical aircraft location?*

What does it mean that the vertical resolution of the radar profile along flight track is 30 m (Fig. 4)? Has interpolation been done? The beam width will be significant at a range of 50-200 km.

Line 217 and the INP spectra in Fig S6 *Is this calculated from the Equation on page 4 using the PCASP aerosol concentration measured, and then increased by a factor of 10 to account for uncertainty in the measurements of Demott? And does it therefore represent a likely upper limit on primary INP concentrations?*

Make it clear in Figure S7 caption that the number concentration has been multiplied by a factor of 10 ... "to represent a likely upper limit on primary INP concentrations"?

Line 233 *but you do not know where this ice was generated and if it had been transported from other parts of the cloud e.g. that could have been in the H-M zone.*

Has there been any change to the text in response to this comment? It isn't clear what is meant by observing "a net production of ice."

Comments on the revised paper

Line 253 *However, the dynamic vertical or horizontal transported of produced ice might induce some uncertainty when evaluating the concentration at the supposed same aircraft position.*

This does not describe the problem. It would be useful to describe a possible scenario of ice being transported from e.g near cloud top by the circulations in convective thermals.

Line 260 *Although the average temperature of P2.1 was as low as -11.7C the abundant large ice particles triggered the active SIP process at P2.1 with high NIce about 300 L-1, indicating that the SIP process was not restricted by temperature.*

This is speculation. There is no direct evidence that the large ice particles triggered the active SIP process. The fact that there is a high concentration of ice particles may be due to vertical and/or horizontal transport previous to the time the pass was made.

Line 262 Similarly, the history of development leading to the cloud regions in P2.2 and P2.3 cannot be determined, can it? I suggest that sentence be modified or deleted.

Line 265 *Aircraft penetrated the cloud-top at P4.3, where several primary ice particles could be observed (Fig. 7c).*

It can only be speculation that these are primary ice particles.

Line 269 *The size spectrum and 2D-S images in Fig. 7c showed that large ice presented at P4.1, and ice grew through riming and Bergeron processes, while the ice at P4.2 was mainly smaller ice, which was still in the process of growth.*

Again, it is speculation that the smaller ice was still in the process of growth. Also, the wording of the first part of the sentence should be corrected.

Line 272 *The large ice falling from the upper layer played a very important role in ice production process, the primary ice crystals formed through the nucleation process and grew up in the upper layer or during the fall, then fell to the lower layer to trigger the ice production process.*

This should be stated as the likely or possible process.

Line 276 *There was a positive correlation between NIce and NRound, where more large droplets generally corresponded to a higher NIce.*

Considering Reviewer 2's comment: 'There are many examples of out-of-focus drops (circles with holes in the centre). How were these handled in the processing of 2DS data. And the authors' response: 'The out-of-focus round particles have been corrected following the method by Korolev (2007) during data processing.'

How are the out-of-focus non-circular images handled? Is it possible that many of the images with holes are not drops, but larger out-of-focus ice particles?

Line 303 *"...but may not be directly associated with *the current* updraft strength or turbulence."*

Line 308 *This suggested the DCT tended to be a more important factor than temperature.*

It is possible of course that the cloud top had ascended to a greater altitude, but then collapsed by the time of the observation.

It seems wrong to say that DCT is more important than temperature in the HM temperature zone. Most likely they are of similar importance.

Figure 10 *Is it not likely that graupel particles will pass through the HM zone in Mature cells and so SIP will occur in the HM zone? It should be emphasised that the discussion on p10 that concerns Fig 10 is a possible scenario (or likely?). There is no direct evidence.*

Line 391 *The seeder-feeder process was found...*

It is only a possible explanation.