REPLY to REVIEWER 1

We thank the reviewer for their review and their detailed comments.

All figures have been updated so that the colour schemes used in our maps and charts allow readers with colour vision deficiencies to correctly interpret our findings.

Below you will find the reviewer's comment in bold and our reply.

L210- 215. When you say "This number of sampling points (which will correspond to a given acquisition calibration period) is increased to assess the impact that the number of calibrating points has in reducing the sampling noise. The exercise is then repeated multiple times (thus involving different orbits or different segments of the same orbit) to find an ensemble of such PDF pairs". It is not clear to me if you also perform a reshuffle of the starting points of the "delta_s" sequence within a given orbit. (To explain me better, look for example at Figure 4 right panel. If in that figure the sequence of the blue and black vertical boxes starts around 8.75 deg Latitude instead of 8.4 deg, you will have a completely different set of calibrating points in that particular case).

Yes, this is exactly what we have done. Indeed we repeat that procedure also changing the starting points of the "Δs" sequence within a given orbit. This has been explained in the text

REPLY to REVIEWER 2

We thank the reviewer for their review and their detailed comments.

Below you will find the reviewer's comment in bold and our reply.

I would ask for is a single sentence clarifying the use of the term "ice cloud bins" from the usual understanding of "radar range bin". Specifically, the ice bins in this text are assumed to be horizontally uniform vertical slices that extended throughout the 2 x 2 deg cell, with a depth of 500 m. While a radar range bin has a horizontal extent of (typically) a few kilometers, and a range extent given by the radar range resolution.

We use the terms "ice cloud bins" or "ice cloud radar range bins" to indicate a (500 m) radar range bin that contains an ice cloud. In Figure 5, in each 2x2deg pixel is shown the mean number of 500m thick ice cloud radar range bins per profile sampled in that pixel. The term "per profile" was missing and should explain the meaning of this quantity. This has now been amended in the text and in all labels of figures. For example, if in a given 2x2deg cell the mean number of 500m thick ice cloud radar range bins per profile is 1, it means that for any vertical profile collected in that region, an average of one 500m thick ice cloud radar range bin will be detected.

In the new text at the beginning of Section 2.3, there is discussion of 5-km-thick layers that are used for PDF generation, suggesting the that 5-km extent lies in the vertical direction. Isn't the 5 km number referring to the along-track sampling distance? Yes, thanks for highlighting this imprecision. "5 km" is referred to the along-track sampling distance and the horizontal width of the sampled vertical slice. When referring to this quantity, at the beginning of Section 2.3 we now changed in the text "5-km thick layers" with "5km-wide vertical slices".