

Response to Reviewer #1 of egusphere-2026-1453

Dear Reviewer #1,

Thank you very much for re-reviewing our paper. We have revised the manuscript based on reviewer's comments with point-by-point responses to your comments. We believe that the revision appropriately addresses your comments, and hope that the revised manuscript now deserves to be published in *Atmospheric Measurement Techniques*.

[RC]: Reviewer's comment

[AC]: Author's comment

[RC1]: *Fig4: I still do not see the scope of this figure. It does not add much to me to the overall content.*

[AC1]: Thank you for your comment. Figure 4 is intended to help assess whether the differences among operational modes are spatially localized or systematically present across a wide range of cloud conditions. This explanation has been added to the manuscript (Lines 242-244 in the track-changed manuscript). In addition, Fig. 4 shows that the larger STDs associated with the low-PRF mode are systematically observed across most cloud regions. This point has been clarified as follows:

- Lines 259-260 in the track-changed manuscript:
“The spatially coherent enhancement of STD in the low PRF mode across most cloud regions suggests that the larger STDs are not driven by a particular latitude or altitude range but represent a systematic characteristic of the lower-PRF configuration.”

[RC2]: *Fig5: second row, unclear what this Delta Std is. Please specify in the caption (refer to Eq5).*

[AC2]: Thank you for your comment. We have added an explanation of what “Delta STD” is as follows:

- Lines 331-333 in the track-changed manuscript:

“The second row shows ΔSTD , defined as Eqs. (5) and (6), which represent the difference in random Doppler velocity uncertainty relative to the 16-km mode, thereby removing the common contribution from natural variability.”

In addition, we have changed the panel titles in Figs. 4c and 4d from “Delta STD” to “ ΔSTD ”, to ensure consistency with the notation used in Eqs. (5) and (6).

[RC3]: Line 297: “exception is found at -20 dBZ for...”, this is quite weird and the justification that is given is not very plausible (you can easily test it). Are we sure the estimate of the SNR 0dB level is correct? A small shift of that could easily explain the issue.

[AC3]: Thank you for your comment. We agree that the previous explanation was insufficient to account for the inconsistency. We confirmed that the estimated SNR = 0 dB level is correct, indicating that the discrepancy cannot be explained by an incorrect SNR threshold. We therefore recalculated the theoretical Doppler velocity errors using the actual operational PRF values recorded in the CPR L1b product, rather than assuming a fixed PRF. The revised theoretical estimates are lower than those obtained previously and are now generally smaller than the observed STDs, as expected. We would also like to apologize for a mistake in the binning procedure used in the original manuscript. In the previous version, each sample was assigned to the lower 5-dBZ interval. For example, values in the range of $[-20, -15)$ dBZ were assigned to the -20 dBZ bin. In the revised manuscript, each sample is assigned to the nearest 5-dBZ bin center. Thus, values from -22.5 to -17.5 dBZ are assigned to the -20 dBZ bin, whereas values from -17.5 dBZ to -12.5 dBZ is assigned to the -15 dBZ bin. This error was a major factor contributing to the inconsistency between the theoretical estimates and the observed values.

Accordingly, we have revised Fig. 5 and Table 2 and modified the manuscript as follows:

- Lines 289-292 in the track-changed manuscript:
“For these theoretical calculations, the PRF used in the calculation was based on the actual operational values recorded in the CPR L1b one-sensor NOM product, version Da (JAXA, 2024a)”
- Removed Lines 296-298 in the track-changed manuscript:
“One exception is found...”

- Lines 314-317 in the track-changed manuscript:

“Figures. 5c and 5d show that the 20-km mode produces substantially larger STD differences (1.54 m s^{-1} and 1.17 m s^{-1} at -20 dBZ for 1-km and 10-km integrations, respectively), whereas the 18-km mode exhibits much smaller STD differences (0.69 m s^{-1} and 0.41 m s^{-1} at -20 dBZ for 1-km and 10-km integrations, respectively).”

[RC4]: *Fig.5: third row. I am not sure this is necessary (also Eq7-8) It can easily be said in words. It only add panels to the figure without real content.*

[AC4]: Since Figs. 5c and 5d already provide sufficient information on the differences in Doppler measurement performance among the operational modes, we agree with your opinion and have removed the RD panels from Fig. 5 and deleted Eqs. (7) and (8).

[RC5]: *Fig8-9: “Mirror” still present in titles of panels. Replace with “second trip”.*

[AC5]: Thank you for your comment. We have revised the panel titles in Figs. 8d–8f, replacing “Mirror” with “Second Trip Echo”. The title of Fig. 9b had already been corrected in the previous manuscript.