ANSWER TO REVIEWER

Manuscript egusphere-2025-1914 ”First insights into deep convection by the Doppler velocity measurements of the Earth- CARE’s Cloud Profiling Radar”

This article describes an analysis of convective events as observed by the radar of the ESA/JAXA EarthCARE mission. This radar uses a novel technology in space, which is its Doppler capability. The authors do a great job of

1) illustrating the quality of the EarthCARE observations and

2) tying radar observations to underlying atmospheric dynamics.

The Authors' expertise allows them to juggle between data products and select the most appropriate to analyze various aspects of convection.

The task at hand is challenging because vigorous convection often means significant attenuation, large velocities that are aliased, multiple-scattering etc., especially at millimeter wavelengths like the one of EarthCARE's radar.

We thank the reviewer for their careful reading of the manuscript and for the thoughtful and constructive comments, which helped us improve the clarity and focus of the paper.

I suggest major revisions of the article before it can be published. This is motivated by the fact that

- the article is quite long (Section 2 should be subdivided and unnecessary material should be left out).

- there is some work needed in terms of editing to avoid distracting the reader from the main message of your article (such distractions are unfortunate because you obviously did a lot of good work!).

For instance Lines 204-224 are really well written. Could you maintain that standard throughout the article, or have that co-author re-read the article?

We will work on shortening Section 2 by splitting it into subsections and removing sentences that are not essential to understanding the topic. In addition, to reduce the overall length of the manuscript, all co-authors will re-read the text to improve its focus and avoid unnecessary digressions.

While I appreciate your use of radar and GEO data, I would recommend also using reanalysis data from ECMWF. In particular, it would be interesting to see if the height of the 0C isotherm is consistent with the melting layer that you observe, and if the ERA5 vertical wind has any updraft.

In convective scenes, due to attenuation and multiple scattering, it is not possible to clearly identify the melting layer. Therefore, the 0 °C isotherm from ECMWF was used as a proxy to define the level below which Doppler velocities can reasonably be assumed to be dominated by sedimentation.

We believe a comparison with ERA5 data would not be particularly meaningful for the following reasons:

- The spatial resolution of reanalysis data is too coarse compared to EarthCARE observations.
- A key strength of the EarthCARE mission is its ability to investigate atmospheric dynamics at very high spatial resolution, capturing processes that were previously unresolved by both satellite and ground-based instruments.
- In convective systems, updrafts are expected to occur on sub-kilometer scales. While dealiasing Doppler measurements at this resolution is indeed challenging, ERA5 simply cannot resolve such fine-scale dynamics.

Also, I would suggest combining Figs 7 & 8: they are great but having to flip back and forth between them was yet another distraction from the precious scientific content of your article.

Thank you also for the suggestion to merge figures; we agree that this will help improve the clarity and coherence of the case study presentation.

Lastly, this is just a convention, but could you please consider showing downward motion as negative velocities? That prevents mental exercises to interpret the Doppler observations.

As is conventional for spaceborne radar measurements, positive Doppler velocity indicates particles falling toward the ground. For this reason, we have chosen to retain the current color scale convention.