Review of "A new aggregation and riming discrimination algorithm based on polarimetric weather radars", by Armin Blanke, Mathias Gergely, and Silke Trömel, egusphere-2024-3336.

Response to reviewer 1

Dear reviewer,
We are very grateful for your valuable feedback, which helped us to improve the manuscript. The manuscript has been thoroughly revised. Please find below our response, highlighted in blue. The revised manuscript is also provided with tracked-changes for better clarity.

General comments:

However, the methodology has notable limitations. The algorithm was developed using a limited number of events from a single radar station, which may constrain its generalizability to diverse meteorological settings. Its high sensitivity to input variables, particularly the accurate calibration of ZDR and ρhv, also poses challenges for widespread applicability, especially in operational radar networks outside Germany. These limitations should be explicitly acknowledged in the conclusion, rather than suggesting a direct application to radar networks like NEXRAD in the US without further validation and adaptation.

We thank the reviewer for these important comments and agree that we should be more precise in addressing the limitations mentioned above. It is true that an extension of the training data set by including more radar stations and diverse meteorological settings could enhance the generalizability of the model. This limitation has already been pointed out in lines 446f. However, we extended our previous formulation following your suggestion in order to emphasize it even more and explicitly: 'The algorithm was built on a limited number of training data sets and from the ESS radar only. In the future, a comprehensive climatological training data set that considers more radar stations and an even wider range of meteorological conditions will enable to increase robustness and to further improve the performance of the GBM retrieval'.
Indeed, the accuracy of Z_{DR} and ρ_{HV} is key for the algorithm, as stated in line 445 of the conclusion. Nonetheless, we are convinced that a sufficient calibration accuracy can be achieved, even for radar networks not having a birdbath scan on hand. In fact, this study exploited the Z_H -Z_{DR} relationship for C-band in light rain (Ryzhkov and Zrnić, 2019) instead of the birdbath scan due to the identified elevation dependency (see lines 104ff). The calibration based on the Z_H -Z_{DR} relationship or similar approaches can be achieved in other operational settings as well. Furthermore, we like to mention that despite the increasing use of phase-based measurements (specific attenuation A or specific differential phase K_{DP}), variables based on signal strength and thus affected by biases still provide valuable information and can not be completely avoided (see e.g. hybrid (ice) microphysical retrievals or rainfall retrievals when the radar monitors above the melting layer).
Similarly, we also agree with the referee that application to radar networks such as NEXRAD remains to be investigated and validated in order to assess to what extent an adaptation is needed. We included the need for further validation in our previous formulation in lines 456f: 'The applicability of the algorithm to radars operating at different wavelengths, such as for the operational S-band radar network of the National Weather Service (NWS) in the United States, also remains to be investigated and validated in the future.'

References:

Ryzhkov, Alexander V., and Dušan S. Zrnić. *Radar polarimetry for weather observations*. Vol. 486. Cham, Switzerland: Springer International Publishing, 2019.