Specific comments

The article investigates the impacts of assimilating retrievals of polarimetric radar data on the assimilation cycles as well as on skills of short-term forecasts, using the ICON-D2 KENDA system of DWD. Authors' efforts are greatly appreciated and it is very encouraging to see positive results of this study. However, I have several specific comments for authors to consider:

1. Language: 1) The language is not concise. For instance, at places "Assimilating LWC estimates instead of Z data where possible (CNV+LWC/Z)", "assimilation of IWC instead of Z where possible (CNV+IWC/Z)" and etc. would be enough to use the acronyms of experiments. 2) There are too many acronyms that seriously disturb the readability of the article since it is often difficult to tell what they are associated with, e.g., LC, LH, LV, OE, LS, LL, MV and ect. If they are really necessary (some of them seem not), could you make them more self-explaining or make a list for acronyms. Besides, it is uncommon to call "Data assimilation parameter". "Settings of the data assimilation system" may be more appropriate.

2. Assimilating of Z at the melting layer: 1) It should be noted that attenuation is normally switched on in EMVORADO, but the observations are corrected for attenuation. Authors should check if they are consistent. 2) I assume that the Mie scattering scheme is used here. As shown in Zeng et al. 2022a,b, the default paramertrizations for the melting layer in case of the Mie scheme result in unrealistically high reflectivities around the melting layer. Therefore, it is striking to assimilate Z only around the melting layer, which could be error-prone.

3. As shown in Zeng et al. 2016, Bick et al. 2016, the one produces smaller errors (likely due smaller localization radius, shorter update frequency and etc.) within assimilation cycles may not always win in forecasts, usually because of the imbalance issue that accelerates the error growth. Generally, it is inappropriate to say which one is the best only based on the performance in cycles but without looking at results of forecasts. Therefore, authors should avoid saying, e.g., "most successful assimilation settings", "finding the best DAP sets" and similar phrases. Maximally, it can be said that they result in smallest errors in terms of ...

4. Redundancy in appendix: It is unusual to describe the LETKF, FBI, FSS and BSS in full length since they are well-known. It would be enough to describe them shortly but provide their references.

Minor comments

1. Line 54: the error covariance matrix ==> the background error covariance matrix

2. Line 69: Bonavita et al. 2010 ==> Gastaldo et al. 2021

3. Line 115: EMVORADO may not stand for "Efficient Modular Volume Radar Forward Operator". Please ask Dr. Blahak Ulrich for this.

4. Line 160: reference for one-moment scheme

5. Line 175: Add the inflation method, RTPP and additive noise are applied for inflation.

6. Line 199: Please check if the used radar observations in 2021 are really of radial resolution of 0.25 km.

7. Line 236; The American climatological value 0.02 can be used for German radars?

8. Line 290: The superobbing described in Bick et al. 2016 is a bit outdated, the updated one is given in Zeng et al. 2021.

9. Line 304: better results than what?

10. Line 332: Please provide the frequency of boundary data

11. Line 350: Is the JQS a new metric introduced in the work? If yes, please explain more why this hybrid metric JQS is more interesting or important than FSS and BSS, otherwise, provide the reference.

12. Line 361: How are weights determined?

13. Line 387: Could authors be more specific about "which may be due to discrepancies between true and model microphysics"?

14. Line 485: Remove colors

15. Line 534: Strange phrase "first-guess precipitation forecasts" ==> first-guess of precipitation

Reference

1. Zeng, Yuefei, Yuxuan Feng, Alberto de Lozar, Klaus Stephan, Leonhard Scheck, Kobra Khosravianghadikolaei, and Ulrich Blahak. 2022b: Evaluating Latent-Heat-Nudging Schemes and Radar forward Operator Settings for a

Convective Summer Period over Germany Using the ICON-KENDA System, Remote Sensing, 14, 5295.

2. Zeng, Y. , H. Li, Y. Feng, U. Blahak, A. de Lozar, J. Luo, J. Min, 2022a: Study of Sensitivity of Observation Error Statistics of Doppler Radars to the Radar forward Operator in Convective-Scale Data Assimilation. Remote Sensing, 14, 3685.

3. Zeng, Y., T. Janjic, Y. Feng, U. Blahak, A. de Lozar, E. Bauernschubert, K. Stephan, J. Min, 2021: Interpreting estimated Observation Error Statistics of Weather Radar Measurements using the ICON-LAM-KENDA System, Atmospheric Measurement Techniques, 14, 5735–5756.