The manuscript illustrates the advantage of including G-band radar measurements at 200GHz to retrievals of vertical wind speed and droplet size distribution (DSD) parameters. The authors describe the theoretically expected potential of including G-band measurements; introduce three different retrieval approaches (vertical wind; optimal estimation technique for DSD; Dm through differential Doppler velocity DDV), and evaluate the advantages based on one test case previously described in Courtier et al, 2022. While the presented case study of G-band measurements offers a lot of exciting material for the different retrievals presented, the main messages of the paper need to be strengthened to underline the advantages of the G-band.

General comments:

-GC1: The authors mention often throughout the text that including the G-band to their retrievals improves the retrievals compared to the KaW combination. Yet, I do not think that this message is underlined enough by the presented analysis and choice of figures. I would suggest two things: i) retrieved results including G-band should be compared in more depth to retrieved results using only Ka or W-band; ii) independent measurements should be taken into account to serve as "truth". If independent measurements are not directly available, retrieval results using the different radars could also be compared to each other in forward simulated radar space.

The disdrometer observations are difficult to use as a ground truth in this case. There are several issues with the disdrometer: it has a poor sampling resolution compared to the radar, in order to get a reasonable count it must collect droplets over a length of time typically at least an order of magnitude longer than the averaging time of the radar spectra and most importantly the disdrometer is measuring the DSD at the surface while the radar observations are taken at 450m, this means that even is some adjustment is made based on average drop velocity the disrometer and the radar are not observing the same thing. There are also unfortunately no other radars to compare against in this situation.

We have tried to address the issue of comparison through a more robust inclusion of OE error in the manuscript (in line with GC2), showing the benefit of including the G-band in reducing the error. Together with this we have shown a second example of the DSD retrieval where there is less added benefit from the G-band highlighting the value of it where it is most applicable.

-GC2: The authors base some of their results on the very powerful optimal estimation retrieval tool. Yet, not the full potential is exploited in the current analysis. I would suggest to analyse the advantages of including G-band by making use of eg the aposteriori errors and information content, and to compare these to the setup using conventional Ka-/W-band retrieval. These results should be illustrated in additional figures (also see specific comment on Fig 7 below).

We have changed the a priori meaning that the aposteriori errors are more directly comparable. The aposteriori errors have now been included in the manuscript to illustrate the reduction in error that the G-band retrieval has as compared to the W-Ka band retrieval.

-GC3: All analysis is based on a case study with light rain of 45 minutes in total. The different retrievals are applied to different times within the covered measurement phase. In my opinion, the advantage of including the G-band could be highlighted more by using all three retrievals for the same selected time stamp. This 'golden case' could be used as a synthesis bringing the different retrievals and advantage of the G-band together. It would also be interesting to include two different time stamps with different rainfall intensities to illustrate when the retrieval techniques (and advantages) are most or least beneficial.

We have included a large rain rate case, in the DSD retrieval (only the attenuation and DSD retrievals are done at specific times) to show that if the W-band has data on the vertical wind speed then the added value of the G-band is less. We have not matched the two retrievals time stamps as they both display different characteristics better than the other

The vertical wind speed and Dm (from DDV) retrievals are both done across the whole time series

Specific comments:

- This might be a matter of taste, but I would encourage the authors to embed subsections 1.1-1.3 in the overall introduction text without subsections. Strengths and drawbacks of the different retrievals introduced here should be sharpened to clarify the motivation for the study. The state-of-the-art for optimal estimation applications to retrieve DSDs needs to be added to the introduction. The subsections have been embedded in the overall introduction and the introduction has been updated

- Sec 3.2: The presentation of the numerous different retrievals with each different inputs would benefit from an overview table summarizing each retrieval's method, input measurement, output retrieved variable, reference to each method. This has been added

- Section titles should be chosen more consistently throughout the manuscript to facilitate the readers' orientation. I would suggest to maintain naming the retrieval sections according to what variable is retrieved by what technique, and to keep the titles consistent between Sec. 3.2 and 4. For example, Sec. 3.2.2 could be renamed to 'DSD retrieval using optimal estimation'. A description of the DDV retrieval method should be added to Sec. 3.2. This has been changed and the DDV section added

- L 162: what observations were used to monitor horizontal winds? At what height levels? The horizontal winds were taken from ECMWF model data and were checked at heights relevant to the observations, i.e. <2km

- Fig 5: a panel showing a flag when case studies were suitable to apply retrievals should be added (L162); and if available, a time line of IWV and maybe LWP, or at least state the IWV in the text (L168) to provide a framework of the stated attenuation. In order to compare Ka, W, and G, it would be nice to add a panel illustrating the W-band measurements for this case, and to add a sub-title to each panel clarifying which frequency is shown. Vertical lines or markers should be added at the DSD case study times chosen for Figs 7 and 10 (or the same time stamp could be picked, see GC3). Why are ice cloud features at 4km height more pronounced in G-band at 14:15 – 14:30, when attenuation is stronger in G-band? The W-band was initially not added as it is similar to the Ka-band and we thought it was better to keep the figure concise, it has now been added. The vertical lines when the retrievals were taken have been added to the Figure. The ice cloud features in the Ka-band subplot were removed accidentally in data quality control, this has been rectified.

- L 205: the text should include information on how the covariances were defined in the optimal estimation retrieval. This has been added

- L232: The authors should clarify in the text where they are pointing at in Fig 6b. This has been added

- L236 ff: This assumption should be underlined with an analysis of the existing data. The authors could show an example by eg zooming in on one time stamp (also see GC 3) to illustrate their hypothesis. We could not do a robust comparison of the accuracy of the vertical wind retrieval as we do not have and observational data to verify against. The statement that the retrieval using two Mie notches will be more accurate refers to the fact that the uncertainty is reduced due to multiple measurements. This has been clarified in text.

- Fig 7 b), d): It is unclear from the figure caption which radar is used for the presented retrieved DSDs. Retrieved DSDs seem to be dominated by the prior assumption, with little information from the observations. As stated in GC2, the potential that OE offers to analyse this case in more depth should be used here to clearly state the information gain by the observations compared to the prior (eg Degrees of Freedom for signal; Averaging Kernel; Jacobian), and benefits on retrieved error thanks to addition of the observations. We have updated the OE so that the prior is the same for both the retrievals with and without the G-band, the prior is now the average DSD of the precipitation event, as retrieved by the disdrometer. The benefits of the G-band to the reduction of error is now discussed in the text.

- Fig 9b): statistical measures of the comparison like RMSE, bias, correlation coefficient would highlight the comparison. The Bias and correlation coefficient have been added as annotations to the Figure and are discussed in text

- Sec 4.4 and Fig 10: I would suggest to replace this figure with a plot showing the retrieved time line of LWC, LWP and rainfall (using Ka/W; and including G); or the retrieved LWC profile for a chosen time stamp (also see GC3) in order to underline the statement given in L298 and the section title. The rainfall retrieval could be evaluated with the independent observations given in Fig 5 top panel and illustrated eg in a scatter plot. We have added the LWC profile to Fig 10 and the rainfall retrieval time series in a separate figure

Technical details:

- labels should be added to all colorbars

- keep DSD (instead of PSD) as label for consistency throughout manuscript (eg Fig 7; L258)

- no abbreviations should be used in Section titles (Sec. 3.2.2, 4.2, 4.3)

- readability of the manuscript would benefit from shortening many sentences throughout the manuscript which stretch over multiple lines separated by commas (eg L110, 154, 161, 251).

These details have been corrected as suggested