Interactive comment on "The TRIple-frequency and Polarimetric radar Experiment for improving process observation of winter precipitation" *by* José Dias Neto et al.

Anonymous Referee #4

Received and published: 12 February 2019

General Comment

The manuscript described a multi-frequency radar reflectivity dataset collected at the JuÌLlich ObservatorY for Cloud Evolution core facility (JOYCECF), Germany from November 2015 to January 2016. The dataset is expected to be useful to analyze multi dual frequency ratio (DFR or DWR) for ice clouds to identify ice particle types and ice growth processes. Analyses using the dataset can give unique insight into cloud microphysics and to be valuable for radar and cloud microphysics communities. The data were well calibrated and quantified. The 'Level2' data described in the manuscript are available on the ZENODO website. The manuscript well described the data processing

and quality. The manuscript can be accepted after some minor revisions, but some more information about the observations about the observation and data processing are needed in the manuscript and should be added to the data.

Specific comments

Manuscript

1. Abstract: A sentence in lines 10-11 of abstract "we find very strong aggregation. . ." This should be rephrased carefully, because several previous studies suggested heavy aggregation above melting layer without using DWR (e.g., Ryzhkov et al. 1998). Please specify this is based on large DWR, as mentioned in conclusion (line 7 in p.22 DWRXKa massively increases up to extreme values of 20 dB, which has not been reported so far.). The sentence in the abstract should also follow this conclusion.

2. Section 3.1:

- Did you use IQ signals to change average time and range-gate spacing? I think that pulse width, PRF, and the number of pulse average are important information to justify the data quality and understand error sources.

- How many data pointes were used for the nearest neighbor interpolation?

3. Section 3.2:

- What are the variability of simulated attenuation and the uncertainty in scattering calculation assumptions (T-matrix)? Could you describe how much the variability/uncertainty in the scattering calculation assumptions impact the calculated attenuation?

- Does the quality vary with height? Did you consider radar data sampling volume in the quality?

- I suppose that attenuations by ice hydrometeors and supercooled liquid droplets were not considered. I suggest mentioning thin in the manuscript or data files.

4. Figure:

- Figure 4: I could not clearly see differences between Panel A and Panel D, and Panel B and Panel E. I think that zoom-up plots for 15:00-23:00 would be better.

- Figure 5: Same as Fig. 4. I think that zoom-up plots for 13:00-15:00 would be better.

5. Others: - P. 14, line 9: Should be Z_{dr}.

- What is the LDR limitation value for each radar? - P. 20, line 9: Should be "suggests."

Data 1. Each file has more than 0.5 GB in size. This is not fairly small to promote using the product. Which version of NetCDF was used? I would recommend using NetCDF4, which can save data space very well.

2.   Are you willing to employ the CF-Radial format (https://ral.ucar.edu/projects/titan/docs/radial_formats/CfRadialDoc.pdf)?   I understand that this format may need more variables that are not important for this observation (e.g., azimuth, elevation). But if you think to extend this triple-frequency observation and the datasets to different scan strategies (e.g., slant angle, RHI) and more general radar communities, the CF-Radial format can offer the capability to extend to different observations.

3. Computed attenuation amount at each range gate is also important data. I recommend including the attenuation by hydrometeors (two-way total attenuation or specific attenuation dB/km) in the data files.

4. The initial analysis in the manuscript used temperature information, which is very important additional information to identify ice particle types and particle growth processes. I think that the temperature data should be included in the data files. 5. Pulse width, actual range resolution, range gate spacing, PRF, the number of integration pulses for each radar are also important parameters. I recommend including the information should in the data files.

C3

6. Have the reflectivity data in files been corrected for the systematic offsets mentioned in section 3?

7. Why the many of X-band echo regions were masked compared to Ka/W-band reflectivites?

8. I briefly took a look at the data on Nov. 23. Why did the X-band reflectivity have noisy signatures at lower altitudes? Those signatures were not found in Ka/W-band reflectivities.

9. Why are offset values variable with time in short time periods?

10. What is a variable "nv" in the data files?

C4