

Interactive comment on “Automated rain rate estimates using the Ka-band ARM Zenith Radar (KAZR)” by A. Chandra et al.

Anonymous Referee #1

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1 general comments

The authors present an algorithm for routinely retrieving rain rates from the ARM KAZR radars by combining two methods depending on rain rate. This is an important topic and the presented product is an important contribution to the community. However, I cannot accept the paper in its current form, because in my opinion the presentation of the used methods is not sufficient. I also expect the co-authors to do a better review and more proof reading before submission.

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2 specific comments

p. 1809/1810: I miss a general introduction about the various ways to derive precipitation rates with radars: e.g. Z-R relation, attenuation based, via the Doppler spectrum, polarimetric, etc...

p. 1809/1810: Your introduction deals mainly with the MMCR, but the study is about the KAZR.

p. 1810, l. 5: “Many phenomena” is too vague

p. 1810, l. 12: In section 3.2.2 you say the dynamic range of the KAZR is better than the MMCR. Consequently, how can you apply the product to the MMCR?

p. 1810, l. 16: This sounds like just the acronym was replaced, but it's a new instrument, where is the introduction of the KAZR?

p. 1811: What about describing your main instrument first, then the others? i.e. switch 2.1 and 2.2

p. 1811: How is precipitation estimated with SMART-R and S-Polka? You use their products in Figure 9.

p. 1812: l. 12: Is the description of the data streams relevant? If not, remove. Instead I would appreciate it if you would provide a list (or add to Figure 4) of all the variables and products you need as an input for your method. E.g. I did not understand how (or whether) you use cloud base.

p. 1812: l. 21: The first paragraph of this section is very hard to understand, please revise.

p. 1813 l. 17: Please give a short introduction to the steady state model. How can you use it for convective systems if it was originally developed for drizzle during stratiform precipitation?

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- p. 1814, l. 18: I don't understand Figure 3. What are the solid lines? Effects of evaporation and accretion? Why does this effect depend on μ , but not on N_0 ?
- p. 1815/1816 How can you actually be sure that the melting layer does not affect your retrieval?
- p. 1815 l: 10-14: So what do you conclude? How do you deal with gaseous attenuation? Do you assume it to be constant?
- p. 1816 l: 1-14: make story more clear. One Example: I guess you want to retrieve surface precipitation and not a profile? I could not find something about that.
- p. 1816, l. 5: what radar range do you actually use for the retrieval? 200-400 m? What happens between 0 and 200 m? And in case of saturation effects you take the information from even higher heights up to 2 km? How often does that happen and how does it affect you accuracy?
- p. 1816, l. 26: So your method works only if there is a co-located S-band? This is an important drawback you have to point out more clearly. Why should I use your method and not the S-Band data directly?
- p. 1817, l. 1: What percentage of your dataset is affected by this?
- p. 1817, l.4: what are the black lines in Figure 5 a and b? Precipitation? Where is the difference between Figure 2a and 5a?
- p. 1817, l.12: Where do you see a linear gradient in the figure?
- p. 1818, l.12: Having in mind that you want to provide an operational product, you should discuss the errors in more detail and give an error-estimate.
- p. 1818, l.18: Why only data > 5 mm/h? And why only data from one of your methods? Does Figure 7 show the complete dataset? Why do you use the disdrometer for the scatter plot, but the gauge for the time series plot? What about cumulative precipitation?

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- p. 1817. l. 25: please use same axis in Figures 6a and b. Please use black points in Figure 6b otherwise it looks like that blue corresponds to 2m/s.
- p. 1818, l. 25: Could you please group the plots of Figure 9 by event type instead of instrument? How do the statistics of your gauge and disdrometer look like?
- p. 1819, l. 8-9: You exclude the possibility that your retrieval does not work properly?
- p. 1819, l. 10: What about the MMCR you mentioned in your introduction so often?
- Figures: Please revise all captions to make sure you describe all lines of the plots.

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