

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-220

Anonymous Referee #2

Referee comment on "Estimation of extreme precipitation events in Estonia and Italy using dual-polarization weather radar quantitative precipitation estimations" by Roberto Cremonini et al., Atmos. Meas. Tech. Discuss.,
<https://doi.org/10.5194/amt-2022-220-RC2>, 2022

The manuscript by Cremonini et al. presents an interesting application of radar dual polarization QPE to analyze extrema of precipitation to compute return times. Most of existing studies are based on raingauge rainfall measurements or reflectivity-based radar rainfall estimation. Kdp is instead used and expected advantage in estimating maxima is related to the better performance in QPE, especially at C-band and for intense precipitation, with respect to the Z-R based estimation. I recommend publication, after revision.

Major comments:

After reading abstract and the introductory parts of the manuscript, I was expecting some comparisons with Zh or Zh-Kdp rain algorithms, not in terms of QPE, but in term of impact on the GEV analysis in order to pointed out the need or the benefits of using a dual-pol radar approach. Such evidence is not made clear by the manuscript. Maybe a comparison with a single-pol approach could be helpful.

Radar QPE is affected by the choice of parameters of radar rainfall algorithms. Even the performance of the R-Kdp estimator, which, theoretically is marginally affected by the DSD variability, can be influenced by such parameterization. If I am not wrong, authors have use relationships from literature. Also, the Kdp estimation method (different methods are used for the two study areas) can have an impact on results. Could the manuscript discuss this point ?

Minor issues:

Line 32: Z_h is more precisely the equivalent reflectivity factor at horizontal polarization. Please specify that authors prefer using a shorter language.

Line 60: "...rainfall intensity estimations based on $R(Z_h, K_{dp})$ ", why not $R(K_{dp})$?

Line 141: Is the 3-dB variation of bias resulting from self-consistency consistent with technical issues occurred ?

Line 149: About $R(Z_h, K_{dp})$: Is Z_h corrected for attenuation ?

Line 205: It is not clear to me what is "z" in the formula and "Z" mentioned in the caption of Fig- 3.

Figure 4. Please define units of axes.

Figure 5. please specify in the caption the meaning of dash lines.