

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2  
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## Comment on hess-2021-105

Anonymous Referee #2

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Referee comment on "A climatological benchmark for operational radar rainfall bias reduction" by Ruben Imhoff et al., Hydrol. Earth Syst. Sci. Discuss.,  
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The paper introduces a new method (Carrots) to improve the radar based QPE for the hydrological modelling purpose. Carrots proposes spatially and daily variable factors derived from the combination of radar, hourly and daily rain gauges on a 10-year period, that can be used for the adjustment of the radar based QPE. The proposed methodology is compared against Mean Field Bias correction of radar data and conclusions are drawn for areal precipitation estimation as well as for discharge simulation on various catchments in Netherlands. The methods are well applied and the results are well discussed. The paper is well written/structured and the readers would benefit from this study. There are however a couple of things that should be addressed but these are minor to moderate revisions. The comments and questions are given in the attached pdf, and also summarized below:

1. Information about the location of the daily and hourly rain gauge should be included in Figure 1 in order to understand better the areal rainfall and discharge results. Additionally, in Table 1 rain gauges included per catchment (if applicable) can be added as an extra column. The role of the gauge density in some catchment (either hourly or daily) may explain the results of Figure 6 – for example catchment Deffland where the MFB has slightly better results.
2. In Figure 5 only the areal annual precipitation of 4 catchments are given and there is not enough information to understand the results of Figure 6. Instead of annual volumes for each method, another Table or Figure may be added to summarize the annual bias of Carrot, MFB and Ru for each catchment. In this case a bias equation should be given in the paper so the reader can understand the results.
3. Another question open for discussion is the role of the catchment model type (either lumped or semi-distributed) and their calibration in the discharge errors (see comment on Figure 6). Are the semi-distributed catchments made of more than 2 sub-catchments? What data has been used for the calibration of these models?
4. In section 2.3 it should be stated clearly that the method is not in "leave-one-out" or split-sampling validation, the same period of data is used for the RA, for the Carrot factors, for the MFB factors and for the model calibration (or was another period used for the model calibration). Explain also shortly at this section why the Carrot factor were not

used in a “leave-one-out” validation (because of low sensitivity obtained from section 3.4).

Please also note the supplement to this comment:

<https://hess.copernicus.org/preprints/hess-2021-105/hess-2021-105-RC2-supplement.pdf>