

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1  
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## Comment on hess-2021-262

Anonymous Referee #1

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Referee comment on "Citizen rain gauges improve hourly radar rainfall bias correction using a two-step Kalman filter" by Punpim Puttaraksa Mapiam et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-262-RC1>, 2021

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### General Comments

*My research interest is focused on citizen science weather observations (in particular rainfall monitoring), so whilst I am confident in reviewing that element of the paper, I am not well placed to comment on the technical aspects of radar rainfall bias correction.*

*The paper presents a novel approach to undertaking radar rainfall bias correction in an area with sparse official ground based rain gauges. The focus of the paper is on the methodology for bias correction, however there perhaps should be equal prominence for the selection of a method for the disaggregation of daily data to hourly, which seems as significant. Many researchers are sceptical about the accuracy of citizen science weather observations, and it would be beneficial to allay such concerns by providing more detail on how to undertake citizen science that generates data good enough to draw the conclusion made herein. Given the intrinsic difficulties in establishing the "true" rainfall amount due to spatial and temporal variation, the conclusions could have been more robustly supported by applying the methodology to an area where validation using official gauges could have been more effectively applied.*

### Specific Comments

*A detailed methodology relating to the Kalman Filter is provided, but it overshadows some of the more basic and fundamental details on which the paper is based. There is no justification provided on the selection of the Tubma basin as the research area. More information would be appreciated in "Section 2.1 Study Area" describing the nature of the basin and the climatic characteristics. Lines 456 – 459 highlight some of the limitations of the study area, which I feel deserve more prominence. The location seems like a difficult place to study and have confidence in the results due to the limited opportunity for external validation via TMD gauging. Given the climatic variation across the study area*

*noted in Section 4.3.4, justification on the use of a 100Km radius for evaluation would be welcome.*

*There is no explanation of how citizen science observations were made, how participants were recruited and trained, or discussion of citizen science limitations either in general or encountered in this research. There do appear to be interesting results from the citizen science gauges that warrant further discussion. E.g, Fig.9 (a) indicates a range in the monthly cumulative rainfall from citizen science gauges of ~170 – 400mm and multiple reporting gaps, whereas (b) the TMD gauge range is ~150 – 260mm . A map with the gauges identified and some detail on elevation or climatic region could be included. If some detail on the application of existing methods could be moved to "Supplementary Information", it would allow more space for consideration of the citizen science element.*

#### *Technical Comments*

*General point – Although common practice I found the use of acronyms made the paper hard to follow at times e.g. Section 4.2*

*Figure 1 – Identification of citizen science gauges*

*Line 164 – replace full stop with comma*

*Line 254 – Point 1 is not clear about the timing of data, could this be rephrased?*

*Line 270 – replace "In case" with "Where"*

*Figure 4 – a grid may make reading easier, or may be too cluttered?*

*Figure 9 – The colours are indistinct for the different gauges, the x ticks could be 'day' and the figures in general are very small making them hard to read on the page*