

## ***Interactive comment on “Ability of an Australian reanalysis dataset to characterise sub-daily precipitation” by Suwash Chandra Acharya et al.***

**Anonymous Referee #1**

Received and published: 8 January 2020

The manuscript “Ability of an Australian reanalysis dataset to characterize sub-daily precipitation” by Acharya et al. evaluates sub-daily precipitation from a gridded reanalysis dataset, BARRA, covering Australia, against gauge observations and radar data. The aim is to assess the performance of BARRA, specifically for the use in catchment hydrology applications. The aim is clearly stated and the analysis is indeed relevant, as the need for continuous precipitation data of high spatial and temporal resolution is obvious. The manuscript is well structured and has a clear language.

On a general term I have some minor suggestions to improve the manuscript as listed below:

For non-Australians it would be useful to have more information about the climate and topography in Australia, specifically the rainfall climate in the selected areas. Also,

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please discuss results in light of regional differences in rainfall climate. I think there is room for one more analysis and figure. Since the target application is catchment hydrology, I would like to see more emphasize on the evaluation of areal precipitation. For instance, a case study analysing the evolution of high-impact events over catchments would be interesting. It might be beneficial to the reader to have other titles on sub-chapters, particularly in the Results section. For instance “4.3 Fractions Skill Score (FSS)” could be renamed to describe what FSS actually evaluates.

Specific comments: Although you state that a spatial resolution of 12 km is considered high, I would argue that the parameterization of convection is a major limitation when studying sub-daily rainfall. Please discuss this in more detail. I can't see that you address the uncertainty in the observation based data. Please discuss these, and perhaps make an attempt to quantify them and include in the figures. p8|228: You state that BARRA tends to overestimate light rain events. Please add a reference or show this in a figure. p10|292: You state that point precipitation is generally higher than areal rainfall at 12 km scale. Could you suggest a way to overcome this? Could you consider using an areal reduction factor? If not, why? In many studies lately there has been a focus on quantifying the contribution of changes in intensity and changes in the frequency to trends in (heavy) precipitation. Could you please relate your results to the how well BARRA represents intensity and frequency?

Figures: Figure 1: Please thicken the line marking the four study regions. Figure 2: Although I like this figure, it is a bit hard to see the colors etc due to the small maps. Could you split the maps and the boxplots into two figures? Figure 5: I might have missed something, but I do not understand why you here only study precipitation up to 6 hours, while up to 24 hours in Figure 2.

Technical corrections: p2|32-33: This sentence should be rephrased. p2|38: Remove “a”. p2|52: “developing use cases”? Please rephrase. p9|258: Add “the” before “two datasets” p10|304: Do you mean “mixed result between locations”?

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