

Interactive comment on “An evaluation of daily precipitation from atmospheric reanalyses over Australia” by Suwash Chandra Acharya et al.

Anonymous Referee #1

Received and published: 18 March 2019

Dear authors,

The manuscript “An evaluation of daily precipitation from atmospheric reanalyses over Australia” aims at comparing the new reanalysis precipitation dataset BARRA with ERA-Interim over Australia using in-situ rainfall data (point-to-grid analysis) and AWAP dataset (grid-to-grid analysis) as benchmarks. I do believe that the paper reads very well, it is properly structured and addresses a relevant topic of uttermost importance. The authors showed that the new dataset BARRA tends to outperform in most of the case ERA-Interim, while provides lower performances when compared to the AWAP dataset. In my opinion, I found the comparison of BARRA with only 1 reanalysis dataset not enough to justify a possible publication in HESS. My main comments are:

1. The purpose of the current study is to document the performance of the BARRA

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dataset at a daily scale and to provide a comparative analysis of its strengths and limitations relative to other available datasets. However, only ERA-Interim is used as a comparison. Why did the authors decide to use only 1 dataset for comparison? Why the choice of using another reanalysis dataset (ERA-Interim) and not other based purely on satellite product (e.g. PERSIANN) or corrected satellite (e.g. PERSIANN-CDR)? I believe the manuscript (and the comparison) will benefit with the inclusion of additional recent and well-known datasets (e.g. CHIRPS, MSWEPv2.1, SM2RAIN ASCAT, CMORPH-CRT), or other reanalysis datasets (e.g. JRA-55, NCEP-CFSR, PFD, or WFEDEI GPCC) for comparison. Obviously, I am not suggesting to include several datasets in this analysis, but the comparison with 3 or 4 more datasets will definitely strengthen the impact of this research and manuscript.

2. The authors first mentioned that “The accuracy at a daily scale provides us with an important benchmark as it is applicable to many hydrological applications and also forms the basis for further examination at finer timescales”. However, the author then contradicted themselves concluding that “The core attraction of the BARRA dataset is the availability of sub-daily precipitation estimates. Such information is not available in the AWAP data set, and the spatial resolution of the estimates is higher than the currently available global 20 reanalysis and satellite datasets”. In fact, in hydrological application at large scale (which is the case for the BARRA dataset due to a spatial resolution of 36km) daily time scale is most used temporal resolution. For this reason, as end-user, I would select the AWAP dataset as input for a large scale model as the resolution is higher and more appropriate to represent complex topographies. Beside the scientific interest in comparing different precipitation datasets, why someone should use BARRA if AWAP is already providing excellent performances at higher spatial resolution?

3. Results and discussions of grid-to-grid analysis are very brief and conclusions are somehow similar to the point-to-grid analysis in which BARRA gives better results than ERA: What is the additional value of including such analysis? It would be better to

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include more dataset for comparison (see the first point) and run only point-to-grid analysis.

4. How the different spatial resolution of the reanalysis dataset and interpolation method of the in-situ gauges can affect the results of this analysis?

5. The methodology is quite straightforward and based on existing approaching for comparing distributed precipitation dataset. Besides the comparison of different datasets over Australia using different performance measures which one is the main research innovation of this paper?

6. From Figure 2.d it is difficult to assess where BARRA is performing (on average) better than ERA-Interim. From my point of view, ERA-Interim shows overall higher KGE values than BARRA (blue points). I suggest the authors to estimate the average (and standard deviation) of the values in figure 2.d to see which dataset provides higher KGE.

7. Lines 18-20 page 7 “Despite having a slightly lower correlation compared to ERA-Interim, the variability of the rainfall is better captured by the BARRA dataset” I do not agree with the authors. From figure 3 it looks that ERA tends to outperform BARRA in almost all the considered performance measures. Also, how the authors can say that rainfall is better captured by BARRA dataset if an aggregated index (KGE) is used?

8. Line 14, page 8 “The spatial pattern, however, is similar for all datasets.” Not really. It looks to me that spatial pattern is different from figure 4. Are the authors referring only to the spatial pattern of BARRA and ERA-Interim?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-607>, 2019.