

Interactive comment on “Daily evaluation of 26 precipitation datasets using Stage-IV gauge-radar data for the CONUS” by H. E. Beck et al.

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Note to the editor and authors: As part of an introductory course to the Master programme Earth & Environment at Wageningen University, students get the assignment to review a scientific paper. Since several years, students have been reviewing papers that are in open online discussion for HESS or BGS, and they have been asked to submit their reports to the discussion in order to help the review process. While these reports are written in the form of official (invited) reviews, they were not requested for by the editor, and we leave it up to the editor and authors to use these reports to their advantage. While several students were often asked to review the same paper, this was not done with the aim to provide the authors with much extra work. We hope that these reports will positively contribute to the scientific discussion and to the quality

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of papers published in HESS. This report/review was supervised by dr. Ryan Teuling (teacher within the ITEE course at Wageningen University and also associated editor with HESS).

The article of Beck et al., 2018 compares 26 different precipitation datasets and compare these datasets to one another by analysing the Kling-Gupta efficiency score (KGE score). The authors show what the limitations are of the current research performed and explains the added benefit of their research to the science community by highlighting characteristics such as the number of datasets used and the size of the geographical area (the conterminous US). Furthermore, the authors present a clear overview of the performance of these 26 datasets using a gridded KGE score for the period 2008-2017. As a reference to compare these 26 data sets to they used a radar-gauge product (Stage-IV) which has been resampled to 0.1° . They reduced systematic bias using PRISM data by matching Stage-IV long term mean to the long term mean of PRISM.

The article by Beck et al., 2018 fits the scope of the HESS Journal well. Especially the following line from the scope of HESS: “the study of the spatial and temporal characteristics of the global water resources (solid, liquid, and vapour)”. It provides the reader with a helpful guide in choosing which spatiotemporal precipitation dataset they can use for specific research questions, therefore helping others in their modelling efforts. The research by Beck et al., 2018 also highlights the benefit of the newly updated precipitation datasets, showing the evolution of precipitation monitoring over the years.

The manuscript provides a good overview and evaluation of current precipitation datasets. The text is generally well-structured and concise. The conclusion of the article is in line with the evidence provided. Although the manuscript shows only limiting reasons for the performance of individual precipitation datasets, it links very well to other studies performed in this area. It can become an important reference paper for future research that uses gridded precipitation datasets. My recommendation would therefore be to publish the article after some relatively minor issues have been

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addressed.

[minor issue 1] The first paragraph of the chapter 3 Results and Discussion gives the overall performance of all precipitation datasets by calculating the mean median KGE score and the KGE score components for all datasets. I wonder how useful these calculations are. In the next paragraphs the authors show how the datasets are different, so showing a mean median and making such a generalisation to start with is not useful in my opinion. I like the thought of an analysis to find the most important factor determining a high KGE score, however I wonder if for different datasets the results might be different and what the benefit is of using the KGE over normal correlation is correlation seems to be the most important factor. I would recommend leaving this paragraph out of the manuscript or clarify my concerns above. Especially clarifying the choice for KGE.

A further recommendation to analyse and assess general performance would be to include an analysis on the error associated to each dataset. Figure 2 does show box-and-whisker plots; however, no further detail is given on the underlying reasons for sometimes large whiskers. I would advise the authors to analysis this spread, instead of only focussing on the median KGE score. Analysis of this spread may prove useful in determining if specific geographic areas are underperforming compared to the median of each dataset.

[minor issue 2] As a reference to the precipitation datasets the authors used the Stage-IV dataset, which is a combination of radar and rain gauge data, they state that the dataset provides high accurate precipitation estimates. However, the authors introduce PRISM as a correction to the used Stage-IV dataset to correct for long-term mean. Again, they state that this the most accurate monthly dataset. I would like to see a better explanation of why Stage-IV is not sufficient, and the claim of the most accurate monthly dataset should be backed up with at least a reference. Plus, there should be a number showing the difference in long-term mean because at the moment it is not possible to see the difference an assess the necessity of this correction.

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[minor issue 3] Why is the WRF dataset included according to table 2, it stopped producing data in 2013, this conflicts with the goal of the manuscript to provide a guide for the reader to choose a dataset that can be used in further research. Also, it is a mismatch to the described analysis period in paragraph 2.3, where the authors state they analyse the period 2008-2017. There are more products that mismatch this analysis period.

I would recommend that the authors explain this mismatch between available data and the chosen analysis period. Including an explanation on how this might affect the KGE scores for these specific datasets.

[minor issue 4] There are 26 data products mentioned, why is there only special focus on the dataset that have a corrected and uncorrected version in the second part of the article? Please elaborate the choice for these datasets in the introduction.

[minor issue 5] Paragraph 3.2 lines 24-31: The product SM2RAIN CCI V2 is a possible option for evaluation and correction of other datasets however the KGE of SM2RAIN CCI V2 is only 0.28, in my opinion this conflicts with one another, I would like to see this further explained or removed

[minor issue 6] In the introduction, the division between the research questions 1-4 and 5-9 should become clearer, indicating that the second set of research questions is to evaluate the evolution of precipitation datasets.

Paragraph 2.3 lines 25-26 is already mentioned in on page 3 line 25.

Paragraph 3.7 line 27-18: A product MSWEP is mentioned which is completely new and doesn't add anything to the paragraph before.

In chapter 4 conclusions page 15 line 28, new things are introduced such as rain gauge density as a possible explanation, why?

In the conclusion the actual goal of the manuscript becomes clear, should be clear from the start.

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Page 10 lines 9-11 You state that a bias is expected but this ended up not being the case, please elaborate on the expectation and on which data this expectation and conclusion are based.

Page 10 line 28, already a conclusion, can be left out here

Page 10 line 32 “suggest that its gauge-correction methodology requires re-evaluation”, based on what is this statement included, please elaborate or include a reference backing up this statement.

Paragraph 3.5 mentions that IMERGHHE V05 performs better than TMPA-3B42RT V7 based on KGE scores, however figure 3a shows that in the west there are significant areas where TMPA-3B42RT V7 performs better, please indicate this in paragraph 3.5

Page 14 line 5, reference to a figure form Beck at al., 2017b), would be helpful if the figure is included in the article as a back-up to statements made in paragraph 3.8

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