Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC1
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Comment on hess-2021-41

Anonymous Referee #1

Referee comment on "A 10□km North American precipitation and land-surface reanalysis based on the GEM atmospheric model" by Nicolas Gasset et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-41-RC1, 2021

General comments:

The paper introduces a new land surface and precipitation reanalysis for North America. The authors explain in detail different components of the model systems and how they interact with each other. Afterwards, samples of up to 7 years are examined and compared to other available datasets.

Overall the paper is well structured and very well written. I consider it relevant at least for the hydrological community and recommend to publish it following minor revisions.

My major comment is about the choice of the final setup. It was decided to produce the entire period with RDRS-10 (the Regional Deterministic Reforecast System with a horizontal resolution of 10km). However, throughput the paper no explanation is given what this choice is based on. In contrast, at various places it is noticed that RDRS-15 performs actually better than RDRS-10. A clarification for the decision seems missing and the paper would benefit from the additional information.

Specific comments:

Lines 33-37: The need for a higher spatial resolution is discussed. I suggest to add the resolution of discussed datasets, e.g. ERA5 and NARR, as well as the required resolution for land-surface and hydrological modelling applications.

Line 45: The surface reanalysis product MESCAN-SURFEX might be discussed in this section as well. For instance:
https://doi.org/10.3402/tellusa.v68.29879
http://www.uerra.eu/publications/deliverable-reports.html (deliverable 2.8)

Line 171: I am not familiar with the Yin-Yang grid. A reference would help the uninformed.

Line 198: “whole period” is not correct. Actually, ERA-interim is available 1 January 1979 – 31 August 2019.

Line 247: When is the first guess provided by GDRS? Figures 1 and 3 indicate that the first guess is based on RDRS only.

Line 531: Here is one section showing that RDRS-15 compares better to observations than RDRS-10. However, at the end it was decided to produce the final dataset with RDRS-10. The reasons remain unclear.

Lines 571-572: The given hours are hard to understand. I suggest to be explicit here: "… are used for hours 6, 9, 12 and 15 UTC (resp. 18, 21, 0 and 3 UTC), with results shown…"

Line 582: Please rephrase the sentence.
"…, but the RDRS-10 bias value is always higher than that of the RDPS, which …". The reader might understand RDRS-10 results are worse but that is not the case as explained afterwards. However, rephrasing this part would ease the readability.

Line 704: How can the reanalysis product, which covers only past periods, be useful for hydrological prediction?

Figure 2: The abbreviations used in the legend should be the same as in the remaining manuscript.
GEM Global should be changed to GDRS
GEM regional to RDRS

Technical corrections:

Figure 7, caption, last sentence: "Results are only based on …"