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Interactive comment on "EMDNA: Ensemble Meteorological Dataset for North America" *by* Guoqiang Tang et al.

Anonymous Referee #3

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Comments on the manuscript entitled "EMDNA: Ensemble Meteorological Dataset for North America"

General comments:

This study develops a new meteorological dataset EMDNA over North America. The dataset contains three variables: precipitation, mean daily temperature, and daily temperature range at a relatively high spatial resolution. Although there have been many other regional and global meteorological datasets, EMDNA stands out with the feature of probabilistic estimates, making it a useful choice for hydrometeorological studies such as the propagation of meteorological uncertainties to hydrological simulations. The dataset fits well the scope of the journal EESD. Overall, the manuscript is well

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Discussion paper

written and methods and analysis are clearly described, well discussion with existing products. I believe that this new dataset will a good and timely contribution to the hydrometeorology community.

I recommend accepting this manuscript with minor revision. Below are a few comments that could be useful to improve the manuscript.

Major comments:

1. The dataset provides both deterministic and probabilistic estimates. The ensemble mean is the average of 100 members, which is also provided in the final dataset. What's the difference between deterministic estimates from optimal interpolation-based merging and the ensemble mean from 100 members? For air temperature, the ensemble mean and optimal interpolation estimates should be similar. For precipitation, the methodology in this study uses transformed precipitation to calculate probabilistic estimates, and then applies back-transformation. Therefore, the ensemble mean may not be the same with the deterministic estimates. It would be useful to discuss their differences and make recommendations on what products should be used in practical applications.

2. The distance-weight function (Eq. 5) is cubic with the maximum distance defined based on the distance between target and neighboring stations. This means that the weight could be smooth in some cases compared to some sharp distance-weight functions such as the inverse distance weighting. It would be great if the authors can discuss the potential effect of the choice of functions?

3. It is useful to add more introduction to SCDNA because it is the most important data source of EMDNA and the independent validation of EMDNA also is related to SCDNA. In practice, many researchers often use raw station-based observations instead of gap filled datasets. More details on SCDNA would be nice to add here, so the readers do not have to read the original paper of the SCDNA.

Minor comments: 1. Line 98: It is better to mention why the three reanalysis products are used.

2. Line 151: The locally weighted linear regression is the same with the geographically weighted regression (GWR). It is better to clarify this concept here.

3. Line 190: The leave-one-out strategy may also be affected by the distributions of stations. For example, if two stations are very close, the leave-one-out may not be able to provide objective evaluation of them. Nevertheless, evaluation using independent stations also have a similar problem. The authors can add a little discussion here.

4. Line 320: Clarification of the streamflow sources will be useful to show whether the bias corrected climatology is reliable. I suppose there may be few streamflow stations in high latitude regions. Can the authors confirm by providing more details of the raw dataset?

5. Line 427: “than” should be added after “higher accuracy”.

6. Line 568: GPM-IMERG needs a full name here: The Integrated Multi-satellitE Retrievals for GPM (IMERG). A proper citation is also needed. IMERG and weather radars cannot cover high latitude regions, and thus it is better to specify the scope in this sentence.

7. Line 569: It will be also useful to mention the error of temperature measurements, although such error could be small compared to precipitation undercatch.

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