

Interactive comment on “WFDEI-GEM-CaPA: A 38-year High-Resolution Meteorological Forcing Data Set for Land Surface Modeling in North America” by Zilefac Elvis Asong et al.

X. Luiz

xl0003@uah.edu

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This study aimed to develop a long-term high-resolution dataset for North America by blending two existing datasets: WFDEI and GEM-CaPA. A multivariate generalization of the quantile mapping technique was used to bias-correct WFDEI against GEM-CaPA for seven meteorological variables. Mackenzie River basin was used as an example to illustrate the quality of the dataset. The dataset provided in this study and the quality assessment described in the manuscript have several fundamental issues and problems that needed to be vigorously addressed. The dataset did not deserve for publication in ESSD because of the following reasons: 1) Uniqueness of the dataset The

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dataset provided in this study did not show any uniqueness at all. The authors merely used two existing datasets which are all publicly available and used an existing bias correction method to bias-correct the data. Uniqueness is one of the most important criteria in publishing in ESSD such that it is not possible to replicate the experiment or observation on a routine basis. In this regard, anyone in the world could actually repeat what the authors have done by downloading those datasets and applying the same bias correction method. In other words, the whole bias correction exercise in this study could be done on a routine basis. This is the fatal problem of the whole study.

2) Generation of meteorological variables It is very problematic to directly use GEM 40m variables to correct WFDEI surface variables [L173-175]. The two datasets estimate the same meteorological variables (e.g. temperature) at two different heights which essentially mean two different environmental conditions. As a result, two different statistical properties and distributions would be expected. By directly correcting one variable to another is like transforming an apple to an orange. The authors did not provide any justifications why this was done and did not discuss the implications of such bias-correction in these variables. In addition, the authors used two different methods to interpolate the data (i.e. bilinear for GEM whereas nearest neighbour for CaPA) [L140-141] and did not provide any justifications why such inconsistency existed when processing the data.

3) Usefulness of the dataset The usefulness of the data is significantly reduced because many land surface models (e.g. VIC) require near-surface temperature and wind speed as their meteorological inputs. However, those variables of the final product were corrected to 40m. This hinders potential users in using the final product because they have to find a way to re-process those variables back to reflect the near-surface conditions. Moreover, there are already other existing datasets covering North America, especially the United States, which are of long-term and high resolution. How useful will this dataset be as compared to the existing one when study areas are in the States, say Mississippi River basin for instance? In addition, the dataset did not truly covers the

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whole North America and would not be useful for Alaska, Florida, and Texas because the spatial domain of the final product excludes part of those areas.

4) Validation of the data quality The authors had done a very poor job in assessing the quality of the data. The authors demonstrated the quality of the bias correction exercise by showing the annual cycle (Figure 3) and the mean annual time series of the datasets (Figure 4). This is not truly a quality assessment for the dataset. First of all, the final product is at 3-hr temporal resolution and checking its quality at annual time scale is a bit misleading because it is obvious that aggregating or averaging to a coarser resolution would provide a better performance regardless of the metrics used. The quality of the data should be assessed at its original temporal resolution in order to truly reflect the robustness of the data. Secondly, the final product covers North America but the authors only showed one basin as an example for quality assessment. There are at least several climatic zones across North America which consist of not only cold regions but also arid, semi-arid, and other regions. One basin in cold region is not sufficient to reveal the quality of the data. Several basins with different climatology should be used to assess the data quality. More importantly, the authors did not validate the final product with any observations. This is a very important and crucial step for any newly developed dataset that is generated by combining existing products. However, such assessment was not provided in the manuscript. This significantly reduces the reliability of the final product.

5) Scope of the study and dataset The dataset provided covers North America but the scope of the study discussed in the Introduction section was mainly focused on cold regions. The scope of the study did not match the dataset at all. The discussion in the Introduction section should be vigorously re-written by extending and including the importance of developing such dataset for other regions (e.g. desert) in addition to cold regions.

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