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Open Access Earth System Science Data Discussions

Interactive comment on "31 years of hourly spatially distributed air temperature, humidity, and precipitation amount and phase from Reynolds Critical Zone Observatory" *by* Patrick R. Kormos et al.

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Response to comments from Referee 2: 31 years of hourly spatially distributed air temperature, humidity, and precipitation amount and phase from Reynolds Critical Zone Observatory - ESSDD

Line number references are to the original manuscript unless otherwise noted.

General Comments

The manuscript entitled: "31 years of hourly spatially distributed air temperature, humidity, and precipitation amount and phase from Reynolds Critical Zone Observatory" by Patrick et al. describes a open dataset on hourly grids of Tair, precipitation, relative humidity, dew point temperature and precipitation phase for Reynolds Creek Experimental Catchment (RCEC). The data set is interesting and may be useful for different applications, especially for validating different meteorological and snow models. I think that this work suites very well with the topic of the specil issue in which the manuscript is framed. My main concern on the provided dataset is the lack of any error estimation, and discussion of obtained errors on the generated grids. In my opinion, the usefulness of the dataset would noticeably gain if authors conduct a cross validation (or similar) exercice for the interpolations and provide error estimators to have an idea on the magnitude of the expected errors for each variable, and determine if it exits any spatial or seasonal pattern in the accuracy of the generated grids. Temporal series of accuracy/error estimators could allow checking if a different number of available cases to interpolate affects the relability of the generated grids. I think that this extra effort must be done before the acceptance of the manuscript. It would be also good to show some series of monthly data (mainly for precipitation) for areas that are far from the observations, compared to observed series. Sometimes when residual correction is performed it can create artifacts in unsampled regions (even when error estimators are good), and this should be checked. Another point that should be considered is about the provided resolution of the grids. It should not be based only in a visual comparison of different resolutions, it should aim to find a good balance with the density of the observations network. A resolution of 10 mts is microclimatology that it could not be properly addressed with the available observation network. Probably an intermediate resolution (30-50 mts) is more realistic for the number of cases used for the interpolation and could reduce considerably the weight of the files.

We thank the referee for a thorough review. We have added details on why we have chosen the spatial resolution as suggested on page 5 line 29 as follows:

“A spatial resolution was selected for this dataset based on future development of distributed radiation. We feel that the lidar dataset provides sufficient data on the topography and vegetation to justify a 10m grid cell. This complimentary dataset will be distributed on the same grid. In addition, this resolution will allow for a more specific delineation of the rain snow transition zone.” Although an error analysis would be a significant advancement for this dataset and the field, it is beyond the scope of this paper. We plan on conducting an in-depth error analysis, addressing both spatial and temporal uncertainty, in additional papers.

Other comments

1. The abstract should indicate the period covered by the offered data.

We have included the period covered as suggested on lines 4-5 as follows:

“The data are spatially distributed over a 10m Lidar-derived digital elevation model at an hourly time step from water year 1984 (WY1984) through WY2014 using a detrended kriging algorithm.”

2. Figure 1 should show the location of the catchment at a wider geographical frame.

We have included a location map of the CONUS as suggested as follows.

3. Figure 2 could be complemented by temporal series for the three variables showing how many stations were working simultaneously (an hence used for interpolation) at each time step in which the gridded data series are provided.

We feel that including a measured value for each timestep for each station would appear too cluttered to the reader.

4. Despite windshields are used, have you any estimation of undercatch precipitation? which wind correction was applied?, is it posible to asses in any way the benefit of applying the wind correction in terms of accuracy?

Hanson et al., 2004 describes the development of the correction for undercatch. That

method uses both a shielded and unshielded guage. Not knowing the real value of the precipitation makes it difficult to estimate error and undercatch. These are good questions and deserve additional research.

5. The dataset is very interesting itself, but the possibility to offer some extra data on snow pack, and other meteorological variables could greatly enlarge the number of applications of the provided dataset.

Thank you for these suggestions. We plan on continuing this research by developing incoming wind and radiation datasets, as well as streamflow and snow data sets on the same forcing grid.

6. Despite my poor skills with Python, I visualized some of the data using the provided code. However, I was unable to download data from the OPeNDAP portal, perhaps I did something worng but it should be checked before acceptance of the manuscript.

I have confirmed the data connection and availability using python and R.

Hoping my comments will be useful.

We thank you for your comments!

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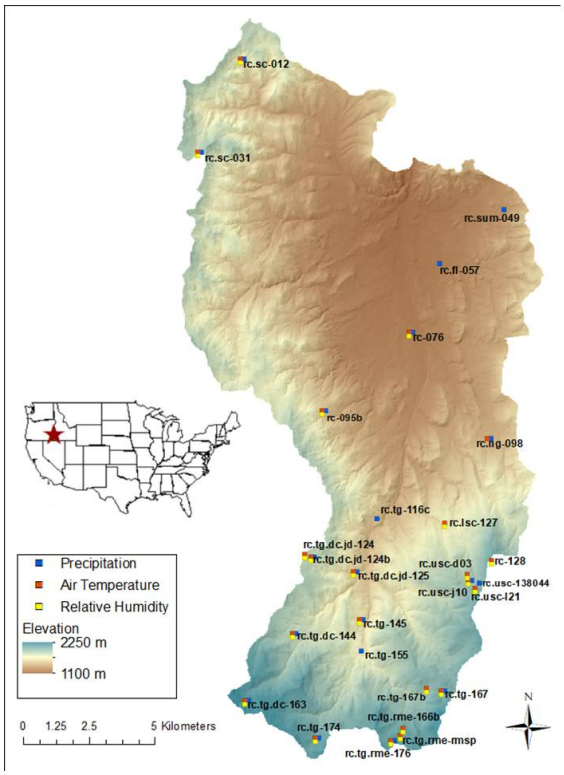

Fig. 1. Figure 1 Revised