

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on **essd-2021-303**

Anonymous Referee #1

Referee comment on "HOTRUNZ: an open-access 1 km resolution monthly 1910–2019 time series of interpolated temperature and rainfall grids with associated uncertainty for New Zealand" by Thomas R. Etherington et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-303-RC1>, 2021

The current manuscript provides information about a very welcomed open access gridded temperature and rainfall dataset for New Zealand. A 1-km spatial, monthly resolution dataset for the period 1900-2019 has been compiled using weather station data. The weather station data have been interpolated (and likely extrapolated for higher elevations) using a natural neighbour interpolation approach. The data product has been made publically available and will therefore provide an additional data source for a range of researchers. It is important in this context to have a companion paper that provides users with a clear explanation of the value of this new data product.

To help support this effort I have the following suggestions.

Main comments

- The reference to the dataset as a "history of open weather" is questionable. The data have been compiled using weather station observations, but a dataset with monthly temporal resolution does not provide information about weather conditions (e.g. L26 and throughout the manuscript). You have created a climatology of temperature and rainfall, but you have not created a "history of open weather" information for New Zealand. I would strongly suggest you carefully define weather versus climate in the manuscript, and be much more careful about the usage of the term weather in the manuscript. I would actually go so far as to suggest you revise the acronym (HOWNZ) – it is appealing but it is not really accurate. There is significant value in creating a new climatology of temperature and precipitation data for New Zealand, but suggesting the dataset will help "facilitate understanding of how long-term weather patterns have been changing and potentially affecting environmental and ecological patterns in New Zealand" (e.g. L53-54) is very misleading. It is not possible to resolve the physical processes associated with weather systems using a monthly climatology, as you

indicate yourself in your limitations on L173-75. Please consider changing the focus from the importance of weather to variability and changes in climate.

- Section 2 provides information about the data sources and there are a number of figures in the manuscript that detail the number of weather records available for the interpolation (e.g. Fig. 1 and Fig. 4). However, additional detail in a (supplementary) table that provides more explicit information about the data sources – the number of stations and how they compare to previous reconstructions - would be welcomed by data users I believe. For example, a ranking or list that provides the primary or most important data sources would be very useful – it is presently quite black box – with just a reference that data were sourced from New Zealand’s National Climate Database (L60). There is very little information about the quality controls of the input data (if any) or any challenges that were faced, with the reference to some of these complexities lacking important detail (e.g. L64; “there were some [in]consistencies”, L64; “much more rainfall than temperature data”, L65; “there was always less data in mountainous interiors”. The compilation of archived weather station data is a massive task – even if primarily sourced from a known database, which you have taken on admirably. I would strongly recommend trying to provide additional detail about the quality and quantity of the data used for each year and region (or elevation band). It will be warmly welcomed by readers and future users of the data.
- Section 5 provides information for users about how to use the uncertainty data that has been generated for analytical workflows in the future. This will be appreciated by readers and is quite useful, but there is still a need to show in some way how the uncertainty generated from the validation compares to independent observations or to another gridded data set (e.g. VCSN data). There are well known deficiencies in the VCSN data (e.g. Tait et al., 2012; Jobst et al., 2017), especially at higher elevations and some demonstration about how the new data set compares should be considered. At the very least a warning or some comment about the need to test the new data should be included, and acknowledgement of the efforts by others to address some of these uncertainties should be considered. There is very little reference to other research or efforts to address these problems in the current manuscript. A quick comparison between VCSN and the new data set would be quite revealing and provide some indication of how they compare, and what users might consider looking out for when using the newly compiled data.

Specific comments – including editorial suggestions

- L49: Add one-character spacing between authors listed. This occurs elsewhere in the manuscript.
- L101: Remove “that areas” after in areas.
- L110: Suggest changing the wording to “uncertainty can be high in regions where weather data are available”.
- L126-27: Be specific when referring to “weather data availability becomes extremely limited” – see main comment 2. I believe further detail about the quantity and quality of the input data would be welcomed by readers.

References

Jobst, A. M., Kingston, D. G., Cullen, N. J., & Sirguey, P. (2017). Combining thin-plate spline interpolation with a lapse rate model to produce daily air temperature estimates in a data-sparse alpine catchment. *International Journal of Climatology*, 37(1), 214-229. doi: 10.1002/joc.4699

Tait A., Sturman J., & Clark M., (2012). An assessment of the accuracy of interpolated daily rainfall for New Zealand. *Journal of Hydrology (NZ)*, 51(1), 25-44.