Comment on essd-2022-212
Anonymous Referee #2

Referee comment on "Global climate-related predictors at kilometre resolution for the past and future" by Philipp Brun et al., Earth Syst. Sci. Data Discuss., https://doi.org/10.5194/essd-2022-212-RC2, 2022

It is indeed very useful to develop a number of climatic variables at the interface between ecology and climate science. Such efforts can act as a link, connecting the two disciplines and helping ecologists include climatic variables into their modelling efforts, at a very high spatial resolution. Moreover, projects like this can encourage the collaboration between climate scientists and ecologists, further developing the field of "climate change ecology". Even though this study is ambitious and could potentially assist multiple ecological studies, it is lacking in terms of validation.

Major comments:

1. The fact that the data from the five climate models, and from the three scenarios (SSPs) are included independently is positive. It allows users to quantify the uncertainty introduced by these two sources (model spread, scenario uncertainty). More models (perhaps in future releases) would be even better.

2. The validation presented in this paper is not convincing enough. Fifteen pages of the results section are used for describing and visualizing the variables, while only one page is devoted to validation of the data. A simple description/visualization does not add much value, and instead a comparison to the station data would have been more useful here. For example, Karger et al. (2017), compared their datasets with station data and other products using maps (spatial) and time series (temporal). This helps in gaining confidence to the CHELSA data by seeing the biases over space (maps) and time (time series). For example, can two ecological studies, one in Africa and one in the Arctic, use CHELSA data with the same level of confidence? Can one study use CHELSA data for spring and for autumn with the same level of confidence?

3. It is understandable that only a number of variables (8) that are more easily
measurable were validated (mostly 1st and 2nd order). It is these eight variables, after all, that are combined in order to create the other seven variables (3rd and 4th order). However, validating more than eight variables would give more confidence to the user. For example, in the case of npp, could remote sensing products be used?

4. Only a global value for r, RMSE, MAE and bias is provided. What about different regions or different seasons? Do all regions/seasons show similar spatial and temporal patterns?

5. Throughout the paper, the words "high spatiotemporal resolution" are used. The spatial resolution is definitely high. Is the temporal resolution of this dataset (monthly) considered high for ecological applications?

Minor comments:

Line 33: live -> life
Line 35: This dataset's highest temporal resolution is monthly, is this enough for detecting extremes? Please provide examples and/or references
Line 71: Same comment as in Line 35
Line 80: Please provide references
Line 447: Please explain how $r$, MAE, RMSE and bias are calculated. Did you use time series from each station, and then averaged them globally to obtain a single number (the number shown in Table 1)?
Line 732: Please provide references for "Moreover, they are comparably robust to gaps in the network of meteorological field stations and therefore provide more reliable estimates in remote areas, compared to alternatives from station-based interpolations"
Line 762: "... realistic patterns in our exemplary remote-area, high-resolution maps in ...". Realistic compared to what? Please define "realistic" here.

Reference: