Response to CC1

This manuscript introduces the China New-type Power Systems Meteorological (CNPS-Met) dataset. Methodologically, the spatially adaptive optimal interpolation scheme is an enhancement of classical data assimilation techniques. The main contribution is the classification of eleven high-impact weather events explicitly linked to the generation-side, grid-side, and demand-side vulnerabilities, which may be useful for power engineering. I have some comments that I hope the authors will consider.

Re: Thank you very much for your constructive comments on this study. We have revised the manuscript carefully according to your suggestions. Below are our point-by-point responses.

1. The results nearby the complex terrain (e.g., Tibetan Plateau periphery) are not encouraging. Is the error in these regions systematic? A scatter plot of error vs. elevation for these regions would be beneficial to explain the reason.

Re: We understand. To address your concern, the errors nearby and over the Tibetan Plateau (Altitude≥3000 m; Figure R11) are analyzed in Figure R12. Results show that, the error dispersion of air temperature decreases with altitude, whereas that of wind speed increases with altitude. Systematic deviations are found for specific humidity and precipitation at 3400 m~3800 m, as well as for precipitation and surface pressure at 4600 m~5000 m. These could be related to the influence of terrain height and slope, factors that are not accounted for in the OI assimilation scheme.

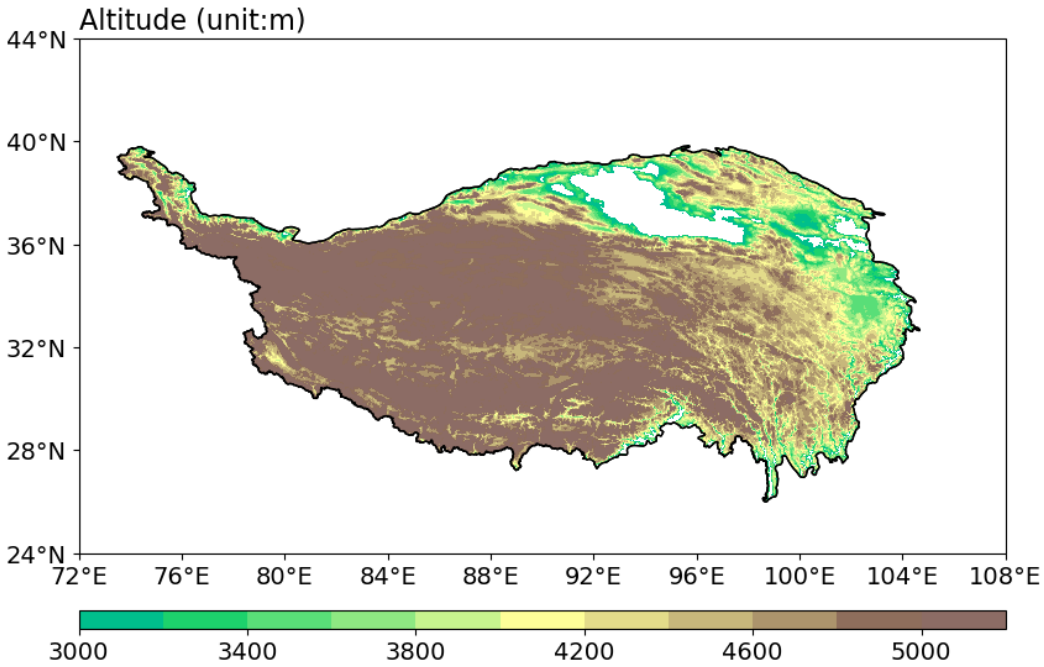

Figure R11. The Tibetan Plateau region with altitude≥3000 m.

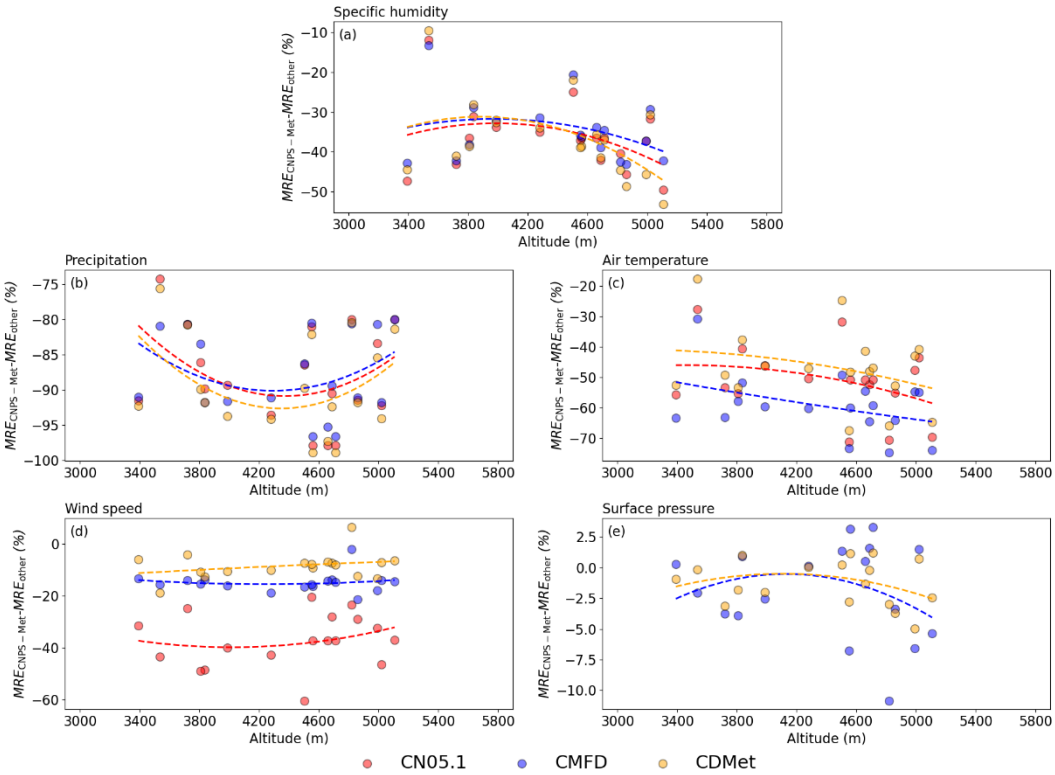

Figure R12. Relationship between the differences in the mean *MRE* (unit: %) and corresponding altitude in complex terrain. (a) 2-m specific humidity, (b) precipitation, (c) 2-m air temperature, (d) 10-m wind speed, and (e) surface pressure.

2. Sub-region Division (Line 332-333, Fig. 1b): The seven sub-regions are divided "according to the spatial distribution and organizational characteristics of the power grid". A brief explanation or citation for this specific division would be helpful for readers unfamiliar with China's power grid structure. Why is it more suitable for this analysis?

Re: According to Zhuo et al. (2022), the rationale for such sub-region division has been illustrated in Lines 373-375 in the revised manuscript.

References

Zhuo Z, Du E, Zhang N, et al. Cost increase in the electricity supply to achieve carbon neutrality in China. *Nature communications*, 2022, 13(1): 3172.

3. Dataset Access and Usability (Lines 565-569): The data availability statement provides a DOI. It would be helpful for the reader if the authors could briefly describe in the response to reviews (or in the final manuscript) the structure of the NetCDF files. For example, are all 19 variables in a single file? Are there separate files for different time periods? A small note on the expected data volume would also be practical for potential users.

Re: Thanks, we agree. To facilitate readers' understanding and use of CNPS-Met, we

have added the following description in Lines 602-619 in the revised manuscript:

The file name for CNPS-Met follows the pattern: CNPS_Type_History_Daily_Variable_CCYY.nc, and all times are in Coordinated Universal Time (UTC). In this naming convention: "Type" is an abbreviation for meteorological variables and for the generation side, grid side, and demand side of the new power system, represented respectively by "Meteo", "Generation", "Grid", and "Demand", respectively; "Variable" is an abbreviation for the variable name; "CCYY " represents the year (e.g., 1980,1981, ……).

The meteorological variables include: tas (2-m mean temperature), tmax (2-m maximum temperature), tmin (2-m minimum temperature), precip (accumulated precipitation), wind (10-m mean wind speed), rhum (2-m mean relative humidity), shum (2-m mean specific humidity), pres (mean surface pressure).

The high-impact weather on the generation side includes: Vout (cut-out wind speed), Vin (cut-in wind speed), Lowrad (low radiation), Tmaxg (extreme high temperature), Tming (extreme low temperature).

The high-impact weather on the grid-side includes: Icing (ice accretion), Snowing (snowfall), Galloping (conductor galloping).

The high-impact weather on the demand-side includes Tmaxd (extreme high temperature), Tmind (extreme low temperature), and HHE (heat and humid environment).

4. Temporal Coverage: The dataset ends in 2016, which is already a decade behind. While the authors mention future updates, the current end-date limits the dataset's applicability for recent power system analyses. Is there a specific reason for this cutoff? A more concrete timeline or plan for extending the dataset to the present day would significantly enhance its value and should be included in the "Future work" section.

Re: When we initially constructed the dataset, the available meteorological station data covered the period 1980-2016, that is why the version presented in this manuscript ends in 2016.

However, we would like to emphasize that our dataset is designed to be a living dataset that can be continuously extended. The construction of the extended dataset after 2017 is currently ongoing. To avoid any ambiguity, and following the reviewer's suggestion, we have removed the time period from the title to reflect its potential for ongoing updates.

The above discussions have also been provided in Lines 595-598 in the revised manuscript.

5. Lines 96-97: "the methodology employed in the aforementioned datasets is fundamentally based on spatial interpolation" – This is a bit of an overstatement for

CMFD, which the authors themselves describe as integrating remote sensing and reanalysis. Consider rephrasing to “relies heavily on spatial interpolation techniques”.
Re: We have revised the expressions, please see Lines 98-99 in the revised manuscript.

6. Line 108: "Hunt et al., 2007" – There is an extra comma before "et al." Please correct to "Hunt et al. 2007" for consistency with other citations.
Re: Revised, please see Line 110 in the revised manuscript.

7. Equation (2) and (5): The use of superscript T for both transpose and iteration number (as) is confusing. Please use distinct notation, e.g., for the iteration.
Re: In this study, the transpose of the matrix is denoted by the subscript T, and the number of iterations is denoted by the subscript γ. We have revised throughout the manuscript.

8. Line 247: “The MRE and RMSE closer to 0” – This phrase is grammatically incomplete. Consider: “Values of MRE and RMSE closer to 0, and R2 and EF closer to 1, indicate better estimation performance”.
Re: Revised, please see Lines 267-268 in the revised manuscript.

9. Table 2 (Impacts column): The impacts for extreme high temperature and ice accretion are fragmented and run together. Please rewrite them as complete sentences for clarity.
Re: Thanks, revised.

10. The notation “” appears to be a typo. Please clarify the intended condition(s).
Re: Revised throughout the manuscript.

11. Line 332: “seven sub-regions are divided” – This phrasing is awkward. Consider “seven sub-regions are defined” or “the study area is divided into seven sub-regions”.
Re: Revised, please see Line 373 in the revised manuscript.

12. Line 364: “show the lower variability” – Should be “show lower variability”.
Re: Revised, please see Line 407 in the revised manuscript.

13. Line 434: “Cut- in wind speed are” – Subject-verb agreement error. Should be “Cut-in wind speed is”.
Re: Revised, please see Lines 477-478 in the revised manuscript.