Review comments on EGUsphere manuscript:

https://doi.org/10.5194/egusphere-2024-1886, revised version

Title:

A Method for Quantifying Uncertainty in Spatially Interpolated Meteorological Data with Application to Daily Maximum Air Temperature

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The revised version of the manuscript cannot be recommended for publishing in the Geoscientific Model Development. The authors do not present any new methods or geostatistical theory, and the cross-validation results is not presented in a clear and transparent way. Below, is a summary of my main critical points:

1) The title is very misleading. It gives the impression that a new method is presented for "... quantifying uncertainty in spatially interpolated meteorological data ...". The content of the paper is a case study of Tmax data from California (c.f. line 180-182), no "... comprehensive evaluation of spatial uncertainty quantification" is presented. Thus, the title of the manuscript is not consistent to the content.

2) The method is not mathematically clearly presented. In classical regression (1), the residual is assumed to be spatially uncorrelated, but the semivariogram analysis demonstrates that the assumption is not correct. This logical flaw is not discussed in the paper. The uncertainties in the regression parameters are not quantified in the analysis.

3) It's not clear to me whether a regression is applied for all days, or only for the yearly average of Tmax for each station. The same is true for the normal score transform. Is there a "lumped" normal score transform, or is the normal score done for each day? From figure 9 (in supplementary material) it looks like it's a lumped normal score, but a semivariogram is applied for every day.

4) The application of conditional Gaussian simulation (CGS) is not sufficiently explained. What parameters are used, how many realizations is generated?

5) Cross-validation is not explained in sufficient detail. If the authors decide to rework the manuscript, I recommend Continuous Ranked Probability Score (CRPS; Gneiting & Raftery 2004).

6) The authors underline that uncertainties are "overlooked" (line 8) and "... relatively little attention is paid to the errors ..." (line 25). This is not true. Uncertainties are a core issue in geostatistical analysis also in meteorological studies (c.f. Lensen et al. 2019; Lussana et al. 2018).

7) Figures are missing (c.f. Fig.3 transparent lines are missing, Fig.4, Fig. 8 are not shown). I consider this as a minor technical mistake, but I've checked several times for an update, and I've also used different web-browsers to make sure it's not my mistake.

References:

Lenssen, N.J.L., Schmidt, G.A., Hansen, J.E., Menne, M.J., Persin, A., Ruedy, R. et al. (2019) Improvements in the gistemp uncertainty model. Journal of Geophysical Research: Atmospheres, 124(12), 6307-6326.

Lussana, C., O.E. Tveito, F. Uboldi (2018) Three-dimensional spatial interpolation of 2 m temperature over Norway. Quarterly Journal of the Royal Meteorological Society 144 (711), 344 364

Gneiting, T. & Raftery, A. E. (2004) Strictly Proper Scoring Rules, Prediction, and Estimation. Technical Report No. 463. Department of Statistics, University of Washington, Seattle, Washington. doi:10.1198/016214506000001437.