Wind Energ. Sci. Discuss., referee comment RC2
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Comment on wes-2021-72

Anonymous Referee #2

Referee comment on "Local-thermal-gradient and large-scale-circulation impacts on turbine-height wind speed forecasting over the Columbia River Basin" by Ye Liu et al., Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2021-72-RC2, 2021

This work investigates the sensitivity of turbine-height wind speed forecast to initial condition uncertainties over the Columbia River Gorge and Columbia River Basin using the ensemble sensitivity analysis and self-organizing map (SOM) technique. The paper is well-written, and the analysis is well-presented. It shows the usefulness of SOM in understanding and quantifying the wind forecast uncertainties. However, I do admit that I am not too familiar with this technique and have trouble fully interpreting the results. Nevertheless, I think this work is inspiring to the Wind Energy Science community and is worthy of publication after addressing the following minor issues.

Specific comments:

- Lines 10-11: why only half of the ensemble members, not the entire ensemble, are used to categorize the SOM type? If the entire ensemble is used, does the pattern of the SOM type change significantly?

- Line 29-31: A recent NWP study by Xia et al. (2021) might be useful here.

Xia, G., Draxl, C., Berg, L. K., & Cook, D. (2021). Quantifying the Impacts of Land Surface Modeling on Hub-Height Wind Speed under Different Soil Conditions, *Monthly Weather Review*, *149*(9), 3101-3118. https://doi.org/10.1175/MWR-D-20-0363.1

- Lines 116-117: I believe only a certain number of variables is perturbed. Can you specify that explicitly, rather than just referencing to the reference?

- Line 135: what is the "neighborhood function"?

- Please provide figure caption for a), b), c) and d) in Figure 5.

- Figures 5-6 and Figures 8-9: Does SOM provide variance statistics for each identified pattern (like EOF)? If it does, it is important to provide such information on the figures as well as in the text to facilitate understanding of the relative importance of the identified patterns.