

# ***Interactive comment on “The Making of the New European Wind Atlas – Part 2: Production and Evaluation” by Martin Dörenkämper et al.***

**Martin Dörenkämper et al.**

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The reviewers' comments are in black and [our responses in blue](#).

## **1 Response to Referee #2**

This paper is of great interest to the community as it describes the details of how the New European Wind Atlas was composed, including the specifics of the modeling, and verifies the model results with data. The methods described are reasonable and state-of-the-science. Although WASP is not perfect, its imperfections are well documented and fairly analyzed and discussed here.

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Thank you for your thorough evaluation and very positive feedback to our manuscript. We answer all of your comments separately below.

## 1.1 Technical Comments

1. Detailed discussion of surface roughness and the difficulties is interesting. Thanks for including.

Thank you.

2. p. 14, line 6. mentions that results were checked for obvious errors “like icing”. On p. 4 line 5, you mention that additional code added to WRF estimates ice accumulation. This appears to be inconsistent.

The manuscript needs clarification here. This refers to two separate things. An icing parameterization, i.e. risk of icing on turbine blades, was added to the WRF model code. The line above refers to the quality control of measurements and potential influence of icing. We propose to clarify this in the manuscript.

3. p. 18 - Assume neutral atmospheric stability. This could be a large, inappropriate assumption. On line 15, authors mention that this assumption may cause small discrepancies. I would be much more concerned since stable conditions, which in some locales occur nearly nightly, can cause low level jets, which can result in shear across the turbine blade as well as large errors in the wind speed. I guess it all depends on how well WRF models those. This could be discussed a bit more.

It is important to stress that the assumption of neutral stratification only applies to the vertical extrapolation of the mean profile from the WRF output to the height of the instrument, which, in most cases, is a distance less than 12.5 m (up or down) and is taking place at elevations above 40 m.

Since WASP is a statistical model, it cannot capture Low-level Jet's (LLJs). Therefore, effects of LLJs are only present in the wind climates insofar as WRF has captured them correctly.

4. Very nice discussion of bias and consideration of RIX implications

Thank you.

5. The authors assume the NREL 5MW turbine for power estimates. Was there any opportunity to compare to actual power for a few existing farms? That would certainly provide a bit more confidence in power estimates.

We agree that this would be valuable. However, the scope of the paper is already quite extensive, so we decided to focus on comparison with wind speed measurements from masts, which avoids additional complexities associated with comparison against power production. We suggest to put this as a suggestion for possible future work at the end of the manuscript.

6. p. 23, line 13. - interesting that WASP reduces the accuracy of WRF in high RIX terrain. Have you considered replacing the WASP results with WRF in those locales? Would be interesting to discuss

Good point. We provide access to both the WRF-based and WASP-based atlases and a map of the RIX values on the website. Users can use the atlas best suited for the locales based on the RIX map. We agree that it would be great to make this filtering process easier for users in the future.

7. p. 24, lines 3-11. - very nice analysis, p. 26, second paragraph - nice discussion of limitations. This is very helpful.

Thanks

8. p. 27 - nice list of bullets. The final one discussed which models are more accurate in different orography. I'm confused then which model is shown on the

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website for wind direction. Is it always WASP? Or is it the most accurate model (WRF for complex, ERA5 for simple)? Which should be shown? Similar questions for bullet 3 for wind speed.

For now, wind direction statistics are not displayed on the website and only the WRF wind speed time series are downloadable. We would like to also make the the WAsP based data more accessible, so these results should be seen as a documentation of the model results for future reference.

## 1.2 Minor comments

1. p. 6, lines 10-11 - “however” used twice in one sentence

[Thanks you. Corrected.](#)

2. p. 8, line 8 - data WERE is appropriate. Please use "data" as plural throughout. There is mixed use in this manuscript - please change to be consistent.

[Thanks you. Corrected.](#)

3. p. 9, line 14 - not a sentence

[Thanks you. Corrected.](#)

4. p. 13 - line 18 - would likely have complex structures “in the flow” due to ... Please specify to help readers

[Thanks you. Corrected.](#)

5. p. 14, lines 11 and 12 - data "were" - correct 3 times please. Several others later so won't point out each one.

[Thanks you. Corrected.](#)

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6. p. 21, line 18 - results, which "show" ... (agreement)  
[Thanks you. Corrected.](#)
7. p. 22, line 7 - Do you mean "convolved" rather than "convoluted"?  
[Yes. Thank you. Corrected.](#)
8. p. 25, lines 23-24 - "A big improvement ...." not a sentence.  
[Thank you. Corrected.](#)
9. p. 30, MD and BTO - likely "automating". automatising is not common English usage.  
[Thank you. Corrected.](#)

### 1.3 Additional Clarifications

We have received further non-documented feedback and spotted ourselves the following issues that we would like to clarify in the revised manuscript:

- Pg. 10 - line 22. Table B1 does not exist in Hahmann et al (2020) [1], it is B1 in the appendix of the second (this!) manuscript
- Pg. 24 - Figure 13. is not based on circular statistics in the submitted version of the manuscript, we have recomputed the metric and redrawn the figure without need for re-interpretation of the results
- We have added a discussion about optimising the wind atlas for the wind climate (distributions) instead of the accuracy of the time series.

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## References

[1] Andrea N. Hahmann et al. “The Making of the New European Wind Atlas, Part1: Model Sensitivity”. In: Geosci. Model Dev. Discuss.2020 (2020).doi:10.5194/gmd-2019-349

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2020-23>, 2020.

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