

Wind Energ. Sci. Discuss., referee comment RC2
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Comment on wes-2021-97

Anonymous Referee #2

Referee comment on "Can reanalysis products outperform mesoscale numerical weather prediction models in modeling the wind resource in simple terrain?" by Vincent Pronk et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2021-97-RC2>, 2021

Summary

This study investigates the question whether a current state-of-the-art re-analysis product ERA-5 is sufficiently good to replace mesoscale models for wind resource assessments in simple terrain. Although the study doesn't provide a definite answer to the question, it provides a good contribution to the scientific community dealing with these type questions. The manuscript is well written and well structured. The figures shown are well prepared highlighting the most important results. Overall I recommend publishing this manuscript with some minor revisions.

Comments

I find the methods used appropriate for this type of study. However, part of the analysis could be summarized in a Taylor diagram (using the cRMSE). This has the benefit of adding the standard deviation to the evaluation in a format which is easily evaluated graphically. This metric is otherwise not analysed. So I would like to see either adding the standard deviation to the analysis separately or included in a Taylor diagram.

The authors study the diurnal cycle in more detail and shows that the WRF simulations yields a larger diurnal variability compared to observations, whereas ERA-5's diurnal variation is underestimated. Variations on additional time scales could also be added to the analysis by e.g. computing the Fourier spectrum for the time series for the three different datasets and the two sites. Please consider this in the revision.

Minor comments

L42, Molina reference lacks year

L47, Please add a few sentences commenting the Sheridan (2020) results here. Similar studies has also been performed for the North Sea and the Baltic Sea (Kalverla et al 2019, Wind Energy Sci. 2019, 4, 193–209, Hallgren et al. 2020, Energies, 13, 3670; doi:10.3390/en13143670).

L93, Please elaborate on the sensitivity of assuming $w=0$ for the horizontal wind speed estimate using this assumption? Will this be significant e.g. during strong convection?

L95, Not sure I understand the details here. Is it correct that you get 1 wind speed sample from the lidar every 15 minutes? The hourly estimate is then an average of 4 15 minutes estimates?

L107, definition of near neutral: with your definition this leaves near neutral to $L=0$ or $L>200$ or $L<-200$. Normally, you would define a range around $z/L=0$ (see e.g. Sorbjan and Grachev. Boundary-Layer Meteorol 135, 385–405 (2010). <https://doi.org/10.1007/s10546-010-9482-3>). Please comment and revise

L113, What type of lidars were deployed at the offshore location and how was the wind speed evaluated from these? Did you also here get hourly average?

L134, Please comment on the different model setup for the land and offshore location

L263, strictly, the conclusions part is more written as "summary and conclusion".