

Wind Energ. Sci. Discuss., referee comment RC2
<https://doi.org/10.5194/wes-2022-118-RC2>, 2023
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Comment on wes-2022-118

Anonymous Referee #2

Referee comment on "Validation of an interpretable data-driven wake model using lidar measurements from a field wake steering experiment" by Balthazar Arnoldus Maria Sengers et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2022-118-RC2>, 2023

General comments

This manuscript contributes to the wind energy field by assessing the quality and performance of a data-driven wake model through a validation experiment with field data.

The authors provide a detailed overview of the measurement campaign and methods used for assessment of the wake models, as well as an extensive consideration of other literature. The results appear to support the conclusion that the presented data-drive wake model outperforms the gaussian-curl hybrid model in terms of prediction of available downstream power. It should be noted that this is only for a downstream distance of four rotor diameters and for a limited range of yaw angles.

Specific comments

The authors refer to the potential of the data-driven model as "enormous" and "huge". This appears to be an overstatement in light of the presented results. Suggest to reduce the exaggeration of potential and make more note in the conclusions of the limitations of this data-driven approach.

The model is claimed to be retrainable, however doing so requires further lidar measurements. Same goes for predictions at other downstream distances. The impact of this requirement on field application needs more emphasis. Additionally, the achieved range of yaw misalignment is considerably smaller that what is used in other literature for wake redirection. It is only briefly noted that the model does not generalise outside of the input range in training data. This limits the potential for application in wake steering control.

In Section 2.2, concerning the choice of lidar angular velocity and number of PPI scans, it is noted that "too few cases are studied for the statistics to converge". Would that not make the entire comparison invalid? The need to motivate the choice of scanning strategy is clear, but these results appear statistically insignificant?

Technical corrections

- Shorter paragraphs would improve structure and readability.
- Suggest to revise structure, there is quite some inconsistency in length and use of sections / subsections / paragraphs.
- Introduction mentions "free-field" experiments, would this not just be a field experiment?
- Figure 1: colours of topographic map need a colourbar
- Figure 7: black line is not referenced. What is it?
- Section 4.2: Numerous references are made to the width of normal distribution fits. Consider quantifying by noting standard deviation of fit?
- Figure 9: indicate the fit quality for the linear fit of trend lines. The associated claim of a "clear" dependency needs more support given the scatter in the data. (ln. 378)