Review of WES 2026-50: Improving offshore wind data from reanalysis using ship-based lidar measurements

This manuscript presents a methodology to improve offshore wind speed estimates by integrating ship-based lidar measurements with ERA5 reanalysis data using a statistical calibration approach inspired by WRF model nudging of observations.

We recommend that the manuscript be **rejected** for publication in WES for three primary reasons, which are detailed further in the following paragraphs.

1. The method presented is a straightforward spatial and temporal interpolation of lidar data to enhance ERA5 reanalysis winds. It is not substantial enough for a full paper.
2. Some of the verification (section 3.2) is in-sample validation. The data used to optimise the interpolation parameters is then used to validate the interpolation results. This does not warrant that it matches well if the site is far from the ferry ship track.
3. The evidence does not sufficiently demonstrate that the interpolation parameters are site-independent. On the contrary, parameters that work for a ferry in Finland will probably not perform as well in other regions, especially where the terrain is complex.

The paper falls within the scope of WES. However, its usability and scientific value are quite limited. Overall, it lacks originality. It demonstrates that incorporating interpolated observations improves the accuracy of the ERA5 reanalysis in coastal regions, as expected given ERA5's low spatial resolution. The main unique aspect is its use of measurements obtained from a ferry-mounted lidar, which adds a temporal dimension to the interpolation parameters.

The authors show that the effect of the interpolated ferry-mounted lidar measurements is observed near the coast, rather than offshore, along the ferry's route. Given this and the poor spatial and temporal sampling of the ferry-mounted lidar, would it be more cost-effective to install a fixed lidar on the coast? I understand that the authors aim to demonstrate the usability of their measurements, but I don't think the manuscript achieves this.

Overall, the paper does not demonstrate sufficient scientific rigour. An entire section relies on using interpolated measurements to validate the interpolation method. This only demonstrates that interpolation is correctly coded. But perhaps the study's largest shortcoming is that the interpolation parameters are optimised for a single ferry route. It seems likely that these parameters will vary from one region to another and depend on terrain complexity. Thus, this severely limits the method's applicability. The good fit between the corrected ERA data and the ship lidar data does not warrant a good fit with other independent observations.

The writing is clear and mostly error-free. However, condensing certain sections (e.g. page 17) into a few tables could improve readability. The figures and tables are of high quality, and the title accurately reflects the manuscript's content.

Minor issues (not comprehensive):

1. The manuscript exhibits some self-citation by the author's research group. Other articles have used data from ferry-mounted lidars but have not cited them. Hatfield et al. (2022, https://doi.org/10.3390/rs14061427) and Alonso-de-Linaje et al. (2024; DOI: 10.1175/JAMC-D-23-0102.1) are, in our opinion, relevant in some sections of the introduction but were not cited.
2. It would be nice to see a plot showing the data count of the ferry lidar measurements along the track. Is there a data-count dependence on the assimilation effect?
3. Page 15, L 300-305, duplication of sentence. Please revise.
4. The terms "assimilate" and "data assimilation" have a very specific meaning in meteorology. Please replace these with another term, such as 'blend' or 'correction'.
5. The abstract could benefit from more quantitative metrics, especially the final sentences.
6. The first sentence of the introduction is hard to read. The authors should consider simplifying it or splitting it into two.
7. It is sometimes not clear which 'lidar' data is being used. Please ensure that the correct data are referenced in each section and figure (e.g., Figures 3 and 4).
8. In Figure 6, I suggest that the authors order the panels in the usual way: top left (a), top right (b), bottom left (c), and bottom right (d). The meaning of the red line should be added to the caption.