Wind Energ. Sci. Discuss., author comment AC4
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Reply on RC3

Abdul Haseeb Syed et al.

Author comment on "Turbulence structures and entrainment length scales in large offshore wind farms" by Abdul Haseeb Syed et al., Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2022-69-AC4, 2022

This paper focuses on the variation in turbulence structures and dominant scales of vertical entrainment above large offshore wind farms located in the North sea based on the observation dataset of the research aircraft. This work is interesting as most of the previous research on entrainment is performed using large-eddy simulations layouts, which do not truly depict the reality. The analysis based on the actual in-situ measurements on real wind farms in this paper has good value for wind energy research and large offshore wind farms. Nevertheless, the structure should be improved as it is not easy to follow. It provided an extensive and detailed analysis, but the highlights of this article could be more clear.

I truly congratulate the authors for this manuscript, which I believe that should be considered for publication after minor changes.

The manuscripts, in my opinion, deserve revision on the following issues.

Q1. I80-85 More information about the study area could be added in the text and Figure 1, such as the general location information (area, distance between land and sea), dominant wind direction, atmospheric circulation background, etc.

Authors' Response:

A new figure is now added which provides information about the dominant wind direction and prevalent stability conditions in the region of interest. (See Figure 1)

This new information is also added to the text. (See l93)

Q2. I260-270 Quantitative results need to be added to help make the results credible.

Authors' Response:

The authors have already included the quantitative results in the plot and text. (See Figure 11)

Q3. Discussion section needs to be improved.

Authors' Response:

The authors have improved the Discussion section based on reviewers' suggestions.

1) The highlight of this paper is the analysis based on observational data, rather than simulation experiments. Therefore, it is valuable to quantitatively compare the results of this study with those of previous studies based on simulation experiments.

2) The paper contains a lot of analysis, but it is not well connected. It is difficult to find the highlights and complete storyline. It should be improved in the discussion and conclusion parts.

Authors' Response:

The authors have improved the Introduction, Discussion, and Conclusions sections based on the reviewers' suggestions.

Please also note the supplement to this comment:
https://wes.copernicus.org/preprints/wes-2022-69/wes-2022-69-AC4-supplement.pdf