

Dear Peer Reviewer,

Thank you for your valuable and insightful comments on our manuscript. Your feedback has been instrumental in improving the quality and clarity of the paper.

Attached, you shall find a detailed response to each of your comments, along with an updated version of the manuscript reflecting these improvements.

Thank you once again for your thorough review and constructive suggestions.

Best regards,

Tahir Malik

Report #1: 'Comment on wes-2024-35', Submitted on 29 Oct 2024 - Anonymous referee #3

Dear Authors,

I find the clarity of the manuscript has greatly improved and you have addressed all of my comments.

- Thank you for your comment!

Unfortunately I believe the quality of writing still needs to be improved. Some paragraphs in the conclusions have especially stood out to me.

- With tried eyes, you correctly point out that text was in places left needing correction and improvement. I have gone through the entire text and weeded out the text that I had previously overlooked. I hope I have not missed anything!

For example the paragraph starting at line 464 does not flow correctly and the use of present continuous in the term "investigating" is incorrect.

- Corrected

Also: L462: maybe you mean "criticality"? but I would strongly suggest rephrasing.

- Corrected

The following phrases up to L475 could also be improved, as past tense is used while present is often used in other parts of the conclusions.

- **You are correct!** I have implemented improvements in the tense.

Moreover, L489: increasing -> increased

- Corrected

And, L490: please choose between "time average" and "time averaging" throughout the paper. "time averaging period" is more appropriate in my opinion.

- Thank you for highlighting the need for consistent terminology regarding "time average," "time averaging," and "time averaging period." Upon review, I agree that "time averaging **period**" is more precise when referring to the temporal duration of the averaging process, as seen in the example: "Shorter time averaging periods may allow for detecting the nuanced effects of turbulence and erosion more effectively."

To ensure clarity and consistency throughout the paper the following is the guiding principle:

1. **"Time averaging period"** refers to the **duration** over which data is smoothed or aggregated.
2. **"Time averaging"** describes the **process** of applying the smoothing or averaging technique.
3. **"Time average"** represents the **resulting statistical value** derived from the process.

Additionally, thanks to your highlighting of this terminology: the following clarification of the usage of the terms:

- **Period** implies a specific, well-defined length of time over which the averaging occurs e.g. "The data were averaged **over a period of 10 seconds.**"
- **Interval** can also be used, but it often suggests a range between two points in time rather than the length of the averaging period itself, such as in the example: "The **sampling interval** was 1 minute, but the **averaging period was 1 hour.**"

Thank you for your valuable input! The Figures are also updated to reflect this.

Please revise English throughout the entire manuscript carefully.

- Thank you for your comment. Typos and slips were indeed found in phrasing throughout the paper. **I hope I have sufficiently squashed these!**

Report #2: 'Comment on wes-2024-35', Submitted on 18 Nov 2024 - Anonymous referee #2

The work makes an analysis of the effect over power production of erosion and turbulence intensity also including the impact of time averaging in the results. The work gives more insight into the complexity of power losses estimation, especially when turbulence intensity appears. The idea of isolating the effect of the different causes is well addressed. The authors attended the first reviews and provided a final version of the manuscript. After reviewing the manuscript, a typo and two general comments are detected and forwarded to the authors.

Referee report to Manuscript Version 4

1) **Line 208:** It seems that a new typo appears 'as it an atmospheric...'.

- Corrected!
- Furthermore, as correctly pointed out, also by the other reviewer, typos and slips were found in phrasing. **I hope I have sufficiently squashed these!**

2) **General comment 1:** For some figures (example Figure 5 & Figure 8) the blade condition is named as P40 roughness, and for some others (example Figure 11 & Figure 12) the blade condition is named as P40. In some parts of the text (line 220) the blade condition is named as erosion and in some other (example line 299) the blade condition is named as roughness 'the power reduction due to roughness'. This double way of calling the degradation status of the blades could confuse the reader. It is suggested to harmonize the figures and the text and select a way of naming the blade status: for instance blade degradation.

- Thank you for the comment – this was inconsistent. Neither was it aesthetically pleasing and additionally could lead to reader confusion, **therefore Figures 5, 8, 11, 12 etc. have all been aligned.** The term roughness has been removed for harmonisation and streamlining of the figures. **Thank you!**
- Furthermore, although P400 and P40 grid sandpaper roughness is used as a proxy for blade erosion. Leading edge erosion (LEE) and leading edge roughness (LER) are used interchangeably as is the case in the field.
- Despite this, your comment is very fair -I have gone over the entire paper **to ensure that it is not used in too interchangeable a manner for consistency.** Yet, some instances remain due to its proxy usage for erosion. Examples are:
 - Abstract:” aerofoil characteristics for the blade were modified to simulate different degrees of erosion, represented by varying levels of roughness.”
 - “Blade leading edge erosion was modelled as varying levels of surface roughness, a quantifiable measure of damage severity”
 - Erosion is the degradation represented by P400 and P40 roughness

3) **General comment 2:** It is explained in section 2.2 that roughness represents a precursor to more significant aerofoil degradation, which is fine but in line 104 it is mentioned that sandpaper provides a simplified model of erosion. The suggestion is to remove the part of line 104 where it is said 'While the sandpaper provides a simplified model of erosion...' and just mention that P40 and P400 degradations are used as reference to calculate the airfoil polar degradation to be used in the aeroelastic model to assess the effect of the different parameters on airfoil performance.

- Thank you. The paragraph has been amended to reflect your fair comment.