

Revision and answers Schepers et al.

We again thank the reviewers for their positive feedback and for their final comments on how to improve the manuscript. The comments are greatly appreciated. With this document we explain how the comments are included.

For convenience we have submitted the document with track changes so that that the changes can be seen clearly.

Comments from reviewer 1:

Line 61: "In this way it can be assessed whether these extreme events yield loads which exceed the design load spectrum. If true, this might lead to a recommendation on adaptation of the load spectrum with events found in the present study." And if not, as it turns out? Adjusting the DLCs? Reduce safety factors? One of my concerns from the first review was the weak conclusions of the work. This aspect has greatly improved in the revised paper (thank you), but in my opinion the key takeaways may still benefit a few more thoughts. Given the results that you show, what do you recommend for the standard? What should a designer do after reading your paper? You list a more accurate wind modeling and the coupling to higher fidelity solvers among the next steps. But what do we do for wind parks where turbines are not isolated, but experience waked inflows? How would you model these phenomena in your numerical framework?

See the additional text at line 61 and the additional text in the conclusions

Line 114: "ERA5 boundary conditions". What are they exactly? Also, no conclusion talks about them. Should one bullet point discuss the differences between GRASP and ERA5 outputs?

See the additional text

Figure 2 and Figure 6 have the top of the legend cut (1000 instead of 10000). The whole paper would also look so much nicer if all figures were generated with the same style, Matlab or Python or Excel or Paraview or ... It could be a very easy and so useful upgrade.

A very good suggestion: All figures are now made with the same tool

Line 181: "However even a turbulence class C (the lowest possible turbulence class in IEC) leads to turbulence intensities which are still far below the extreme ". Shouldn't the word be "above"? The extreme values observed are below the values from turbulence class C (and A), not vice versa, no?

A very clumsy and confusing mistake. Apologizes! Has been corrected

Line 279: were the original loads run in Phatas? I tried to access the AVATAR deliverables to check myself, but the website seems to be down (or not accessible to me?). If they were, I find the fact that you rerun the loads irrelevant to the reader. I understand it was a useful step for you to avoid inconsistencies, but the reader does not gain anything here. I would remove the sentence at line 281/282.

The original loads were run with Phatas indeed but I agree that the value is internal and it has no value for outside readers so I removed the sentnec

Line 289: "The yaw angle is prescribed to be 8 degrees in line with the IEC standards." Isn't this condition for misaligned load cases only? That should not be true for DLC 1.2. What am I missing?

As a matter of fact the IEC standard, section 7.4.1, second alinea says the following: “In addition, deviations from theoretical optimum operating situations such as yaw misalignment and control system tracking errors shall be taken into account in the analyses of operational loads. We at TNO generally use 8 degrees and this 8 degrees is based on the GL standard section 4.5.1 which states: “Yaw misalignment and hysteresis shall be considered in the yaw movement. If values for the turbine type cannot be specified, yaw misalignment of -8°, 0° and +8° evenly distributed in ± 8° shall be applied (DLC 1.1 to 1.3 and 1.5 to 1.7)”

Our sentence was a bit cryptic indeed but I feel there is not much value in a detailed explanation for the purpose of the present study. I replaced the sentence by: A small yaw angle of 8 degrees is included to account for yaw control tracking errors.

Figure 9: typo in the label of the y axis “Exterme”.

Corrected. Thanks!

Line 361: “The variation in flatwise moment from the low-level jet is very different.” Azimuthal variation? Or variation compared to what?

This is the azimuthal variation indeed. And it is compared to the variation which results from DLC1. We added an explanation

Comments from reviewer 2:

* line 114: to what is \textit{Dutch North Sea area with ERA5 boundary conditions} referring to? Either a reference or introduction seems lacking. Could be this is obvious of readers with a stronger meteorological background, but it is not obvious to me.

Reference is included

* For the scatter density plots: I assume the color refers to the number of occurrences? Could you add this to either the caption or add a label to the color bar in the figure?

Has been added

*line 316: is it possible you accidentally forgot to remove this reference to a sequel report?

Actually This is not a sequel report but it is a completed report. We think it has relevance to let the reader know that we have simulated a reduced reference load set where a full IEC reference load set would increase the extreme loads even more.

Finally: The turbulence as fed into AeroModule is frozen indeed like it is in the turbulence from a conventional wind simulator. We have added a remark on that in the conclusions