

Interactive comment on “Impacts of the Low-Level Jet’s Negative Wind Shear on the Wind Turbine” by Walter Gutierrez et al.

Anonymous Referee #1

Received and published: 18 July 2017

Dear authors,

Thanks for your manuscript. In general I think that it contains good and interesting information but in its current version it reads more like a technical report rather than a scientific contribution. I hope you answer all my major and specific comments, which hopefully help improving your work to the standard of a scientific paper.

Major comments

1. The literature review is way too long. Also you have a whole section with two subsections dedicated to it besides the introduction where there is also some literature review. My suggestion is that the literature review should be part of the introduction and you need to refer to the important work on the matter (you have many references

C1

to non-valuable work). But please but do not make it much longer than it is!!!

2. You use the met tower data as an input for your aeroelastic computations. But from a tower (with different sensors at different vertical levels) you can derive a "2D" wind field. What do you assume to get the 3D wind field or how do you get it anyway?

3. As I mentioned before, I have the opinion that this manuscript reads more like a technical report than a paper for a scientific journal (the only exception is the discussion part that tries to give value to the work). The authors do not state clear how innovative their approach is. It just seems quite standard to perform aerolastic simulations using wind fields with certain characteristics.

4. As mentioned in the discussion the negative shears can have a smaller impact on the loads than the positive shears because the positive shears are larger in magnitude. I think it is important that after describing the met data, pdfs of the wind shear should be shown to see how different these are. Also, what will be the result if the magnitude of negative wind shears was as big as the positive ones? That will be interesting to see in the simulations

5. During LLJ conditions the variation of the wind shear might be large but so the wind veer and that might have a large(r) impact on the loads. This needs to be addressed in the manuscript.

6. Finally the authors repeat too many sentences throughout the manuscript than can be deleted without losing connection or detriment. I will point to some in the specific comments

Specific comments

1. Page 1 line 6 “at the heights of the turbine” For the abstract to stand alone, you need to say at what heights relative to the turbine hub height you refer to here.

2. Page 1 line 9 add “the tower’s” before “slower velocities” otherwise the reader might think you are talking about the flow

C2

3. Page 1 line 11 "slightly more stable" is quite ambiguous. Perhaps the whole sentence is not needed
4. Page 1 line 12 replace "the heights of more LLJs" by "LLJ's typical heights"
5. Page 1 lines 15-16 replace "are mainly detected" by "often occur"
6. Page 1 line 19 shouldn't you move the second "is" after "influence"?
7. Page 1 line 20 add "turbine" before "structure"
8. Page 2 line 6 leave a small space between numbers and units throughout the whole manuscript (this I think it is the first instance)
9. Page 2 lines 28-end is not needed + already said. Remember to cleverly, efficiently and shortly combine sections 1 and 2!
10. Page 3 lidar and sodar can be used already as words so you can save the explanation of the acronyms
11. Page 3 line 12 "which in wind energy... 1/7" This is not true. If somebody is doing this they are doing it wrong. 1/7 is the shear for a specific roughness, height, and stability conditions (in flat terrain)
12. Page 3 lines 24-25 "could be estimated using an interpolation formula" If this is indeed true then nobody should refer to that paper at all because there are no physics in that
13. Page 3 line 30 add "a" after "used"
14. Page 4 "More recently... jet peak" The power law is not physical so the reference to that study is not needed at all. The strange thing will be that they find the power law to be applicable to LLJs
15. Page 4 line 9 the sentence is not needed as it is obvious. The strange thing will be the opposite

C3

16. Page 4 line 19 you mean "wavelet" instead of "wavelength"?
17. Page 4 lines 21-22 this sort of conclusion is not true. You refer to some literature regarding measurements with remote sensors that are not valuable for comparison. There are many papers where winds (and LLJs) have been observed with lidars (for example) and that you are not referring to
18. Page 4 line 29 "AEP at night" I guess you mean production... AEP is in a yearly basis and is one single number
19. Page 4 line 30 "to the wind farm" which wind farm? You are referring to some work from Antoniou which is not that much relevant. The danes have made many other campaigns with lidar measuring the wind profile all the way up to the ABL height that are relevant for your study
20. Page 5 line 15 you mean "farm" instead of "turbine"?
21. Page 6 line 9 replace "explain" by "explains"
22. Page 6 line 8 and 12 replace "200-meter's" by "200-m"
23. Page 6 line 27 where in Stull (1988)?
24. Page 6 lines 29-30 "The data... queries" is not needed. Also how you know they are "corrupted" or "inaccurate"? "the conversion to a normalized data structure... paremeters" is not needed either
25. Page 7 line 4 what do you mean by "sustained winds" and by "preference" (you use them or not)?
26. Page 7 line 8 "resolution of 1 m in both directions" which 2? It is just tower data! If you meant the turbulence box then you need to say how you go from a tower to a turbulence box where you need to model the three wind speed components. What assumptions you made for coherence?

C4

27. Page 7 lines 10 -11 Not needed, already said
28. Page 7 line 15 replace “height above the ground level of the turbine height” by “turbine hub height”
29. Page 7 lines 25-27 Not needed, already said
30. Fig. 2 The axes in your figures cannot be read. You need to increase the size of the labels of nearly all figures
31. Page 8 After “Results” this is repeated all over the manuscript. Delete!
32. Page 9 line 2 replace “by looking at plots of” by “with”
33. Page 9 lines 24-31 this information is not needed, is too elemental about pdfs and plotting. Also in figure 3 frames b and c contain the same information. Cannot read the axes labels!
34. Page 10 all the text is not needed and/or has been said before. The description of what the lines are should be in the caption
35. Page 11 lines 2-7 This can be omitted
36. Page 11 lines 8-9 Is this a statement or an observation from your analysis?
37. Page 11 line 13 “are very skewed” where? I cannot see skewness
38. Page 11 line 16 change “conclusion” by “observation”
39. Page 12 line 5. Similar to comment 38
40. Page 12 lines 12-13 Not needed, delete please
41. Page 12 lines 18-19 similar to comment 40
42. Page 12 line 23 similar to comment 38

Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2017-22>, 2017.