General comment

Interesting topic. There is definitely a need for studying and publishing on the effect of veer on wind turbine power performance. However the usual challenge with experimental data is how to identify whether the effect on the performance is due to veer or other wind conditions, especially speed shear which is very much correlated with veer. This is my main criticism to the paper: all the observed performance variations are attributed to the veer effect without considering the speed shear during the measurement campaign. This could totally invalidate the results. A description of the shear during those measurements and an estimate of its expected effect on the turbine performance need to be included in the paper.

Apart from that, the paper is rather well structured. References are made to the relevant existing study on the matter. The analysis and interpretation of the results need to be clarified in several places but this probably only a matter of sharpening the language (see detailed comments).

Detailed comments

P3- l.9: could you clarify this sentence or paragraph? Do you mea in Vanderwende, it was not complex terrain contrary to the two other studies or it was complex terrain in all of them – then why does complex terrain prevents the occurrence of changing wind direction wind height in the two first cases and not in the other?

P3-l.22,24 and 25: wrong cross ref: “section 0”

P4, l3-4 The data have also been used…LES models” – delete this sentence. It is not relevant in the context of this study.

P4- Figure 1: where is this sub-region located in relation to the overall 200 turbines wind farm? Are there any turbine or any obstacles to the south of that region? How far?

P5, l8: why have you used 2-min averages and not 10 min?

P5, fug.2: how were the availability calculated for the lidar and turbine? Availability of 2 min data over one day? At what height for the lidar? For which turbine? Four turbine were mentioned in figure 1? Were the data for wind speed below 2.5m/s also excluded from the lidar data for availability quantification?

P7, fig. 4: those data are from which of the 4 turbines highlighted in Fig 1?

P7, section 2.4

1. This is a bit confusing since it is stated in page 5 that the study was based on 2min averages. Could you please clarify?
2. What is meant by "average over different time periods": the 10 min period were named after the beginning of the period for the turbine and the end of the period for the lidars(or vice versa) and it could be fixed with a 10 min shift or the clocks were not synchronized during the campaign and you had to manually find the beginning of the 10 min period to be averaged?
3. How have you checked the time synchronization between the turbine and lidar signals?
4. This section about time averaging and time ynchronisation should be moved before the "wind turbine" section since the time averaging and synchronization needed to be performed before producing the plots in figure 4.

P8, l3-4 (and figure 5):

1. How come the measure power is larger than for wind speed above 12m/s? this does not match with the blue dots in Figure 4a).
2. For what range of wind speed shear, direction shear and TI was the power curve provided by the manufacturer? Could that explain the discrepancy between 5 and 8m/s?

P8, l7 to 11. I do not quite understand the point of the exercise with the Pearson correlation coefficient.

1. What is the purpose of this comparison? Did you have some doubt about the lidar measurements accuracy? Has it been compared to another wind speed measurement (e.g. mast mounted anemometer or other lidar) before or after the campaign? Or is this to show somehow that there is a good correlation between the lidar wind speed and the turbine power, although it was placed rather far from the turbine(s)?
2. The nacelle anemometer measurements are expected to be disturbed by the rotor and the nacelle. The manufacturer power curve is provided with the free hub height wind speed on the x-axis. In order to get a comparable measured power curve using the nacelle wind speed, it must be corrected with a Nacelle Transfer Function (NTF)? Was this applied? If so, where did the NTF come from? If the nacelle wind speed was not corrected, it is to be expected that there is not be a good agreement with the manufacturer power curve.

p.9: "Directional shear": this section is hanging (missing numbering)

p9, lines 6 to 17: this should be in the introduction.

P11, figure 7: there are average and median over the whole measurement period? Could you include a standard deviation or 25th, 75th percentile in the figure as well?

P12, l.9: how does the LDWS and HDWS events correlate to wind speed shear and turbulence intensity?

Figure 10 to 13:

1. are those results for Turbine D?
2. strong veer is expected to be correlated with strong speed shear – which is expected to have a larg impact on the power performance. How do you know those results are not just due to the wind speed shear?

p18, l.9 to p19, l3.The points you are trying to make with comparison to other studies need to be clarified. The reasons why you finds them in contradiction with your own results are not clear.

P19, l15-17. This is often the challenge. But is no because the dataset is too small to bin them according to spped shear and direction shear (with statistical significance in al bins) that the effect of speed shear can be ignored. The speed shear or wind speed profile for this specific dataset has to be carefully understood and described in the paper before drawing any conclusions on the effect of veer on the turbine power performance.

P19, l21 to 33. I think it is outstretching to expand the discussion to skewed wake effect on power performance here (how do you make the different between the underperformance due to "standard "wake and skewed wake?) and is out of scope.

Looking forward to reading you again. And thanks for giving me the chance to get back to this topic after many years.

Best regards,

Rozenn