Answer to Reviewer 2

March 16, 2017

Thank you for reviewing the article. I have copied your main comments below in bold letters.

Specific comments:
The roughness length for the wind farm has been chosen as 1m. Did you check for its influence on the analysis? E.g., by comparing with a smaller one? Technically the paper is of good quality with no flaws in English language only a couple of typos and small technical issues were found (see next paragraph).

It is interesting to wonder what the roughness length of a wind farm should be and how it would influence the current study. Wind farm modelers have used values between 0.5-0.7 m [3, 4], using the wind farm roughness relation of Frandsen [2]. Studies based on large eddy simulations of a fully developed boundary layer over an infinitely large wind farm have shown that the wind farm roughness can be as high as 8.9 m [1]. Hence, using 1 m as a wind farm roughness in the present work seems to be in the correct range. Choosing a different roughness will change the results, but not the general trends observed in the simulation of wind farm represent by a roughness length. I have performed simulations of wind farm roughness of 10 m, which gave a more stronger initial counter clockwise deflection compared to using a wind farm roughness of 1 m. I will add a discussion about the wind farm roughness in the revised article. In addition, I will correct the article for the typos that you have pointed out.

References

[1] Calaf, M., Meneveau, C., and Meyers, J. Large eddy simulation study of fully developed wind-turbine array boundary layers. *Physics of Fluids*, 22:015110, 2010.

[2] Frandsen, S. T. Turbulence and turbulence-generated structural loading in wind turbine clusters. Risø-R-1188(en), Risø National Laboratory, 2007.

[3] Frandsen, S. T., Jørgensen, H. E., Barthelmie, R., Rathmann, O., Badger, J., Hansen, K., Ott, S., Réthoré, P.-E., Larsen, S. E., and Jensen, L. E. The Making of a Second-generation Wind Farm Efficiency Model Complex. *Wind Energy*, 12:445–458, 2009.

[4] Volker, P. *Wake Effects of Large Offshore Wind Farms - a study of the Mesoscale Atmosphere*. PhD thesis, DTU Wind Energy, 2014.