Response to the anonymous referee #1:

Thanks a lot for the review. Here our response to the reviewer's comments. The response is given within XXX--- ---XXX

Regards,
The authors

The manuscript presents a comparison between an evaluation of wind turbine SCADA data and mesoscale model simulations for the Anholt wind farm. Assessing wakes in larger wind farms is an important topic that deserves attention. The efficiency of wind farms very much depends on a meaningful consideration of possible wake effects. Although wake properties are very much determined by atmospheric stability, the simulations for this manuscript have been made without taking atmospheric stratification into account. Unfortunately, I'm inclined to reject the manuscript in its present form. Reasons for this negative decision are:
(1) The Introduction does not present a thorough scientific discussion of the current problems regarding turbine wakes in larger wind farms and does not identify clearly formulated research issues which are to be addressed in this manuscript. The manuscript rather appears to be a collection of isolated evaluations made from the SCADA data, the Jensen park wake model and several mesoscale models (I found "Fuga", a linearized RANS model and WRF mentioned in the text without seeing a clear strategy how and why they have been used).

XXX--- We have modified the introduction to highlight the research issues addressed in this manuscript and some of the issues when modeling wakes in large offshore wind farms. As pointed out by the reviewer, we did not explain the motivation of using Fuga and WRF in the introduction of the original submission; we now try to explain why we use them for our analysis (please see the marked-up manuscript which highlights the changes and additions) ---XXX

(2) Page 12, line 2 declares the greatest deficiency of the manuscript: atmospheric stability is not accounted for in the simulations. Why do the authors present such incomplete simulations, although they state in the introduction the importance of atmospheric stability?

XXX--- The westerly and southerly flow cases are presented to show the ability of the wake models to predict the wake loss for particular inflow conditions only. The westerly case being the one where the effect of the land should be the highest and the southerly case being one of those cases with the highest wake losses due to the farm layout. Most of the manuscript is about the wake models being used in a long-time series fashion; it is rather difficult to include atmospheric stability in all the models used here and for the type of use we want them for in this paper, which is the prediction of the AEP. Most important, for the type of the analysis we are focused on (i.e. AEP-like analysis) and given the results we show in terms of AEP/Capacity factor, one can see that inclusion of these effects might not be that important for such analyses. This is because for AEP predictions, the over-and under-estimations we make with these models are generally compensated (unless the long-term atmospheric stability is far from neutral, which is not the case of the North Sea). In the introduction we state that it is important to include them when comparing the wake models for particular flow cases. Also there are no measurements available for stability estimation. Of course WRF provides modelled values of atmospheric stability but using them in a time-series basis is difficult in all wake models and highly uncertain (see Peña and Hahmann, 2012). We now add "We have atmospheric stability measures from the WRF simulations but `instantaneous' WRF stability measures are highly uncertain (Peña and Hahmann, 2012)" ---XXX

(3) The last sentence of the Conclusions gives the final reason why I should not read this paper. Here, the authors clearly state that their results are wind farm specific and SCADA specific and cannot be transferred to other wind farms.

XXX--- We think that it is important to mention that our results are wind-farm specific because they are, as well as most wake evaluations in all literature (if not all). In our particular case, the relative model error is a function of the SCADA and the way SCADA have been treated. This is the reason of our statement. The study shows a way to perform-such an analysis, which can be done in all wind farms but the results are simply only valid for Anholt. It is though probable that the relative differences between models of the relative model error (in Fig. 9 of the original submission) will be similar for different offshore wind farms and configurations, with main differences in the bias from zero relative model error ---XXX

Further issues:
(4) Some references point to grey literature. This is not convenient for the possible reader (e.g., p. 7, line 20).

XXX--- We added this reference following the comments of the associate editor. We now use `proper' referencing in this case ---XXX

(5) The denotation of the different wake model simulations is inconsistent. "Park 1" and "Larsen 2" have the same characteristics (as have "Park 2" and "Larsen 1"). This is irritating.

XXX--- This is now changed as suggested ---XXX

(6) What is meant by a "quadratic sum"? It would be helpful to give a few mathematical formulae in order to avoid unnecessary ambiguity.

XXX--- We now explain with formulae what is meant by linear and quadratic sum as suggested ---XXX

(7) The statement in line 20 on p. 2 needs references to the existing literature.

XXX--- References are added as suggested ---XXX

References:

Peña A. and Hahmann A.N. (2012) Atmospheric stability and turbulence fluxes at Horns Rev – an intercomparison of sonic, bulk and WRF model data. Wind Energ. 15:717—731