

## ***Interactive comment on “On wake modeling, wind-farm gradients and AEP predictions at the Anholt wind farm” by Alfredo Peña et al.***

**Anonymous Referee #2**

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The paper provides an interesting evaluation of the effect of proximity to the coast on offshore wind farm wake losses which is clearly a relevant and topical area, though there are some points to address: 1) Given that the paper acknowledges that roughness change is the main driver to the change in wind speed offshore, why did the authors not compare the use of WRF with a simple roughness change model to confirm this? 2) It seems strange that a ‘full’ (non-linearised) RANS model was only used for the southerly flow case. Either such results should be shown for comparison in all cases or not at all. 3) The discrepancy between the RANS model and the results in Fig 7 was put down to a possible prevalence of stable conditions. It was stated that it was not possible to know this, but surely the WRF model results should have given enough information to at least estimate the stability conditions? Although not definitive, this

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could lend some weight to this hypothesis. Indeed, in all cases stability is likely to have played a role in wake recovery (and in the coastal transition), though this was not really commented on and would likely have affected the observed wake losses. Also, the RANS model could have been run under stable stratification (perhaps using a couple of  $z/L$  scenarios) to test whether a better fit was observed in this case. 4) The results for the capacity factor in 3.2 used the WRF gradient wind speed with wake models. Given that previously, results were presented with both a WRF wind speed gradient and a single representative WRF wind speed, why was this not presented here? 5) The authors suggest that an extension to the work would be to infer the wind speed gradient directly from the SCADA data. It seems odd that this was not already included in this work as it was such an obvious thing to do compared to trying to estimate the effect using a model. I would suggest that it would make this work much stronger if it were included. 6) As suggested in other comments on this paper, the explanation of linear and quadratic wake addition would benefit from some equations and the order of '1' and '2' should be consistent between wake models.

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