

# Response to reviews – wes-2022-52

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## Reviewer #1

Thank you for the positive evaluation of our manuscript. Your comments, together with those of referee #2, led to a slight revision of the paper. The specific changes are outlined below. In our response, the reviewers' comments are in black, and our responses are in blue.

The paper provides an estimate of the future changes in wind resource over the North Sea. To do so, a high-emission scenario is simulated in the CMIP6 models, which are first validated, in their historic portion, against reanalysis products, WRF simulations, and observations.

The topic is within the scope of WES. The paper is very well written, the methodology seems sound, and the standard of the figures is high enough for a peer-reviewed journal. In general, I do not have any major comments, so I would like to congratulate with the authors for a well-conducted analysis, and recommend publication of the paper after my few, very minor comments below have been addressed.

1. The last two sentences of the abstract seem to break the flow and are hard to connect to the rest of the abstract, I would suggest rephrasing.

We have revised these two sentences. They now read:

The common practice of extrapolating 10-meter wind speeds to turbine height using the power law with a constant shear exponent is often a poor approximation of the actual turbine height wind speed. This approximation can exaggerate the future changes in wind resources and ignores possible surface roughness and atmospheric stability changes.

2. 67: a capital letter “I” should be changed to “i”.

The text has been changed. Thank you.

3. 130: “to evaluate the boundary layer winds in the reanalysis datasets” is not clear since the reanalysis have not been introduced yet. Maybe it would be better to introduce the reanalysis first, and then the mast observations.

Thank you. Switching the order of the two data types makes sense and makes the manuscript flow better. We also changed the title of the subsection to “Reanalysis and mast observations”

4. 134: the sentence “We use the data from the 102 m.” is not clear.

Agreed. We have changed the sentence to read “We use data **from the anemometer** at 102 m **above mean sea level.**”

5. 139: can we really consider the NEWA a reanalysis product? As you state in Table 2, it does not assimilate any observations.

Agreed. The NEWA dataset does not directly assimilate observations but uses spectral nudging to the driving reanalysis. We have changed the sentence that starts in L137 to read “We use the wind speed and direction derived from three modern reanalysis: ... ”. We have also changed the headings in Table 2 from “Reanalysis product” to “Dataset”

6. Figure 4: missing “.” at the end of the figure caption.

Fixed.

7. 280: broken reference.

Fixed.

8. 300: there is a repetition in this sentence, please correct.

Fixed, thank you.