

We thank the reviewer for his/her time and efforts in carefully reading our manuscript. The feedback on our work is highly appreciated!

A point-by-point reply to the individual comments can be found below in blue (the original comments are included in black).

This work used a year-long LES simulation dataset to look at energy production and wake losses for six different 4 GW offshore wind farm scenarios. Authors looked at wake and losses for six different scenarios as a function of wind speed and direction, stability, as well as different wind farm layouts.

I believe that paper is well structured, and this work is very relevant for the entire wind energy community.

Some specific comments:

Line 72 and 77: decide if you would like to use “subgrid models” or “subgrid-models” and be consistent.

Choose ‘subgrid model’.

Line 80: Km is not defined

Corrected

Line 83: “eddy-viscosity model specifically developed for anisotropic grids. “ So the grid is anisotropic? Need more details about grid spacing.

No statements about the grid configuration are made here (the grid configuration /simulation set-up itself is discussed in Section 2.4). Here, the reference to anisotropic grid just refers to one of the characteristics of the applied Rozema subgrid scheme. (see also reply to comment Line 81 RC1)

Line 88: So this model includes moisture and phase changes? How are clouds and precipitations treated in the model? Need more information about moist processes in the model.

Requested information has been added (see also reply to comment on Line 88 by RC1).

Line 152: Why you picked 2015? Is there any particulate reason? Need additional info about this choice.

2015 was chosen because of availability of Meteomast IJmuiden observations. Added this motivation directly at this location in the text instead of a couple of lines later. (similar to comment Line 152 RC1)

Line 156: What type of “Vertical grid stretching”? How many points there is in Z direction and how is grid spacing distributed? Need additional clarification.

The number of vertical levels is already indicated: 48. Grid stretching was done by applying a uniform growth factor from the lowest model level upwards. Added: ‘(i.e. a uniform growth factor of 2.845 %)’

Very important note here (regarding model setup): Many studies reported that wind farm generates gravity waves (for example Allaerts (2017)), and I'm not sure that authors accounted for that fact. Without proper treatment of these waves, they might affect overall result, so should be properly addressed. Authors should address/discuss absence of proper treatment of farm induced gravity waves and their possible impact on this whole analysis.

By nature, the LES that we use is capable of representing wind farm induces gravity waves. One can debate to what extent our simulation setup allows for proper modeling of these waves. We added results of an additional sensitivity simulation with a 14.5km high domain and added a discussion on this topic.

See reply to main general comment RC1 on this topic.

Line 156: Is there a reason for a domain to be horizontally 76800m long?

It is not smaller because then it would be too small for modeling the designed 4GW wind farms, it is not larger because of computational costs. Added: 'Sensitivity experiments discussed in Section 5 indicate that this domain size is sufficiently large.' (see also comment on line 156 RC1)

Line 157: what about upper boundary conditions?

Good point. Added a subsection 'Upper boundary conditions'

Line 293: "Schneemann et al. (2021), . " delete ,

Corrected

Line 341: "averaged over all the entire year" delete "all"

Done