

Second round review of “A North Sea in situ evaluation of the Fitch Wind Farm Parametrization within the Mellor–Yamada–Nakanishi–Niino and 3D Planetary Boundary Layer schemes” by Agarwal et al.

The manuscript has been much improved since the first version, with the authors having made many changes related to the comments of both reviewers. The scope has been narrowed significantly, and results are better connected to theory and existing literature.

Still, the analysis presented in the manuscript should be improved before acceptance.

Specific comments

- The manuscript uses two point measurements of very short temporal range to determine what PBL scheme is more accurate. The actual WS values at these points are a resultant of many factors, mainly the background wind speed, wake generation and wake recovery. These factors should be addressed separately and in more detail. From my understanding:
 - Background wind speed: higher for MYNN
 - Generated wake: higher for MYNN due to higher wind speed and thus higher trust. Otherwise the same (Fitch code not touched).
 - 3DPBL adds more TKE, especially around upper tip height

This leads to weaker wakes in 3DPBL: Lower trust due to lower WS, and faster wake recovery due to more turbulence.

The point measurement are insufficient to capture these dynamics and should be evaluated as such. It should be clearly indicated that you use one point in a wind farm within the rotor area (FINO1) and one point above the wind farm (flights). More trajectories inside and downstream of the wind farm are needed to fully evaluate what PBL scheme captures the wake dynamics more accurately.

- While ideally a recommendation is given on what scheme to use, this is not possible based on the current analysis and observations used. This should be noted more clearly, especially in the abstract.
- The FINO1 dataset allows for a comparison over a longer temporal range. While I appreciate the desire for consistency with other datasets and literature, I recommend a longer simulation (at least a month, ideally a year) to evaluate whether the results presented in the presented case study hold over a longer period of time.
-

Technical corrections

- Introduction: Many references to the same papers in a row. This should be rewritten to improve readability.
- L144: justify the use of the boundary layer approximation
- Section 2.3: This section is messy and should be rewritten. Information related to sensitivity tests included in the Appendices should be moved there.
- Section 3.1.1: This section is very long and hard to read. Please split up in more subsection and rewrite to improve readability.

- Fig 4: the main difference between PBL schemes is clearly in the TKE profiles. This should be highlighted more in the text.
- Fig 5: please increase quality of the figure
- L375: it is mentioned that the inversions are simulated approximately 100m higher than observed. I don't really see this in the figures. Please clarify.
- L385 'minor disagreements': I believe the differences between model and observations are significant and should be acknowledged as such.
- L 408-409 "The 3DPBL ... region (Fig. 6a,c)": Rephrase
- Fig 7: Reduce the extent of the colorbar in a-d.
- L410-411: You claim (throughout the manuscript a few times) that larger TKE is related to greater momentum extraction. Clarify/justify this statement.
- Fig 8:
 - What height?
 - Blue here indicates 3DPBL>MYNN. In Fig 6e,f and 7e,f blue indicates the opposite. Keep this consistent.
- L435 "MYNN wind speeds are also consistently faster than 3DPBL wind speed": I don't quite see this from Fig. 9.
- L445 "more variable wind speed R2": I don't see this from Fig. 10b.
- Fig 14 and Table 7: combine by annotating values of Table 7 in the subfigures of Fig 14.