Interactive comment on "Impact of the current feedback on kinetic energy over the North-East Atlantic from a coupled ocean/atmospheric boundary layer model" by Théo Brivoal et al.

Thank you for your remarks. Here are our responses for your main points:

1 – "*For validation of the ABL1D model, it was not clear to me what was the true value. The ASCAT product has an error of 1 to 2 m/s relative to buoy wind speed (Fig.11, Bentamy and Fillon, 2012, https://doi.org/10.1080/01431161.2011.600348). This is of a similar magnitude to the RMS difference between ASCAT and ABL (L.234, 1.98 m/s) and to that between ASCAT and ERA-interim (L.236, 1.43 m/s). It is probably valid to assume that ASCAT is the true value, but it was not clear to me if the use of the ABL model improved the wind output and/or ocean state estimate. Fig.1b suggests that ABL model did not change the distribution of wind speed much, which is not validation. In Section 3.2, the model was deemed validated based on the qualitative agreement of the present result with past work, some of which are theoretical and simulations. (L.289, L.297). I am not convinced that the ABL model is validated with these attempts.*"

The ABL1D model is strongly simplified and is likely to compute less realistic winds than ERA-Interim, in which atmospheric data is assimilated. However, the aim of this part of the paper was to show that winds computed by the ABL1D model are quite close to ASCAT winds, despite the simplicity of our model (and, therefore its very low computational cost). We clarified this point in the new version of the paper.

On the same manner, we showed that ABL1D model is able to reproduce coupling coefficients consistent with previous results from ocean – atmosphere coupling, and therefore the wind response to the currents. Clarifications have also been added in the new version of the paper.

2 – "*For the ocean current feedback, I failed to see the significant of the present work, al-though many experiments were described in detail. I could not point out what was discovered in this work and what was already known. The results are often described without interpretation (e.g. why the KE response is quasi-homogeneous in Fig.6 de-spite its inhomogeneous mean state?). I also could not find the reason why the authors chose "a region of low mesoscale activity" (L.90) for this particular study.*"

We added discussions and reorganised the paper to clarify what is already known and what is new from our study (capability of a super-simplified model to represent major part of dynamical ocean/atmosphere interaction, impact of current feedback at depth).

Major changes :
- Fig 5 and 6 : Total KE is used rather than just geostrophic KE only to be consistent with the rest of the paper.
- We reorganised section 3: 3.3.1 becomes section 3.3 : *Impact on kinetic energy* and section 3.3.2 becomes section 3.4 : *Current feedback impact on kinetic energy budget over the water column*
- Figure 8 is now Figure 7, and now represents only the impact of the current feedback on KE, since the vertical profile of trends did not provide new information. We also added a vertical profile of KE differences between ABL REL and ABL ABS in % of ABL ABS.
- Discussions added in sections:
  o Introduction : clarifications on "why we chose a region of low mesoscale activity"
  o 3.1 : discussion about the differences between ERAi, ASCAT and ABL1D winds and what can cause these differences.

- o 3.2 : discussions about how the ABL1D model is producing the wind response to the surface currents, and about the values of the slope between Sτ and the background winds.
- o 3.3 : discussions added on why the KE response is quasi-homogeneous despite its inhomogeneous mean state and more, and on how the ABL1D is producing the KE partial-reenergisation. We also added discussion about the KE differences between ABL REL and ABL ABS at depth: to our knowledge, this is the first time a study shows that the current feedback can have an impact on the ocean at such depth (1500m). We also added signposting to introduce part 3.4.
- o 3.4 : Clarifications about Ekman pumping mechanism added
- o Conclusion & abstract: we clarified what is new in our study.

- Clarifications about the nudging of the tracers have been added in section 2.1.