Reviewer #2

The authors present a 1/10° data-driven data set of 3D ocean currents, as well as of temperature and salinity in the upper 1500 meters of the North Atlantic subtropical gyre between 20°N and 50°N, WOC-NATL3D. The data set covers the period from 2010 to 2019 with daily resolution.

The product is based on a diagnostic tool originally developed for a global product (OMEGA3D) by Bruno Buongiorno Nardelli (2022). The method is based on the the quasi-geostrophic omega equation. A deep learning technique is used to obtain the fields from Argo profiles, altimetry, SST and SSS. Also used are ERA5 air-sea fluxes and modelled Ekman currents from Copernicus.

Both products, WOC-NATL3D and OMEGA3D, are supposed to better reproduce drifter observations when compared to reanalysis products. WOC-NATL3D aims to improve accuracy near the surface, in particular by using the modelled Ekman currents. Two reanalysis products (SODA and GLORYS) as well as drifter and altimetry data are used for evaluation.

The article is written well and comprehensibly and also well structured.

We thank the reviewer for their overall comment. Please see below our response to each of your comments. Be aware that the line numbers correspond to the "track-change" version of the manuscript.

Comments

1) Evaluation of the vertical velocities (section 3.1) is quite limited. I find it understandable that no comparisons with direct measurements are possible. However, an estimation of the uncertainty of the vertical velocities is desirable.
Response: Of course we fully agree with the reviewer. As such, we would really be pleased to provide an uncertainty estimation. However, unless the reviewer has some more specific suggestion on the way to obtain it, we are afraid that product intercomparison and indirect assessments are the only viable methods (both already followed in our work).

2) I understand that the SODA data set was selected for comparison because vertical velocities are rare in reanalysis products. With GLORYS a second reanalysis product was selected for comparison, is there a justification for this choice?
Response: While the SODA dataset provides vertical velocities, its resolution is notably coarse (1/4°). As mentioned in our paper, an alternative method to assess our product is to examine horizontal velocities, which can be inferred from vertical velocities. Our product presents a high horizontal resolution of 1/10°. Therefore, it seems appropriate to compare our product to another one with a reasonably similar resolution. In our view, GLORYS, with a resolution of 1/12°, was a suitable choice for the analysis.

3) The labels and titles of the figures are in a small font size. The subscript letters in the titles in particular are difficult to read on a printout.
Response: Thank you for bringing this up. We enhanced the font size of labels and titles of all figures.

l 15: "On the other way round", I would remove this. Corrected

l 108: the surface latent and "sensible" heat flux ? Added (now l. 119)

l 179: I can't find an explanation of the meaning of the variable γρ in Eqn. 2. Sorry for the confusion, we meant to write γρ instead of νρ line 185. γρ is a non- local tracer effective gradient. It has been corrected (now l. 195)

l 182: I can't find in which equation the variable νρ is used. As we said before, we meant to write γρ instead of νρ.

l 185: I would start a new paragraph, before "In order to further improve ...", as the following text focuses on extensions of OMEGA3D. Done (now l. 199)

l 218: "... likely due ...", can this be explained further?
Response: It is well known that resolution plays a significant role in capturing fine-scale processes and details. However, other factors can contribute to differences in the representation of those processes such as the numerical scheme employed, the choice of vertical coordinate systems, the domain size…
Hence, we used the term "likely due" because we cannot definitively assert that the intensity of vertical velocities is solely attributed to resolution. Multiple factors contribute to the overall behavior, and acknowledging this complexity allows for a more nuanced understanding of the simulation results.

Figs. A1, B1, C1 "computed computed" in the caption. Corrected