Review 1

The authors would like to thank the reviewer for their helpful suggestions. Our responses are below (reviewer's comments are indicated with black bold font).

L21: change "more and more powerful" to "more powerful"

Done.

L28. Change colon to period and begin a new sentence.

Done.

L29: change "tends to a decreasing" to "decreases"

Done.

L32: Delete "We note that"

Done. We also deleted "this" and now the sentence reads "Wind driven vertical mixing is an important mechanism regulating upper ocean changes for all high wind events, including those that are not associated with tropical cyclones (Cardona and Bracco, 2012; Kuang et al., 2011; Large et al., 1994; Meng et al., 2020)."

L35: change "upper ocean changes in temperature" to "changes in upper ocean temperature" to mirror "changes in upper ocean salinity" later in the same sentence.

Done.

L40: replace ", regulating the strength of" with "and"

Done.

L41-42: by "taking into account" do you mean "assimilation of"?

Balaguru et al 2020 show a strong inverse relationship between salinity and tropical cyclone (TC) rapid intensification (RI) in the eastern Caribbean and western tropical Atlantic due to near-surface freshening from the Amazon–Orinoco River system, i.e. salinity stratification reduces SST cooling, which contributes to stronger surface enthalpy flux for rapidly intensifying TCs. Balaguru et al 2020 statistical results are confirmed through experiments with an ocean mixed layer model, which show that the salinity-induced reduction in SST cold wakes increases significantly as the storm's intensification rate increases (the impact of salinity on more weakly intensifying storms is insignificant). Also, through experiments with a statistical RI prediction scheme, it is

found that the inclusion of surface salinity significantly improves the RI detection skill, offering promise for improved operational RI prediction. This is why we used the wording “taking into account”.

L42-43: delete “also it may be important to better understand post-cyclone air-sea interactions.”

Done.

L47: replace “…(Sun et al. 2021). Contrarily, in the Southern Hemisphere a salty wake after TC passage is observe on” with “…(Sun et al. 2021) and the left-hand side of the storms in the Southern Hemisphere.”

Done.

L50: this is improper use of a semi-colon. From https://www.niu.edu/writingtutorial/index.shtml: “Use a semicolon to join two related independent clauses in place of a comma and a coordinating conjunction (and, but, or, nor, for, so, yet). Make sure when you use the semicolon that the connection between the two independent clauses is clear without the coordinating conjunction.” The two phrases joined by a semicolon here should be two separate sentences. Authors should check other uses of semicolon throughout text for other possible edits.

Done and checked the use of semicolons all over the manuscript.

L51: delete “i.e, in most regions where cyclonic activity is found”

Done.

L59: delete “e.g.”

Done.

L77-78: the phrase “which has potential implications for upper ocean stratification and air-sea exchanges” and its close relatives seems to be overused. It only needs to be highlighted once in the introduction and once in the conclusions.

Done.

Review 2

The authors would like to thank the editor for their helpful suggestions. Our responses are below (editor's comments are indicated with black bold font).

Several data sets and data products are used and the authors show mention these correctly in the data availability section. I would like to ask the authors to check whether the data originators request a separate data use statement, or possibly ask for citing of specific papers describing the data.

Requested data statements are now included in the acknowledgements.

The barrier layer plays an important role in the text. However, there is no definition of it in the text. It would be useful to define it and its characteristics, so that all readers think about the same feature when barrier layer is mentioned.

This sentence is now included in the introduction at line 58 in the pdf highlighting differences from the previous version:

Using Argo observations and a composite approach, Steffen and Bourassa (2018) quantify barrier layer development due to tropical cyclones. A barrier layer is the salinity-stratified isothermal layer situated between the base of the mixed layer and the top of the thermocline (Godfrey et al., 1989), in some regions of the ocean, and it acts as a barrier to the turbulent entrainment of cold thermocline water into the surface mixed layer (Cronin et al., 2002).

L9 Add "surface" before temperature for clarity

Done.

L42 delete (Balaguru et al., 2021) as it is already mentioned earlier in the sentence

Done.

L43 "it is important" instead of: it may be important

This sentence was removed, as suggested by reviewer #1.

L61 … by about 35%

Done.

L74 Please add SI units for knots; they could be inserted in parentheses

Done.

L98-99 "Data and methods used in our analysis are described in Section 2 and 3, respectively. Results are presented in Section 4. Section 5 includes a summary

and conclusions." This can be deleted as the structure of the manuscript shows up in the text below and these descriptions do not add any new info.

Done.

L107-108 Change to (note the punctuation): "Data are reported at six-hourly resolution, since 1851 for the Atlantic hurricane database (HURDAT2), since 1949 for the Northeast and North Central Pacific (HURDAT2) and since 1945 for the JTWC Best Track Data."

Done.

L139 Please add SI units for knots; they could be inserted in parentheses

Done.

L142-143 "… we exclude, from the remaining data, any other event within ±2◦ and 7 days before and after the one selected." Maybe add a sentence why you do this.

This sentence is now included at line 148 in the pdf highlighting differences from the previous version:

… we exclude, from the remaining data, any other event within ±2◦ and 7 days before and after the one selected, to ensure selected events are independent.

L164 instead of: "e.g. Figure 3, 4", see Figures 3 and 4

Done.

L193-195 This can be more succinct: … which we also call the "signal" profile, needs to be between 2 days before and 20 days after the TC passage to hedge against storm effects prior to the event, as described in Hu et al. (2024) and consistent with Cheng et al. (2015).

Done.

L228 change to: … as shown in Figures 5 and 6.

Done.

L233 I think "of upper ocean changes during hurricane-strength TCs" can be deleted, as this is mentioned again in the next line

Done.

L246-248 "A difference in cooling is also seen when comparing HYCOM composites based on the vertical structure of salinity before a hurricane-strength wind event as in our analysis, i.e., pre-event salinity "increasing" versus

"decreasing" with depth, instead of pre-event barrier layer present versus not." This sentence is hard to understand. Please rephrase for better reading

Done. Now the sentence reads:

A difference in cooling is also observed when comparing HYCOM composites based on the vertical structure of salinity before the event, i. e., pre-event salinity "increasing" versus "decreasing" (instead of pre-event barrier layer present versus not).

L265 At line 133 it is written that absolute salinity is used (for Argo). Here 0.05 psu is given? Which one do you use? Please note that psu is not a unit.

Our results for salinity are reported as psu (we include "psu" to make it clear that what is being reported is based on the practical salinity scale). We use Argo absolute salinity to calculate potential density.

L300-301 "The analysis of HYCOM fields in the previous section quantifies upper ocean changes with hurricane-strength wind events based on the pre-event vertical structure of salinity." This sentence can be deleted as it is clear from the previous section.

Done.

L303-305 "In this section, we focus on the specific case of hurricane-strength TCs and analyze Argo profile data to estimate upper ocean changes based on pre-event salinity "increasing" versus "decreasing" with depth." This can be deleted as the title of the section gives this info and the following text is showing it.

Done.

L311-314 "This difference may be related to how vertical mixing processes are represented in the HYCOM model, the availability of sparse ocean observations co-located with events of interest, as well as the details of the vertical structure of pre-event upper ocean properties in the model versus observations." This is quite general information, which then do not convey much understanding to the reader. Please explain and elaborate how such factors might affect the difference.

This sentence is now included at line 319 in the pdf highlighting differences from the previous version:

This difference may be related to e.g. how vertical mixing processes are represented in the HYCOM model, and in particular how deep the wind-induced mixing reaches with the event; the details of the vertical structure of pre-event upper ocean properties in the model versus observations, i.e. the initial condition of events of interest; the availability of sparse ocean observations co-located with events of interest compared to the continuous time series the HYCOM model provides in its spatial domain.

L316-320 This one long sentence is hard to understand. Please rephrase and split it into two sentences for better understanding

These sentences are now included at line 327 in the pdf highlighting differences from the previous version:

However, it is not surprising that the same vertical pattern of changes, with different signs at different depths, is not seen in Figure S5-a in Supporting Information S1. While the near surface cooling is common across locations used to estimate ocean changes for the 'increasing' versus 'decreasing' composite, the depth of the warming signal and its vertical extent vary , (analogous to what discussed for Figure 3-a).

L328-329 “Consistent with wind-induced vertical mixing, salinity increases versus decreases with the TC passage for the "increasing" versus "decreasing" case (Figure 5)” This sentence is not clear. Please rephrase

This sentence is now included at line 339 in the pdf highlighting differences from the previous version:

Consistent with wind-induced vertical mixing, salinity increases with the TC passage for the "increasing" case, and it decreases for the "decreasing" case (Figure 5).

Caption Figure 7: Please mention and define the abbreviations MLT, MLS and MLPD as used as y-axis label in the caption

Done.

L447 delete pp.

Done.

L543 Add after 30,: 1933, doi:10.1029/2003GL017878

Done.

L552 delete pp.

Done.

L554 Add after 30,: 1572, doi:10.1029/2002GL016717

Done.

L571 delete p. before 1287

Done.