Response to reviewer #2

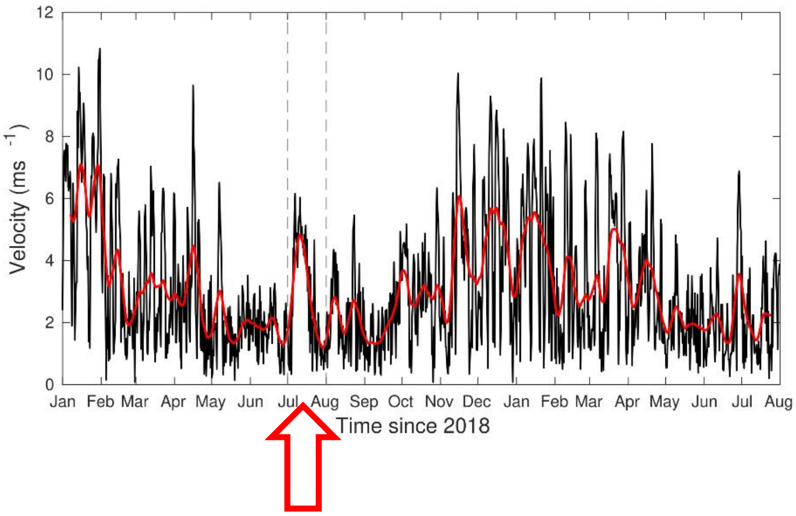
We thank the reviewer for carefully reading our manuscript and helping us to clarify the presentation of our results. All corrections, modifications and explanations are given in red color lines in the text of our manuscript as well.

Hu et al., 2018?

It is corrected to He at al.

Analysis of altimeter data shows that the secondary maximum wind intensity in the TT Gulf formed a long-lived ACE in this region between 15 and 23 July 2018. please provide a more direct evidence on this conclusion.

The figure shows wind speed in the TT gap wind region from January 2018 to August 2019 (data are from the ECMW database). The secondary maximum wind velocity in summer is not a very frequent event, but in July 2018 there was a relatively strong wind event over a period of about 16 days. This eventually led to eddy formation during the summer season.



The wind velocity variation at Tehuantepec Gulf is shown in black. A moving average with 7-day interval is shown in red.

It's better to add a supplement movie demonstrating the formation and evolution of the eddy.

A video showing the eddy genesis and its evolution is added to the appendix.

Considering the large uncertainty in model simulations, I suggest the authors to use the WOA18 products or climatological averages of WOD profiles as referenced large-scale background values.

We added the WOA18 to our analysis, specially for the comparison of T-S diagram with in-situ observations and analysis of all CTD observations. Please see the section 3.3 and 3.4 for the changes using WOA18 as the reference. However, due to the absence of current velocity data in WOA18, we could not further use WOA18 in our analysis. Therefore, for the sake of consistency we stick to reanalysis model products for the HT/ST. A validation for reanalysis data against in-situ observation is shown and added to the ms.

Temperature, salinity, and oxygen anomalies induced by the eddy The vertical temperature (T), salinity (S), and dissolved oxygen (DO) profiles obtained from an E-W transect across the eddy center (Figure 1b) measured within 2 days from 02 April to 04 April 2019 are shown ….

It is difficult for me to distinguish which CTD profile was in the eddy. The authors may want to mark the relative positions of the CTD profiles to the eddy first in Figure 2 or Figure 3.

The relative position of measurements to the eddy is illustrated in Figure 4. The text is rewritten in lines 115-125 for a better clarification. All CTD stations and their relative position to the eddy is also given in the Table 1. The eddy appearance at each station is explicitly given in an extra column for better clarifications.

The authors may, firstly, add a comparison of the evolutions of SLA and SST between satellite measurements and the reanalysis data, as well as a movie of the evolution of 3D Temperature structure at the eddy positions in the reanalysis data, to confirm that the eddy was successfully reproduced by the model (Figures 4-6 in He et al., 2017 may be a good reference).

To show that the reanalysis product successfully produced the 3D structure of eddy, we illustrate the comparison of reanalysis-model products with the in-situ observations of T and S. The comparison of in-situ observation and reanalysis model in capturing the T/S anomalies also clearly shows that the model successfully reproduced the eddy impact (Figure 7 and 11).
In addition, the northeastern tropical Pacific is located in the warm pool of the Western Hemisphere, which is very homogeneous in the SST. The warm pool grows especially in April and May in this region, with this regime reaching its maximum development in the open ocean. This makes the detection of a warm eddy-driven T anomaly in this region, which mostly occurs at subsurface region, a very difficult task (Wang, C. and D.B. Enfield, 2001: The tropical Western Hemisphere warm pool. Geophys. Res. Lett. 28: 1635-1638). The 3D temperature structure of the eddy is being revised in the ms with the SSHA depicted at the sea surface (shown as white contours). Please see Fig. 12.

Line 290, 700?

Corrected to 700 m.

Line 292, north-south section

Corrected

Same line, anomalies across the eddy center

Corrected

Line 293, values

Corrected

This Figure should be placed before the Figure 9.

The figure presence re-adjusted.

How was the "trapping depth" estimated here?
The trapping depth is set to 1500 m where the ultimate T anomaly were observed.

These are model results rather than observations.
The text is corrected.

Interestingly, the positive S anomaly is observed in all profiles from the ocean surface to 35 m depth (Figure 10e-h). Again, these are not observational results. compared with the CTD profiles in Figures 5 and 6, these positive S anomalies are more likely model errors instead.

The anomalies calculated with the comparison of our observation with WOA18 confirm that the positive S anomaly illustrated in the reanalysis model are indeed correct (Fig 7b). Using WOA18 data was a great point to clear this uncertainty in the previous analysis.

Fig 9 in line 321, This Figure should be placed before the Figure 10.
The figures presence is adjusted.

Line 321, northwestward?

It is removed from the text.

Line 351, meridional?
It is corrected to zonal.

Line 358, Given the authors presented the temporal evolution of the HT in Figure 12, readers may be more interested in why the HT reached the peak at 27 April.

The maximum HT is derived from maximum T anomaly observed at 27 April. This could be due to the different background seawater temperature available at the various transects. The transects are taken at a spatial distance of about 5° from 113°W and 118°W which indicates that the different water mass can occur.

Line 363-365 Please make sure that you are comparing zonal heat\salt transports by the rotation of the eddy with meridional eddy transports in those studies.

We present a new comparison with previous studies in the text. And the heat/salt transport are entirely edited in the text to meridionally-integrated zonal transport. See text lines between 400-420

Line 417, the thermocline?
It is added to the text.

Line 421, It is not appropriate to compare zonal transports with meridional transports.
The comparison with meridional T/S transport in previous studies are removed from the ms. Some additional references are replaced. Please see lines 405-425.

this study has shown that this may not be the case for all mesoscale ACEs passing through the NETP. Only a eddy case cannot reach this conclusion.

The text is accordingly edited. Whereas some strong mesoscale eddies passing over the area targeted for deep-sea mining change the near-bottom current regime at depths >4000 m and potentially may affect the deep seafloor and its ecosystems (Aleynik et al., 2017; Purkiani et al., 2020), weaker mesoscale eddies may only affect the properties of seawater in the upper ocean layers without affecting the hydrodynamics of the seafloor.

Salt?

In figure 13, the text (Salt) in corrected.