

Response to Reviewer 2

General comments:

The authors investigated the responses of two warm eddies to a typhoon using observational and reanalysis data. There have been lots of efforts on eddy feedback to TC evolution, while our understanding of eddy response to TCs remains limited. The work is potentially interesting and contribute to broaden the knowledge of TC-eddy interaction, but I have some comments before the paper can be published. I recommend moderate to minor revision of the manuscript.

Response: We would like to thank you for your careful reading, helpful comments, and constructive suggestions, which have significantly improved the presentation of our manuscript. We have carefully considered all comments from the reviewer and revised our manuscript accordingly. The manuscript has also been double-checked, the typos and grammar errors we found have been corrected. In the following section, we summarize our responses to each comment from the reviewer. We believe that our responses have well addressed all concerns from the reviewer. The changes are highlighted in the manuscript. Please see below, in blue and black, for a point-by-point response to the reviewer's comments and concerns. All page numbers refer to the revised manuscript file with tracked changes.

Primary comments:

1. The motivation of conducting the study should be more clarified. Just stating that "However, there has been relatively limited exploration of different responses exhibited by warm eddies under the influence of typhoons" is not adequate from my opinion. There have been several studies on the eddy response to TCs. The authors should be more carefully summarize what have been reported from these previous studies, and what new knowledge will be reported in this study.

Response : Thank you for your nice comments on our manuscript. According to your suggestions, we re-summarized what has been reported in previous studies of eddy-typhoon interactions, as well as what new knowledge will be reported in this study. please check Lines 98.

"Previous studies on the interaction between eddies and typhoons have primarily focused on two aspects, one is the influence of ocean eddies on typhoons: the enhancement of warm eddies on typhoons; and the other is how typhoons affect ocean eddies: the response of cold eddies to typhoons. However, the exploration of the response of warm eddies under the influence of typhoons and the three-dimensional response of eddies to typhoons is relatively limited. In this paper, we explore the effects of the different positions of warm eddies on the response of eddies as well as the changes in their three-dimensional thermohaline structure characteristics, which will provide inputs to the study of eddy-typhoon interactions."

2. The writing of the paper needs a substantial improvement. There are lots of sentences that are hard to follow and hinder understanding. The logics between paragraphs should be clear. On

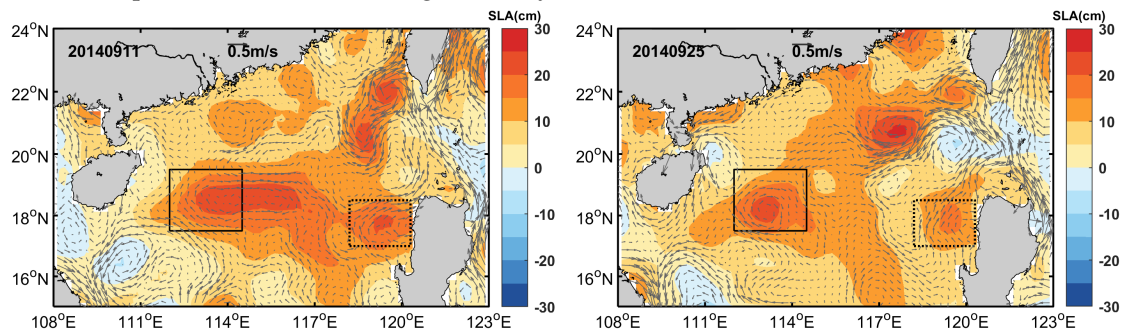
Line 31, the word of “typhoon” is used, but in the following the “tropical cyclone” is used instead. The paper should keep consistency in word usage.

Response : Thanks for your suggestion. As some papers and also our study show that some tropical storm also play important role in air-sea interaction. So we change the word “typhoon” to “Tropical cyclones (TCs)” in Line 31. We also keep consistency in the revised manuscript.

Specific comments:

1. Is it reasonable to use the rectangle areas represent AE1 and AE2 (Figure 1)? As eddies always move during typhoon.

Response : Thank you for your asking. We have figured the spatial distribution of SLA and geostrophic current from 11 September to 25 September, and both AE1 and AE2 were active within the rectangular frames during this period. Here, we just show two days’ snapshots, on 25 September (right panel), these two eddies still in the rectangular frames. Moreover, the moving speed of the two eddies from 11 September to 25 September was calculated through the “Mesoscale Eddy Trajectory Atlas” product. The mean moving speed of AE1 is 0.18 m s^{-1} , and 0.07 m s^{-1} for AE2 during this period, so the mean travelling distance is about 217.7 km and 84.7 km, respectively, which are still in the rectangular frames during this period. Further more, we focus on the fixed area are helpful for comparison. So it is reasonable to use rectangular areas to represent the eddies during the study.



2. There are several common issues with the figures in the manuscript that need to be addressed, including the addition of x-labels and y-labels, as well as the unification of font sizes etc. Specific comments are as follows:

1). Figure 1: The first letter of “depth” in Y-label needs to be capitalized.

Response: Thanks, the figure has been modified as suggested.

2). Figure 4: Just keep one arrow legend and text of “15 m/s” in (a), the quiver and the text should be larger.

Response: Thanks, the figure has been modified as suggested.

3). The coordinate axes are duplicated in Figure 5, delete the x-axis and y-axis in Figure 5 (a), (d), (g), (j), just like Figure 4; Set the range of SST colorbar as 26 to 31 °C; Change the red dots to larger black dots.

Response: Thanks, the figure has been modified as suggested.

4). Figure 6: The first letter of “date” needs to be capitalized, like “Date”.

Response: Thanks, the figure has been modified as suggested.

5). Figure 7: The first letter of “date” and “depth” needs to be capitalized; The unit of “psu” should be “PSU”.

Response: Thanks, the figure has been modified as suggested.

6). Figure 8: The first letter of “date” and “depth” needs to be capitalized; Please use the density excess replace the density, that means density minus 1000 $\text{kg} \cdot \text{m}^{-3}$; The unit of buoyancy should be written as “ $\text{N}^2 (10^{-4} \text{s}^{-2})$ ”.

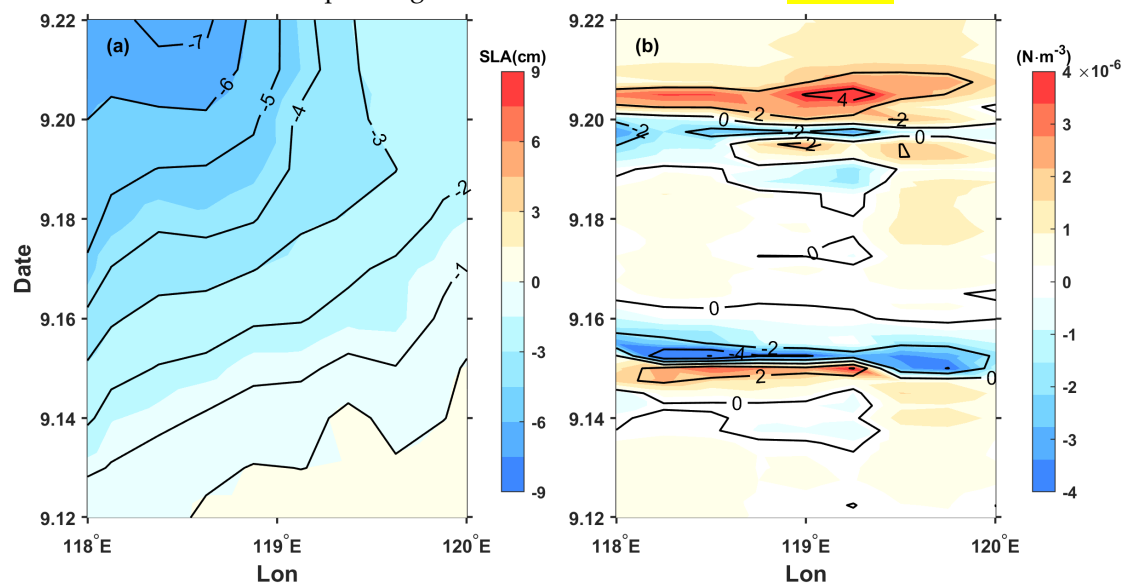
Response: Thanks, the figure has been modified as suggested.

7). Figure 9: The first letter of “depth” needs to be capitalized; “psu” should be “PSU”.

Response: Thanks, the figure has been modified as suggested.

8). Figure 10: The unit of wind stress curl unit should be “ $\text{N} \cdot \text{m}^{-3}$ ”, so the colorbar will make some confuse, move “ $\text{N} \cdot \text{m}^{-3}$ ” to the right side of colorbar or another proper place. To compare AE1 and AE2, the same figure as Figure 10 but for AE2 is needed.

Response: Thanks, the figure has been modified as suggested. The similar figure for AE2 has been added and the corresponding sentences have been added at **Line xxx.**



9). Figure 11: The first letter of “date” and “depth” needs to be capitalized.

Response: Thanks, the figure has been modified as suggested.

3. There are some spelling or inappropriate use of singular and plural in the manuscript, for example,

L39 on ‘the’ one hand

L65 the typhoon track ‘are’ more intensely

L87 of a ‘near-inertial’ wake

L118 The daily Sea Level Anomaly (SLA) and geostrophic current data ‘are’ provided by Archiving

L131 ‘database’

L156 temperature and salinity ‘from’ 1 September to 30 September 2014 ‘were’ chosen to study.

L216 ‘where’

L278 ‘passage’

L398 warm anomaly of $1.2 \text{ } ^\circ\text{C}$ ‘was’ observed at a depth

L444 'Compared'

L508 'contributes'

Response: Thank you for your carefully reading and correction. In our resubmitted manuscript, the typos are revised at Line 39, 65, 87, 118, 131, 156, 216, 278, 398, 444 and 508, accordingly.

4. Inconsistent use of tenses. When describing the work of previous researchers, you should generally use the **past tense**. This is because those studies have been completed in the past and form part of the background for your research. When describing your own work, you should generally use the **present tense**. This helps emphasize that your results are current and still valid.

For example, L122 the data access needs to use the past tense. ?

L309-313 please use the past tense

L316-319 please use the present tense, etc?

Please check the full manuscript carefully.

Response : Thank you for your suggestions. We have corrected tense misuses in our new manuscript.

5. Many abbreviations have repeated definitions, including but not limited to:

L71 and L118 SLA duplication definitions.

'EPV' is firmly defined 4-5 times, 'Rossby number', 'SST', 'EKE', etc.

Response: Thanks. All abbreviations are only defined at the first time.

6. A mix of American and British spellings, such as Typhoon 'center' and 'centre' are appeared in the manuscript.

Response: Thanks for your careful checks. We have corrected the 'centre' to 'center' to make the word harmonized within the whole manuscript.

7. Line 650: Please check out the format of the reference.

Response: Thank you for your suggestion. We have checked the format of the reference at Line 650, it is correct. Please see the screenshot of this reference we cited.

Effects of a Warm Oceanic Feature on Hurricane Opal

Lynn K. Shay, Gustavo J. Goni, and Peter G. Black

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Page(s): 1366–1383

All of the co-authors are so grateful to you for the time spent on our manuscript. The comments and suggestions provided by the reviewer are invaluable for us to improve our

manuscript. We are so appreciated.