Response to Reviewer 1

General Comments:

The authors have followed the reviewers' comments to modify their manuscript, and hence the quality of the paper is much improved. the authors proofread their paper much more carefully before the paper can be accepted for publication.

Response: We express our gratitude for your thorough review, valuable comments, and constructive suggestions during your second review. Your input has greatly enhanced the clarity of our manuscript. We have meticulously reviewed all comments provided by the reviewer and have made revisions accordingly.

In the subsequent 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 previous primary comment 1 was not addressed properly. Although they have re-organized their rationality for conducting the work in the response letter, there seems no change in their modified manuscript. The authors seem not careful in preparing their response letter (There is even words like "Line xxx")

Response: We sincerely apologize for the notable error like "Line xxx" in our previous version. In this revised manuscript, we are taking our revised manuscript more carefully and conducted a final thorough check to rectify any identified typos and grammar errors. Considering the primary comment 1, we have reworked specific sections of introduction (Lines 91-96) and summary (Lines 537-547) to emphasize the innovations and research motivations. About influence of near-inertial energy, we have incorporated additional sentences at Lines 325-328. Furthermore, the discussion on Ekman layer depth has been expounded upon in the Discussion section (Lines 423-434).

2. There are numerous grammar or tense mistakes, especially in their newly supplemented sentences (e.g., Lines 25-27, 96-98, 321-322, Lines 414-415, Lines 418-431, etc).

Response: Thank you very much! We have carefully reviewed and made necessary corrections, which are highlighted in yellow in the revised manuscript. We have converted the entire manuscript to present tenses, including Lines 25-27, 96-98, 321-322, 414-415, 418-431 as your suggestion in the original manuscript.

Lines 25-26: we have rectified "triggered" into "triggers", "enhanced" into "enhances" .

Lines 409: we have adjusted "will delve" to "delve".

Lines 412-428: “The EPV is very small before the typhoon, measuring less than 0.5×10^{-5} m s^{-1} in both AE1 and AE2. However, during 15-16 September (Fig. 9c-f), when the typhoon crosses the NSCS, the EPV undergoes significant changes. Its absolute value increases to over 1.5×10^{-4} m s^{-1} within both AE1 and AE2. AE1 consistently exhibits a predominantly negative EPV during most of this period. Consequently, during Typhoon Kalmaegi, the negative EPV facilitates downwelling and convergence (Jaimes and Shay, 2015), leading to a warmer and fresher subsurface layer in AE1 (Fig. 6 a-b).
On the other hand, AE2 displays a more fluctuating pattern. It is positive on 14 September, shows both positive and negative values at 0000 UTC on 15 September, and remains mainly negative from 15 to 16 September, and eventually returning to positive, reflecting a continuously fluctuating process. The positive EPV in AE2 contributes to the influx of colder subsurface water into the upper layers, resulting in surface and subsurface water cooling and an increase in salinity in the subsurface (Fig. 6c-d). Correspondingly, the variations in Ekman layer depth (D_E) with the typhoon's passage are similar to EPV, as shown in Fig. 10. When Kalmaegi approaches at 0000 UTC on 14 September, the mean D_E within AE1 is only 21 m, while in AE2, it is 114 m. This indicates that AE2 has already been influenced by Typhoon Kalmaegi. Subsequently, the depth of the D_E within AE2 sharply deepens, reaching its maximum depth of 241 m at 0000 UTC on 15 September, coinciding with the proximity of Typhoon Kalmaegi's center to AE2.”

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.

Response to Reviewer 2

General comment:

The authors examined the response of two pre-existing warm eddies to Typhoon Kalmaegi based on observations and reanalysis data. After the typhoon's passage, the two warm eddies presented different changes in terms of amplitude, Rossby number, and kinetic energy. The authors ascribed this difference to the relative positions of warm eddies to the typhoon. I recommend acceptance of the manuscript after a minor revision.

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. 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 with yellow 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.

Minor comment:

1. Lines 88-89: The focus of this study is the relative locations of two warm eddies to the typhoon center. Therefore, the maximum wind radius of Typhoon Kalmaegi is an essential metric and must be stated clearly, especially the maximum wind radius when Kalmaegi passed AE1 and AE2.

Response: Your comments have been immensely benefici al, and we sincerely appreciated! Consequently, we have added the marking of the one- and two-time maximum wind radius of Typhoon Kalmaegi in Figure 3. Furthermore, we have provided explanations regarding the maximum wind radius and relative distance between Typhoon and eddies when it passed AE1 and AE2 in the revised manuscript. Kindly review the revisions made in Lines 228-231, Lines 232-233, Lines 443-451, 467-471.

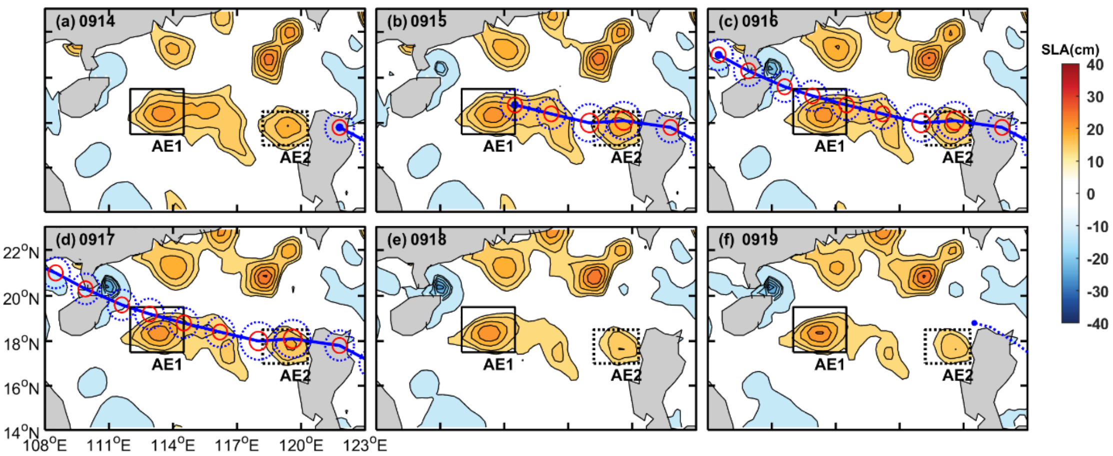

Figure 3. The variations in sea level anomaly before and after Typhoon Kalmaegi moved over the anticyclonic eddies AE1 and AE2 between 14 September and 19 September **(a-f)**. The black solid rectangle represents the area of AE1, while the black dashed rectangle represents the area of AE2. The blue solid line depicts the path of typhoon Kalmaegi, and the solid red and dashed blue circles are one- and two-times the maximum wind radius of the typhoon, while the blue dotted line in **(f)** is the path of tropical storm Fung-wong (best-track data sourced from CMA).

Lines 228-231: “Throughout this intensification stage, Kalmaegi encounters two warm eddies: anticyclonic eddy AE1, is positioned to the left of the typhoon’s path, with its core situated on the periphery of the typhoon’s two-times maximum wind radius (Fig.3c-d).”

Lines 232-233: “AE2 precisely intersects with the typhoon’s trajectory, and its core nearly coincides with the maximum wind radius of the typhoon (Fig.3b-d).”

Lines 443-451: “After traversing the warm ocean characteristics of AE2, Typhoon Kalmaegi strengthens, resulting in a reduction of the maximum wind radius. As it passed through AE1, the maximum wind radius is 35 km. Notably, the center of AE1 is located outside the typhoon’s two-times maximum wind radius, approximately 104 km away from the typhoon center (Fig. 3). As mentioned earlier, strong upwelling occurs within two-times maximum wind radius, while weak subsidence exists in the vast area outside the upwelling region (Jaimes and Shay, 2015). Hence, the hypothesis presented here suggests that the observed intensification of AE1 on the left side of the typhoon track is more likely attributed to the negative wind stress generated outside the maximum wind radius, driving the enhancement of downwelling in the pre-existing anticyclonic feature in the ocean.”

Lines 467-471: “The response of AE2 differs from that of AE1 mainly because AE2 is quite near the Typhoon Kalmaegi’s track. As the typhoon passes through AE2, the maximum wind radius is 48 km. AE2 is merely 26 km away from the typhoon center (Fig. 3). The significantly positive wind stress curl at the typhoon center induces upwelling and positive vorticity downward into the eddy (Huang and Wang, 2022), and noticeably weakens the eddy, corresponding to the decrease in SLA (Fig. 12a).”

All of the co-authors are so grateful to the reviewer 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.

Response to Reviewer 3

General comment:
I am not sure about the novelty of the results presented here. The aim of the paper is not presented clearly. As a consequence, it is difficult for the reader can see the value of the manuscript in the context of an already very rich literature on the subject. The manuscript requires a major revision.

Response: We express our sincere gratitude for your thorough review, valuable comments, and constructive suggestions, all of which have significantly enhanced the quality of our manuscript. We have diligently addressed your comment and made corresponding revisions to improve clarity and accuracy. The manuscript has undergone a meticulous double-check, ensuring that identified typos and grammar errors have been rectified. These changes are highlighted by yellow in the revised manuscript. All page numbers refer to the revised manuscript with tracked changes.

We particularly appreciate your regarding the clarity of our introduction. In response, we have strengthened both the introduction (Lines 91-96) and summary (Lines 537-547) sections to better elucidate the novelty and purpose of our research.

Primary comments:
1、I am not sure about the novelty of the results presented here.
Response: Thanks for your suggestion. While many previous studies have explored the interaction between TCs and eddies and have drawn generalized conclusions, such as the weakening (strengthening) effects of cold (warm) eddies on TCs and TCs are recognized for strengthening cold eddies and weakening warm eddies, our study takes a different approach. We aim to illustrate that even when TCs encounter eddies of the same polarity, the response of these eddies to TCs exhibits variations. This nuanced response is intricately linked to factors including the relative position of the eddies and the TCs, the eddies' intensity, and the background current. Notably, this is the first time it has been discussed in the South China Sea. By analyzing wind stress curl distribution, EPV, buoyancy frequency and the relative position between the eddies and the typhoon's track, this case study provides a more nuanced understanding of the mechanisms driving these different eddy-TC interactions in the Northern South China Sea. Moreover, it will further improve the accuracy of TC forecasts and enhancing the simulation capabilities of air-sea coupled models.

We have re-written this part in Lines 537-547.

2、The aim of the paper is not presented clearly.
Response: Thank you so much. The NSCS frequently experiences intense tropical cyclones (TCs), coinciding with notable mesoscale eddies activity in the region.

Following the passage of a TC, the alteration or intensification of mesoscale eddies exerts an impact on the subsequent TC wake response and geostrophic adjustment process. This, in turn, leads to variations in ocean temperature and salt distribution in the local regions of the TC channel. Additionally, it influences the air-sea interaction of tropical cyclones following similar paths, a factor crucial for the accurate prediction of the next TC. Based on in-situ datasets, multi-platform satellite measurements, and GLORYS12V1 reanalysis data, we investigate the influence of two anticyclonic eddies on upper ocean responses to Typhoon Kalmaegi. This marks our initial endeavor to characterize the distinct physical variations induced by TCs within two eddies of the same polarity. This effort contributes to a deeper understanding of the role played by mesoscale eddies in modulating interactions between TCs and the ocean, and a more detailed understanding of the driving mechanisms of eddy-TC interactions in the northern South China Sea.

We have re-written this part in Lines 91-96.

All of the co-authors are so grateful to the reviewer 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.