Thank you very much for your effort and time to read our paper and help us improve it. The comments are very insightful and constructive for us. We have revised the manuscript point by point to the comments as listed below.

Review1 General comments:

This work designs a series of numerical experiments using FVCOM model to investigate the drivers of Qingdao cold water mass. The study finds that both tidal forcing and winds are important in the formation of cold water. However, the manuscript is not well organized and include the information not directly related to this work. The objectives of this study are not very clear. Figure 12 is not even mentioned in the manuscript. In Conclusions, the authors confused "anti-clockwise" with "anti-cyclonic". Therefore, I would recommend the publication of the manuscript after major revision. Below are my detailed comments and suggestions.

Response to the comment:

Many thanks for your helpful review, perspectives, and comments. We have removed the content that is not strongly related to the work. To express the objective of this study more clearly, we have also rewritten the scientific questions based on your suggestions. We apologize for the confusion regarding Figure 12; we have corrected it and added a description. Additionally, we have made the necessary modifications to ensure consistency regarding the "anti-clockwise" and "anti-cyclonic" terms. Please see the detailed response below.

Minor Comments:

1. *Lines 35 and 47: line 35 states that the cold water is featured by moderate salinity, while line 47 says it is a low salinity water mass. Please be consistent.*

Response to the comment:

Thanks for the correction. We have corrected and changed the low salinity to moderate salinity.

2. Lines 39-40 and Lines 47-49: information duplication.

Response to the comment:

Thanks. We have deleted that "It forms from March to April, reaches its peak in May" in lines 47-49 (in old version).

3. Lines 59-70: I would recommend the authors to rewrite this portion. First, other cold water masses are not directly related to this work, so it is unnecessary to include so many details. Please be concise and remove those examples. Second, the question need to be answered in a study should be very specific. Why you still use an example to express the question?

Response to the comment:

We have removed the examples and rewritten this part to make it concise. Please see lines 62-66:

Bohai Sea (Liu et al., 2003; Wan et al., 2004; Zhou et al., 2017) and the Yellow Sea cold water mass (Ho et al., 1959; Hur et al., 2000; Wei et al., 2010; Yuan et al., 2013). The special circulation structures around the Bohai cold water mass and Yellow Sea cold water mass have been well described in previous research (Wang et al., 2014; Xia et al., 2006; Zhou et al., 2017; Zhu and Wu, 2018), but the anticyclone current field analysis near the Qingdao cold water mass still needs to be investigated.

4. Lines 71-77: This portion is poorly organized. In question one, why you say it is a special cold pool structure? Question two is too vague. Influence what features of the anti-cyclonic gyre? Morphology, Duration, Magnitude, Timing, or something else? There is no need to list only two questions using one paragraph.

Response to the comment:

Regarding scientific question 1, we have deleted the "it is a special cold pool structure" and rewritten the scientific question to "Is the Qingdao cold water mass causing the local seasonal anticyclonic structure?" (lines 66-67). For scientific question 2, we have added "the morphology, magnitude, and position of" to make it more specific. Additionally, we have combined this paragraph with the previous paragraph.

Lines 66-68: In this work, we investigate the following questions: (1) Is the Qingdao cold water mass causing the local seasonal anticyclonic structure? Does such a seasonal *anticyclonic circulation fit the geostrophic balance? (2) What factors influence the morphology, magnitude, and position of seasonal anticyclonic circulation horizontally and vertically?*

5. Line 82: cite the wrong paper. It should be Chen's 2003 or 2006 paper. Also there are a lot of citation format issues in this work. Please double check your citations.

Chen, C., Liu, H. and Beardsley, R.C., 2003. An unstructured grid, finite-volume, three-dimensional, primitive equations ocean model: application to coastal ocean and estuaries. Journal of atmospheric and oceanic technology, 20(1), pp.159-186.

Chen, C., Beardsley, R. and Cowles, G., 2006. An unstructured grid, finite-volume coastal ocean model (FVCOM) system. Oceanography, 19(1), pp.78-89.

Response to the comment:

Sorry, we have corrected it.

6. Line 82: remove "while".

Corrected.

7. Line 89: provide citation of CFSv2 dataset.

Corrected.

8. Lines 93-94: why only one sentence in this paragraph? Is it necessary to use one paragraph to state tidal forcing?

Corrected.

9. Line 101: Very confusing. Please rewrite this sentence.

Response to the comment:

Sorry about this confusion. We have rewritten this sentence, please see lines 103-104:

Ensemble simulations are conducted for the control run, no-tide run, and no-wind run. Each ensemble simulation consists of four numerical simulation members.

10. Lines 103-104: why you choose these four time frames? Also there is no information regarding your 9-year climatological simulation.

Response to the comment:

This is a good question, which reminds us to address the motivation of ensemble simulation. We have added a paragraph to describe why we need the ensemble simulation and why we conduct ensemble simulation in such a way. In short, we would like to seed a perturbation in the ensemble simulation, so we used four slightly different initial conditions, namely shift in model start time. Additionally, the details of how the perturbations are seeded do not matter, they can be seeded by slightly different model start times or by the simulations with the same model configurations conducted in the different clusters (Geyer et al. 2021). We have addressed the motivation for ensemble simulation in lines 113-121 in the manuscript.

The motivation for using ensemble simulations is based on the observation (Lin et al., 2022, 2023; Penduff et al., 2019) that deviations form within the ensemble members if the ensemble simulations are conducted with the same model configuration except for slight perturbations in the initial conditions. In other words, if we have only one numerical simulation, the model output will be a mix of "signal" (external forcing) and random effects. Some spatial features are not repeatable in other ensemble members, even though the model configurations are the same. Averaging across ensemble simulations efficiently reduces the random impacts of randomness. Therefore, in Sections 3 and 4, we consider the ensemble means for further analysis. An ensemble simulation with slightly different initial conditions is one way to analyze ocean internal variability. For the ensemble simulation configuration in this study, we follow the tradition of generating an ensemble simulation with slightly different initial conditions (Penduff et al., 2019).

We used the 9-year climatological simulation to provide slightly different but consistent initial conditions. All the initial conditions for the ensemble simulation members are taken from the same climatological simulation, even though the time shifts a bit. The model starting time of the 9-year climatological simulation is 1st Nov. 2008, and the model ending time is 31st Dec. 2019. The climatological forcing for the climatological run is a smooth annual cycle without weather variations based on National Centers for Environmental Prediction (NCEP) Climate Forecast System Version 2 (CFSv2) data. We have added the description of the climatological simulation in lines 106-110:

Note that we conducted an independent 9-year simulation to generate slightly different but generally consistent initial conditions for the ensemble simulation. The model starting time of the 9-year climatological simulation was 1st Nov. 2008, and the model ending time was 31st Dec. 2019. The climatological forcing for the climatological run is a smooth annual cycle *without weather variations based on National Centers for Environmental Prediction (NCEP) Climate Forecast System Version 2 (CFSv2) data.*

11. Line 105: why you choose year 2019? If the cold water mass has strong interannual variability, can 2019 scenario represent the normal year condition?

Response to the comment:

Thanks for your question. 2019 was chosen as an example for analysis. If we choose to simulate the results of other years (for example, we have simulated the result of 2010 discussing the characteristics of the seasonal variation of Qingdao cold water mass, published in a Chinese journal (Huang et al., 2019)), the basic characteristics will be similar, and the simulation of this anticyclonic circulation in other years is currently running, which will be the next step of work and the focus of the next step, namely, discuss the interannual variation characteristics and mechanisms of the interannual variation this anticyclonic circulation. We have mentioned this limitation and next step work in the paper.

Lines 375-379: In this paper, we use the model result of 2019 as an example. Huang et al. reported similar basic characteristics of the temperature and salinity of the Qingdao cold water mass in 2010 (2019). Currently, we limit ourselves to the simulation of 2019; in the future, we plan to discuss the interannual variation characteristics and mechanisms of the interannual variation in this anticyclonic circulation.

12. Lines 115-116: why you say "these results are not different if we consider the mean T …"? In your example the benchmark's mean T is around 5 while the sensitivity test's mean T is ~7.5. The rationale behind this setup is very tricky.

Response to the comment:

Sorry about this confusion, we have deleted this sentence and rewritten why we do a t-test for the control run, no-wind, and no-tide simulation. Hope it can express more clearly in the new version. Please see lines 122-134.

Because the deviations exist between ensemble members caused by the randomness, we need to test whether the differences between the ensemble mean of the control run and the no-tide run (/no-wind run) may be caused by external forcings (tidal or wind forcings) or could only because of randomness. A proper way to do so is statistical hypothesis testing with the null hypothesis: "external forcing has no effect". If this null hypothesis is rejected with a sufficiently small risk, then a valid conclusion is that an external factor has an effect and plays *an active role. Here, a t-test is done for the ensemble monthly mean for May. The results (Figs. 2 and 3) show the sensitivity of the forming of the spring cold water mass to the presence of tidal forcing and wind forcing. Those grid points, at which a t-test indicated that the effect of external forcing is significant, are marked with a cross. Figs. 2 and 3 demonstrate that the difference between the control run and the no-tide ensemble (or the /no-wind ensemble) is significant, especially where the intra-ensemble deviations are larger.*

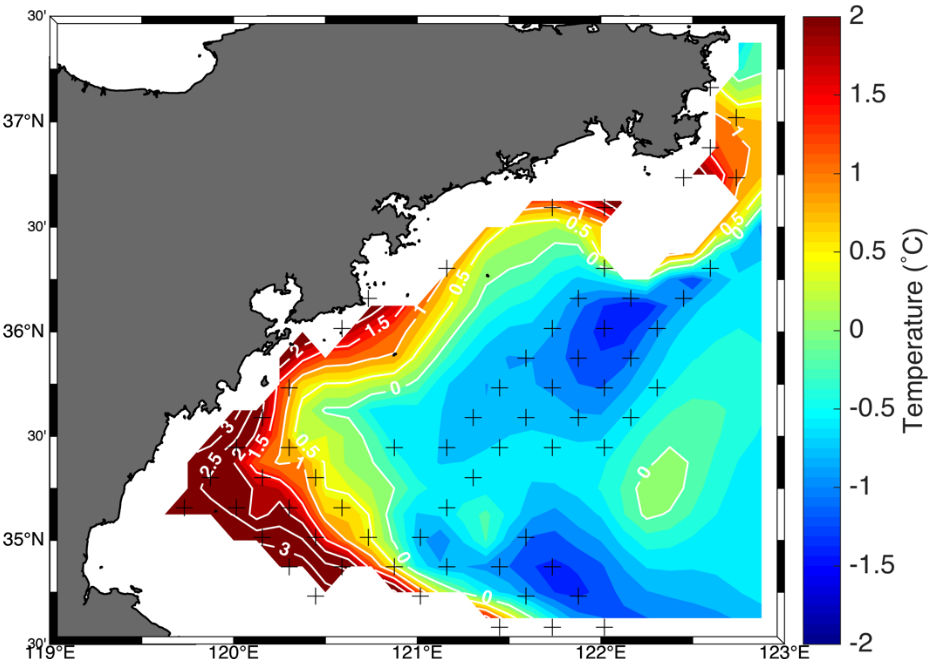

Figure 2. The difference in temperature between the ensemble means of the control runs and those of the runs without tidal forcing. The crosses represent the areas where the difference between the control run and the run without tidal forcing was significant at the 5% level.

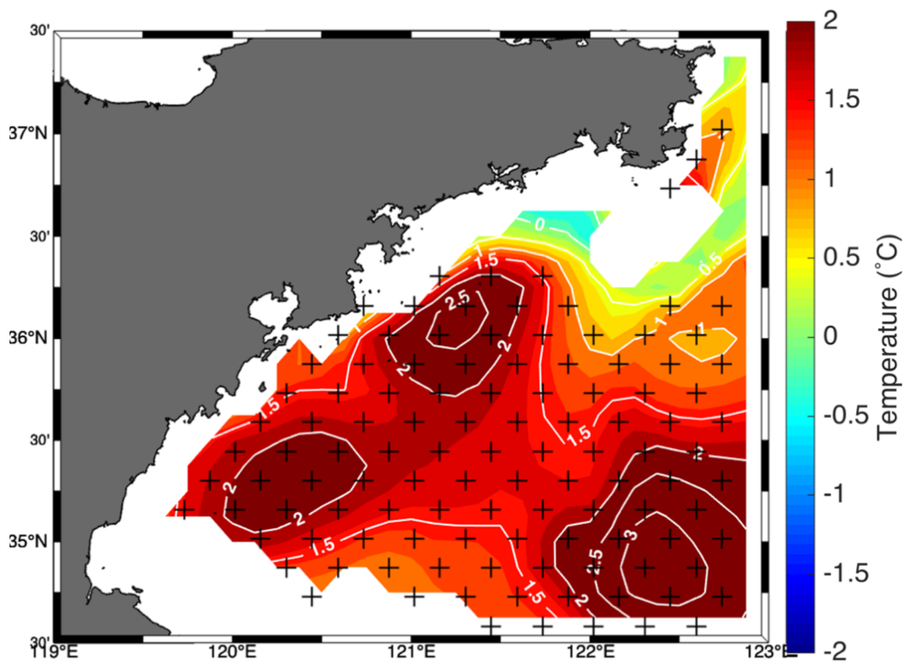

Figure 3. The difference in temperature between the ensemble means of the control runs and those of the runs without wind forcings. The crosses represent the areas where the difference between the control run and the run without tidal forcing was significant at the 5% level.

Additionally, the explicit logic behind the significance of the statistical test under review (the preprint: https://www.preprints.org/manuscript/202407.2261/v1; section5.2). As the main topic of this paper is the seasonal anticyclonic circulation around the Qingdao cold water mass, so we only briefly describe the ocean's internal variability related to the definition and understanding in the paper.

13. Line 122: Results.

Corrected.

14. Lines 124-126: the structure of this part is weird. There is no need to have this portion as a paragraph, especially when it does not provide too much detailed information.

Response to the comment:

We have deleted this portion, and have rewritten the model validations can be found in the previous publication in one sentence in section 2.1.

15. Lines 129-130: you already included the similar information in Introduction, no need to repeat it here.

Response to the comment:

We have deleted this part.

16. Lines 131-133: the figure should be included in the supplementary material to help readers better understand your work.

Response to the comment:

We have added the figure as suggested.

17. Line 137: remove "moreover". "the shape of ... has a ... direction"? Rephrase this sentence.

Response to the comment:

We have deleted this sentence.

18. Line 138: it should be Shandong coastal current, not Bohai coastal current or Bohai coast current.

Corrected.

19. Line 139: In Fig. 2, why not show data in June?

Response to the comment:

We have added a panel showing the salinity data in June. Please see the Fig. 4 in the revised manuscript.

20. Line 141: "Diao et al" citation issue.

Corrected.

21. Line 144: the figures directly jump from Fig. 2 to Fig. 15?

Response to the comment:

Sorry, we have moved Fig. 15 in the old version to Fig. 5 in the revised version and adjusted the figure number correspondingly.

22. Line 147: Additionally?

We have deleted the "Additionally".

23. The color gradient of colorbar and the x axis labels are not well matched.

Thanks. We have replotted the figures. Please see Figs. 9 and 10. And we have avoided this kind of problem in the revised paper.

24. Line 161: to July?

Corrected.

25. Line 163: it is hard to tell the anticyclonic structure is closed from the figure.

Response to the comment:

Sorry for the confusion, it should be the anticyclonic structure closes in May, rather than "in May and June". To be more accurate, we have rewritten the sentence, and the sentence in the revised version is "In May, the anticyclonic structure almost closes".

26. Lines 199: In Figs. 5d and 6d, I don't think the statement in the manuscript "vertical fricition term plays a role, especially east of 122E" match the figure.

Response to the comment:

Ok. The significance of the vertical friction terms is mostly described in section 3.4, so we decided to delete the "vertical friction term plays a role, especially east of 122E" in section 3.3 and address the importance of the vertical friction later in section 3.4.

27. Line 210: the subtopic is too long. Please be concise.

Response to the comment:

We have changed the subtopic to "Relation between the seasonal anticyclone circulation pattern and the Qingdao cold water mass".

28. Line 216: why you choose 35.5 N transect? If you look at Fig. 1 this transect does not cross the center of the cold water mass.

Response to the comment:

35.5 ºN was chosen because it is around the center of the anticyclonic structure. The center of the Qingdao cold water mass is not exactly the same as the center of the anticyclonic structure. Additionally, we have examined the results if we shift the transect 0.5º northward or southward. It does not change the conclusion that the geostrophic balance is not satisfied because the topography of the Qingdao cold water mass is shallow, thus inducing strong vertical friction.

29. Line 280: I don't think the authors discussed Fig. 12 in the manuscript.

Response to the comment:

Sorry for this. The Fig. 12 in the old version manuscript is now Fig. 14 in the revised version. This figure is used to show that the center temperature of the Qingdao cold water mass decrease by 2°C when the wind forcing is turned off, so I have the description of it in the manuscript.

Lines 314-317: On the other hand, in the absence of mixing caused by surface winds, the temperature of the Qingdao cold water mass decreased by 2°C (Fig. 14), resulting in an increase in the baroclinic pressure gradient force around the location of the Qingdao cold water mass in the no-wind experiment. The vertical friction somewhat decreases because of the lack of wind stress in the no-wind experiment.

30. Lines 310-311: rephrase this sentence "for the eastern portion,....but for the eastern portion,..."

Response to the comment:

Thanks for the correction. The correct sentence should be "For the western portion (122.625-123°E), the wind forcing still plays a role, but for the eastern portion, tidal forcing contributes more to upwelling". We have corrected it in the manuscript.

31. The two transects show very similar results. I think one transect is enough.

Response to the comment:

We have modified it as suggested, please see Fig. 5 in the manuscript.

32. Line 353: be concise. I feel this section does not relate to the topic of this research. I would recommend to remove it.

Response to the comment:

Deleted as suggested.

33. Line 369: Conclusions

Corrected.

34. Lines 372, 373, 378: anti-clockwise or anti-cyclonic?

Response to the comment:

Sorry about this. It should be anticyclonic. We have corrected and double-checked it in the whole manuscript.

Reviewer 2 General comments:

This study presents the results of a local anticyclonic gyre around Qingdao cold water based on 3D numerical simulations. In short, the authors found that wind and tide are major factors influencing the anticyclonic structure, not the temperature and salinity gradients caused by the cold-water mass. The manuscript is generally well written but clarifications or more explanations and rearrangements of figures are suggested. There are also some typos. Please see below the detailed comments.

Response to the comment:

We appreciate the reviewer for the time and effort in reviewing the manuscript. Thanks for the confirmation of the paper and suggestions which help us to improve the manuscript significantly.

1. A large bathymetry map identifying locations (e.g., Shandong Peninsula, Korean Peninsula), coastal seas (e.g., Yellow Sea, South Yellow Sea, Bohai Sea), and coastal currents (e.g., Bohai coast current, Yellow Sea warm current) mentioned in the paper are suggested to provide a big picture for readers who are not familiar with this region.

Response to the comment:

We have added a map which identifies the locations, please see Fig.1.

2. Please supplement explanations on why ensemble experiments are needed. Why not directly using the realistic simulation but initializing the model for four times to get the ensemble?

Response to the comment:

Thanks for your question, which reminds us to address the motivation for ensemble simulation. We have added a paragraph to describe why we need the ensemble simulation and why we conduct ensemble simulation in such a way. Essentially, we conduct the ensemble simulation to reduce the randomness caused by a single numerical simulation; and initializing the model four times a way to generate an ensemble simulation, such a way follows the tradition of previous research (Büchmann and Söderkvist, 2016; Geyer et al., 2021; Penduff et al., 2019). Additionally, the details of how the perturbations are seeded do not matter, they can be seeded by slightly different model start times or by the simulations with exactly the same model configurations conducted in the different clusters (Geyer et al. 2021). We have addressed the motivation of ensemble simulation in lines 113-121 in the manuscript.

The motivation for using ensemble simulations is based on the observation (Lin et al., 2022, 2023; Penduff et al., 2019) that deviations form within the ensemble members if the ensemble simulations are conducted with the same model configuration except for slight perturbations in the initial conditions. In other words, if we have only one numerical simulation, the model output will be a mix of "signal" (external forcing) and random effects. Some spatial features are not repeatable in other ensemble members, even though the model configurations are the same. Averaging across ensemble simulations efficiently reduces the random impacts of randomness. Therefore, in Sections 3 and 4, we consider the ensemble means for further analysis. An ensemble simulation with slightly different initial conditions is one way to analyze ocean internal variability. For the ensemble simulation configuration in this study, we follow the tradition of generating an ensemble simulation with slightly different initial conditions (Penduff et al., 2019).

We used the 9-year climatological simulation to provide slightly different but consistent initial conditions. All the initial conditions for the ensemble simulation members are took from the same climatological simulation, even though the time shifts a bit.

3. is the anticyclonic structure formed at depth shallower than 25 m?

Response to the comment:

We have plotted the current pattern at the depth 5m and 15m, please see below (Figs. 1* and 2*). The shape of the anticyclonic structure at the depth of 15m can still be visible, but the center is not very clear compared to that at 25m. The anticyclonic structure disappears completely at 5m depth. Thus, we choose a 25m layer for detailed analysis because the boundary and center of the anticyclonic are much clearer.

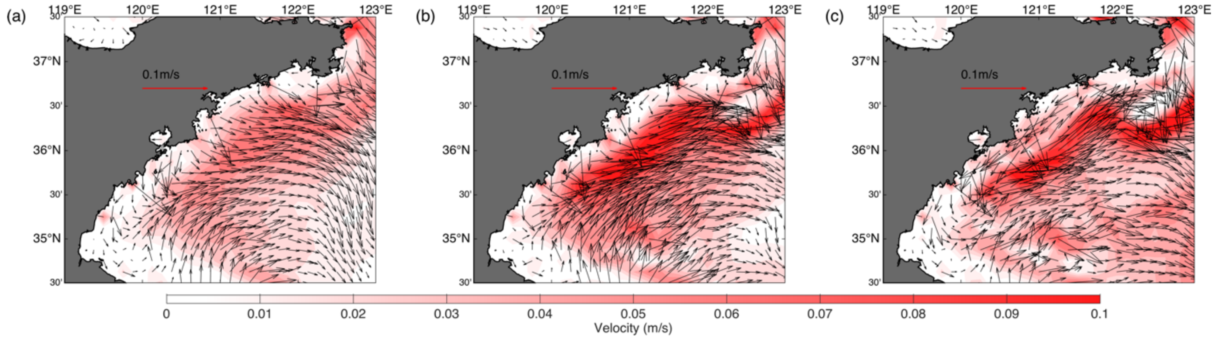

Figure 1*. The horizontal circulation distribution around the Qingdao cold water mass (5 m layer) in April (a), May (b), and June (c).

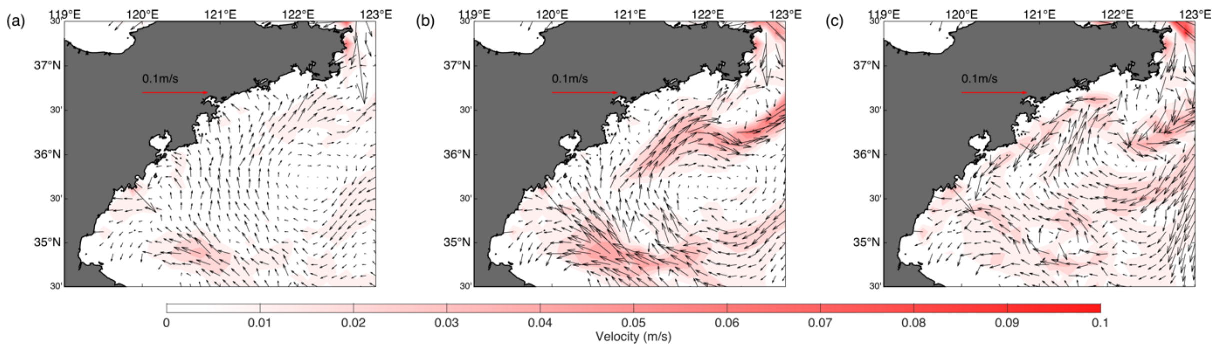

Figure 2*. The horizontal circulation distribution around the Qingdao cold water mass (15 m layer) in April (a), May (b), and June (c).

4. "temperature or salinity gradient" was used several times, are these horizontal or vertical temperature/salinity gradient?

Response to the comment:

Sorry about this. We have clarified the horizontal or vertical temperature/salinity gradient accordingly in the manuscript.

5. The short Section 3.1 Model validation could be merged into Section 2.1.

Response to the comment:

We have merged the brief model validation into Section 2.1 as suggested.

*6. '-fu' in Equation (2) should be '+fu'. The expression of the barotropic pressure gradient force should be g*dζ/dx in Line 190.*

Response to the comment:

Corrected. Thank you for the correction.

7. the identified different roles of wind and tide on upwelling that occurred east or west of the cold water mass is interesting. Yet, what leads to the different roles of wind and tide on different sides of the cold water mass seems lacking. The tide-induced front was mentioned. Could you add a plot showing where the tide-induced front is?

Response to the comment:

We have added a summary of how the wind and tide affect the upwelling at the end of section 4.3. The model results show that the western portion of upwelling is contributed by wind forcing and the eastern portion of upwelling is contributed mostly by the tidal forcing, but wind forcing plays a role as well. The upwelling caused by the wind force can be explained by the Ekman theory because of the predominant southeasterly monsoon; and the upwelling contributed by the tidal forcing is because of the tide-induced front (Fig. 3*), which affects the horizontal (Fig. 3*) and vertical (Figs. 5a and 5b) temperature distribution. The temperature variation will change the density distribution. The density redistribution will further influence the baroclinic pressure gradient force change accordingly around the front zone, which further triggers upwelling (when the tidal forcing is considered). The mechanism of how tidal forcing changes the baroclinic pressure gradient force and in the end triggers the upwelling is explained in previous research (Lü et al., 2010), in this paper, we found that such explanation can interpret the upwelling around the Qingdao cold water mass as well.

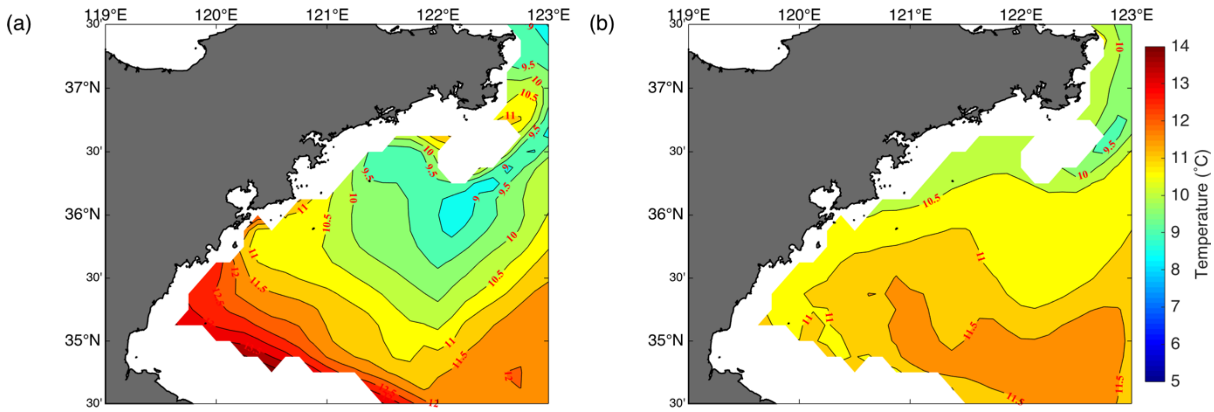

Figure 3* The temperature distribution in the control run (a) and no-tide experiment(b). In the control run(a), there is a front around the cold water mass. When the tidal forcing is turned off, such front disappears (b).

8. All "anti-clockwise" in Conclusion should be "anti-cyclonic" or "clockwise".

Response to the comment:

Sorry, we have corrected it.

9. Line 35: the cold pool is characterized by "moderate salinity" but later, it was described as "low salinity" (Lines 47, 53). Please check it.

Response to the comment:

Corrected. To be consistent, we have changed to "moderate salinity".

10. Line 41: "emergence" to "mergence".

Corrected. Thanks!

11. Line 56: add reference(s) after "…the Qingdao cold water mass forms".

Response to the comment:

We have added the reference as suggested.

12. Line 57: "Yellow Sea cold water mass" should be "Qingdao cold water mass"?

Corrected.

13. Line 70: "anticyclone" to "anticyclonic"

Corrected. Thanks!

14. Line 115: "However, these results are not different…" seems to be not correct. In the example, the mean temperature of this grid node's ensemble is 4.875 ˚C for the control run and 7.375 ˚C for the no-tide run. Their difference is 2.5 ˚C, which is different from the "3 ˚C".

Response to the comment:

Sorry for the confusing sentence. We have deleted it and rewritten the significance of the statistical test in lines 122-134. Additionally, we have an explicit version of why we need statistical test in another under-review paper with the topic of "Significance of Internal Variability for Numerical Experimentation and Analysis" (section 5.2; preprint: https://www.preprints.org/manuscript/202407.2261/v1). To explain more clearly, we would like to show part of the content in the reply to the review comments.

Lines 122-134: Because deviations exist between ensemble members because of randomness, we need to test whether the differences between the ensemble means of the control run and the no-tide run (/no-wind run) may be caused by external forcings (tidal or wind forcings) or could be caused only by randomness. A proper way to do so is statistical hypothesis testing with the null hypothesis: "external forcing has no effect". If this null hypothesis is rejected with a sufficiently small risk, then a valid conclusion is that an external factor has an effect and plays an active role. Here, a t test is performed for the ensemble monthly mean for May. The results (Figs. 2 and 3) show the sensitivity of the formation of the spring cold water mass to the presence of tidal forcing and wind forcing. Those grid points, at which a t test indicates that the effect of external forcing is significant, are marked with a cross. Figs. 2 and 3 demonstrate that the difference between the control run and the no-tide ensemble (or the /no-wind ensemble) is significant, especially where the intraensemble deviations are large.

When such local tests are conducted, one has to expect that even if the null hypothesis is valid, at approximately 5% of grid points, the null hypothesis is rejected (multiplicity of tests, cf. von Storch, and Zwiers, 1999). Since the rejection rate is itself a random variable, the false *rejection rate can be much larger, but more than 20% is very unlikely. Here, the rate is considerably greater in both cases.*

15. Line 141: (Diao, 2015) to (2015)

Corrected. Thanks!

16. Line 144: Figures should be mentioned in ordered sequence in the text.

Response to the comment:

We have corrected it and avoided this problem in the revised manuscript.

17. Line 161: "July" should be "June" (?)

Corrected.

18. Lines 160, 168: "southeast monsoon" and "southward monsoon" are a bit confusing. Is it southeasterly monsoon or northward monsoon?

Response to the comment:

Sorry, we have changed to southeasterly monsoon. We would like to express that a southeasterly monsoon prevails around the Shandong Peninsula, and a northward current exists along the Shandong Peninsula.

19. Lines 178-179: please clarify "meaning that the Qingdao cold water mass is less affected by horizontal disturbances".

Response to the comment:

We have deleted this unclear sentence.

20. Lines 199-200: "east of 122 ˚E" should be "west of 122 ˚E"? change "southwest wind stress" to "southwesterly wind stress," "northern current" to "northward current".

Corrected. Thanks!

21. Line 299: please check "a decrease in the baroclinic pressure gradient force around the location of the Qingdao cold water mass in the no-wind experiment". Is it "increase"?

Response to the comment:

Thanks for your correction. We have corrected it.

22. Line 335: "west side" should be "east side"?

Corrected.

23. Add references in Section 4.4 for the Yellow Sea basin-scale cyclonic circulation.

Response to the comment:

As we consider that the description of the Yellow Sea basin-scale cyclonic circulation is not strongly related to the main topic of this paper, we decide to delete section 4.4 in the revised version.

24. Question about the terminology: the anticyclonic circulation studied here disappears as the seasonal Qingdao cold water mass disappear. It's not a permanent feature, maybe call it a 'seasonal anti-cyclonic gyre' is more accurate or just use 'anti-cyclonic circulation'?

Response to the comment:

Thanks for bringing this discussion to us. In our opinion, the gyre usually refers to a large-scale feature, such as the sub-tropical gyre. In our paper, maybe it is more appropriate to use seasonal anti-cyclonic circulation. Further discussion about this issue is warmly welcomed. Additionally, in the revised version, we have added seasonally in front of the anti-cyclonic circulation.

Specific comments about figures:

1. Some figures can be combined for better visualization and comparison of results, for example, the following figures can be put together: Figures 1 and 2, Figures 5 and 6 (those two can be re-formatted into two rows and each row shows four plots), Figures 10 and 11.

Response to the comment:

We have replotted the above diagrams as suggested.

2. the unit of the momentum term in several figures is wrong: Figures 5, 6, 10, 11. It should be m/s2.

Response to the comment:

Thanks for the correction. We have corrected it.

3. For those figures showing features at 25 m, some of them masked the nearshore region (I believe these are shallower than 25 m), like Figures 1-3, 5-6, but others have valid values in this shallow region, like Figure 10-11. Please check it.

Response to the comment:

Many thanks for your comments. We have checked this problem and found the visualization problem is caused by unsuitable color bar. We have replotted the above diagrams.

4. Figure 7: correct (e, f, g) to (d, e, f). Which direction does the positive value represent?

Response to the comment:

Corrected. Thank you!

The positive value represents northward direction. We have added this informatio in the manuscript in line 233.

5. Figure 8: there should be no unit for Ekman ratio.

Response to the comment:

Corrected.

6. Figure 11: why is "time average over two M2 tide cycle" used here, rather than using "monthly mean for may" as Figure 10?

Response to the comment:

Thank you for pointing out this problem. We have modified it and both diagrams are monthly mean.

7. Figure 12 is not cited in the main text. Figure 12a is the same plot as Figure 1b, keep one figure is fine.

Response to the comment:

Sorry about this mistake. We have added a description for Fig. 12 and removed Fig. 12a (now Fig. 14 in the revised version) as suggested.

8. Figure 14 is repeated with one of the plots in Figure 15. You may consider put Figure 15 into supplementary. It's also recommended to reduce the vector numbers in Figures 14-15 to make them easier to see.

Response to the comment:

We have removed Fig. 14 in the revised version.

*9. Figure A1: which period of the surface wind stress is shown in this figure? The caption indicates that this *constant* wind field was used in the control run (?)*

Response to the comment:

Sorry about this. It is the monthly mean of surface wind in May. We use the realistic wind forcing, not the constant, as we described in the model configuration part. Sorry for not expressing this clearly. Fig. A1 (now Fig. A2 in the revised version) is only used to provide a direct feeling for the readers of the wind stress direction.