General comments:

The manuscript has been improved; however, several critical issues remain unaddressed. My main concerns lie with the main current patterns in the Yellow Sea, and the effects of wind and tidal forcing on these patterns. The current version lacks a logical, thorough, and convincing analysis of these dynamics. I therefore recommend a major revision.

Major comments:

1. What made me confused during the revision for the last two version is the main current patterns in the Yellow Sea in summer. After some literature studies, now, I have some understandings. In Figure 1, the authors show only the YSCC, which is corresponding to the southward current in Figure 8a 122.5E–124E. This is the eastern boundary of the Qingdao cold water mass. However, the northeastward current in the Lu'nan coast (seeing figure below) and the northward current in Subei coastal current were not shown in Figure 1 and discussed thoroughly. These two currents are at the western boundary of the Qingdao cold water mass. The listed 3 currents together generate the summer anticyclonic circulation discussed in this work. Besides, the currents shown in the below figure and the Figure 1 in the manuscript are surface currents, however, the authors aimed to analysis the current patterns at near bottom (25 m). First, the authors should prove that the patterns of these 3 current systems are similar at surface and near bottom. This is what I have pointed out in the last revision. However, in the updated manuscript, the authors still didn't provide detailed analysis on it. Secondly, before the discussion on any effects on the current patterns, the authors should identify and label the current systems in their simulations (i.e., label the current system in Figure 8a). Additionally, the current system in Figure 8a should cover the entire computational domain.

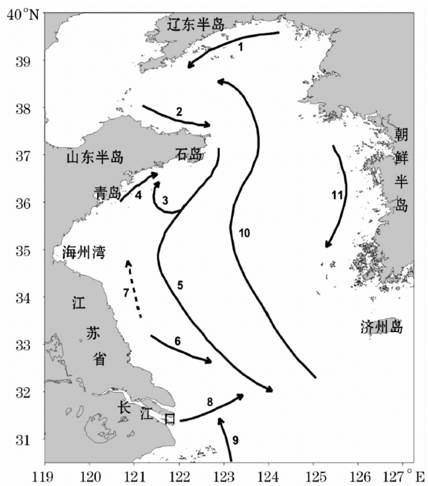

图 1　黄海流系示意图(据文献[6,9,14]重绘)

Fig. 1　Diagram of coastal current systems in the Yellow Sea (Redrawn after references[6,9,14])

1. 辽南沿岸流;2. 鲁北沿岸流;3. 青岛—石岛近海的反气旋中尺度涡旋,青岛冷水团;4. 山东南部沿岸的东北向流动;5. 黄海西部沿岸流;6. 苏北沿岸水;7. 夏季苏北沿岸的北向流动;8. 东北向扩展的长江冲淡水;9. 台湾暖流前缘水;10. 黄海暖流;11. 朝鲜半岛西部沿岸流

1. Liaonan coastal current; 2. Lubei coastal current; 3. Mesoscale anticyclonic eddy in Qingdao-Shidao offshore, Qingdao cold water mass; 4. Northeastward current in Lu′nan coast; 5. Yellow Sea western coastal current; 6. Subei costal current; 7. Northward current in Subei coast in summer; 8. Northward extension of Yangtze River diluted water; 9. Taiwan warm current; 10. Yellow Sea warm current; 11. Korean peninsula western coastal current

Figure from Wei et al., (2011)

Wei, Q., Yu, Z., Ran, X., & Zang, J. (2011). *Characteristics of the Western Coastal Current of the Yellow Sea and Its Impacts on Material Transportation*. Advances in Earth Science, 26(2), 145–156. doi: 10.11867/j.issn.1001-8166.2011.02.0145

2. I am lost during the exploration of the wind and tidal effects on the anticyclonic circulation. Based on my understanding in physical oceanography and my careful revision on this manuscript, I am providing my points of view on how the wind and tides affects the studied anticyclonic circulation.

Wind effects. As shown in Figure A3 (please show the wind and wind stress patterns over the entire computational domain), surface currents in the west Yellow Sea are northeastward and eastward. There are at least three effects. (1) Waters piles up on the east side leading to barotropic pressure gradient forces pointing westward. Going down into deeper layers, as the existence of the Qingdao cold water mass, the temperature gradient is pointing westward at the west side of the cold water mass, generating a baroclinic pressure gradient force pointing westward. So, at 25 m depth, both barotropic and baroclinic gradient forces are negative, as denoted by Figure 10b-10c (but I think the authors messed up the signs in these plots). Such **local wind effects** on the deep water will generate a northward current. (2) As the waters move offshore, a basin-wide (at least over west of 123E because over this region, depth is shallower in the west than in the east as shown in Figure 1b) upwelling system will be stimulated. This is the results due to Ekman transports. (3) Summer monsoon in the Yellow Sea and East China Sea should be similarly southwesterly (I am not quite sure if it is true in summer 2019). The currents from the southern boundary are highly affect by East China Sea coastal currents, which are highly affected by the same southwesterly monsoon. This is the **remote wind effects**. The authors, however, did not provide any discussion on it.

Tidal effects. (1) As shown in the Figures 8a-8b, northward coastal currents on the west side of the Qingdao cold water mass are weaken when tides are considered, while the currents (the YSCC) on the east side of the cold water mass turn to northward when tides are turned off. These patterns have been pointed out in the manuscript, which is good. The authors provide discussion on tidal-induced changes in barotropic and baroclinic terms. But what are the specific tidal effects that cause such changes? Residual tidal current? Tidal mixing? Or others? (2) In section 4.1, the authors aimed to discuss the tidal effects on the upwelling. However, discussion on changes in barotropic and baroclinic terms does not answer which tidal processes affect the upwelling system. To my understanding, upwelling systems are compensate current due to the surface water divergence across coastal shelf and the mass balance, but not due to the changes in barotropic and baroclinic conditions at deep layers. Instead, alike the upwelling, the changes in barotropic and baroclinic conditions at deep layers are also the results of changing surface current patterns.

Detailed comments:

1. Figure 1a. Please provide a reference for this plot. It seems like from this work:

Liu, Shichu, et al. "Interannual variation in winter thermal front to the east of the Shandong Peninsula in the Yellow Sea." Journal of Sea Research 193 (2023): 102370.

2. Line 176-177. Please show evidence to support the baroclinic effects on the differences in current patterns along vertical direction. If not, please remove this sentence.

3. The arrows in Figure 5 are hard to see.

4. Line 195-196. The geostrophic balance is hardly violated in the cold water area (122E-123E, 34.5N-36N), which is shown in Figure 5d and is also mentioned in Line 239.

5. Line 213-214. Should be "between the control and the no-tide experiment (Fig. 6)"

6. Line 219. As shown in Figure 8a and 8b, the velocity is greater in the no-tide experiment than in the control ones.

7. Line 221. Without tidal forcing east of $122°E$, the magnitude of the barotropic term also increase.

8. Line 219-214. I don't understand what the main conclusion or the main purposes of this paragraph is. I lost here. Please see the major comments 2 for the tidal effects.

9. Lines 224-237. Seems that the authors try explain why the YSCC is reversed when tides are off, but I didn't find the logic of for this paragraph and cannot come up with a clear conclusion.
Let me clarify my confusion.
On line 226-227, the anticlockwise gyre is the one around 124-126E, 34.5-26.5N. It is beyond the studied clockwise circulation around the Qingdao cold water mass.

Line 228-230, the norward current west of 122E is not the compensation currents but the northeastward current in the Lu'nan coast and the northward current in Subei coastal current. Please correct me if I am wrong.

Line 231-233, the "northward flow in the eastern part of the southern Yellow Sea" is around 125E, while the "southward flow in the west portion of the southern Yellow Sea" (or the YSCC) is at around 122-124.5E. Do they have any linkages when you compare them?

All the above changes are the so-called changes in broader-scale Yellow Sea circulation. But they still not answer what tidal processes affect changes in broader-scale circulation, and then affect the YSCC. Although the authors list reasons in 238-245 citing other works. But what the authors get from their simulation are still not well addressed.

10. Line 243, where is the mentioned "basin-scale cyclonic gyre"?

11. Lines 284-289. The analysis conflict with the signs shown in Figure 10.

12. Figure 10. Please double check the signs. For example, the positive (eastward) barotropic term in Figure 10b conflict with the westward barotropic term shown in Figure 5b.

13. Section 4.1. Please see the major comment 2 related to the discussion of upwelling. As shown in Figures 11a and 11b, surface currents (0-10 m) are eastward moving waters offshore. I would insist that the authors should focus on the adjustment of basin-scale mass balance rather than on the changes in barotropic and baroclinic terms over a transect or a profile (Figure 12) when linking the tidal effects and the upwelling system.

14. Line 345-346. My understanding on oceanic front is that front is determined by horizontal gradients of temperature or salinity or density, but not based on gradient on the x-z panel, especially for the Qingdao cold water mass, which has strong horizontal temperature gradient.

15. Line 354. As shown in Figures 12a -12b, the vertical friction is near zeros. So, at this location, pressure gradient forces balance with the Coriolis force, which means that the geostrophic balance is met.

16. Figure 12. Why do you show the momentum at depth=15 m when the rest of the analysis is based on the currents pattern on depth =25m?

17. Lines 374-375. Distinguish instead of extinct? This is an incomplete sentence.

18. Line 381-382. As I observed on Figures 13-14, 51.29% is for no-tide conditions, while 89.68% for no-wind conditions. Also, rounding to integer is enough.

19. Figure 13-14, are they for depth=25 m? Please update the captions.

20. Lines 424-426. The geostrophic balance maintains over the cold water mass.