Reviewer 3

We warmly thank the reviewer for the time and attention devoted to our paper, and for those positive and constructive comments. We have carefully considered all those comments and suggestions in the revised version of our manuscript. In what follows, our answers and modifications are highlighted in blue. Page and line numbers refer to the highlighted version of the revised manuscript.

This manuscript presents an investigation of the effect of tides and rivers on upwelling intensity over upwelling areas in Vietnamese waters in the summer of 2018 at different time scales. In addition, the physical mechanism of Mekong upwelling development was further investigated. The results of this paper is very interesting, comprehensive, and deepen the understanding of upwelling and the dynamics of upwelling areas. The manuscript is quite fully done and well-constructed. I suggest the manuscript to be accepted after minor revisions. Here are my comments:

Some technical mistakes should be corrected:

- ":" should not have a space before it.

This has been corrected throughout the manuscript.

- Line 29: "14 E" should be "14 N"

This has been corrected (page 2, line 30).

- Line 56: "and" should be "are"

This has been corrected (page 2, line 57).

- Line 81-82: two "moreover", line 91-92: two "however": should use one word!

One "moreover" has been replaced with "also" (page 3, line 82), and one "however" has been with "thus" (page 4, line 94)

- Line 108: "refsec:conclusion"?

Indeed it should be "Section 5". This has been corrected (page 4, line 111).

- Line 173: "Fig.1e,f" should be "Figs. 1e,f"; similar to others!

This has been corrected, here and throughout the manuscript

- In section 2.1, the limits of four numerical domains should be added with longitudes and latitudes in the caption of Fig. 1 or in the main text. It is not so good to read if we always need to check the paper of To Duy et al. (2022) or Herrmann et al. (2023).

Coordinates of the upwelling areas are now provided in the caption of Fig. 1 of the revised manuscript.

- In Fig. 1: the lower limit of the color bar is 26oC so the center of the upwelling area shows a white (blank) color, this color bar should be extended!

Fig. 1 has been redone to avoid blanks (temperatures below 26°C appear as dark blue, as it should.

- The authors already simulated, showed, and emphasized the spatial differences of SST of only a representative year of 2018 (Fig. 1). Why did the authors discuss that representative year? Do you get similar conclusions for 2017?

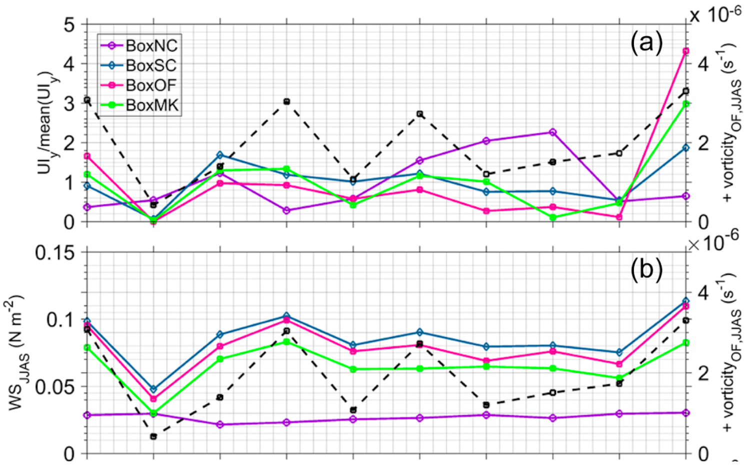

Figure A : Normalized yearly upwelling index (a) and JJAS averaged wind (b) between summers 2009 and 2018 in the LONG simulation. From To-Duy et al (2022, their Figure 13).

To-Duy et al. (2022) showed that wind over the SVU region was weaker than average during summer 2017, and so was the upwelling intensity (see Fig. A above, extracted from To-Duy et al. 2022). 2017 and 2018 therefore represent two cases representative of respectively weak and strong summer wind and upwelling. To discuss the representativeness of our conclusions obtained from the analysis of summer 2018, we thus examined the variability of the upwelling development over summer 2017, also simulated in the FULL, NoTide and NoRiver 2-year ensembles. Figure B below shows for summers 2017 and 2018 the maps of summer SST in the three ensembles. Figure C shows the daily time series of wind over the SVU region, and of the ensemble average $UI_{d,box}$ and intrinsic variability $VI_{d,box}$ of daily upwelling intensity over its four areas of development. The correlation between wind over the SVU region and $UI_{d,box}$ in the FULL ensemble is provided in Table A.

Table A : correlation between the daily wind averaged over the whole SVU area and the ensemble average of UIy is provided in Table A in the FULL ensemble. Correlation significant at more than 99% (at less than 90%) are in bold (italics).

	SCU	OFU	NCU	MKU
Summer 2017	**0.594**	**0.554**	*-0.167*	**0.621**
Summer 2018	**0.596**	**0.604**	*-0.025*	**0.683**

Analysis of summer 2017 confirms the conclusions obtained from the analysis of summer 2018 :

- The intraseasonal chronology of upwelling intensity for OFU, SCU and MKU is primarily driven by wind (Fig. Ca,b,d,h), with highly significant correlations (at more than 99%) between $UI_{d,box}$ and wind for both summers 2017 and 2018 (between 0.55 and 0.68, see Table A).
- The intraseasonal variability of upwelling intensity of NCU is not driven by wind (see Fig. Ca,f and the not significant correlations between $UI_{d,box}$ and wind for both summers 2017 and 2018, Table A). As for summer 2018, NCU only develops during summer 2017 at the beginning and end of summer, confirming our conclusion about the blocking role of the general circulation that prevails over the area during the core of summer.
- For both summers 2017 and 2018, the influence of OIV on upwelling intensity is very weak for MKU, weak for SCU, and stronger for OFU and NCU (Fig. Cc,e,g,i). The stronger influence of OIV on OFU and SCU in 2017 compared to 2018 is presumably related to smaller values of upwelling intensity (since VI is computed as the ratio between the ensemble standard deviation and average).
- As already observed for summer 2018, summer 2017 shows no significant impact of tides and rivers neither on ensemble average intensity nor on OIV of SCU, OFU and NCU (Fig. Be,f and Fig. Cb-g)

- Tides have a major role in MKU development both for 2017 and 2018, with no MKU developing at all in the NoTide ensemble for summer 2017 (Fig. Be and Ch), and rivers slightly reducing the upwelling intensity in the middle of summer.

Figure D below moreover shows the yearly upwelling location, materialized by the UI_y 0.2°C iso-contours, and for summers 2017 and 2018 of the FULL ensemble and also for summers 2009-2018 of the LONG simulation evaluated and analysed by To-Duy et al. (2022). For summer 2018, the 10 members show rigorously the same location of MKU development. This area is strongly reduced for summer 2017. Over the 2009-2018 period, MKU always develops over the same core area, with a spatial extension varying with the strength of the upwelling. Following the comment of another reviewer, we also included in the paper a discussion about the role of topography, performing an additional simulation where the topography over the MKU shelf is smoothed (Section 4.1, page 12, lines 353-360, and Figure 7 of the revised manuscript). This change in topography results in a change of the southern limit of MKU extension. Those results confirm that the stability of the location of MKU development, indeed related to the influence of topography.

This further analysis of summer 2017 in our three ensembles and of the 2009-2018 simulation therefore suggests that our conclusions based on the detail analysis of summer 2018 regarding the mechanisms involved in the development and intraseasonal variability of SVU (wind, general circulation, intrinsic variability, tides, rivers and topography) over its four area of development, and in particular over the MKU region, are robust throughout the different years and associated atmospheric, oceanic and river conditions.

→ following this comment, we added those figures (Figures 2, 11,12) and a whole dedicated section (*Section 5, Representativeness of summer 2018,* page 16) in the revised version of our manuscript and modified the Introductioon (page 3, lines 110-111) and conclusion accordingly (page 17, lines 532-534).

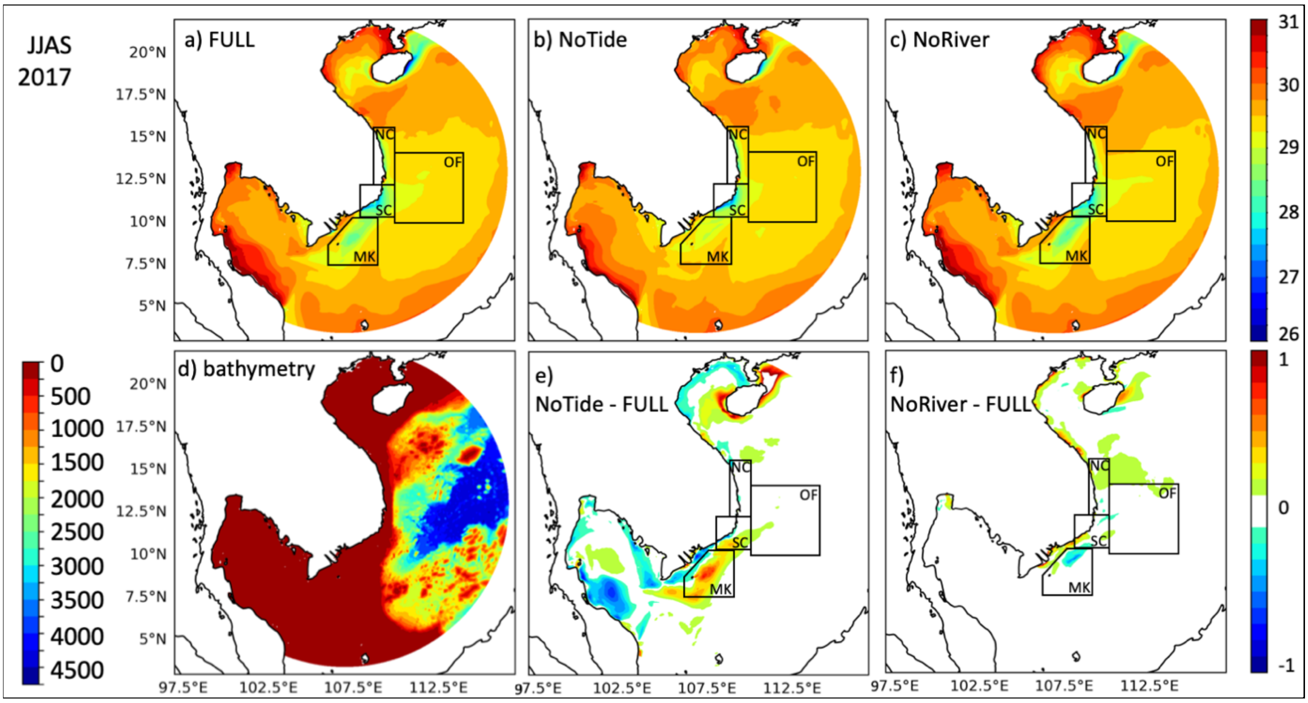

Figure B : Ensemble average SST over June-September 2017 in the FULL (a), NoTide (b) and NoRiver (c) ensembles and difference between the NoTide (d) and NoRiver (f) and FULL ensembles (∘C). Panel d shows the bathymetry of the domain (m). Color bars for panels (a-c) and (e-f) are provided on the top and bottom right, and color bar for panel (d) on the bottom left.

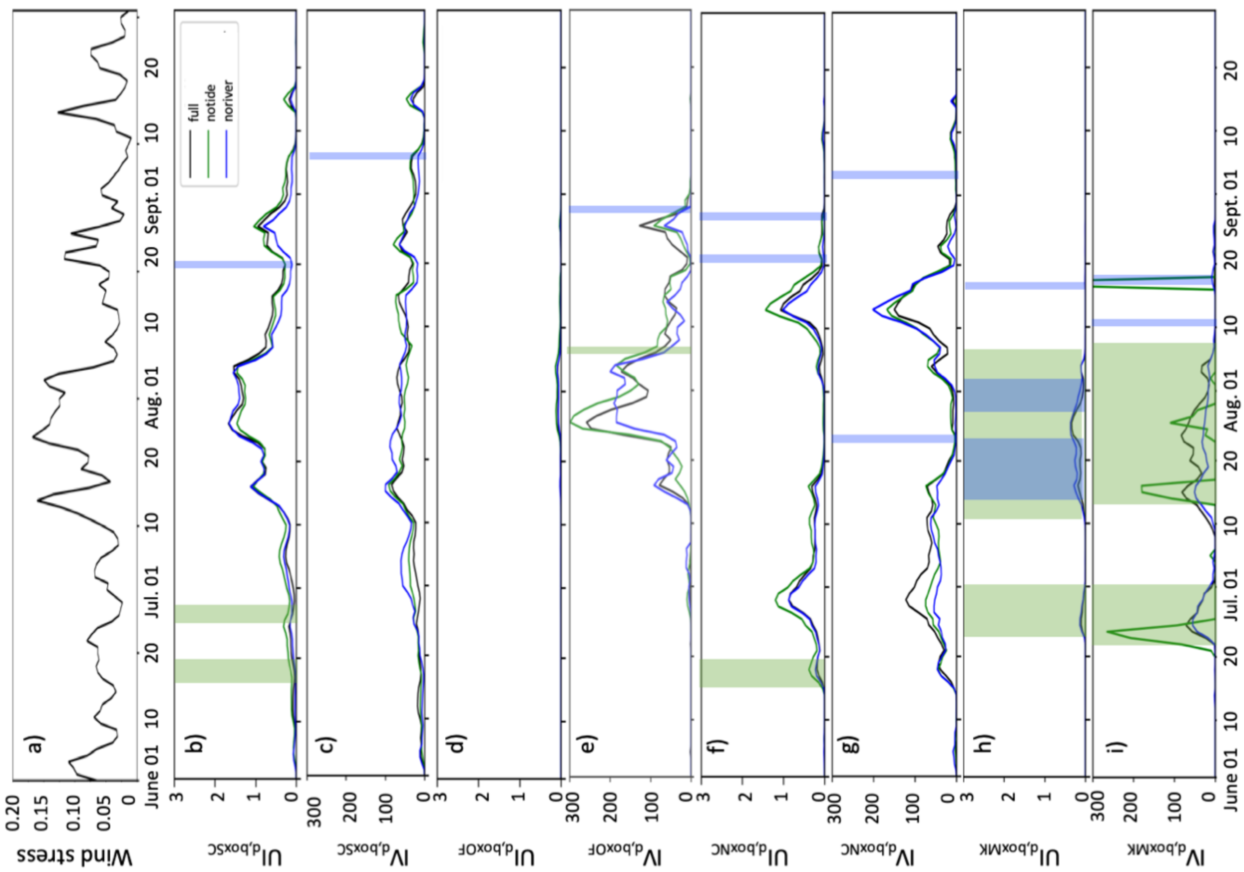

Figure C : Daily time series over summers 2017 of averaged wind stress (a, N.m−2) over the whole upwelling region (7.5-14°N, 106-114°E) and of the ensemble mean of $UI_{d,box}$ and of $IV_d(UI_{d,B})$ (∘C) for the FULL (black), NoTide (green) and NoRiver (blue) ensembles for NCU (b,c), SCU (d,e), OFU (f,g) and MKU (h,i). Shaded green and blue colors shows the areas where the difference between the reference FULL and sensitivity NoTide and NoRiver ensembles is statistically significant at more than 99%.

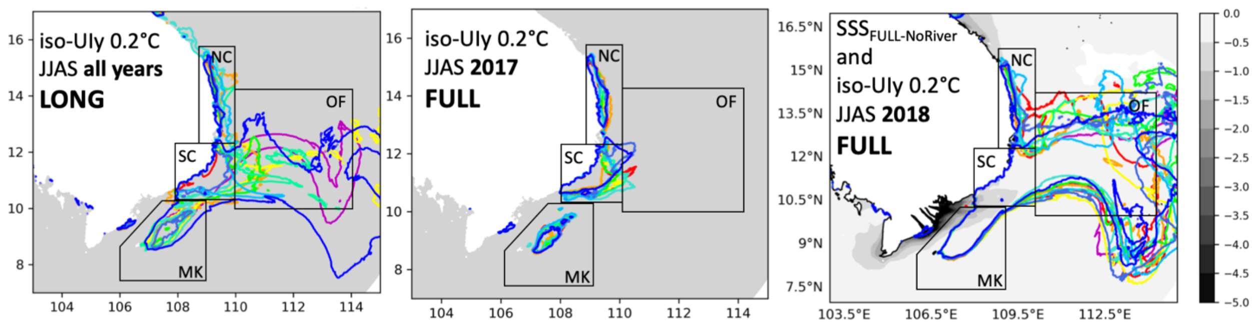

Figure D : isolines of 0.2°C of yearly upwelling index UIy for the ten summers (June-September) 2009 to 2018 in the LONG simulation (left), and for summer 2017 (middle) and 2018 (right) in the ten members of the FULL ensemble. The difference between ensemble average of summer sea surface salinity (SSS) in the FULL and NoRiver ensembles is also showed in the right panel to highlight the Mekong river plume position.

- Line 261: "It belongs to the large scale cyclonic circulation…" => I could not see this cyclonic circulation, is it not shown in Fig. 3 or it is anticyclonic?

This was indeed a typo, the correct work is anticyclonic as suggested by the reviewer, and has been corrected (p 11, line 325)

References

Herrmann, M., To Duy, T., and Estournel, C.: Intraseasonal variability of the South Vietnam upwelling, South China Sea: influence of atmospheric forcing and ocean intrinsic variability, Ocean Science, 19, 453–467, https://doi.org/10.5194/os-19-453-2023, 2023.

To Duy, T., Herrmann, M., Estournel, C., Marsaleix, P., Duhaut, T., Bui Hong, L., and Trinh Bich, N.: The role of wind, mesoscale dynamics, and coastal circulation in the interannual variability of the South Vietnam Upwelling, South China Sea – answers from a high-resolution ocean model, Ocean Science, 18, 1131–1161, https://doi.org/10.5194/os-18-1131-2022, 2022.