

This response includes the replies to the minor comments raised by the editor. Our replies are presented in **bold**, in the point-by-point revision below.

Dear Katsuro Katsumata,

Thank you very much for your comments on the latest version of our manuscript. We have revised the manuscript accordingly and uploaded the updated version.

Below, we provide point-by-point responses to each of your comments.

Editor's comment

In response to the reviewers' comments, the authors have made a considerable revision including the title. I understand Reviewer #2 had two major issues in the previous version; the significance of the finding as a full peer-review paper and robustness. For the first issue, I see the revised manuscript presents the novelty in a more focused way and I am now ready to leave the decision to the reader since sufficient detail of the methods is provided in the revised manuscript for the reader to evaluate its credibility and significance. For the second issue, the robustness has shown great improvement by addition of the sensitivity tests.

I also see the authors have addressed each comment from Reviewers #2 and #3 appropriately.

I am therefore almost ready to accept the manuscript for publication. Before that please consider fixing the following minor problems. The line numbers are for "egosphere-2025-3999-manuscript-version4.pdf".

L.333, "hydrographic parameters ~63°W". Is it possible to convert this location to "Distance to Cabot Strait" so that we can see the "sharp transition" on Fig.4?

Response:

We thank the editor for raising this point. We have added that this location of 63°W corresponds to a distance from Cabot Strait of ~290 km, allowing for direct

comparison with the results shown in Figure 4. We additionally updated Figure 4 moving the x-axis label below the lowest subplot.

L.365, I agree the end-member uncertainty affects the LCW fraction, but fail to see why "shallowing of the isopycnals and limited vertical mixing" does. Please add more explanation.

Response:

We thank the editor for this comment and agree that this point requires further clarification. In the western Gulf, the water column gradually becomes shallower, and the deepest density layers are progressively truncated by the seafloor. As bottom waters adjust to this topographic constraint, weak and slow upwelling and vertical mixing can occur. Although this mixing is very limited (Stevens et al., 2024), it may introduce slightly colder, LCW-like properties into the $\sigma_\theta = 27.26$ kg/m³ isopycnal layer, thereby biasing the linear mixing calculations toward higher LCW fraction estimates. We have clarified this in the manuscript by adding an explanatory sentence.

L.401, "6. Conclusion" → 5. Conclusion

Response:

Thank you for pointing this out and the careful read-through. We have corrected the numbering and double-checked that it is consistent throughout the manuscript.

Fig.S5, In order to facilitate comparison with Fig.5 in main text, Fig.S5 should use the same colorbar as Fig.5. Also the caption says red x's are for 0% LCW. All the data points on Fig.S5 appears "red x" on my monitor.

Response:

We agree that Figure S5 should use the same colorbar as Figure 5 and have updated the figure accordingly. When considering only the temperature and salinity in the simple linear water mass fraction analysis though, no LCW contribution is estimated within the Gulf. This result is consistent with previous

studies that rely solely on hydrographic parameters. As the result, all data points in Figure S5 appear as red x's, corresponding to 0% LCW.