

## RESPONSE TO COMMUNITY'S COMMENT

for the manuscript “*River discharge impacts coastal Southeastern Tropical Atlantic sea surface temperature and circulation: a model-based analysis*” by Aroucha et al., submitted to *Ocean Science*.

*We thank the community for its interest in our manuscript and suggestions. Below, we provide a response to the community's comments.*

*References cited in this document are included at the end. Responses to individual comments are provided below, with specific references to the corresponding lines and sections in the revised manuscript. For clarity, our responses are highlighted in **blue font** throughout this response letter.*

### **Community comment (CC1):**

I congratulate the authors for this very interesting work.

However I note that our Alory et al. (2021) paper is cited several times (L70, L423, L570) but its results are misinterpreted. It is true that our work hypothesis was that the Niger River could limit coastal upwelling in the Gulf of Guinea through the generation of an onshore geostrophic flow, But in the end, we found that this onshore geostrophic flow already existed in our simulation without river. While there was an additional onshore geostrophic flow due to halosteric effects when adding the Niger River in the model, as you find south of the Congo River, we found that it did not significantly affect our GCUI index as the increased uG was compensated by a reduced MLD. Please correct your interpretation when citing our paper.

This also leads to the following question:

When computing the GCUI (L180) in simulations with/without river, did you take into account the changes in MLD?

**R. Thanks for the comment. We apologize for the misinterpretation. Indeed, your paper highlights the river-induced mixed-layer thinning compensation effect on the current change. We reviewed our interpretation when citing the Alory et al. (2021) paper throughout the manuscript. Please see these changes in the main final manuscript from L.73-75, L.428-431, and L.585-588. Regarding the GCUI computation, we do take into account the changes in the MLD, as now described in L.200-202. However, the MLD changes in simulations with/without river at the 50km coastal band (i.e. the here defined cross-shore width where upwelling occurs) are less significant than the changes in the coastal current within the same coastal region. Hence, a significant change in the GCUI around the Congo's mouth is observed when comparing both simulations.**

### **References cited in this document**

Alory, G., Da-Allada, C. Y., Djakouré, S., Dadou, I., Jouanno, J., and Loemba, D. P.: Coastal Upwelling Limitation by Onshore Geostrophic Flow in the Gulf of Guinea Around the Niger River Plume, *Front. Mar. Sci.*, 7, 607216, <https://doi.org/10.3389/fmars.2020.607216>, 2021.