

This review reflects comments and contributions by Júlia Sambugaro and Maria Carolina Matos resulted from the graduate-level course "*How to Read and Evaluate Scientific Papers and Preprints*" from the University of São Paulo, which aimed to provide students the opportunity to review scientific articles, develop critical and constructive discussions on the endless frontiers of knowledge, and understand the peer review process.

The preprint examines circulation and water transport in the Archipelago Sea, Finland. Earlier works in the study area failed to estimate the water transport due to the complex topography of the archipelago, leading to an overestimation. The vulnerability of this region justify the necessity of understanding the transport dynamics.

Using a high-resolution NEMO configuration, the study reveals that currents are influenced by the area's geography, resulting in stronger currents in narrow channels and weaker currents in more open spaces. Seasonal and interannual variations in transport volume and direction were observed, emphasizing the intricate dynamics of the Archipelago Sea's water exchange processes.

The work rectifies past limitations and offers valuable insights for managing this unique marine ecosystem, presenting an advancement in understanding transport dynamics in the Archipelago Sea.

MAJOR COMMENTS

Introduction

- Consider adding a concise statement about the main research goal to improve the last paragraph that previews of what the preprint aims to achieve.
- Your study group has been conducting various research projects in the region, contributing to a better understanding of such a complex area. We believe that in order to reach broader audiences, it would be beneficial to include a map depicting a larger surrounding area, along with a reference to the corresponding country in the text (beginning of the Introduction). With this addition, the current Figure 1 in the introduction could be relocated to the Methods section, where it would fit more appropriately.

Methods

- There is a concern regarding observing seasonal variations through a model validated using measurements that don't have complete seasonal data coverage. Maybe in the future, collect data seasonally would bring more reliability to modeled seasonal variations.

Model validation

- Another concern revolves around the differences in depth between what was measured and modeled. Despite the RMSE being lowest for the first ten meters, the magnitude of the value is high enough to raise doubts about the ability of the model to predict data.
- It was mentioned that “*Direction distribution of the modeled currents is slightly narrower than that of measured currents both in Norrgrundet and Utö (Fig. 2)*”, perhaps the bigger discrepancy between the current speed and direction should also be mentioned.

Currents in the Archipelago Sea

- Very interesting that wind can be represented by mean values while currents can't due to its bi-directional nature.

Discussion

- To show the interannual variation was presented the wind and its variability data. Therefore to show the seasonal variation the importance of wind and fluvial discharge was mentioned. So, it would be helpful to provide the fluvial discharge data.
- It is great that you recognize the uncertainties of the model and already suggest the next improvement in the method: “*As noted already by Westerlund et al. (2022), one way to address the issues caused by the boundary conditions would be to develop a two-way nested configuration with a coarse resolution Baltic Sea model and the high-resolution local model.*”

MINOR COMMENTS

- It is mentioned in the text “Fig. 1b”, but in the figure itself the maps are not named “a” or “b”.
- The smaller map in Figure 1 could be improved by coloring the land masses another color to make it distinct from the sea area.