

## ***Interactive comment on “Hydrodynamic modeling of coastal seas: the role of tidal dynamics in the Messina Strait, Western Mediterranean Sea” by A. Cucco et al.***

### **Anonymous Referee #2**

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The paper “Hydrodynamic modeling of coastal seas: the role of tidal dynamics in the Messina Strait, Western Mediterranean Sea” by Cucco et al., investigating the tidal impact on the exchange flow in the strait Messina, using numerical model techniques, is interesting and important for understanding/modeling the regional dynamics. The results are important and can be applied in operational oceanographic applications but also in longer-term (e.g. climatic) studies. The main problem with the manuscript is that it includes too many focal points (tidal validation and analysis, tidal variability impact on the exchange fluxes and tracer studies), which is reducing its coherence. I believe that the paper should be published, after minor revision, but I also think that there should be a reduction of the manuscript, in order to make it more focused and useful.

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More specifically:

Figure 2 (and its description in page 10) does not provide a complete picture of the tidal flow in the region and does not contribute in the overall discussion since the paper is not focusing on identifying the tidal signal. The results of TDO are only compared to observations/previous work only for validation purposes.

Section 4.2.2, on the thermohaline features, needs more discussion on the processes involved in modifying the fluxes and T/S fields, due to tidal flow variability.

I believe that the Section 4.2.3 does not contribute to the overall focus points of the paper and does not add significant information to the results presented in previous sections and should be omitted. If the authors want to connect this work with operational needs (e.g. advection/diffusion of tracer), an operational setup of the modeling system should be considered.

Other specific comments:

How do you define the length of the strait?

Are the full slip conditions appropriate for the regional dynamics?

The tidal model validation seems incomplete (important constituents are missing). The authors should explain where data are available and where bibliographic values are used. The authors should also provide an overall estimation of the error and some indication for the accepted level of accuracy for the model.

Figure 4 caption: What do you mean by “across and along section A-B”

You should define winter and summer period used, explain the reason why you are using only 45 days for estimating the mean seasonal characteristics. Annual average values for the fluxes should also be presented and discussed.

Figure 7: it is better to use dates instead of day numbers.

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Figure 7: Where is the blue line?

The estimation method and the reason for using the “average negative and positive fluxes” should be commented. There seems to be confusion in what you are using for creating Table 3.

Figure 8: Use latitude instead of km.

“South to/north to”: should be corrected to” south of/north of” (everywhere)?

I think you should reconsider the words “correspondence” and “promoting” (everywhere in the text).

Page 26 – line 11: The phrase is wrong (“The heat budget through section AB”).

Very little can be seen in figure 10. It would be better if you plot the difference.

The computation and interpretation of the ETTS should be mentioned, although reference is provided, in order to help the reader follow the discussion in this section.

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