

Interactive comment on “A Model of Black Sea Circulation with Strait Exchange (2008–2018)” by Murat Gunduz et al.

Anonymous Referee #2

Received and published: 8 October 2019

Review of the manuscript “A Model of Black Sea Circulation with Strait Exchange (2008–2018)” by Murat Gunduz, Emin Özsoy and Robinson Hordoir:

The manuscript reports development of a high resolution Black Sea circulation model, with additional coupling the basin hydrodynamics with exchange flows at Bosphorus Strait by including an artificial box on the Marmara side. It is a big effort such high resolution model to run with complicated time dependent boundary conditions that could be the case, different than actual conditions. According to the authors, the objective is to achieve coupling with Bosphorus Strait, extending the domain to include a portion of the Marmara Sea and also the Azov Sea. In my opinion, this main objective of this paper is rather well met. The abstract is compact containing the purpose of the study and the most important results. The scientific approach and applied methods are valid.

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The manuscript is well organized and accomplished by briefly reviewing some of the relevant literature and explaining how the current study is related to them beginning from earlier studies upto recent researches skipping unnecessary details. On the other hand, I am not sure that this model enables to capture the trend of rapid climatic change observed in the Black Sea. Although satisfactory results, the model with current configuration is far from producing results comparable with real observations. Discrepancies can be through the time dependent boundary conditions, i.e. imposing climatological river discharges rather than actual, inaccuracies in precipitation and evaporation estimates, as well as model approximations of the free surface. All these factors could have contributed to the difference in model and observed values. While this paper entitled "A Model of Black Sea Circulation with Strait Exchange (2008-2018)" is a model development paper, could be published in the journal after technical corrections.

Here is the list of suggested some corrections and changes:

- Page 8, by the caption of Figure 4, "Marmara box shown in the 1" can be replaced by "Marmara box shown in the Figure 1"
- Page 10, Line 15, please change "Table 1" with "Table 2".
- Page 14, Line 10, the word "on" is written with double "o".
- Page 16, Line 11, "May 2012" is wrongly written.
- Figure 7 and Figure 14 are of poor quality. The plots color scale and contour level could be changed appropriately to demonstrate the thermohaline structure of the sub-regions and stations better.
- Table 2 and Figure 6, no unit information of fluxes in the caption and in the label of y-axis
- No units were written on the figures and also in the captions starting from Figure 8 to Figure 10

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Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-163>, 2019.

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