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

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Interactive comments ($>>$ *italic black) by Anonymous* **Referee # 3** *(RC3).*

Authors' responses are given in blue print in each section

$>>$ *In the manuscript the authors describe the implementation of a high resolution oceanographic model for the Black Sea and validate its decadal simulations with several in situ observational data sets. The manuscript provides an important contribution for the modelling of the Black Sea and may be published in the Geoscientific Model Development.*

We thank Referee #3 for a brief summary of the paper and suggestions for publication of the manuscript.

$>>$ *I have several minor comments that should be addressed by the authors before the publication of the manuscript.*

1. The abstract states that the boundary condition in the Marmara Sea is climatological and that this enables capturing the climatic change. Does this mean that the climatic change in the Black Sea is independent of the Mediterranean? Has this been demonstrated in the manuscript?

Yes, the expression was rather confusing in the abstract. We only meant that the climatic changes are now apparent in the Black Sea hydrography (with proper references in the text), although we only implied seasonal effects represented in the Bosphorus connection. In reality, of course both the Mediterranean are under the same effects, although more amplified in the Black Sea. We only try to capture the changes in the Black Sea hydro-climatology expressed in observations and model response, where the seasonally adjusted Bosphorus fluxes have a role.

$>>$ *2. Page 1, line 20. I understand that the study cannot give the overview of all literature on the Black Sea modelling. On the other hand, the study should at least collocate itself within the most recent modelling development in the Black Sea by comparing model resolutions and forcing.*

We have added new paragraphs with proper references mentioning the most recent modelling development in the Black Sea.

$>>$*3. Page 4, line 2: Figure 1 does not show the Kerch Strait bathymetry in detail and how it has been enlarged.*

Please find below the detailed bathymetry around the Kerch Strait. We can include this figure in the final text, to inform that the readers of the zoomed bathymetric information, which was only altered a little in order to avoid instabilities in the initialization and runs of the model associated with short-period oscillations of the coupled Azov and Black Sea domains.

>>*4. Page 5, lines 1-3: Why is the smoothing of bathymetry implemented in this model set-up?*

We had some numerical instabilities at the beginning of the model run.

>> *5. Page 5, lines 5-8: This sentence is not grammatically correct and should be corrected.*

It is corrected.

>>*6. Page 11, line 11: Is it "the depth of the 21 PSU isoline"?*

It is 21. The wrong text in the figure caption is corrected. Thank you for this correction.

>> *7. Page 11, line 13: This statement should be rewritten to provide a quantitative comparison instead of an opinion.*

This sentence is changed.

>> *8. Conclusion: How does this model implementation differ from the others?*

A sentence was added to the introduction section to explain this. Thank you very much.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2019-163, 2019.
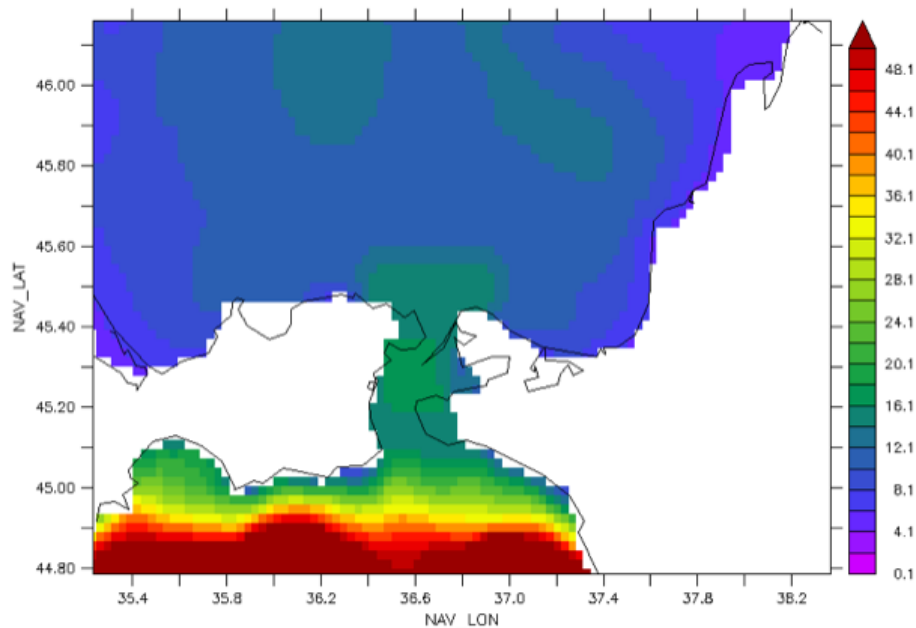
Fig. 1. Detailed model bathymetry around the Kerch Strait