

Interactive comment on “Influence of initial stratification, wind and sea ice on the modelled oceanic circulation in Nares Strait, northwest Greenland” by Lovisa Waldrop Bergman and Céline Heuzé

Anonymous Referee #3

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Review of the manuscript “Influence of Initial Stratification, Wind And Sea Ice on the Modeled Oceanic Circulation in Nares Strait, Northwest Greenland” submitted by Lovisa Waldrop Bergman and Céline Heuzé to the Ocean Science journal (os-2018-122).

The main goal of the manuscript is to evaluate how the Strait responses from different external forcing and initial conditions. Authors also expected to extend data collected during Oden cruise (2015) to the entire domain using modeled results.

The main tool for getting the results is coupled ice-ocean model implemented for re-

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gional domain that consists of Nares Strait. The model is well known and documented, it is general circulation tool developed by Massachusetts Institute of Technology – MIT-gcm.

Sensitivity studies are always needed because it can help to diagnose links between forcing, forecasts and experimental data, which in consequence will help in developing the models. It also could determine the errors and uncertainty of the modeled results.

I am very sorry but I cannot recommend this manuscript for publication. Authors report twelve simulations based on MITgcm model but none of them is documented that it works correctly. Moreover, the modeled volume transport based on these integrations is over three times lower than experimental (Muilnchow). Because lateral boundaries for all simulations are identical, any of the test can not be qualify as the reference running.

There are also other problems in the manuscript, which are less important, but should be taken into account in the future work, for example:

- a) There is no information about mass budget in the model – it is validation part and one sentence on page 3 (line3) is not sufficient. This budget is also linked to lateral boundaries.
- b) How long should be spinup time (the model starts from no motion) and what determines it?
- c) It could be nice to have a few words about initial salinity and temperature (the default case) – the resolution of source data is 0.5 degrees thus it looks like you have 1 point across the strait 10 points along – does it have influence on spinup?
- d) There is lack of important model settings – for example bottom stress and free surface representation, which have influence on volume transport and fresh water content.
- e) A few words should be added about stability of the water column of the four initial stratifications – one layer, two layers and tilted cases.

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I would like to add, that it is not good idea to begin any simulation on the first day of January – I would expect to start the model in the minimum(maximum) of ice extent, thus as it is in the manuscript in August(April), and making the simulation up to next season (not only ~270 days).

Data from, as you noticed, short observation period (6 years) has to be taken in to account during validation process too – I do not understand why do you treat it marginally.

Summarizing, in the first step the model should work properly and next you can make sensitivity study. I think when you will have model ready, you probably will decide to make different initial and forcing settings.

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