



EGUsphere, referee comment RC1
<https://doi.org/10.5194/egusphere-2022-151-RC1>, 2022
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Comment on egusphere-2022-151

Anonymous Referee #1

Referee comment on "The modelled climatic response to the 18.6-year lunar nodal cycle and its role in decadal temperature trends" by Manoj Joshi et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-151-RC1>, 2022

The authors try to quantify the effects of one of the lunar cycles on our climate, and in particular on surface temperature and the NAO, via millennial length runs of a coarse coupled model. Although the idea is interesting and thought-provoking, the chosen model is inadequate.

My main issues are:

1.The model's resolution.

Two degrees is way too coarse to investigate tides. We're talking about a process that has a typical scale of fewer than 5 km at critical locations, and that is highly dependent on the correct representation of bathymetry.

2.The model's biases

From line 111, you try and find an explanation for the seemingly "inconsistent" behavior of the Nordic Seas and later that of the Southern Ocean. From line 125, you report on potential but non-significant links with the modelled AMOC. Unfortunately, FORTE2, whose reference Blaker et al. (2020) was missing from the bibliography, has significant biases that most likely impact these two results:

- Warm bias in the Southern Ocean and in the northwest Atlantic;
- Deep mixed layer bias in the Nordic Seas and in the Ross Sea.

Similarly, you ought to verify the biases in the model's NAO before analyzing its response.

3.The focus on temperature only

In regions that are salinity-controlled (Arctic, Nordic Seas, North Atlantic, Southern Ocean), the change in background diffusivity should primarily affect the salinity. A freshening would likely lead to a surface cooling, and a salinification to enhanced mixing so to a warming of the surface. Maps or timeseries of salinity changes should be shown. Similarly, there is currently no mention of sea ice changes in this paper.

Other comments:

Inconsistent usage of "high latitudes". Line 69-70 for example, it excludes the Arctic (which is extremely stratified).

Figures 5:8 are very hard to read. Use a pseudocolor plot, or at least filled contours.

All figures are at the end of the document, and their captions are on a different page. It is really uncomfortable to view on a screen. The EGU sphere now (finally!) recommends that figures and their captions be in the text, closest to where they are discussed.