

Interactive comment on “The effect of tides on dense water formation in Arctic shelf seas” by C. F. Postlethwaite et al.

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Text:

1) Introduction:

Page 1671, Line 9: The Rossby radius and M2 tidal wavelength are given as 315km. Perhaps typical GCM grid sizes from AR4 could be given for comparison.

Page 1673, Line 8: "hence leads are represented by sub-grid scale advection". Could this be expanded? I don't understand it's relation to the previous line.

2) Model description

Page 1674, Line 2: Why was only one ice category used?

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Page 1674, Line 5: Are open boundaries possible on all sides in the standard version of CICE 3.14?

Page 1674, Line 9: What is the size of the grid? (Nx by Ny)

2.1) Surface and boundary forcing

What are the details of the ice/ocean coupling? If this is just the standard version of CICE presumably this is some kind of McPhee turbulent model. If so, were the turbulent coupling parameters increased with extra mixing from tides, or was the only effect from tides on the coupling due to an increase in the far field temperature? Perhaps this could be mentioned?

Page 1675, Line ~3: Could some details be given of the sea ice relaxation at the boundary of the sea ice model. This is a non-standard feature as far as I'm aware.

Page 1675, Line ~6: It is unclear to me what tidal model is used in this study. Is the model run before the coupled ice and ocean model run with the tidal results used as some kind forcing for the ice/ocean? Or, is the tidal part given by the free surface ocean model with the open boundaries forced by the tidal model (i.e. there is no tidal model interior to the domain)? As someone unfamiliar with tidal models what was actually done with the tidal model is unclear.

3) Results

Why are results for salinity given for the bottom grid cell rather than the vertical average?

Page 1676, Line 1: By how much is M2 the main tidal constituent?

Page 1678, Line 9: The open area in the Pechora sea increased from what area to what area?

4) Discussion

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Page 1683, Line 1: Explicitly state that the increase in open water leads to ice production which is compensated by the increased precipitation.

Page 1683, Line 12-16: Could this sentence be more clearly phrased. How can a mass of salt be step shaped? What distillation process?

Page 1683, Line 18: Wouldn't freezing of any speed not just rapid result in salt rejection?

Tables 1 & 2:

Could the values of thickness increase per year be added?

Figures:

Figure 1: While a schematic showing the discussed processes is useful and a good idea, it is unclear on the diagram what part is for Redistribution. Perhaps the flat ice under the "Redistribution" label could have a ridge put into it.

Figure 6: Could two more plots showing thickness as well as area and volume be added?

Figure 7: State in caption whether this is for tide or no tides model.

Figure 9: Parts a and b - is this the tidal model or the non-tidal? Can that be stated in the figure caption.

Figure 10: Add plots of the difference between salt production in the tides and no tides case.

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