

Interactive comment on “Modelling the variability of the Antarctic Slope Current” by P. Mathiot et al.

Anonymous Referee #2

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Review of "Modelling the variability of the Antarctic Slope Current" by P. Mathiot, H. Goosse, T. Fichefet, B. Barnier, and H. Gall'ee.

Ocean Sci. Discuss., 8, 1–38, 2011 www.ocean-sci-discuss.net/8/1/2011/
doi:10.5194/osd-8-1-2011

General comments:

This paper describes numerical experiments of the volume flow of the Antarctic Slope Current. The model study performed is fine, but the paper is not presented in an optimal way, and more analyses should be added. I agree with reviewer #1 in that a better focus on what was actually learned from the model runs is needed, and suggest how to change the outline below.

The figures are generally fine, and illustrate the main points. A figure on the properties

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of the ASC should be added.

The major revision needed here is on the structure of the paper, and doing away with the overload of not meaningful acronyms. This is the worst example I remember to have seen so far. The only two acronyms that bear any meaning are the WIND and SEASO ones. The others could all be deleted. This is a fairly short paper, and it would generally benefit from writing names out in full. ASC is the only one I suggest to keep.

Structure: The paper should be re-organized. The findings are interesting, but I was struggling to remember all the different runs, and sensitivity tests along the way. You should first present your best long run (1950-2000). I also find it strange that different periods were analyzed (1990-2000) and (1985-1989), why not use the 1985-1989 for all runs? I presume you do not have the atmospheric model results for the 1990's otherwise that seems like the best period to use.

I guess your "standard run" is what you have termed ORCA05. Present these results first. All results, all around Antarctica. Call it the "standard run", or something everybody understands (not an acronym with no meaning). It is still not OK if you explain why someone termed it ORCA, perhaps it is the name of the model. The reader gets confused with such acronyms. After you have presented your best model run, then present the differences for the other resolutions in a separate section. You can still use most of your original figures. Also discuss a little more why the better resolution run (ORCA25, but call it "the fine scale run" or something better) is not better, as one would expect. Reviewer #1 seems to be confused about the length of the runs, something I understand well in this acronym jungle.

The sensitivity runs (1980-1989) with the different forcing are good science, but the presentation is awkward too. You have the above run to compare with. The full atmospheric model forcing is probably "the best" here, but nobody will demand to see a 50 year run using this as the "standard run". Give the tests names like "no season", or "mean wind" or "temperature".

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A few other general minor issues are the description of (model) resolution. Often this is done without a 'latitude' or 'longitude' added.

My last general comment is on hydrographic properties. You have nothing there. I suspects that they are not so good, or that you will "save them" for a different paper perhaps. I suggest you at least add one section where a good climatic mean from observations can be made. There is plenty of data on the World Ocean Database for the Greenwich meridian, so this is a good option. If some other section better illustrates the model performance use that if you will.

Below, when I write an acronym, it generally means that you should delete it. At least you should spell it out fully the first time. If it is a name it should be spelled with capitalized first letter, not all.

Specific comments:

Abstract: This is fine, apart from the acronyms. Both the abstract, and conclusion, should be readable without having read the rest of the paper. This implies that all acronyms should be defined. The only one you should use is ASC. Even ERA40 should be spelled out, but I suggest to remove the acronym and just state "reanalysis" in the abstract. CORE too, and certainly MAR! Both ERA40 and CORE would need proper referencing as well, as you have done for CORE on page 6, line 18. I couldn't find the ERA40 reference at all.

1. Introduction. page 4, line 2. modelling studies ...

2. Experimental design.

NEMO

ORCA

Page 5, line 18. Make sure to specify lon/lat! Here you mean longitude as 1 deg W = 55 km at 60 deg S. But the model resolution is not clear to me. Is it also using 1 deg N

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?? Then the delta $Y = 110$ km

page 6. first line. What is the purpose of introducing this name PERIANT ??? For a reader it is totally unnecessary, and serves to confuse. Just state that you have used a regional configuration of a global model, and give the references.

MAR

DFS3

T10Q10

SEASO

Section 2.3 and 2.4 should be re-written to follow the new structure of the paper. First present the "standard run" with resolution and forcing. Then describe the forcing used for the sensitivity.

3. Sensitivity....

You should first present your best shot at how the ASC flows. This is likely your ORCA05 run. And you should have a section called something like "Mean flow of the ASC". Now you present a number of cases, but do not dare to judge which is best. This is what it is about, you are the expert. Present what you think is right, based on your model experience, or discuss with your co-authors.

Page 10, line 5-8. The Greenwich meridian is probably the best sampled section in the southern ocean. Data exist back to 1977. It is strange that you have chosed NOT to include it as one of the your sections in figure 8. Also Klatt et al (2005) have the current meter data, and you mention it here in the text. It leaves the impression that results are here "worse" than for other sections. This is clearly nothing to hide away. You have some good results, and they are worth publishing.

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Page 11, line 7. ... enters the Weddell Gyre (delete "in").

line 8. Not clear sentence. west of 60 deg E ????? Then you are not in the Weddell Gyre at least. Use west, or east, not "after"

line 15, of two as in the (add "as").

line 25. Not global. Use "circumpolar".

Page 12 line 1. Don't you mean: " The ASC is not present along the" ??? Figure 8 and 9 shows negative values for section 1 as far as I can see...

line 7. studies. not study.

Page 13. line 5. by "jet" you mean current? Jet is normally used for strong atmospheric winds, so you need to specify at least. 1000 m depth, also add depth. Unless you mean an atmospheric jet at 1000 m height.

line 11. discussed later.

Page 14. line 2. The model resolution issue again. Isn't 0.5 deg latitude your model resolution? You cannot (of course) resolve a 0.1 deg S wide front unless you have such a resolution.

line 8. shown, not show.

line 29 Isn't this your section #11???? The Brunt Ice shield is otherwise hard to find from reading your paper

Page 15. line 1. increases up to. You do not know where it increases. It could well be along the long continental shelf in the southern Weddell Sea too. If you did check, mention it clearly.

Line 4. It looks as section #1 has smaller than zero flow to me from figure 8 and 9. Does this not mean eastward flow??

Conclusion. Again - all abbreviations should be defined. This is often what people read

first. The DRAKKAR project does not belong here, it belongs in the acknowledgement. Same for all the other ones. And start describing the best results, and then discuss the model resolution differences.

You have (so far) only investigated the volume flux of the ASC. This is OK. but you should say sensitivity of the ASC volume flux. Both in line 6 (Page 18), and line 16 (Page 18).

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