

Interactive comment on “Transports and budgets in a 1/4° global ocean reanalysis 1989–2010” by K. Haines et al.

Anonymous Referee #2

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Review of “Transports and budgets in a global 1/4 deg. global ocean reanalysis 1989–2010” by Haines et al.

The paper describes the results obtained with a global ocean reanalysis assimilating temperature and salinity profiles in an eddy permitting OGCM over the period 1989–2010. Most of the validation is done in terms of transports through sections and global / regional budgets.

General comments:

The results shown are interesting and illustrate well how ocean reanalyses can be used to improve our understanding of the ocean mean state balance and to address climate related issues. The use of data assimilation increments to close budgets is instructive

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of the models or forcing deficiencies. A lot of work still remains before fully assessing and validating an eddy permitting reanalysis however this kind of study constitutes a first step in that direction.

The methodology used to perform some of the calculations / budgets is sometimes unclear and should be improved (see comments below). The interpretation of the increments in terms of missing physical processes should be also better explained. From what is written the conclusion, it appears that the increments are interpreted only in term of surface atmospheric flux deficiency. This certainly not true for increments at a few hundred of meter depth of near western boundary currents like in the Gulf Stream region (in that case, the increments are related to model shortcomings like the lack of resolution, deficiencies in subgrid processes characterizations, ...). So I encourage the authors to indicate this more clearly in the different sections and in the summary and conclusions section.

Specific comments:

Abstract, line 2: “vital” is certainly exaggerated

p263, line 1: misspelling: Geise → Giese

p264, line 10: Are the short wave and long wave radiative and precipitation fluxes 6-hourly fields or daily averages ?

P266: line 1: How is $Q_{assim} \sim 4.9 \text{ W/m}^2$ calculated ? Is it an integral from the surface down to the ocean floor ? Shouldn't we expect data assimilation increments at depth (depth $> 100 \sim 500 \text{ m}$) to be uncorrelated to surface flux errors and to be mostly related to shortcomings in models, lack of resolution, etc ?

P266, lines 1–15: general comment: what is the geographical domain of the heat budget ? Is it fully global ? Does it cover the sea-ice domain ? Does it include fluxes below ice ? Arctic sea ice free areas in summer ? Please, be more precise.

Table 1 and p266, line 22: Is the sea ice included / excluded in the FW budget (i.e.

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ocean only) ? What is the geographical domain of the FW budget ? What are the geographical domains of your basin areas ? They should be included in Table 1. What about the SSS restoring ? Is it included in the surface forcing ? What is the magnitude of this term w.r.t. the surface forcing ? How is the Advection contribution computed ? From monthly means ? From 5-day averages ?

P267, line 1-2: please explain what is “resolved net precipitation”

p267, line 9: “from velocity fields”: I guess from temperature field also ? Is this calculation done using monthly outputs ?

P268, line 11-14: I would remove this citation as it does not bring much information to the reader.

P269, line 17: Does Fnet include the SSS restoring contribution ? From what is written line 26 I guess not. But it is not clear.

P269/270, §2,3,and 4: the overall discussion is not clear and it is difficult to understand how the balance is achieved. Please explain better.

P271, line 18: “wind stress. The” → “wind stress, the”

p271, line 24-27: the low frequency maximum is not obvious.

P272: very interesting discussion.

Section 5, p273: not easy to understand. Should be rewritten.

P274: line 11: arevery → are very

Summary and conclusion sections: see my previous general comment

Interactive comment on Ocean Sci. Discuss., 9, 261, 2012.