

Interactive comment on “Evaluation of oceanic and atmospheric trajectory schemes in the TRACMASS trajectory model v6.0” by Kristofer Döös et al.

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Answers to the major comments

1. The novelties of version 6.0 and the differences between this paper and Vries and Döös (2001) is now stated in the two first paragraphs in the introduction.

2. The reason for now citing and discussing the differences with Chu and Fan (2014) is that we simply do not agree with their approach and their results. This would require

C1

a separate study, which would be beyond the scope of this paper. In their experiment they fail to keep the trajectories along the stream lines for the Stommel Gyre, which TRACMASS is able to do with all its schemes. We have discussed together with Bruno Blanke to submit a note on this issue with the Chu and Fan (2014) paper.

Minor comments

- page 1, line 24: perhaps good to define what's meant with a "grid cell" here. A model grid cell?

Answer: We have added the word "model"

- page 2, line 14: What type of "continuous interpolation" is meant? Spline? Linear?

Answer: We have added the word "linear".

- page 3, line 23: This discussion of mass and volume interchangeability in OGCMs of course is only true in hydrostatic models (also page 4, line 17).

Answer: We have rewritten this now making it clear it is only valid for models that are incompressible.

- page 6, line 20: This comment about how TRACMASS works on any vertical grid has been made already, and there is probably no need to mention it again here

Answer: We have removed this paragraph.

C2

- page 8, line 6: Are there any physical interpretations for α , β , γ and δ ? In particular for α , what kind of flow is $\alpha > 0$ versus $\alpha < 0$

Answer: We have added a physical interpretations for α at the end of section 2.4.1 and 2.4.2

- page 10, line 14: The terminology of grid cell boundaries is a bit confusing at times. Here it is called a "wall", even though it is not a land-sea boundary. I suggest to carefully go through the manuscript to standardise the wording used to distinguish ocean-ocean (or atmosphere-atmosphere) grid faces from land-ocean faces.

Answer: We have replace the words "wall" and "grid-box wall" by "grid face" in the entire text.

- page 10, line 27: Would be good to explicitly mention which root-solving algorithm is used.

Answer: Done.

- page 11, line 28: "Conveyor Belt" is a simplistic term here, better to call it thermohaline circulation?

Answer: We do not agree with this. Any circulation in T-S space can be defined as thermohaline but the Agulhas rings flowing north into the Atlantic are part of a global circulation often referred to as the "Conveyor Belt".

- page 11, line 29: How are the particles seeded in the vertical? At all depth levels?

C3

Answer: Yes, at all depths, which we have added in the text now.

- page 12: There appears to be no reference to Figure 5 in the text between the first references to Figure 4 and Figure 6?

Answer: Fig. 5 is now references to between Fig. 4 and Fig. 5.

- page 16: refer to Lacasce (2008) here, for the standard work on the statistics of particle dispersion in the ocean?

Answer: We are now citing Lacasce (2008) in this appendix.

- Figure 4: What does the colouring of the trajectories represent? And it might also be useful to add a grid with selected longitudes and latitudes, so that reader unfamiliar with the Agulhas region can orient themselves (that latter point also for Figure 9)

Answer: We have added "Colouring used to separate the trajectories from each other.

- Figure 7: Beyond showing the mean distance, would it also be useful to show the spread (e.g. the one standard deviation of each line with time)?

Answer: That is basically what the relative dispersion shows

- Figure 8: The presentation of Fig 8 is not ideal, because most lines fall on top of each other. I appreciate that this is the whole point of the Figure, but a quick reader might be confused where the other lines are. Is there no better way to show that 6 of the 7 lines essentially lay on top of each other?

C4

Answer: We have tried different solution but the fact that the line lay on top of each other just reflects that they give very similar results.

Type-os etc: - page 2, line 18: Replace "always" with "typically"?

Answer: Done.

- page 2, line 23: "behind these can be found"

Answer: Changed.

- page 5, line 23: should be Eq (19)?

Answer: No.

- page 9, line 16: Eq 32 should not be part of this list?

Answer: Yes and it is written Eqs. (31)-(34), which includes Eq. 32.

- page 9, line 18: There is no following subsection, there is just the text below - page 10, line 10: use "domain" rather than "?box?"?

Answer: True and we have rewritten the text and deleted "following subsection".

- page 10, line 28: "r" at end of line misses subscript i

Answer: Added an index i to this r.

C5

- page 11, line 20: "implies that they"

Answer: Changed as suggested

- page 12, line 16: "distances have been possible to compute since all"

Answer: The extra "been" has been removed.

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