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Climate of the Past Discussions

Interactive comment on "Paleo Agulhas rings enter the subtropical gyre during the penultimate deglaciation" *by* P. Scussolini and E. van Sebille

Anonymous Referee #3

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The manuscript analyses the intrusion of density anomalies into the South Atlantic by the occurrence of Agulhas rings during the glacial termination II. To proof the presence of the paleo Agulhas rings along the Walvis Ridge they generate a timeseries of delta18O variability of Globorotalia truncatulinoides and combine it with data from an ocean model under current-day conditions.

Although the topic is of great relevance of a large scientific community, the interpretation using the ocean model comes too short and needs further refinement, in particular a more quantitative combination of the two methods.

Firstly, the authors have to clarify the aim of their study:

IF the main approach was to show that current-day Agulhas rings are present over the

core site at the Walvis Ridge causing density variations, this had been documented well in the literature (e.g. Schouten et al. 2000; Chelton et al. 2011). In addition, modern satellite data would give a better indication of the ring path across the Walvis Ridge.

However, IF the approach is rather to explore the variations at the core site, the model does not seem to be optimal for this type of approach; mainly, because it produces an unrealistically regular ring path.

A more quantitative comparison between the model data and paleo analysis is needed. Are the density variations seen in the model of comparable size as the delta18O variations? How many rings per year are needed to produce significant variations in delta18O variations to be stored in the sediment?

I would encourage the authors to put the analysis on more solid grounds to come up with a more conclusive contribution to this interesting topic.

Some particular comments:

Section 2.2

More information on the model, in particular its assimilative character, is needed.

Some verification of the model in the field of interest, such as western boundary current transports, strength of MOC, and (most important) sea surface height variability to infer the degree of realism for the strength and pathways of Agulhas rings, is needed.

p. 2103, l. 5

The assimilative character of the model may lead to wrong implications. Since assimilation mainly works on the large bulk of water masses and not on mesoscale variability, the analysis of Agulhas rings (especially due to the connection of dynamical quantities like sea surface height and thermocline densities) does not automatically lead to good results.

p. 2103, l. 12

Where did you show that the influence is maximal right at T II?

References

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