

Interactive comment on “Agulhas ring injection into the South Atlantic during glacials and interglacials” by V. Zharkov and D. Nof

Anonymous Referee #3

Received and published: 15 May 2008

Report on "Agulhas ring injection into the South Atlantic during glacials and interglacials" by Zharkov and Nof

This paper has an interesting hypothesis that attempts to explain the reduction in the number of Agulhas Rings shed into the South Atlantic by the retroflexion during the last glacial maximum and during the Younger Dryas. There are a number of speculations about the consequent effect on the salinity of the North Atlantic and on the Atlantic meridional overturning cell, which need more justification.

The core of the paper is the relationship between the orientation of the coastline, the position of the retroflexion and the number of eddies that are shed. This hypothesis is tested by a simple theory and also by some numerical simulations. Not enough detail

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is given to judge if the numerical model has sufficient physical detail to deal with this region. There are certainly stability problems and high eddy viscosities are needed in some cases.

The examples from the simple theory are presented in a rather rambling way that ultimately becomes very confusing for the reader. This substantial part of the paper needs a considerable revision making it more concise and easier to follow with an improvement to the English.

The comparisons between the Agulhas region and the East Australia Current are interesting. The authors claim that the interglacial flow in the Agulhas is more like the present day East Australia Current with a retroflexion at much lower latitudes and well before the Cape of Good Hope is reached. The position of the retroflexion is set by the authors at the latitude of zero wind curl. Although this zero curl makes the meridional transport in the ocean interior be zero, it does not stop the coastal Agulhas current from flowing and so does not set the position of the retroflexion.

In summary, there are some very interesting ideas in this paper that are worthy of publication in Ocean Science if the above points can be addressed.

Interactive comment on Ocean Sci. Discuss., 5, 39, 2008.

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