

Interactive comment on “Relating Agulhas leakage to the Agulhas Current retroflection location” by E. van Sebille et al.

Anonymous Referee #1

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Review of OS-2009-38: "Relating Agulhas leakage to the Agulhas Current retroflection location" by van Sebille et al.

This paper describes an attempt to derive a proxy for the magnitude of Agulhas leakage from satellite altimeter data. The proxy is constructed by the assumption that there is a (linear) relation between the magnitude of Agulhas leakage and the westward position of the retroflection. This relation is investigated in a regional, eddy-resolving, nested model of the Agulhas Region. It appears that in the model the relation between the two is significant, but poor. Too poor for the proxy to be useful. The uncertainty in leakage estimates is about 15 Sv. The authors argue that the linear correlation does confirm previous theoretical models of the loop occlusion mechanism. Therefore, this paper is a small step forward in our understanding of the dynamics that control the formation of

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Agulhas Rings, and a small first step in the development of a more usable index.

The paper is clearly written, and the authors are rigorously honest about their results, although they are mainly negative. In this sense the paper may serve as an example. For this reason it merits publication, the research is performed well and described well, and the authors can't help it that the data confirm their theory/hypothesis only weakly.

There are two points I would like to see addressed in a final version: Firstly, why is the averaging length-scale for the proxy taken to be 95 days. Does the correlation drop for longer (yearly?) periods, and if so, is this because there are less data-points available, or is the drop independent of this, and is there a more fundamental reason why the averaging period of 95 days gives optimal results? Secondly, the correlation between change in front location and size of the shedded ring is weaker in the data than in the model. Does this not affect the uncertainty band of the estimated magnitude of the leakage in the altimeter data? I understand that this band is taken to be the same as in the model, but should it not scale with the relative uncertainty of Fig. 8 versus Fig. 4?

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