Ocean Sci. Discuss., 11, C152–C154, 2014
www.ocean-sci-discuss.net/11/C152/2014/

Ocean Science
Discussions
Open Access

Interactive comment on "An observed 20 yr time-series of Agulhas leakage" *by* D. Le Bars et al.

D. Le Bars et al.

dewi.lebars@gmail.com

Received and published: 1 April 2014

Answers to referee #1

"General Comments This is an excellent piece of research, clearly executed and presented, which advances a new technique for estimating Agulhas Leakage, a parameter of ocean circulation believed to have importance to global climate. The authors validate their technique carefully using an ocean model. The paper needs very few minor revisions before it is ready for publication."

We thank referee #1 for his/her compliments on the manuscript and the useful comments. We address all of the specific comments.

"Specific Comments (1) Add the satellite tracks again to the panels of fig 4."

We added the satellite tracks to the panels a and b of figure 4.

"(2) Figure 5 and the description of the development of MADT threshold in the text are hard to understand. Perhaps could be clarified with a re-write? Is there a better illustration of the "convergence" of the position of the threshold than figure 5?"

To make this section more clear we added a sentence in the caption of figure 4: "Note that, as mentioned in the algorithm, these patterns are selected because for an ADT threshold 1cm lower, the Indian Ocean group of points, red pattern in (e-f), would extend west of 30W."

We also extended the description of the method to make clear the use of figure 5 in the demonstration of the validity of the method presented. We mention the name of the Python function (scipy.ndimage.measurements.label) that is used to find the group of Indian Ocean points so people interested in the details can refer to the Python documentation.

"(3) The low correlation of the leakage transport calculated from adjacent SSH tracks in the model seems surprising. Can the authors expand on this? For instance, very low transports on section 122 around 1970 that are not reflected on the tracks just upstream."

This fact is indeed interesting, we now include the following text to discuss it: "The cross-correlation is small mostly because of the deep ocean. If the top 1500m is considered then the cross-correlation between the transport along these tracks is 0.72 between tracks 20 and 198, and 0.81 between tracks 198 and 122. An explanation for the importance of the deep ocean in de-correlating the time series is that the signal could propagate slower at depth. It would then be necessary to take a lag between the different tracks to improve these correlations. This lag would have to depend on the depth and would probably have to be different for the AC and for the ARC, but this work is out of the scope of this paper."

"(4) The last paragraph of section 5 is not clear. Are the trends for SSH and model swapped around??"

The values are correct. The computation of trends on such short time series comes with an important uncertainty and the trend can change within a few years. This is what is seen from the satellite altimetry signal: it has an important positive trend over the period 1993-2007, but no trend over the whole period 1993-2012. To make this point clearer we have added this text to the paragraph: “This shows that when computing trends of such short time series a few years of additional data can have a big influence.”

"(5) Fig 9 and the associated discussion about trends could be clearer if a low-pass filtered time series is calculated."

The two time series from model and altimetry in figure 9-a only have 15 points in common so it appears difficult to low pass filter these further.

Interactive comment on Ocean Sci. Discuss., 11, 171, 2014.