Response to reviewer #2:

We would like to thank the reviewer for the comments that helped us improve the manuscript.

2) TMI measures SST free of clouds over the global tropics between 38oN/S. It also measures column integrated cloud liquid water content, water vapor content and rainfall. So it can be used to study how the heat exchange taking place in the Agulhas rings and how it affects the precipitation. This will make the manuscript more interesting and more readers.

We do agree that the air-sea heat fluxes are important and can be seem used the TMI data. It may explain the modifications on the surface layer seem in the TS diagrams by Souza et al. (2011b). However, the present paper concentrates on the momentum flux. We are exploring the heat fluxes both at the air-sea interface and the bottom of the mixed layer for a subsequent publication.

3) The authors obviously missed a new publication by Frenger et al (2013, Nature Geoscience). It is important to have a full review of literature before submitting a manuscript.

Modified as suggested by the reviewer.

4) The eddy synthetic pattern (Fig. 5, 6) generally presents a pattern which could represent a dominant one, however the pattern significance should be estimated. The variation correlation can not be served as such estimated.

We added a supplementary figure showing the eddy averaged relation between the mean T' and the std of T'. In this figure it is possible to observe that the mean is ~1.5 times the standard deviation in the eddy centers.

5) Based on statistical analysis, please justify 16 rings are statistical enough to make the conclusion.

This is the total number of Agulhas rings observed in the study period, which was limited by the coverage by Argo floats.

Specific comments:

1) P10, second paragraph, it is not clearly how the Argo profile data are processed to obtain only east-west section.

The process to obtain the vertical section from the Argo profiles is explained in Souza et al. (2011b).
For each altimetry map, all ARGO profiles that fall into a ±2 days interval and that are located less than 2.5° (∼270 km) apart from an eddy center are selected for the reconstruction. The profiles are projected into a zonal axis in function of their distance from the eddy center. The symmetry in the meridional direction is assumed. As eddies are located every 7 days from SLA maps, in the case of profiles that are not from the same instant of the SLA data, the eddy position is linearly interpolated to the time of the ARGO profile for the estimation of its distance from the eddy center.

2) P.15, Line 10--15 should wind stress is replaced by the relative wind speed with respect to the surface current?

The wind stress is calculated using the relative wind speed.

3) P.15 Line 20--25, the interpretation of Term 1 does not make sense.

Modifyed following the reviewer comment.

4) P.16, Line 1, it seems there are disconnection in context, which two fields?

Corrected following the reviewer comment.

5) P.16, can the heat flux by Ekman pumping be estimated using Argo data?

Yes, but this is not a simple task. Since the Argo profiles are incapable of resolving the variability of the whole eddy vertical structure, they have to be analyzed individually. Comparing pairs of Argo floats inside and outside the eddy core with the climatological water column structure, and taking into consideration the distance of the profiles from the eddy centers, it is possible to estimate the heat flux and Ekman pumping. We are exploring this for a subsequent publication.

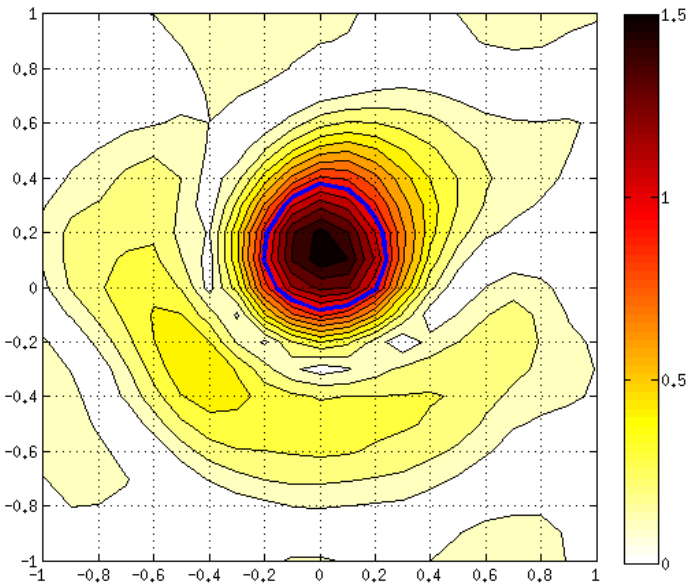


*Illustration 1*. Relation between the eddy averaged mean and standard deviation (std) of T' (c.i. 0.1). The 1 contour, that marks the equality between the mean and the std is highlighted in blue. It is possible to observe that the mean is larger than the std in the eddy core. The representativeness of the mean follows the general spatial pattern observed for the T' structure.