

Answer to Editor - Dr Chapman

We would like to thank the editor and the reviewers for their positive evaluation of the manuscript and for their constructive comments that have helped us improve the manuscript. We feel that addressing the questions and suggestions has led to a better quality manuscript and that the robustness of our results has greatly improved.

Below we detail the changes we have made to the manuscript, addressing point by point all the issues raised. The comments from the reviewers are in bold, while our responses are interspersed between the comments in non-bold text. All line numbers indicated in our responses correspond to the new version of the paper.

To address the general comments of the editor and the reviewers, we have considerably shortened the description of the AMOC, keeping only the text necessary to introduce the South Atlantic MOC (SAMOC) observing systems in the Introduction. We added, also as recommended, a description of the regional dynamics of the Cape Basin and the processes and the local water mass exchanges associated with eddies, dipoles, and filaments. In the Data and Methods section, as suggested we expanded the description of the configuration, set up, and calibration of the instruments used in our analysis (Microcats, ADCP, CRIES, and GEM field). As suggested by the reviewer, we have applied the method of Lilly and Rhines (2002) to the detection of eddies, filaments and dipoles with our mooring data. The eddy detection method of Laxenaire et al. (submitted, 2018) is under review at this time, and we believe it has significant positive aspects. To address comments from the reviewers, we chose a version of the algorithm comparable with the ones of Chaigneau et al. (2008, 2009) and Pegliasco et al. (2015). We added, in the Data and method section, a description of the eddy detection method and the main changes compared with the original algorithms. We are happy that the presence of the structures at the mooring is supported by both that method and the Lilly and Rhines (2002) method. Finally, as suggested by the reviewers, for identifying water masses we now use neutral density as the vertical coordinate instead of depth.

In the data and methods section, no mention is made of any pressure sensors on the instruments. However, in lines 260-261 and again later, it is stated that pressure sensors showed how well the system worked. A statement on these sensors needs to be added under “Data and Methods.”

We agree, we did not include enough information about which instruments/levels had pressure sensors in the previous version of the manuscript. We have modified this sentence to add the missing information in the new version of the text (l. 121) and in the revised Table I.

Line 153 – the authors mention “the C-line (criteria of Laxenaire et al (2017)”. As this paper is still in submission, they need to define the meaning and position of the C-line.

We agree, this is a great point. We have added the position of the C-line to Figure 1, and we have added some explanations in the text as well l. 226-227: “This line extends from the southernmost tip of Africa (Cape Agulhas) and, after crossing various seamounts, ends at 45°S in the Southern Ocean (Figure 1).”

Line 156 – do these rings really move at 7 +/- 91 km/day? This suggests some are incredibly fast. While the mean agrees well with translation speeds in Olson and Evans (1986), the standard deviation seems about an order of magnitude too high.

Thanks for pointing this out – you are correct, some of the ‘speeds’ that we had estimated were artificially high because we had some spurious features that were being tracked that exaggerated our standard deviation. We have redone this calculation and we have been careful to avoid artificial translation due to the intense merging and splitting in the area. We have now a comparable mean and standard deviation (11 ± 6 km day⁻¹) to that found in previous estimates (l. 440-442).

Lines 1980-221 – this is a horrible paragraph! I suggest the authors break it up into several shorter paragraphs so that readers can focus more on the various rings.

We have revised and rewritten this paragraph as several shorter ones (l. 246-272).

Line 224 – this line makes no sense as it stands. Is there something missing?

Thanks for pointing this out; as you had guessed, this was a typo/editing problem (l. 273).

In section 3.3, the authors give the velocities of various rings. Strictly, the maximum for ring A13 should be -60.4 cm/s, not 60.4 cm/s, as written. The same may be true for other velocities. Please check.

We agree. We have carefully gone through the manuscript to make sure that we consistently use a positive value for the azimuthal velocity of an anticyclonic eddy in the southern hemisphere and a negative value for a cyclonic one.

Lines 367-369 – the authors state that “the eastern mooring array is strongly affected by the regional intense mesoscale dynamics generated by instabilities of the South Benguela upwelling front...” but they haven’t really given any evidence of this.

We agree, we have modified this statement to make a more general comment at this point l. 445-446: “Analyses of both satellite and mooring data show that the eastern mooring array is strongly affected by the intense regional mesoscale variability.” Concerning the origins of the mesoscale features, the eddy detection method allows us to detect the location of their generations. Most of the cyclonic eddies and some of the anticyclonic eddies are firstly identified along the South Benguela upwelling front (Figure 3). We changed the text accordingly to explain the location of the generation without any statement on the instability of the front, as it's true, we did not give any evidence of it.

In Fig. 11, it might be better to show the temperature changes in °C rather than as a percentage, as is done for the salinity plots.

We followed your suggestion and the ones of the reviewers in modifying this figure, i.e. we modified this figure to illustrate conservative temperature anomalies in °C and absolute salinity in g kg⁻¹ with neutral density as the vertical coordinate instead of depth.

References: Line 73 – Olson (1986) should be Olsen and Evans (1986); Galdyshev et al is in the ref list twice; McCartney (1977) in reference list but not in text?

These mistakes have been corrected as suggested. Thanks for pointing them out.