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Interactive comment on "Eddy characteristics in the South Indian Ocean as inferred from surface drifter" *by* Shaojun Zheng et al.

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Response to Anonymous Referee #1

The authors analysed the surface drifter data to understand the eddy characteristics in the southern Indian Ocean. This is an interesting study that is within the scope of the Journal. The novelty of the paper is to provide analysis on sub mesoscale eddies, in addition to what can be derived from satellite altimeter data. It is a good amount of work, however, the paper can be improved by adding more analysis on the eddy characteristics, especially on the submesoscale eddies. Questions could be answered by this study include:

Reply: Thank you very much for your valuable comments to our work, and our replies

are as follows.

(1) Do the eddy numbers correspond to eddy energetics, in different parts of the southern Indian Ocean, the western boundary current system, the eastern boundary current system, and the interior ocean?

Reply: Thank you very much for your suggestion. In page 10, line 15-29, we revealed "Large eddies (r $\geq$100 km) populate a band along 25°SïijŇMozambique Channel, and Agulhas Current. The populated region of large eddies has a large EKE (blue rectangle in Fig. 12)." Therefore, large eddies maybe correspond to eddy energetics, but not for all kinds of eddies.

(2) How do the sub mesoscale eddies derive their energy? Either from the energy cascade from larger eddies, or from instability of the ocean current? Why do they have different seasonal cycle compare to larger eddies?

Reply: Thank you for your valuable suggestion. It's an interesting topic to discuss the energy source of submesoscale eddies. However, restricted by our data, we could not answer the question how submesoscale eddies derive their energy from larger eddies or instability for ocean current from surface drifter, and corresponding seasonal cycle, maybe we can use model to study them in our future work.

(3) Why do cyclonic sub mesoscale eddies double the number of anticyclonic submesoscale eddies?

Reply: Thank you for your suggestion. The number of anticyclonic submesoscale eddies is double of cyclonic submesoscale eddies, and we illustrate in page 9, line 12-15, for "The area of high number of submesoscale anticyclonic eddies agrees well with location of the garbage patches, where drifters converge due to convergence of surface flow (Maximenko et al., 2012; Van Sebille et al., 2012)."

(4) Can drifters be continuously trapped in eddies for a long time period?

Reply: Thank you for your suggestion. Indeed, some drifters can be trapped in eddies for a long time period (see below Fig.1). The mean rotation times for individual large anticyclonic eddies (LAE) is about 2, while for submesoscale anticyclonic eddies (SAE) is about 3. Submesoscale eddies trend to rotate more times than large mesoscale eddies. While in our paper, we cluster drifter loops with more than one rotation times to one eddy according to method of eddy identification. Therefore, we don't discuss much about the rotation times in the paper.

(5) In addition, some of the statements in the text have vague meanings, and a careful English editing is necessary.

Reply: reedited as suggestion.

(6) When referring the seasons, the authors need to use austral summer/winter consistently to avoid confusion.

Reply: corrected as suggestion.

Interactive comment on Ocean Sci. Discuss., 11, 2879, 2014.

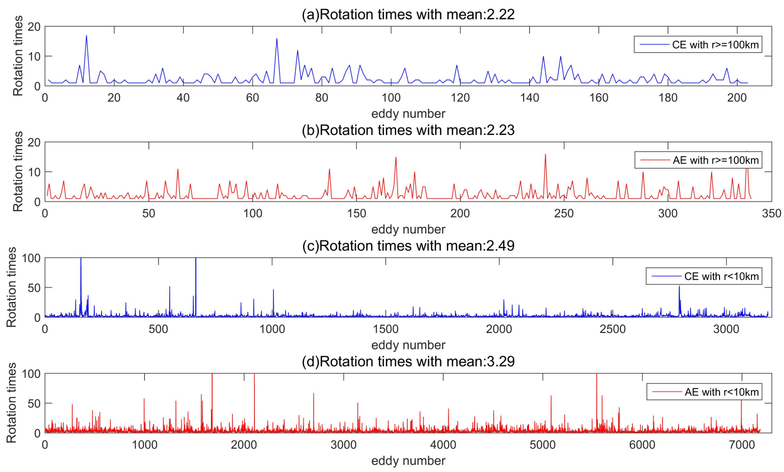

Fig. 1. Rotation times for large cyclonic eddies (a), large anticyclonic eddies (b), submesoscale cyclonic eddies (c), and submesoscale anticyclonic eddies (d).