

## *Interactive comment on* "Multicore structures and the splitting and merging of eddies in global oceans from satellite altimeter data" *by* Wei Cui et al.

## Amores (Referee)

angel.amores@uib.es

Received and published: 18 January 2019

This manuscript deals with the problem of two eddies of the same polarity interacting between them (merging or splitting) from satellite altimetry observations. They apply a slightly modified eddy detection algorithm to identify eddy structures with one or more eddy cores and develop a new technique to study the phase of eddy merging or splitting. The results of the paper are interesting and it is well written. I recommend its publication after few considerations (they are not written by relevance order).

\* Although two cores are technically multiple cores, I would not use the word "multicore" since the authors only deal with structures of two cores ("... this study focused only on

C1

the classical merging of two eddies into one and splitting of one eddy into two, ... "; line 413). This connects with the point number 3 of the section 2.2.1; there is no need to identify structures of 3 cores.

\* The authors say that "The census revealed that eddy splitting and merging do not always occur most frequently in eddy-rich regions,..." (line 17). When the map of eddy splitting and merging from Fig. 9 is compared with the distribution of eddy amplitude from Fig. 10 of Chelton et al. 2011, it can be seen the eddy splitting and merging takes place in regions with high eddy amplitude. I do not think that "stronger" eddies interact more than "weaker" eddies so it has to be related with the thresholds applied when identifying and tracking the eddies and with the capabilities of the satellite SLA maps.

\* The previous comment connects with the paper "Up to What Extent Can We Characterize Ocean Eddies Using PresentâĂŘDay Gridded Altimetric Products?" by Amores et al. How do you think the results of that paper could influence the results of the present manuscript. In that paper it is showed that satellites tend to merge several small eddies into larger one, think that would make impossible to differentiate a real large eddy from a sum of several smaller eddies into larger one. Maybe you minimized this problem with the thresholds used and the different steps of the algorithms. However, I really think that it should be clarified in the paper: your results are from a very small fraction of the global ocean eddies, so they should not be taken as universal truth.

\* My next comment is out of the scope of this paper, but it could be interesting applying your algorithm to a model output and to satellite-like SLA maps extracted from the model (similar to the paper by Amores et al.) to see what part of the eddy interactions you are missing in your results.

\* What about the role of the eddy polarity in these processes. A Fig. 10 computed by polarity could be interesting.

\* Line 92: indicate the reference of the satellite product.

\* Line 95: What filtering processes were applied? Filtering window, type of filter, ...

\* Line 105 – 108: this could be moved to the part of data.

\*Line 113: ... subsequently transported.

\* The authors claim that their eddy tracking algorithm is parameter free. The step (6) of the eddy identification makes it whatever but parameter free.

\* Line 134: ... eddy core ...

\*Line 150: for an eddy are given.

\* Line 219: 2 altimeters were measuring during  $\sim$ 7 years (30%); 3 during  $\sim$ 9.5 years (41%); and 4.5 during  $\sim$ 6.5 years (29%). I do not know if these numbers support the statement "most times".

\* Line 467: "5-7 events". Are these events per year; events in the 23 years?

\* Figure 9: the colorscale is not adequate. Limiting the maximum allowed value will show the structures better. The units of the colorscale are missing. Change the text inside the panels to eddy merging and eddy splitting. It would be interesting to see a map of anticyclones merging (splitting) – cyclones merging (splitting).

\* Typos and similar: Line 2: ... an improved geometric... Line 33: ... local circulation of marginal seas ... Line 34: ... 2016), or the Mediterranean ... Line 482: ... the dramatically narrow ...

Interactive comment on Ocean Sci. Discuss., https://doi.org/10.5194/os-2018-96, 2018.

C3