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Ocean Science
Discussions

Interactive comment on "Two typical merging events of oceanic mesoscale anticyclonic eddies" *by* Zi-Fei Wang et al.

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Q: I find the introduction and use of errorbars unsatisfactory. It is mentioned only once in the figure caption, li 67: "errorbars indicate the standard deviation...", without further description. Because the bars are constant for a given parameter, I am guessing you obtained this as one std of say 10-15 values shown in the panels. Of course, for the relatively flat curves of AE, the std is minimal. But this doesn't mean that error is so small. This is not an acceptable approach and I request you make an attempt to estimate an error based on your methods and analysis (and briefly describe this in the paper). If, in the light of errorbars, you need to adjust your discussion and/or conclusions, please do so.

A: Thanks for comments and suggestions. Yes, we used the standard deviations of the values shown in the panels other than the standard deviations of values in each case. Now we estimate the errors based on each case.Now we estimate the errors based on each case, and add a new subsection 2.5 to descript this.

We first estimate the errors of eddy parameters (e.g., A, Lx, and Ly) obtained by non-linear fitting. This is simple, because the outputs of the fitting algorithm have already included the standard deviation (e.g., δA, δb and δS) of each parameter, and the coefficient of determination (R2). Typically, the standard deviations are 2$\sim$8% of eddy parameters, and the fitting performance R2 is from 0.87 to 0.98 in this study.

Secondly, we estimate the standard deviations of eddy properties. Since we have used numerical integration of eddy parameters to obtain eddy properties, there are no simple and explicit relations between eddy properties and eddy parameters. The exact standard deviations of eddy properties can hardly be obtained in this way. Here we approximately estimate the standard deviations of eddy properties by assuming that eddy is a circle with same area S of original ellipse. Then the eddy properties can be expressed as functions of eddy parameters (e.g. A and S) after integration. The standard deviations of eddy properties can now be estimated with standard deviations of eddy parameters. For example, the eddy enstrophy in Eq. (9) is Es=cA2/S, where c is the integration constant. Then the standard deviations of eddy enstrophy is δEs= Es(2δA/A+δS/S). We use these standard deviations to draw errorbars in figures.

Some minor edits:

Q: li 81: Eddy merger

A:Thanks, suggestion followed.

Q: li 86: the surface

A:Thanks, suggestion followed.

Q: li 87-88: please rewrite the opposite cases of surface and subsurface avoiding brackets

A:Thanks, suggestion followed.

Q: Table 1: Use increased/decreased (not ascended/descended).

A:Thanks, suggestion followed.

Q: It would be better if you could add the percentage of increase/decrease too.

A: Thanks for the suggestion. However, this might be not very significant, since the percentage of increase/decrease is not a constant. The previous theoretic studies have shown that the percentage of increase/decrease may vary in a wide range [e.g. Lumpkin et al., 2000; Sangra et al., 2005]. It depends on the parameters (size, amplitude, etc) of merging eddies before merger.

Q: Fig 6 is horizontally distorted, please fix

A:Thanks, suggestion followed.

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