

Interactive comment on “A clustering analysis of eddies’ spatial distribution in the South China Sea” by J. Yi et al.

Anonymous Referee #1

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The manuscript made a clustering analysis on eddies’ spatial distribution in the South China Sea (SCS) based on the K-means approach. The motivation of this study is to explore the spatial characteristics embedded in eddies’ generation data using an existing familiar technique, which is often ignored in previous studies. This is an interesting try on descriptive oceanography, and may have the potential to drive the focus of eddy generation prediction. The writing is clear and informative, although there exist some typographical and formatting errors. Therefore, I recommend its publication on OS after several revisions.

Major:

1.P3454 L20, the authors said “there are null data from 2003 and 2004, so we used the output from 2005 to 2011”. The reasons on the null model SSH data should be

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introduced briefly or a reference should be given at least. Another question is why the authors didn't use the AVISO merged SSH data, which is often used in studying eddies all over the world and its range is from 1992 to present.

2. In Section 3.2, the authors apply K-means by specifying K from 1 to 20 and replicate 100 times on every K to determine the correct number of clusters. This is a good way in avoiding the selection randomness and indetermination. As we know, another flaw of K-mean clustering method is the difficulty in determining the initial clustering centers, the selection of initial centers has great impact on the final clustering results. But it is not clear to me how the authors overcome this problem.

3. P3461 L7, A9 and A10 are located in the range of the anticyclonic eddy of the dipole. The authors should address it. Also P3462 L16, "C3-A6' repret the dipole eddies off Vietnam" should contain A9 and A10.

4. P3463 L11-12, this statement is not correct. It is known that the most prominent spatial pattern of eddy distribution in the eastern SCS in winter is that the anticyclonic and cyclonic eddies are clustered in an alternating order from north to south, which is caused by the orographic wind stress curl (Wang et al., 2008).

5. P3463 L21-22, the conclusion "Hence, overlaps. . ." is too general and not so convic-tive. More previous studies and explanations are needed and discussed.

6. Just a comment. This study mainly focuses on the eddy centers clustering. Have you consider to cluster eddy tracks (movement paths)? From previous works, we have known eddies generated in different zones show various paths (Wang et al., 2003), but the characteristics embedded in eddies' paths have been fully unveiled.

Minor:

1. P3454 L18, Wang et al. (2012) > Wang et al. (2011)

2. P3455 L28, generated at > generated in

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3.P3461 L2, Wang (2004, 2006) > Wang (2004) and Wang et al. (2006)

4.P3462 L23, northeastern > Northeastern

5.P3474, in Fig. 1, the numbers should be given in the legend box. Also the same problems in Fig. 9 and 10

6.P3476, the abbreviation 'SSE' in the Figure caption should be revised to its complete form 'sum of squared error'

7.P3479, Fig. 6 and 7 represent the same contents of AC and C, so two subplots in one figure would be more evident for comparison.

8.P3472 L5, in > under

9. These references have some typographical mistakes or incomplete information, the correct forms are:

Cheng, X., Qi, Y. Q. and Wang, W. Q.: Seasonal and interannual variabilities of mesoscale eddies in the South China Sea, *J. Trop. Oceanogr.*, 24, 51-59, 2005 (in Chinese with English abstract)

Li, J. X., Zhang R. and Jin B. G.: Eddy characteristics in the northern South China Sea as inferred from Lagrangian drifter data, *Ocean Sci.*, 7, 661-669, doi:10.5194/os-7-661-2011, 2011

Wang, G. H., Chen D. K. and Su J. L.: Winter eddy genesis in the eastern South China Sea due to orographic wind jets, *J. Phys. Oceanogr.*, 38, 726-732, 2008.

Yuan, D. and Li R.: Dynamics of eddy-induced Kuroshio variability in Luzon Strait, *J. Trop. Oceanogr.*, 27, 1-9, 2008 (in Chinese with English abstract)

References

Wang, G. H., Su J. L. and Chu P. C.: Mesoscale eddies in the South China Sea observed with altimeter data, *Geophys. Res. Lett.*, 30(21), 2121, 2003.

Wang, G. H., Chen D. K. and Su J. L.: Winter eddy genesis in the eastern South China Sea due to orographic wind jets, *J. Phys. Oceanogr.*, 38, 726-732, 2008.

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