**Ocean Science
Discussions**

Interactive comment on "Eddy characteristics in the Northern South China Sea as inferred from Lagrangian drifter data" *by* J. X. Li et al.

Anonymous Referee #2

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The manuscript by Li et al. entitled "Eddy characteristics in the northern south China Sea as inferred from Lagrangian drifter data" makes use of historical surface drifter data from the region to perform a number of statistical analyses. The data set is extensive and the computations novel. The resulting statistics should be of interest to scientists working in that region as well as to a larger group of ocean scientists working with satellite altimeter data and eddy processes. For these reasons, I recommend the manuscript for publication with minor changes.

One critical novel aspect of this work is the particular automated method of eddy detection described in Section 2.2. I'm not certain I understand how the algorithm used leads to the isolation results shown, for example, in Figures 3 and 4. One suggestion I have is to move this section to an Appendix where additional detail of the algorithm

itself can be included without distracting unnecessarily from the main results of the manuscript.

The data set itself is impressive and is a tribute to the multi-national Surface Velocity Program (SVP) initiated years ago as part of the World Ocean Circulation Experiment (WOCE. The data are well described in Section 2.1. However, it is not clear what statistics, exactly, is shown to represent data density in Figure 2b. The text and figure caption say "trajectory number," which is a non-standard quantity. I assume that it refers to the number of distinct trajectories (i.e., drifters or drifters that have left the box and later returned as new trajectories). If so, that measure is not as instructive as the number of buoy days, independent of drifter. At least that is true for Eulerian quantities derived from the drifter data. I concede that the analyses presented here are about eddy or curvature quantities that are intrinsically Lagrangian. At a minimum, please try to better define "trajectory number."

Also in Section 2.1, please comment on the winter versus summer seasonal mixed layer depths in the study region. Since the authors point to a result that the number of large eddies peaks during the winter monsoon, it is imperative that the 15m drogue depth be well within the mixed layer in both seasons.

At the end of Section 2.2 on page 1580 the authors describe their criterion for separating a new eddy from, possibly, multiple loops around the same eddy. They use a criterion based on the sum the radii of two successive loops. They do not, however, justify that length scale against any independent data or theoretical behavior. How does the 2 x radius length scale compare with the distance an eddy is expected to advect westward on a beta plan over two rotation periods? (This would be roughly 5 cm/sec x Trot.)

At the end of Section 3.2 on page 1582 the authors state that "The reason may be that drifters are biased toward regions of convergent flow associated with anticyclones (Chairgneau and Pizarro, 2005)." I have not looked up this particular reference, but

I believe that the statement is not correct. In the northern hemisphere, surface flow in mesoscale eddies is expected to be convergent in cyclones and divergent in anticyclones. This expectation is based on the notion of frictionally driven secondary circulation that breaks geostrophic balance slightly at the surface leading to a slight high-to-low pressure flow, which is inward in cyclones (analogous to atmospheric cyclones). Please review this statement and better justify it.

In Figure 10a it would be helpful to show or describe the error bars in the results based on the standard deviations. It is not obvious that the temporal fluctuations in eddy number are significant.

Minor comments:

Page 1577, bottom: "drifters dataset" should be "drifter dataset"

Page 1578, top: "avoid the energy" should be "avoid aliasing the energy"

Page 1578, bottom: "identification method for these loops" should be "identification of these loops"

Page 1579, top: "disturbing of" should be "disturbance of", "we need do the skip searching, not the" should be "we must do skip searching, not"

Page 1580 and Figure 6: What is the obvious mean current at 117degE, 118degN? It is not identified yet it is a significant feature of the mean current pattern.

Page 1581, top and Figure 8 caption: Refers to 10 km histogram bins but the figure appears to have 5 km bins.

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