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Discussions

Interactive comment on "Single super-vortex as a proxy for ocean surface flow fields" *by* Imre M. Jánosi et al.

Anonymous Referee #2

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The authors studied the eddies along the U.S. West Coast. They revealed a surprisingly strong relationship between the surface integrals of kinetic energy IKE and enstrophy Iz (squared vorticity) with the observation data. In addition, they also noted that the square of the fitted height parameter is proportional to the sum of the square of all individual eddy amplitudes obtained by standard vortex census. In general, the paper is well written. However, there are still some issues to be clarified.

Major comments: The Relationship of IKE vs Iz in case of Gaussian shape vortex is not surprise for me, which was previously noted in Li et al. (2018). They used area instead of 1/2Rˆ2, then applied to census of global ocean eddies without any validation [Li et al., 2018]. It is interesting that the direct integration of oceanic data (Figure 2) supports this relationship. Nevertheless, this notation should be clearly presented as

this study has done. Please add a short notation addressing this issue after equation (5) in section 2.

Figure 3. I don't understand what Red crosses (black squares) mean from the caption of figure. For example, why there are so many red crosses at a given area, e.g., 3.0*10ˆ5 km2, what's the difference? Even I have read the explanations in Lines 10-13, page 4. The authors should add both some notations in figure caption and some explanations in result. The result in Figure 3c implies that there is a linear relationship between the eddy amplitude and the eddy scale. The larger the eddy is, the higher the amplitude is. Authors may want to address this in revision.

Figure 4. I suggest authors trying eddy area other than eddy scale in Figure 4a, since authors have already noted that area is an important parameter in the study. The result of eta_0ˆeff (∼0.7 m) in average may be 10 times of that obtained by eddy identification method (e.g., Chelton et al., 2011; Li et al., 2016), which can be also seen from histogram for eddy height in Figure 4b, where the height peaks at about 0.07 m. So I simply suspect that authors might incidentally make some mistake for this parameter by ignoring the gravitational acceleration g in the calculation.

Figure 5. It is surprising that the difference between eddy radius and eddy scale minimizes at near shore region, but maximizes at off shore region. Could authors address more about this?

Figure 5. The square of the fitted height parameter is proportional to the sum of the square of all individual eddy amplitudes. Could authors go further to find a simple relation between them, like IKE/IZ = 1/2Rˆ2?

The cyclonic eddies have relatively faster westward propagation speeds than anticyclonic eddies, which is seldom mentioned as far as I know. Could authors make some further explanations?

Minor comments: Figure 1. Add the point 40N, 130W in this figure with a notable

symbol. Figure 2. Add the coefficient of two curves in the figure, if possible.

Typo: Page 8, line 16. Reports->reported

References: Chelton, D. B., Schlax, M. G., and Samelson, R. M. (2011): Global observations of nonlinear mesoscale eddies, Progr. Oceanogr., 91, 167-216, 2011. Li, Q.-Y., Sun, L. and Lin, S.-F. (2016) GEM: A Dynamic Tracking Model for Mesoscale Eddies in the Ocean. Ocean Science, 12, 1249-1267. Li, Q.Y., Sun, L. and Xu, C. (2018) The Lateral Eddy Viscosity Derived from the Decay of Oceanic Mesoscale Eddies. Open Journal of Marine Science, 8, 152-172.

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