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Discussions

Interactive comment on "Could the mesoscale eddies be reproduced and predicted in the northern south China sea: case studies" *by* Dazhi Xu et al.

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General comments: The motion and transport of mesoscale eddies have been intensively studied with the altimeter data. In contrast, the simulations are relatively very few, although they are more useful for prediction and applications. As the simulations in this paper are quite well, I have a few minor comments on results. My major concerns are how to improve the writing skill of the paper to make it more comprehensible and valuable for readers. In final, the result is interesting and valuable, but some minor revisions are required before publication. Ans: Thank you very much for your supports and valuable comments. We totally agree with the reviewer and we made every effort

to clarify our results and improve the manuscript. The revised version reflects these changes. The detailed comments have been replied one by one below. Once again, thank you very much for your significant comments and suggestions, which are valuable in improving the quality of our manuscript. 1. In this paper, both amplitude and intensity are used. In general, eddy amplitude was common used in previous studies (e.g., Chelton et al., 2011). I suggest authors use amplitude other than intensity in the paper Ans: We totally agree with your comments. The intensity has been removed in the revised versions. 2. The motivation of study may be stressed in a more comprehensive way for board readers, if the authors include the previous knowledge on evolution and propagation of oceanic eddies from altimeter data. The motion of mesoscale eddies would be a straight line, if eddies freely propagate in open ocean. However, most of eddies may have interaction with topography (costal and islands), strong currents (e.g., western boundary current), eddies during their lifetime. The motion of eddy will be modified and even split when approaching an island (Yang et al., 2017). It is also recognized that western boundary is graveyard of eddies (Zhai et al., 2010). The dynamical processes such as splitting and/or merging of eddies can also make termination and/or genesis of eddies in open ocean (Li et al., 2016). Thus the dynamical processes make that the prediction of eddy motion is a challenge for ocean simulation. Ans: We greatly appreciate your support and constructive comments on our work. We agree with your comments. Thank you for the supportive and constructive comments on our manuscript. 3. The result is useful that generation, evolution and propagation paths of AE1 and AE2 can be well reproduced and forecasted when their amplitude >8 cm. I have two comments on this point. Firstly, authors should clearly point out what "their amplitude" means, observed one or simulated one. Secondly, the values in tables should be clearly consist with this result. Ans: Thank you. The means of "their amplitude" has been clearly point out, it is the observed amplitude (P1, line 9); The values in the tables have been corrected in the revised versions. 4. Moreover, amplitude is good criterion, a dimensionless one might be better, which makes the result more valuable. This could be achieved if the authors may go one step further. As we

know that mesoscale eddies are nonlinear compare with linear Rossby waves (Chelton et al., 2011), they are quite different, e.g., for propagation speed. It is hypothesized that the advective nonlinearity parameter might be presumably important, and authors may use it as an additional criterion. The advective nonlinearity parameter is defined as the nondimensional ratio U/c, where U is the maximum rotational speed and c is the translation speed of the eddy. A value of U/c> 1 implies theoretically that there is trapped fluid within the eddy interior that is advected with the eddy as the eddy translates, which is a fundamental distinction between linear waves and nonlinear eddies. The authors can check their results: what U/c exactly is in their simulations. Ans: Thank you for your comments. The advective nonlinearity parameter has been calculated, the results have been shown in Fig.5 in the revised versions. Others Table 3, intensity –> amplitude Ans: Thank you. The word “intensity” has been changed to “amplitude” in the revised versions. (Table 2) The labels AE1 and AE2 in Figure 1 are coved by symbols. Please shift them away from the symbols, and similar change for Figures 6, 9-11. Ans: Thank you. The related figures have been corrected in the revised versions. Line 576-579, the order of parameters in table caption are different from that in table. Please modify reorder the parameters. Ans: Thank you. The table has been corrected in the revised versions. (Table 2)

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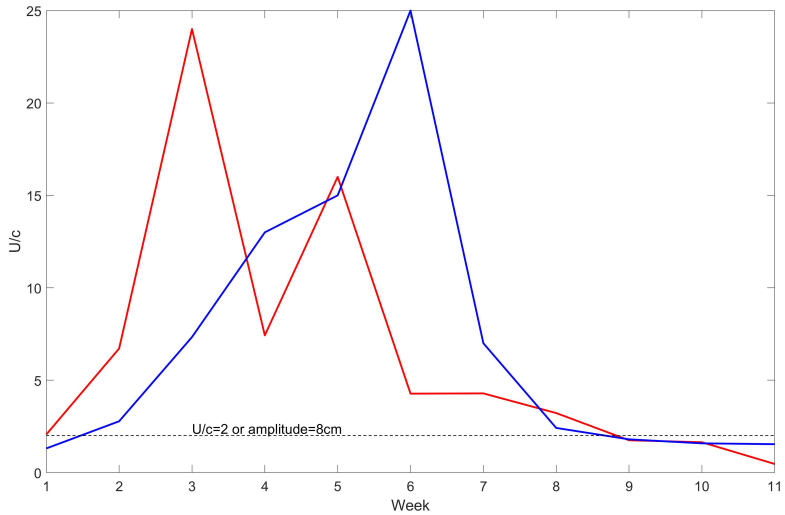

Fig. 1. The advective nonlinearity parameter. The thick red (blue) curve indicates the U/c of the observed (As_exp experiment) of AE2, the dash line indicates the value of eddy amplitude at 8 cm or the U/c=2.