

Interactive comment on “A modelling study of eddy-splitting by an Island/Seamount” by Shengmu Yang et al.

Shengmu Yang et al.

ycm15@mails.tsinghua.edu.cn

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We are very grateful to your time and efforts. Your insightful comments will greatly help us to improve our present manuscript and our further work. In the revised manuscript we will follow your (and others') comments to address the issues raised. Here are our replies to your comments.

General comments

(1)Have they used it in non-hydrostatic mode. . .Are the overall rules of thumb. . .

Reply: We have not used the non-hydrostatic option although the model is non-hydrostatic. As you say, the model resolution cannot capture the non-hydrostatic effect. So we turn it off to reduce computational cost. We agree with you that the non-

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hydrostatic effect is important in the interaction and we will try to improve our resolution of the model to study the energy transfer in our next work. As to the values of heat diffusion and vertical eddy viscosity used in model, main purpose is to avoid instabilities around island. Some limited model experiments show that the results of the eddy movement and eddy splitting are robust.

(2)With a sequence of eddies hitting an island. . .

Reply: What you have mentioned is very interesting, and we guess that a sequence of eddies hitting an island will be much different from an isolated eddy hitting an island. This will be an aspect we should explore in our next phase of the work.

(3)In the experiments, the island/seamount is placed in. . .

Reply: A related matter was mentioned in the work of Simmons and Nof (2000) who idealized the seamount as a wall (see references in the manuscript). However, large differences have been found when an eddy colliding with an island compared with a wall. So more work is needed to test the influence of hitting point in the eddy-island interaction.

Specific comments

(1)Page 7: We believe that the secondary eddy comes from eddy-splitting rather than being formed independently. Remark: This can be checked by using a tracer, and will give added value, see second remark above.

Reply: Yes, you are right. Actually the temperature used in the model can be seen as a kind of tracer. We will reformulate this sentence in the revision.

(2)Page 8 line 10: which positive vorticity has increases Remark: Fig 6 is a snapshot after 50 days. How can we see that PV has increased?

Reply: Yes, in the revision we will substitute it with a time series of snapshots of the eddy evolution to see the change of PV.

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(3) In the interaction with seamount studies only warm eddies are used. Are the warm and cold eddy cases symmetric?

Reply: We will add more similar experiments using cold eddies to check whether it will be symmetric with warm eddy cases.

Technical corrections

We will correct these in the revision, many thanks.

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