**Ocean Science
Discussions**

Interactive
Comment

Interactive comment on "Particle aggregation in anticyclonic eddies and implications for distribution of biomass" *by* A. Samuelsen et al.

Anonymous Referee #2

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General comments

This paper uses an eddy-resolving ocean model to address the question of how particles are distributed in an anticyclonic ocean eddy. It is found that surface particles accumulate at the edge of the eddy, while deeper particles follow the isopycnals. Individual particles may follow the 3D fields, move but at a constant depth, or perform diurnal vertical migration to imitate swimming organisms.

I recommend this article for publication. The topic of eddy influence on biomass is pertinent and timely, and is a relevant to readers of Ocean Science. Their methods for ocean simulation, eddy identification, and particle tracking are accepted practice with a history in the literature. The title and abstract clearly and correctly describe the work presented. The overall text is well written, technically descriptive, and flows smoothly.

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Interactive Discussion

Discussion Paper

I particularly appreciate the variety of experiments covered in table 1, which result in a clear comparison between passive particles and swimming particles, or particles released at depth versus those at the surface. Comparing their results with observational data is a great strength of this study.

My only high-level criticism of the article is that the analysis of a single eddy might be a poor representation of eddy mechanisms overall. It would be better to conduct this sort of study on a population of eddies in order to make stronger statements about the biological effects of eddies as they pertain to basin-scale processes. However, given the computing and analysis work required to describe this single eddy, and the detail provided in their presentation, I think a single eddy is sufficient for this publication. I recommend that the authors consider describing particle aggregation for a large number of eddies in a future publication. It would be interesting to know how aggregation characteristics vary in cyclonic versus anticyclonic eddies, deep versus shallow eddies, strong versus weak eddies (as judged by min Okubo-Weiss), isolated versus eddies in braids and filaments, etc.

Specific comments

In the discussion section, the authors should explain if they consider this single eddy to be representative of the effects of eddies in general, or if this isolated eddy, which is easier for analysis, may be a special case. This is touched on in 4.2, but only for cyclonic versus anticyclonic eddies.

I found the statement 'distribute along isopycnals' in the abstract confusing. Do they remain on the original isopycnals where they were released? If so, then different words would be more clear, like 'remain on their original isopycnals, but redistribute horizontally within the eddy'.

There is a great statement in the conclusion about 'the mechanism for aggregation at the surface being of physical origin', but biological processes may amplify this effect. That is a memorable conclusion, and worth stating clearly in the abstract.

Technical corrections

Fig 6: The colors appear to max out at green. Consider changing your max colorbar range to 10.

Fig 7: Again, the colors max out at green. Consider changing max colorbar range to -60 or -50.

Fig 7: Eddy edges are identified as about 23:30 and 3:00. Was there any velocity data that accompanied this section? It would be nice to overlay a black outline of the eddy from dynamic data on this plot.

Fig 7: The text says 'Note the concentrations of biomass close to the edges (particularly on the left side at about 300m depth)'. I don't see green at 300m and 23:30. Is this a typo? Or would a change in the colorbar help?

Interactive comment on Ocean Sci. Discuss., 9, 187, 2012.