Biogeosciences
Discussions

Interactive comment on "Physical and biogeochemical spatial scales of variability in the East Australian Current separation zone from shelf glider measurements" *by* A. Schaeffer et al.

Anonymous Referee #1

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General comments: In this paper, the authors analyze the spatial distribution of decorrelation ranges on the east coast of Australia using the semivariogram approach. The decorrelation scale analysis at east coast of Australia is relatively new. Over all, the quality of the work done and of the manuscript are adequate. However, more details are needed in order to make the content clearer and more understandable. Below are some comments that I hope can be used to improve the manuscript. Specific comments: 1. More details of the equations are needed in order to let readers understand the method the authors use. For example: 1) Equation (1): what does "variance" represent in this equation? Variance of what? Please specify. 2) Equation (2): what the general physical meaning of this equation? Why is equation (2) more robust than equa-

tion (1)? What do the number 0.457 and 0.494 represent? Why the 4th square in this equation? The details of this equation is especially important because this is the whole paper based on. 3) Equation (3): The author explain the meaning of sill, nugget and the range in this equation, but what is the meaning of this equation in general? Why do the authors separate it into 3 sections (h=0, 0<h<r......)? What are the 3/2 and 3rd square mean? What is the benefits and drawback of this equation? 2. Figure 3 lower left panel. Compared with across-shelf Temperature, Salinity, Fluorescence and DO, the across-shelf distance of CDOM extends more than 20 km, while all other variables are limited to less than 20 km (left panel a, b, c, and d). Why is that? I didn't find the explanation in the manuscript. Please explain. 3. In figure 2, the authors separate the analysis into 12 months. Why not do the same for figure 3? Please explain. 4. Due to the method used here is highly empirical, the authors should discuss the advantages and limitations of the method. 5. Decorrelation scale is the analysis variable of this manuscript, and it is also one of the most important parameters in setting up data assimilation procedures. The authors mentioned the observational errors and representation errors in the data assimilation section, but they didn't mention decorrelation scale at all, which should be the center of this paper. I suggest the authors to add discussion of decorrelation scale in this section. The following paper is an example setting up data assimilation projection space according to decorrelation scales: Pan, C., Yaremchuk, M., Nechaev, D., 2011. Variational assimilation of glider data in the Monterey Bay. Journal of Marine Research 69 (2-3), 331-346. 6. According to figure 1, all glider observations are confined within 200 m isobath. This means the decorrelation scales are all confined within 200 m isobaths. So how does this affect cross-shelf decorrelation scales? Minor comment: Figure 1: "Across-shelf" does not seem to be a normal word. "cross-shelf" might be more appropriate. According to my observation, I believe this paper is well-organized. The method the author used is straightforward, and the figures support the results, although more details are needed to enrich the content. Therefore, I recommend minor revision.