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Discussions

Interactive comment on "Ecosystem function and particle flux dynamics across the Mackenzie Shelf (Beaufort Sea, Arctic Ocean): an integrative analysis of spatial variability and biophysical forcings" *by* A. Forest et al.

Anonymous Referee #1

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In this manuscript, the authors report on results estimates of organic matter fluxes across the Mackenzie Shelf area of the Arctic Ocean. One of the many nice things about this study is the combination of the instruments used and the lengthy analysis performed. However, the latter is also to my mind a weakness of the manuscript. Much of the data analysis makes extensive use of regressions and is exploratory in nature. This makes the interpretation of the analysis difficult — how firm is a particular result? So I find myself with mixed feelings; I generally like the manuscript and find that the extensive sets of measurements and interdisciplinary nature of the material very

interesting. However, the details of the data analysis leaves me uneasy.

In more detail, there is little mention of uncertainties in the values used. This is important when looking at trends, and in exploratory data analysis in general. For example, on line 10 the authors state that they use average particle abundances when more than one profile was available. This would naturally lead to an estimate of the uncertainty of the data in such cases, but this seems not have been used.

There are many regressions and fits to data used in the manuscript, yet none of them include uncertainties on the fitted parameters. Calculating these parameter uncertainties is going to be critical, especially if one intends to use the resulting relationship to derive additional quantities (as the authors do). If uncertainties are calculated (and almost all modern fitting programs will calculate 95% confidence limits on the parameter values) then a propagation of errors allows one to calculate the uncertainties on any derived quantities. In addition, R^2 parameters are used a great deal as measures of goodness-of-fit. This is ok for linear relationships (though there are better measures) but it is known that R^2 is a biased measure of the goodness-of-fit for non-linear relationships (e.g. in Appendix B). Given the exploratory mature of some of the analysis conducted here, it may be better to use an information theory measure such as the Akaike measure.

Some of the data analysis techniques used in the manuscript require some additional explanation. For example, redundancy analysis. For example, what does "(scaling $= 3$)" mean (after equation 2)?

On Page 10903, the authors refer to Figure 11, and say that the settling speeds are plotted as functions of A and b. But values of A and b do not appear on the figure. Also the caption to the figure refers to "cinematic viscosity" which should be "kinematic viscosity".

The first sentence of the conclusions makes no sense: "linear trend" of what?

Many of the figures reporting the results of regression fits need to be looked at again. For example, in Figure 9, what are the additional lines? I'm assuming that the innermost grey lines are 95% confidence limits, but this needs to be stated. Similarly with Figure A2, though in that case I find the innermost grey lines hard to believe if they are indeed 95% confidence limits: if they are, then I suspect that the regression is being driven by the extremes of the data values, particularly given the spread in the middle, which can be up to two-orders of magnitude.

So all in all, I like the aims of the paper, and find the results intriguing. However, I would like to see more rigor and detail in the exposition of the data analysis.

Interactive comment on Biogeosciences Discuss., 9, 10883, 2012.