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Biogeosciences Discussions

Interactive comment on "Hydrodynamics and light climate structure alongshore phytoplankton blooms in spring" *by* G. Brandt and K. W. Wirtz

Anonymous Referee #1

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Review on "Alongshore spring bloom dynamics" submitted to BGD by G. Brandt & K.W. Wirtz

This manuscript focuses on the different spatial distribution of phytoplankton spring blooms in two consecutive years in the North Sea/ German Bight. Ferry Box data indicate different bloom scenarios in 2004 and 2005, showing a homogenous Chla distribution along a transect for 2004 and a patchy distribution in 2005. A one-dimensional Lagrangian particle tracking model combined with a NPZ-model was used to identify the different mechanisms of large scale chla distribution. Despite its simplicity (as outlined by the authors), the model could reproduce the general spatio-temporal distribution of blooms along the Ferry Box transect for both years and therefore demonstrate the importance of hydrodynamics for bloom dynamics.

The study contains an interesting approach and deals with a highly interesting scientific question. However, to be published it needs thorough revisions. A clearer writing style might help to rule out doubts on the results validity. The overall structure of all chapters needs to be improved, especially when it comes to some details of methods and results. Also, the language is often not precise. The first author might be not very experienced in scientific writing, which excuses some mistakes, nonetheless, an overall improvement in structure, language, and style are necessary to clearly demonstrate that the authors did pay attention to missing details and fulfilled a certain scientific standard (which I assume they did!).

Scientific relevance: 1; Scientific quality: 2-3 (probably better, but hidden by a fair to poor presentation); Presentation quality: 3-4;

Specific comments and improvements are given in the following lines:

Abstract:

page 2: line 1-2: I would recommend to start the abstract more study specific, not by a 'textbook' sentence.

line 4: that is right, but blooms in other areas can also be highly variable (e.g. E.huxleyi blooms!) - try to be more precise in what you intend to say.

line 13-15: this sentence is confusing, it says that you compared phytoplankton growth in 2004 with spatial structure in 2005. I guess, you mean chl-a distribution for both years?

line 20-22: this sentence is not precise, too. The term 'ecosystem function in coastal environments' covers much more and is too broad when the impact of hydrodynamics of phytoplankton bloom dynamics should be pointed out.

Introduction:

Improve the overall structure. Make more clear that you have to deal with different fea-

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tures: (a)Lacking of high resolution measurements of chl-a but also other parameters like e.g. nutrients, water turbidity, zooplankton grazing, benthic filter feeders (b)Different modeling approaches (please make clear to non-modelers what the difference is between Langerian and Eulerian models) (c) The scientific question of what leads to interannual differences in spring blooms spatial distribution

page 3: line 9:maybe better 'diversities' instead of 'irregularities'. (what would be a regular bloom and what a irregular one?)

line 10: why is turbidity considered as biological condition?

line: correct brackets!

page 4: line 25: correct brackets!

Methods:

page 6: I very much miss detailed information on the spatial/temporal resolution of Ferry Box measurements since they are the very basis of this study. Also, it should be mentioned explicitly, that Chla was determined by the Ferry Box fluorometrically (you only mention SCUFA II from Turner Design in the Appendix) and also, if/how the seawater was pumped in. If the Ferry Box pumped the water before Chla was measured, Chl-a concentrations are likely to be underestimated. (It is known, that different pumps could damage different phytoplankton species differently.) Chl-a is the models most important state variable, so more attention needs to be paid on this parameter!

Results:

In Fig 5, squares indicate different areas to calculate the Chla gradient – why are these squares different in both years? Please be more consistent with the names you use to indicate different water masses (also in the Discussion)! You use East, West, Southern Bight, German Bight, Frisian coast, West Frisian coast, Dutch West coast, western German Bight waters, coastal German Bight and so on. Especially for a study that

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deals with spatial distribution it is highly important to be very specific with locations! Moreover, put names of locations into the map!

page10 line 1-5: you write the same content twice!

Discussion:

Since it is still an ongoing discussion, whether P or N are liiting nutrients in the Wadden Sea/German Bight area -would the results look different if nitrogen would be used as model currency?

Make more clear when you refer to results from FerryBox, or results from the model (e.g page 15, line 11 &19;

page16: The study of Loebl et al 2007 is on primary production not on microzooplankton grazing!?

page 20 You write: "Many assumptions, e.g. the ignorance of remineralisation processes or adaptation in algal stoichiometry and/or community structure, have to be re-considered prior to a potential application to the entire season." So, why do these factors do not play a role for modeling spring bloom dynamics?

line 24: please explain CPR – probably not everybody might know what it means continious plankton recordings, I guess?

Interactive comment on Biogeosciences Discuss., 6, 4993, 2009.