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Interactive comment on "The 2007 North Atlantic spring bloom in operational analysis from the TOPAZ system" *by* A. Samuelsen et al.

Anonymous Referee #3

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General comments A coupled ecosystem-hydrodynamic model was used to forecast North Atlantic phytoplankton spring bloom in 2007. Data assimilation of physical variables revealed no significant effects the ecosystem model forecast. The model was successful in reproducing annual cycles but was not successful in reproducing the spring bloom. The main concern is that the model was coupled to reproduce a seasonal event (spring phytoplankton chlorophyll bloom), but it failed to do so. Surface chlorophylls are underestimated in spring and overestimated in summer (not clear if the differences are statistically significant or not, but I think they are). In other words, the key ecosystem components driving the phytoplankton spring bloom were neither identified nor reproduced by the model. Therefore, at this stage the present operational analysis seems to be not suitable to assess the 2007 North Atlantic spring bloom. An

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additional effort should be made by the authors to obtain a better modelling approach to the observations by identifying the key forcings driving the phytoplankton bloom or improving the model formulation and parameterisation, and therefore, to make the paper worthy for publication.

Specific comments The authors should clearly indicate the statistical significance of the differences between model results and the (satellite) observations instead of restrict their comments to expressions such as “too high, too low” (page 344, lines 16-18). Although the ecosystem model is described in literature, some additional information about it is required here as the core of the paper is just assessing the phytoplankton chlorophyll, a biological ecosystem component, during springtime. A figure showing the ecosystem model structure and interactions will be helpful to better understand the model functioning. A table showing model parameters will be useful to identify eventual model parameterisation deficiencies. The fact that surface chlorophylls are underestimated in spring and overestimated in summer suggest a failure the ecosystem model identification of key state variables, state variable interactions, or model parameterisation. The authors suggest an excess of primary producers consuming surface nutrients and preventing themselves to hold and increase their biomass in spring. The lack of grazers is also pointed out as a possible reason to explain higher chlorophyll concentrations than those expected in summer (page 354, lines 24-28), etc. What about a possible limitation of the hydrodynamic model to simulate the biological state variables? Were the 22 layers in the hydrodynamic model enough to reproduce the processes in the vertical dimension? What about the vertical profiles of chlorophyll concentration? No information is provided about the model performance regarding this topic. The expression -underestimated mortality- (page 354, line 28) if referred to phytoplankton should be changed by any other such as -low phytoplankton consumption by zooplankton-, as referring to phytoplankton mortality should not be appropriate. Once more, a figure showing the ecological model structure (not shown) will be helpful. According to the authors, the (coupled) model -is not optimised for coastal regions- and suggest that the present results should provide nesting conditions to a

coastal model (page 355, lines 9-11). If this was a goal of the paper this should be indicated at the end of the introduction section and not here. Moreover, TOPAZ is for -operational prediction of North Atlantic European coastal zones- (page 344, lines 3-4) what makes this point confusing. The authors indicate that -the model will be set up for operational forecasting in the Atlantic and Arctic Ocean- (page 356, lines 20-21). This suggests that the present modelling exercise which is not successful in reproducing the spring bloom is preliminary and require further effort to get a better approximation (i.e. to obtain non significant differences) to the observations.

Interactive comment on Ocean Sci. Discuss., 6, 343, 2009.

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