

***Interactive comment on “A mathematical  
modelling of bloom of the coccolithophore  
*Emiliana huxleyi* in a mesocosm experiment” by  
P. Joassin et al.***

**Anonymous Referee #3**

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General comments: The manuscript describes a mathematical model with the aim of replicating the findings of a mesocosm experiment. The model which is based on carbon, nitrogen and phosphorus cycling involves a fairly complex set of biogeochemical processes dealing with not only with the *Emiliana huxleyi* bloom process but also associated processes such as calcification, microbial loop, TEP formation, virus impact. The parameter set related with these processes are calibrated by an iterative procedure which is an improvement to trial-an-error type conventional tuning approach, that is critically important for complex models with numerous parameters. The model was technically well-designed and successful covering all major processes took place in the mesocosm experiment. The manuscript was also well-written in English as well as for

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explaining the details of processes.

Specific Comments: I will have not many comments on the technical aspects of the modeling part of the manuscript. But the following suggestions may hopefully be useful to further improve its scientific creditability. 1) The model started with a given initial conditions and the parameters were then tuned iteratively. The question is then how the parameters are dependent up on the initial conditions. In other words, do they have some generality which may be used in other modeling studies, or do they apply only to the specific mesocosm experiment? Another version of the same question is to elaborate whether the same model parameters will be successful replicating the observed structure if the initial conditions would be different. A paragraph in the Discussion section will be enlightening for the readers. 2) The bloom period in the experiment was very short; about 5 days. However, Emiliaenia blooms may last for more than a month in a real ocean. As I can see, the bloom period was limited by the viral effects. An experiment without this effect would be useful to further explore the performance of the model. If the cause of short bloom period was something else, it is also worth explaining it. 3) The model is very successful but very complex and certainly provides considerable elaboration to the existing models. However, the model complexity limits its implementation to real oceanic cases in which the simulation of Emiliaenia blooms is not the main interest but a part of the complex food web structure. As the authors have had extensive sensitivity tests, they should have some idea how much of the model can be simplified within tolerable limits of not losing the model realism. A paragraph or two in the Discussion section will be helpful for the people who will have an interest its implementation to real cases.

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