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Interactive comment on "Vertical distribution of chlorophyll in dynamically distinct regions of the southern Bay of Bengal" *by* Venugopal Thushara et al.

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Reviewer: Emmanuel Boss, University of Maine.

This paper is concerned with the dynamics of chlorophyll concentration in the Bay of Bengal, and uses observations from glider, a ship, satellite and a numerical model to describe it and attempt to understand it.

The paper's English is good. However, the English used is often not clear when it comes to the description of phytoplankton and their evolution. Bloom is never defined, sometime it seems to mean a relatively elevated chlorophyll concentration while in

other time it denote a positive change in time.

The paper may be of interest to readers of BG but I feel that it could be of significant more value if the authors addressed the following. I am also returning an annotated PDF (I stopped towards the end due to exasperation. Sorry.). I think addressing these will do a lot to make this paper significantly more useful.

1. The author adopt the classical view that phytoplankton dynamics are all determined by nutrients and light with physics modulating their availability. This view is not consistent with the fact that phytoplankton do not double in concentration daily even though they, on average, divide daily in most of the oceans (see review in ARMS by Ed Laws). This bottom up view is understandable given the lack of measurements to constrain losses, but the author should be very careful in their interpretation of temporal dynamics. In fact, in the height of the bloom, the maximal concentration, is when loss = growth. The recent paper by Behrenfeld and Boss, 2017, may make this point of view clearer to the writers.

Yes, productivity=growth rate x biomass, and hence when there is more chlorophyll there is likely more productivity.

2. The issue of photoaclimation is very important in stratified waters as chl/C can vary by factors as high as 5. The fact that the glider measure bbp as well as chlorophyll could be use to study this question. Similarly, the model you use should have variable Chl/C, unless you use bbp to estimate C_phyto (e.g. Graff et al., 2015)

3. If Fcdom is available (not clear what the 3rd channel of the triplet is) it could also be useful to understand light availability to phytoplankton.

4. Chlorophyll is a limited descriptor of biology (we don't know the species and the associated ecosystem from it). Limiting the text to describe its dynamics rather than talking about the 'biology' will make your text more palatable to some. In addition, the value you are estimating for it based on 'factory calibration' is likely biased by a factor

of 2 (e.g. Roesler et al., 2017).

5. The term 'bloom activity' is used over and over. What does that mean? Changes in chlorophyll concentrations? Try to be more precise.

6. Phytoplankton primary productivity is driven by PAR, which means they care about absorbing a photon in the visible but not about the energy of the photon (blue photons have about twice as much as red one). Your light model should be in PAR not W mˆ-2 and should take CDOM into account ('compete' with phytoplankton by absorbing blue photons).

Dear authors, I am often wrong. If you feel I am 'off the mark' feel free to contact me directly and if convinced, I will be more than happy to change my review.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2018-300/bg-2018-300-RC2-supplement.pdf

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2018-300, 2018.