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Discussions

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Interactive comment on "Mixed layer variability and chlorophyll a biomass in the Bay of Bengal" *by* J. Narvekar and S. Prasanna Kumar

Anonymous Referee #2

This paper describe the seasonality of the MLD, nitrate and chlorophyll in the Bay of Bengal using an extensive dataset compiling in-situ data from hydrographic surveys, ARGO floats and and remote sensing data. The paper is well written and based on substantial data. I really enjoyed the reading until I reached the "discussion" section, that is actually absent. The so called "results and discussion" section is only presenting the results. Results should be kept as they are and completed by a separate discussion section. I have two remarks on that point, which I develop in more details below: 1) the coupling between the physical and biogeochemical variables should be more explicit in the discussion and 2) a strong limitation of the paper is that there is no discussion of the findings compared to previous work (actually there is not one reference to the work of others in the discussion/result and conclusion sections). I think the lack of synthesis in the results section also impacts the abstract that is a little long.

I therefore recommend a revision of the paper taking into account this main comment.

General Comments:

Abstract:

I find the abstract a little too long. Perhaps the authors could emphasize on the major results like the seasonal contrasts and/or the north/south contrasts, without describing all the processes. The material is there, this is just a matter of synthesizing it.

Results and discussion:

I strongly recommend the authors to discuss their results in a SEPARATE section: 1) The paper is entitled "Mixed layer variability and chlorophyll a biomass in the Bay of Bengal" and basically that is exactly what we have in the results and summary: a paragraph on MLD and then a paragraph on chlorophyll a and nitrate. The separation between the two is ok in the result section but the discussion about the coupling appears poor mostly because you don't couple them in the text. I recommend you really highlight the coupling in the discussion by describing the seasonal cycle of MLD, nitrates and chlorophyll a at the same time, instead of going through the complete seasonal cycle for MLD and then talk about the biogeochemical variables. This comment apply to the abstract too.

2) To me a strong limitation to this paper is that there is not one reference to the work of others in the discussion/result section, not even one! There are several points that could be discussed (I cite a few papers but there are others): - what is the main driver controlling MLD? - How do your findings compare to the work of other on Chlorophyll and physical drivers on seasonal time scales (Lévy et al., JGR 2007, Vinayachandran et al., 2013)? - how do your climatological study fit in the context of the several papers that were published on extreme events (cyclones etc. Prasanna Kumar et al., DSR 2004, 2007) and interannual variability (Currie et al., Biogeosciences 2013) and their impact on chlorophyll in the Bay of Bengal - the role of Rossby waves in controlling the

MLD and chlorophyll?

Currie J.C., Lengaigne M., Vialard J. Kaplan D M, Aumont O, Naqvi SWA and Maury O: Indian Ocean Dipole and El Niño/Southern Oscillation impacts on regional chlorophyll anomalies in the Indian Ocean, Biogeosciences, 10, 6677-6698, doi:10.5194/bg-10-6677-2013, 2013.

Lévy, M., D. Shankar, J.-M. André, S. S. C. Shenoi, F. Durand, and C. de Boyer Montégut (2007). Basin-wide seasonal evolution of the Indian Ocean's phytoplankton blooms, , J. Geophys. Res. 112, C12014, doi:10.1029/2007JC004090

Vinayachandran, P. N. (2013) Impact of Physical Processes on Chlorophyll Distribution in the Bay of Bengal, in Indian Ocean Biogeochemical Processes and Ecological Variability (eds J. D. Wiggert, R. R. Hood, S.Wajih. A. Naqvi, K. H. Brink and S. L. Smith), American Geophysical Union, Washington, D. C.. doi:Ăă10.1029/2008GM000705

Minor comments:

- In the introduction, the authors went through the effort of referencing most of the studies on ML in the BoB chronologically. Although it is well written, I found it difficult to get a clear message of what the results were and what the opened questions are. For example, the two following sentences state that some work has been done but do not really help the reader in understanding what the findings were: " Influence of salinity on the seasonal evolution of mixed layer in the Bay of Bengal was studied by Rao and Sivakumar (2003) using climatological data. Narvekar and Prasanna Kumar (2006) examined the seasonal cycle of mixed layer in the central Bay of Bengal and its association to chlorophyll using more comprehensive data set including Argo data."

- P16420 L1: I wouldn't refer to "eddy-like structures", which could be confusing for the reader as most of them are more likely to emerge from the interpolation technique than from eddies. Climatologies you are looking at smooth out the signature of mesoscale structures. In particularly stable features, you might indeed catch structures such as

the Sri Lanka Dome.