

Interactive comment on “Relationship between N : P : Si ratio and phytoplankton community composition in a tropical estuarine mangrove ecosystem” by A. K. Choudhury and P. Bhadury

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Received and published: 28 April 2015

The authors are thankful to the reviewer for the in depth analysis of the manuscript. We appreciate the efforts put in by reviewer to make us more conversant with the idea of Redfield ratio. Keeping in view the comments made by reviewer we can make revisions to the manuscript to make it more acceptable for publication in this journal.

The authors largely agree with the comments and concerns raised by reviewer and revisions will be included in the manuscript accordingly. The molecular dataset will be subjected to similar statistical analysis as was done for microscopic data. The statistical data will be carried out with respect to OTUs that are generated in the genetically

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derived dataset.

After going through the literature kindly suggested by reviewer, we agree with the comments of reviewer and conclude that indeed our system is eutrophic both in terms of Secchi depth as well as nutrient concentrations. Accordingly, Abstract, Discussion as well as conclusion will be modified to make it more appropriate. P 2308 L 24: Reference will be corrected. P 2309 L 10: The reference Broecker and Henderson 1998 will be removed from the manuscript and the sentence will be either deleted or suitably modified to make it more relevant to the objectives of the manuscript. L 15: Consistency about the use of abbreviation will be maintained throughout the manuscript. P 2310: As suggested by reviewer, first paragraph will be modified and references will be added. Objectives will be rewritten for better clarification to the reader. Methods: 2.3 P 2313 L 28: Turner et al. will be removed and suitable reference will be included. 2.9 Sequence analysis and molecular phylogeny: An attempt will be made to prepare a PCA plot of the environmental variables with OTUs and attempt will be made to analyze the same. No extrapolation of chlorophyll a data from Secchi depth data is needed as we already have chlorophyll a data. It was not included in the submitted version of the manuscript to keep the number of graphs to a minimum. The dataset of Chlorophyll a will be graphically represented to make the manuscript more acceptable. Results: 3.2 P 2319: The whole paragraph from L 11 – 21 will be rewritten with better clarifications of the queries raised by reviewer. Emphasis will be given on explaining the variations in Ammonia concentrations and nutrient limited conditions will be discussed as well. 3.3 P 2320 L11: Necessary corrections will be done in view of reviewer's suggestions. 3.4: In a previous work cyanobacteria were reported from the same study area by other authors of this group (Bhattacharjee et al. 2013). However, those species were largely benthic and rarely planktonic. Since our study was largely restricted to surface depths, benthic cyanobacteria were seldom available. Moreover, due to the freshwater plume of different riverine sources merging with the marine water of Bay of Bengal, Ekman transport in this area is very weak that would possibly reduce the availability of benthic cyanobacterial species as well. So it seems that physical forces are somewhat

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involved in delimiting the cyanobacterial population even though nutrient concentration may have promoted cyanobacterial population. However, no specific work is still available on this. P 2321 L 8-9: Changes will be done. L 13: Changes will be done. 3.5: P2324 L 20: Changes will be done. 3.5: P2324 L 22: Corrections will be done in view of the suggestions made by reviewer. The cloning and sequencing approach was mainly done as a secondary verification of the chromophytic algal population of the study area. It was done to confirm that class wise distribution of phytoplankton functional groups were similar in both microscopy and molecular analysis. A consistency of both would suggest that microscopic estimates were relatively accurate as verified by molecular data. Moreover, since the molecular diversity of chromophytic phytoplankton population has already been worked out from this group (Samanta and Bhadury, 2014) this study was done to envisage if any drastic temporal shift happened in the overall phytoplankton community composition. Thus, we could verify that specific phytoplankton classes at the study area largely remained same and did not undertake any major temporal shift. This part of the work will be shortened and we will try to make this more contextual with respect to the present work. We will also change the order (3.4 to 3.7) to make it more relevant in the manuscript. 3.6 P2325 L9-11: Corrections will be done in view of the suggestions made by reviewer. 3.7 P2327 L17-18: Corrections will be done in view of the suggestions made by reviewer. Discussion: Si:N ratios will be discussed in more details in context of the objectives of the present manuscript. An attempt will be made to analyze the genetic data (OTUs) in terms of nutrient ratios. P 2328 L 27-28: The monthly variation data for oxygen will be included in the revised version of the manuscript. It was not a seasonal pattern but a more gradual decreasing pattern from the summer to the post monsoon period through monsoon. There may be a possibility that due to high eutrophication happening in the monsoon months, there may be an increase in the heterotrophic population at our study area which would reduce oxygen concentrations. Moreover, in the post monsoon months there is increased anthropogenic activity. This may further add up to eutrophication and a consequential rise in heterotrophic population. Such changes may be possible reason for the gradual

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decreasing trend in oxygen content of the habitat. This aspect of decreasing oxygen will be discussed in more detail in the revised version of the manuscript. P 2329 L 3: Discussion on Ammonia will be modified. P 2329 L 8-9: We agree with the opinion of the reviewer. Even though N and P are important parameters, it is possible that there can be Si limitation at our study area. Hence we will definitely modify the manuscript with a more focused approach on nutrient limitation with respect to N, P or Si. P 2329 L15-16: After going through the various references kindly suggested by reviewer, we agree that our results for phosphate and Secchi depth clearly indicate towards eutrophic or hypereutrophic condition of the study area. Accordingly we will modify the discussion as well as the abstract sections of the present manuscript. P 2329 L 18: Corrections will be done. P 2331 L 5: Samanta and Bhadury, 2015: Corrections will be done. P 2331 L 29 – P 2332 L 3: Corrections will be done. P 2332 L 5: Corrections will be done. References: The list will be rectified and addition or removal of references will be done more cautiously. Table 1: The error values are for bi weekly data for each parameter measured in triplicates where N = 24. Table 4: Even though we largely agree with the comments of reviewer, we wish to persist with the shape column in this table. This is mainly because based on the shapes there are specific formulae for calculations of biovolume (Hillebrand et al. 1999). If someone wishes to replicate the methodology, then a table on specific shapes can be useful to find out the specific formulae needed for biovolume calculations. A separate column for centric or pennate shape can be included. Figures: Fig. 1: The inclusion of environmental data in the map was done on the basis of the initial suggestions made by handling Editor. They can be separated. Temperature scale will be changed and monsoon will be highlighted. Fig. 2: Spelling error will be rectified. The error bars are for standard error. Each parameter was measured twice (bi weekly interval) in a month in triplicates. So the data represented is the mean value for six readings in a month with standard errors, where N = 24. Fig. 4 and 5: This legend will be removed. Fig. 5: The names are representatives of months and not species number. This PCA plot was done to see if any seasonal habitat variability exists on the basis of the nutrient and physico chemical properties of the habitat.

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Figure caption will be included with name of the months. The percentage of explained variance is already mentioned in the figure for each component designated as Factor 1 and Factor 2 respectively for each of Fig. 5A and 5B. Fig. 7 D: Corrections will be done. Fig. 8: Species number will be included in the figure caption and percentage of explained variance will be included as well.

Interactive comment on Biogeosciences Discuss., 12, 2307, 2015.

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