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Biogeosciences Discussions

Interactive comment on "Phytoplankton diversity and productivity in a highly turbid, tropical coastal system (Bach Dang Estuary, Vietnam)" *by* E. J. Rochelle-Newall et al.

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In this study, using multivariate analyses, the authors attempted to determine the factors controlling spatial and seasonal changes of biodiversity and productivity (abundance) of phytoplankton community in a tropical coastal ecosystem, the Bach Dang Estuary, Northern Vietnam. They concluded that salinity, suspended particulate matter, and probably heavy metals (mercury, tin) were important factors controlling the phytoplankton community and productivity. There are several issues in this manuscript.

1. There is no figure or table summarizing the dominant phytoplankton species and their relative abundance to the total phytoplankton; the estimation of the contribution of

each planktonic group (nano, pico, cyano) to total primary production (as Chl-a) was not shown.

As noted in our replies to the comments of Reviewer 1, we do not have size fractioned Chla measurements. We can provide the size ranges for each group as obtained from the cytograms. However, given the extremely large variability in Chla:size conversion factors (over 80 times in some cases for diatoms), we think that it is not very rigorous to provide these type of calculation. Nevertheless, if required we can try to do a back of the envelope calculation using the relationships presented in Montagnes et al. 1994, Limnol. Oceanog. 39: 1044-1060. As noted in the reply to reviewer 1, we will complete the table of algal species present in the Supplementary materials section.

2. The authors emphasized higher primary production in the wet season (p499 lines 13-14). However, in wet season they collected samples three times from station 28 and twice from station 30 during 09-11 July 2008 (Table 1). The daily value of Chl-a, DPP, PPP, BA, Pico, Cyano concentrations in station 28 varied greatly (up to 14X), and the Cyano concentration in station 30 varied _10X in two days. If the Chl-a data of station 28 in the 2nd and 3rd sampling dates were removed, the primary production between the two seasons would be very similar. The authors seemed to ignore the large daily changes in the same stations, raising a big question concerning the reliability of the data obtained from the other stations.

The reviewer questions whether or not we have a significant difference in primary production between the stations if the high values of Stn 28 are removed. We do not agree with this comment. Indeed, even removing these high values, the rates of primary production are still higher during July than during March. Comparing pairwise all of the stations, the rates of production (PPP, DPP, BP) are almost always higher during July. However, we do agree with the comment of the reviewer that there is a high degree of daily variability for these two offshore stations (28 and 30). This was probably due to the shifts in wind direction (westerly) and intensity during the last sampling day when a large bloom of phytoplankton was blown from St. 23 to the more

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offshore and easterly stations (28, 29 and 30). It is probable that this increase in wind direction "pushed" some of the higher turbidity waters from the Van Uc system in to the less turbid Haiphong Bay system. Indeed, the higher nutrient and turbidity measurements support this hypothesis, along with the drops in salinity observed. We think that these results give an insight into the dynamics of phytoplankton diversity in this dynamic system rather than, as suggested by the reviewer question their reliability.

Moreover, we had addressed the potential effects of hydrodynamics on the spatial distributions in the discussion. In the revised version, we will develop this a bit more adding a short discussion of the physical factors controlling phytoplankton activity in tropical ecosystems on short times scales (e.g. Torreton et al. Correspondence between the distribution of hydrodynamic time parameters and the distribution of biological and chemical variables in a semi-enclosed coral reef lagoon; Estuarine Coastal and Shelf Science; 74:766-776).

3. The authors mentioned that "methyl-mercury (MeHg) concentrations in the particulate phase were higher during the dry season" (p499 lines 4-8) and concluded that "Freshwater phytoplankton community composition was associated with dissolved methyl mercury and particulate inorganic mercury concentrations during the wet season, whereas, during the dry season, dissolved methyl mercury and particulate butyl tin species were important factors for the discrimination of the phytoplankton community structure." (p485 line 20-24). However, in Table 3, the concentrations of both particulate and dissolved MeHg in wet and dry seasons were very low, 0.00-0.02 in most of the stations, and there was no trend in seasonal variation.

We agree with the reviewer that the concentrations are low for some species (dissolved methyl mercury for example), however, for other species the concentrations are much higher. Moreover, despite the low concentrations of dissolved methyl mercury, there is a factor of over 3 difference between the two sampling periods. We will add a further number after the decimal to make this clearer. Furthermore, it should also be noted that these values are above the detection limit of the methods used and can therefore

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be considered as reliable. However, it is clear from the reviewers comment that the phrase they cite is too complex and so we will rewrite the sentence with clarity in mind.

4. Other issues: the manuscript is not concisely written and hard to understand.

Please see above and below comments, we will take care to keep brevity and clarity in mind whilst revising the manuscript.

Abstract

P485, lines 19, 21, 23 conclusion related to methyl mercury does not supported by the data, needs to be removed;

Please see the above comment.

P490 line 10, change “mans’ activities” to “human activities”.

This will be changed

P491 lines 24-25, change “(e.g., Duarte et al., 2007; Ullrich et al., 2001; Downs et al., 1998)” to (e.g., Downs et al., 1998; Ullrich et al., 2001; Duarte et al., 2007)” ; line 28, change “organo-tin” to “organotin”; line 29, change “Again, many” to “Many”.

This will be changed

P492 line 20, change to “The study sites were located in Bach Dang Estuary, North Vietnam. Bach Dang Estuary is a large”; line 23, change “The site is subject to a sub-tropical” to “This estuary is subject to a sub-tropical”.

This will be changed

Methods

P493 line 10 “Inorganic nutrients”, need to itemize the inorganic nutrients, give the full-names; line 26, change “Lugols” to “Lugol’s”.

This will be changed

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P494 line 20 changed “determined after” to “measured by”; line 28, change “was measured using NaH14CO3 following the method of Rochelle-” to “was measured following Rochelle-”

This will be changed

P495 lines 11-13, change to “The production rate of a sample was considered to be significant when the scintillation count of the sample was at least three times of that of the dark blank.”; lines 18-22, change to “Bacterial production (BP) was measured following Rochelle-Newall et al. (2008a) with the incubations conducted in the dark and at in situ temperature.”; line 26, change “the particulate and dissolved concentrations,” to “the particulate and dissolved concentration of metallic species""

These changes will be done

Results

P497 lines 14-19, change to “The meteorology and physical conditions of the two sampling periods differed considerably (Table 1, Fig. 2). In July, temperatures were higher (28.5–31.1 _C and 18.5–23.1 _C, for July and March, respectively) and river discharge was higher, reflecting the higher precipitation rates observed during the wet season (Table 1). For example, at Station 4, river outflow was 988m3 sôĂĂĂ1 in July as compared to 175m3 sôĂĂĂ1 in the dry season (March) (Vu et al., in preparation). Consequently,”

These changes will be done

P498 lines 14-15, change to “Concentrations of tin (Butyl-Sn) and mercury species varied between stations and season and fell within the range of those observed in temperate estuaries. For tributyltin (TBT), the concentrations of both particulate and dissolved forms were higher in the wet season than dry season; no significant difference of mono-butyl tin concentration was found between the two seasons. For di-butyl tin although the concentration of the particulate form did not vary significantly between

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the seasons at each station, the concentration of the dissolved form were significantly higher in the dry season for almost all the stations (Table 3)."

These changes will be done

P499 lines 1-10, change to "The concentrations of mercury species also varied between station and between season. As the general trend, the inorganic mercury concentrations (both particulate and dissolved forms) were higher in wet season than dry season. methyl-mercury (MeHg) concentrations were generally low (0.00-0.07 ngL-1); at some stations (e.g. Stns. 10, 15) the particulate form MeHg was higher in wet season, while at other stations (e.g. 18, 26) higher in dry season (Table 3)."

These changes will be done

Table 1. Change abbreviation for Station from "Stat." to "Stn."; the decimals for the values of the wet and dry seasons are no consistent for most of the items measured, e.g. Depth, Sal., Turn, Dip,....

These changes will be done

Reference P512 line 24-26, delete Navarro et al 2011 because this paper is still in preparation. P515 lines 9-11, delete Vu et al. 2011 because this paper is still in preparation. We will update these references.

Interactive comment on Biogeosciences Discuss., 8, 487, 2011.