Biogeosciences Discuss., 5, S1085–S1087, 2008
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Biogeosciences Discussions

Interactive comment on "Nitrification and inorganic nitrogen distribution in a large perturbed river/estuarine system: the Pearl River Estuary, China" *by* Minhan Dai et al.

Minhan Dai et al.

Received and published: 13 July 2008

Specific Comments

1) It is not clear why the nitrification rates were lower in the PR estuary than other estuaries with very high NH4 concentrations such at the Scheldt estuary.

We agree with the reviewer that the reason causing the difference in nitrification rates in different estuaries with similar NH4 levels is not fully understood. Generally, it should be related to the fact that nitrification reactions are also modulated by other environmental factors than NH4+, such as temperature, dissolve oxygen concentration, nitrifier abundance as being discussed and investigated in this paper and elsewhere (e.g., Bhaskar and Charyulu, 2005; Kemmitt et al.,2006; Kesik et al., 2006; Lyssenko and Wheaton,

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2006). This can be best reflected by the fact that NH4 was lowest in the summer yet the nitrification rate was higher in the Pearl River estuary.

2) If temperature is one of the main factors controlling nitrification rates, then why were the maximum nitrification rates found in March when water temperatures are near their minimum.

During the three seasons under investigation, average temperature is about 158451;, 198451;, and 318451; in Jan. 2005, Mar. 2006, Aug. 2008 respectively (Fig. 7a), and the NH4+ oxidation rate ranged from 0 to 5.4 umol N L8722;1 d8722;1 in Jan. 2005, 0.1 to 14.8 umol N L8722;1 d8722;1 in Mar. 2006; and 1.5 to 33.1 umol N L8722;1 d8722;1 in Aug. 2005. Thus the highest nitrification rate was actually observed in summer. It should be noted that good correlation existed between the nitrification rate and temperature, in which the nitrification rate was the average nitrification rate from all incubation stations, rather than single value.

3) P. 1564 line 20 - explain more clearly what are the 2 groups of nitrifiers.

Nitrosomonas is the most frequently identified genus associated with the first step of nitrification, ammonia-oxidizing bacteria oxidize ammonia to nitrite, although other genera, including Nitrosococcus, and Nitrosospira, some subgenera, Nitrosolobus and Nitrosovibrio, can also autotrophically oxidize ammonia. Nitrobacter is the most frequently identified genus associated with second step of the process, nitrite-oxidizing bacteria oxidize nitrite to nitrate, although other genera, including Nitrospina, Nitrococcus, and Nitrospira can also autotrophically oxidize nitrite. This will be added in the revised MS.

4)P. 1566 - line 23-25. This important statement/conclusion should be in the abstract.

We will do so in the revised MS.

5)P. 1565 - line 17 - you say that "oxygen is one of the most important factors interplaying with nitrification, yet in the abstract and conclusion you state that temperature

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is the most important and that oxygen concentration is of secondary importance.

As correctly pointed out by the reviewer that our data showed that temperature appeared to control nitrification rates to a large degree yet only clearly at a seasonal time scale. The spatial variability of nitrification rates was obviously controlled by a combination of many other factors, such as nutrient concentrations, nitrifier abundance and DO concentration. We will clarify and add this in both the abstract and the conclusion of the revised MS.

Technical P. 1564 line 16 - should be were (not was) Table 1 legend - should be hydrography (not hydrograph) Fig 1 legend - should be March (not Marcch) p. 1548 - line 21 -remove the semi-colon since this is not a complete sentence 8211; should be 8211;nitrificationrates with special 8212; The MS needs another revision to correct other errors in English and typos.

We apologize for the errors and will correct all of the typos in our revised MS.

Interactive comment on Biogeosciences Discuss., 5, 1545, 2008.