

## ***Interactive comment on “Recent advances in the biogeochemistry of nitrogen in the ocean” by S. W. A. Naqvi et al.***

### **Anonymous Referee #1**

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#### General comment

First of all I will thank the editor for the honor of reviewing this very interesting manuscript. This manuscript by Naqvi, Voss and Montoya summarizes the main scientific outcome of the SPOT-ON meeting on the marine nitrogen cycle held in Warne-muende, Germany in July 2005, which was organized by the authors. After a general introduction about the history and “state of the art” to the research on the marine nitrogen cycle, the manuscript is divided into 7 sections each dealing with recent advances and ongoing discussion in each of these specialized fields of the nitrogen cycle. The Manuscript gives a fair discussion about the views and arguments given by the various contributors and participants of the SPOT-ON workshop, with a bottom-line discussion or conclusion to each of the 7 sections by the authors of this paper. Although the pa-

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per is well written and interesting with a very broad reference covering most fields of marine nitrogen research, there are some minor points that I would like the authors to consider before publication.

Page 3: Thamdrup/Dalsgaard and co-workers 2002/2003/2004 was probably the first to detect anammox activity in sediments. They also reported a relation between the organic content and the relative importance of anammox and denitrification in sediments, which I think should be taken into this section

Page 4: On the discussion about the giant sulphur bacteria there are two references (Fossing et al and Schulz et al) which are claiming that these bacteria are denitrifying. Otte et al (AEM 1999) and more recently Preissler et al (ISME 2007) demonstrate that these bacteria are reducing the stored nitrate to ammonium (DNRA) and find little or no evidence for denitrification. Ammonium is not lost to the atmosphere which makes a significant difference for the role of these bacteria in the marine nitrogen cycle, consequently the authors should take this into account in this section.

Page 12:

The section on oxygen is problematic and as far as I can see there is no reference or data supporting the  $1\mu\text{M}$  oxygen concentration suggested as a limit for denitrification. Although some work exists on the effect and oxygen-tolerance of denitrifiers has been done on sediments (i.e. Bonin and Raymond *Hydrobiologica* 1990), no experimental data has been published on this for denitrification in water samples (to the best of my knowledge). Packard et al (DRS 1983) reported  $\sim 9\mu\text{M}$  as the limit for marine denitrifying bacteria which is very similar as recently reported oxygen tolerance of anammox activity (Jensen et al *L&O* 2007).

Low concentrations of oxygen in oxygen minimum zones is a difficult subject as conventional methods do not work for concentrations below  $1\text{--}2\mu\text{M}$ . Nevertheless,  $1\text{--}2\mu\text{M}$  oxygen might be very important for the N-cycling (reported N-Loss rates are all in  $\text{nM d}^{-1}$ ) and aerobic ammonium oxidation rates have been shown in oxygen deficient waters (Ward

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et al DSR 1989, Lipschultz et al DSR1990 Lam et al PNAS 2007). Because of the importance of this subject I would suggest the authors to extend the discussion on this subject. This statement cannot be left as it is.

In your evaluation please take into account the following aspects:

1) Does the paper address relevant scientific questions within the scope of BG?

**Yes**

2) Does the paper present novel concepts, ideas, tools, or data?

Yes

3) Are substantial conclusions reached?

**Yes**

4) Are the scientific methods and assumptions valid and clearly outlined?

**Yes**

5) Are the results sufficient to support the interpretations and conclusions?

**Yes, with one exception (see specific comment about oxygen above)**

6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

**Not relevant**

7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

**yes**

8) Does the title clearly reflect the contents of the paper?

**Yes**

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9) Does the abstract provide a concise and complete summary?

**Yes**

10) Is the overall presentation well structured and clear?

**Yes**

11) Is the language fluent and precise?

**Yes**

12) Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

**Yes**

13) Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

**No**

14) Are the number and quality of references appropriate?

**Yes with some exceptions (see comments above)**

15) Is the amount and quality of supplementary material appropriate?

Yes

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