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Biogeosciences Discussions

Interactive comment on "The significance of nitrogen fixation to new production during early summer in the Baltic Sea" *by* U. Ohlendieck et al.

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The significance of nitrogen fixation to new production during early summer in the Baltic Sea

1. This paper addresses N2 fixation, which is one of the most important biogeochemical processes. The main question was to estimate the amount of N2 fixation during summer, to compare it with primary production and to determine how much of it depend on N2 fixation and to localize N2 fixation in specific size classes. These questions are therefore all within the scope of Biogeosciences. 2. The methodology, ideas or concepts of this paper are not new, but the data are novel. 3. The data confirm earlier reports on N2 fixation except that these authors reach considerable higher estimates of new N over the period that they have measured than previous estimates by others.

However, this does not necessarily mean that the older reports have underestimated N2 fixation. There is still very little knowledge about the year to year variation of N2 fixation and the authors may have picked years with exceptional high rates of N2 fixation. The authors could not confirm the claim of Wasmund et al. (2001) that non-heterocystous, putative picocyanobacteria fix N2. They confirmed their previous report (Ohlendieck et al. 2000) that N2 fixed by the heterocystous cyanobacteria is transferred to the picocyanobacterial fraction. This is also in agreement with other ideas and results (e.g. Stal and Walsby 2000), although the tiny filamentous cyanobacterium Pseudanabaena could potentially fix N2 (Stal et al. 2003) and has recently been shown to express nifH (Stal, unpublished). 4. The authors used 15N and 14C assimilation to study N2 fixation and primary production. They carried out these measurements correctly and with care. 5. It is the first time that such a comprehensive basin wide study of N2 and primary production has been carried out in the Baltic Sea. The results presented in this paper support the interpretations and conclusions of the authors. 6. The authors have carefully described the methods that they have applied and can be reproduced by other scientists. A minor point of criticism is the reference to Meyerhöfer 1994 that is probably not easily accessible, yet essential for the HPLC pigment analysis. The authors (which include Meyerhöfer) may wish to consider leaving out this reference and including the necessary information in this paper. 7. The authors have given credit to all other related work and clearly indicated their own original contribution. 8. The title describes exactly the contents of this paper. 9. The abstract provides a concise and complete summary of the contents of this paper. 10. The structure and presentation of this paper is excellent. 11. The paper reads very well and language is fluent and precise. 12. All mathematical formulae, symbols, abbreviations, an units are correctly defines and used. 13. The manuscript is excellently organized; no recommendation to clarify, reduce or combine parts. 14. The number and quality of the references is excellent. The only minor points are: I haven't seen the Redfield et al. (1963) cited in the text. On page 1292 the citation of Konopka et al. (1985) does not appear in the list of references and the reference Konopka et al. (1987) is not cited in the text. Probably the

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year 1985 should be changed into 1987. 15. There was no supplementary material.

Minor editorial points:

Abstract: line 16: exchange ‘suggest’ for ‘suppose’ Results: page 1288, line 18 and 20: it is unclear to me what was done here. Line 22: change to: very low rates or no N2 fixationĚLine 24: what do you mean by integrated median rates? Integrated over 24 h period? Page 1289: line 8: of the total rate: what rate do you mean? Discussion: page 1294, line 10-15: the authors should consider the possibility that picocyanobacteria in the Baltic Sea may produce larger aggregates.

In summary, this is an excellent piece of work and an important contribution to our understanding of the nitrogen cycle and primary production during cyanobacterial blooms in the Baltic Sea.

Interactive comment on Biogeosciences Discuss., 3, 1279, 2006.