



Interactive comment on “Seasonal cycling of phosphorus in the southern bight of the North Sea” by C. van der Zee and L. Chou

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Received and published: 28 December 2004

We are pleased with the review and would like to thank anonymous referee #3 for his/her comments and suggestions in final review. Alas, we are not able to travel in time. Please find our response to the points raised below.

P683/2-5 A reference to the article of Smith et al. (2003) has been included in the introduction.

P683/21 TN and TP have been rewritten as total N and total P.

P684/4-6 The annual loads have now been expressed in mol instead of kt and the TN loads are replaced by the nitrate loads to make it better comparable with the phosphate loads given.

P684/18 DIN has been defined as dissolved inorganic nitrogen.

P684/22-25 The paragraph has been amended.

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P685/6-7 We have changed the sentence to: “This part of the North Sea is highly influenced by the eutrophied rivers Scheldt and Rhine, and oceanic water flowing from the Atlantic through the Channel into the North Sea.” We do not think that the low salinity plume off the Belgian coastal zone is exclusively due to the input of freshwater from the Rhine. When we extrapolate the nitrate and silicate wintertime concentrations to zero salinity, we obtain values of $235\mu\text{M}$ Si and $353\mu\text{M}$ NO₃. These values correspond well with the zero-salinity values in the Scheldt of $211\mu\text{M}$ Si and $344\mu\text{M}$ NO₃ in winter. Much lower values of $119\mu\text{M}$ Si and $214\mu\text{M}$ NO₃ were measured in the Rhine at Maassluis. We will add all DOC data or leave all of them out in our revised manuscript.

P685/20 That part has been omitted.

P686/4-5 Information has been provided.

P687/21 - P688/6 We will add all DOC data or leave all of them out in our revised manuscript.

P687/21 - P688/6 The figure has been changed. POC is now expressed in mg/L.

P687/21 - P688/6 A new figure has been added (Fig. 3) which includes the POC:Chla and POC:SPM ratios. The corresponding results section has been rewritten. The contribution of resuspended sediments has been commented accordingly. The end of section 4.1 (P691/5-7) has also been altered in this light.

P688/18 No it should not, because the four species measured were nitrate, nitrite, ammonium and DON. Of those four, nitrate was the dominant one. Subsequently we continued with only three species: nitrate (nitrate+nitrite), ammonium and DON.

P690/22-24 We do not envision any mechanism that would cause rapid removal of DOP in the salinity range <32 during the whole year. The paragraph about DOP and DON in section 4.1 has been rewritten. There seems to be a riverine source for DON, whereas that is not apparent for DOP.

P690/25 We have replaced “intensity” with “timing”.

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P691/21-24 We have now discussed the difference in timing of the spring bloom initiation (starting in the southwest and spreading to the northeast).

P692/1 The reference of De Galan et al. has been updated.

P692/5-6 The references of the Scottish rivers by Balls have been omitted. Instead, data from 2003 of the Rhine and Scheldt have been added in order to make our point.

P693/9-11 The statement has been omitted.

P693/16-19 Please note that the cruise in May 2003 took place at the end of the month, on the 26th, by that time the *Phaeocystis* bloom had ended. Pigment analyses and microscopic cell counts were conducted on the same samples obtained during the Zeeleeuw cruises (Rhia Gonzales). Her data showed a dominance of *Phaeocystis* in April 2003 at all stations except at station ZG02 (not sampled in April) and station 700 (only about 35% contribution to the total Chl a), but not in May 2003. Microscopic cell counts showed the presence of *Phaeocystis* only in March and April 2003. The second paragraph of section 4.3 and Table 2 have been revised.

Table 1. The units of latitude and longitude have been added (also at P684/9)

Table 1. All figures were correct and the table was incorrect. In the table “2003” and “2004” have been changed to “2002” and “2003”, respectively.

Interactive comment on Biogeosciences Discussions, 1, 681, 2004.

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