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Interactive comment on "Distributions and stoichiometry of dissolved nitrogen and phosphorus in the iron fertilized region near Kerguelen (Southern Ocean)" *by* S. Blain et al.

Anonymous Referee #2

Received and published: 10 September 2014

General comments:

This is an interesting study with a good dataset that presents vertical distributions of both inorganic and organic nitrogen. Overall, the manuscript is well organized although there are some sections that need attentions either in the presentation or the use of English language. This paper should be published after some improvements are made.

Specific comments:

Abstract:

Please revise accordingly after revising the other sections.

Introduction:

Page 9951, L17: please use "air-to-sea flux of CO2".

Page 9951, L24-27: please reword. While it is true that many models do not explicitly simulate the iron cycle, there is a problem in the statement. Besides, one reference does not represent "many".

Page 9952, L1-8: the authors could emphasize: (1) there has been evidence of N and P decoupling over various spatial and temporal scales in the Southern Ocean, which is associated with both physical and biogeochemical processes (there are more relevant references, which should be cited); (2) data of DON and DOP have been lacking.

Materials and methods:

Please provide more information such as sampling time and locations. I would recommend the authors to combine the sampling and analyses sections.

Page 9953, L11: please reword so readers know that you measured both inorganic and organic N and P. The method for nitrite is also needed.

Results:

The first paragraph belongs to the M&M.

Please rephrase: page 9953, line 17; page 9954, L17-19 and L23-25; page 9955, L1-3.

Page 9955: section 3.2.1 needs improvement, particularly on DON dynamics.

Page 9958, section 3.3.2: please make it clear that the Feb data were from 2013, but others from 2011. I would think that this section could be moved to the discussion section because (1) there may be uncertainties in your estimates of stocks given that there is a considerable difference in PO4 concentration below 200 m between Oct and Nov, 2011; (2) the authors may calculate the ratio of depleted NO3 and PO4, which is relevant (see page 9959, line 20-28).

Please pay attention to the tense. There are places with mixtures of present and past tenses.

Discussion:

Page 9959, L7-10: please reword.

Regarding the N* minimum between 100-200 m, I have some comments. I don't think that it is caused by preferential remineralization of OP, which should occur at all the depths. It may be linked to changes in the community structure thus N/P uptake ratio over time and/or space. Nitrate to phosphate ratio is often <16 in the Southern Ocean, and there has been evidence of subsurface minimum of NO3:PO4 ratio (e.g., in AU9309 and AU9706), which would lead to minimum N* in the subsurface.

Figures:

Please use the same orders for labels and sub-plots. For example, in Fig 4, both A3-1 and A3-2 may have an order of NO3, DON, TDN, σandθin labels; Figs 5 and 6 have similar problems; Figs 7 and 8 should use the same order, e.g., (a) nitrate and (b) phosphate.

Interactive comment on Biogeosciences Discuss., 11, 9949, 2014.