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# *Interactive comment on* "Spatio-temporal patterns of C : N : P ratios in the northern Benguela upwelling regime" *by* A. Flohr et al.

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The submitted manuscript deals with patters of C:N:P: ratios in an upwelling region of the SE Atlantic Ocean. The manuscript has a clear focus and deals with a very topical issue, i.e. the nitrogen (and phosphorus) cycle in a low oxygen environment. The paper is clearly written, but there are a couple of issues which require clarification (see below). In addition, the captions contain numerous spelling errors. The data is of good quality, and the interpretation is sound (apart from a number of issues mentioned below). The open question that remains after reading the paper is what is driving the temporal N* variation in the SACW. The authors hint at variations in diazotrophy, but would be the forcing factor for this be. It will be good for the authors to explore this SACW N* issue somewhat further.

I recommend publication following moderate revision.

Specific comments: P 10460 Line 1: This starting sentence is unfortunately incorrect. The Redfield ratio of N and P in phytoplankton biomass shows a good similarity (obviously with interesting deviations) with deep ocean soluble N:P concentration ratios. However, the C:N and C:P ratios of phytoplankton biomass are very different to the deep ocean concentration ratios of these elements. A similar case for O2:N and O2:P. The C:N and C:P and (corresponding O2) ratios are important for assessment of uptake and remineralisation processes, but not steady state concentrations. The second sentence consequently needs to be reconsidered and rephrased as well. P 10460 Line 9: to study the impact of what? Unclear phrasing. P10460 Line 14: only the P level changes, hence not the complete Redfield Ratio changes. P10461: Line 5: In not many cases is C availability limiting phytoplankton growth. There are a number of examples of improved growth at high pCO2 which indicate that enhanced C availability will reduce reliance on the carbon concentration mechanisms and hence be energetically favourable. N, P and Fe are far more important in controlling oceanic primary productivity. P10461: Line 9: The Redfield ratio is a set and defined number and does not change with time or space. You actually mean the nutrient ratios. P10461: Line 10: The nutrient ratio in seawater does not really matter to the organisms as long as it is available plentiful supplies. Only upon exhaustion of one of the nutrients does the ratio become important. P10461: Line 12-18: see my comment on the text in the abstract. P10462: Line 4: produced instead of raised P10463: Line 6: Eastern South Atlantic Central Water P10466: Line 1: The VINDTA 3c uses the semi-closed cell titration principle. The cell is actually an open cell but the sample is titrated as if it were in closed cell (as no CO2 purging takes place). P10466: Line 18: Were the ammonium concentrations measured in this study? Why are they not reported? They are very useful for the assessment of the various N cycling processes. Fig. 4. In case salinity corrected alkalinity is used, then also DIC needs to be salinity corrected when plotting these variables against each other. In the current graph a bias in the slope occurs due to the fact only TA is salinity corrected P10469: Line 17-21: see my comments on the



BGD
10, C4640–C4642, 2013





abstract. Phrasing here is awkward.

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