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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.

Anonymous Referee #1

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General appreciation: Overall this is an interesting manuscript discussing the C:N:P cycling in the Benguela upwelling area. The study reveals the potential significance of the PO4 that is released from Namibian shelf sediments, upwelled and advected to more northward located areas, where this extra PO4 sustains N2 fixation. This newly fixed N is then advected southward with SACW eventually to be reduced in OMZ waters. The authors underline the need for N2 fixation studies at the northern edge of the NBUS system.

Comments: Section 2.3, p10466: please show the appropriate T-S diagrams. Section 3, P10467, line 6-8: this sentence is too long and not very clear; please reformulate; Section 3.1, p10469, Line 1: This is in line (is was missing) . . .; Lines 4 to 11: this section is not very clear. Make clear what causes the PO4 maximum and where. Do

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the authors suggest the PO4 max in the Kunene section originates from PO4 efflux ? Also, may be redraw Figure 5 by showing the ODV plots of NO3 and PO4 with O2 iso-lines superimposed instead of the opposite. Section 3.2, p10470, Line 15: "... the decomposition of organic matter exported locally from the surface .." ; Lines 18-19: "This variability was .." be more explicit here. What is it you want the reader to discover from Fig. 7 ? Line 17 p10470 till end of section 3.2: The discussion about N*: Subsurface positive N* values are attributed to nitrate remineralised from OM produced by N2-fixers and advected southward with SACW. The nice coincidence of the subsurface N* max with the O2 min waters (Figure 9; Kunene section; offshore stations) thus reflects this remineralisation, right ? But nothing is said here about the negative N* vales in the very surface waters (due to Ekman transport of upwelled water?) and in deeper water, where O2 is plentiful. May be the use of the global equation to calculate N* is not fully appropriate here, and regional, local, variations in the NO3/PO4 ratios need to be taken into account; see recent paper by Singh et al. (DSR I, 93, 2013). This needs to be discussed further. Section 3.3, Page 10472, Line 12, sentence starting with "Since the mud belt is a geological feature .." what is the reader supposed to deduct from that statement? Please be more explicit. Further down sentence "...variability of that P source depends .." authors mean P* source ?

Graphs: Figure 1: ESACW is defined as Eastern South Atlantic Central Water, but in the text at p10463 is is called Eastern South Altantic Water .. please check for other typos Figure 3: please use different symbols which eventually also are visible in a black and white print out; avoid grey shadings; correct inserted legend of 3 a: Benguela; Figure 4 legend: lots of typos here; please check; the legend mention 'lines' but these are arrows of which only 2 of the 3 are explained in the legend. Figure 5: Increase size of the graphs. Suggestion: inverse the representation: show ODV plots of NO, PO4 and superimpose O2 isolines Figure 6: How was the gridding obtained for the December cruise between Rocky Point and Walvis Bay (since the central part of the area was not sampled) ? Idem for the off-shore region in February. Figure 9: Indicate the months the sampling took place. Figure 10: Specify the months and indicate in the

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figure caption this is the section off Walvis Bay. Figure 11: blue dashed line and grey shadings are barely visible.

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