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Interactive comment on "Intact polar lipids of Thaumarchaeota and anammox bacteria as indicators of N-cycling in the Eastern Tropical North Pacific oxygen deficient zone" *by* M. Sollai et al.

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We thank Dr. Schwab for her comments. Below we respond to them and indicate how we have modified the manuscript. As you will see, we have followed most of the suggestions included in the comment. The revised manuscript will be uploaded when required form the editorial system. In particular, see Q for questions and A for answers.

Q1. In this paper, the authors investigated the occurrence and distribution of ammonia oxidizing archaea (AOA) and anaerobic ammonia-oxidizing (anammox) bacteria in the

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Eastern Tropical North Pacific (ETNP) oxygen deficient zone (ODZ). The source specific biomarkers hexose-phosphohexose (HPH)-crenarchaeol and the phosphatidylcholine (PC)-monoether ladderane are used to trace changes of AOA and anammox, respectively in the water column. The occurrence of these microorganisms at different depths of the water column of a coastal and an open ocean setting is discussed. In the coastal setting, the AOA dominated between 25 to 35 m, whereas anammox dominated between ca. 40 to 70 m. In the open ocean setting, both organisms dominated between 90 to 110 m. This article addresses an important topic, which is a possible relationship between different ammonia- oxidizing organisms in anoxic environments and their relation to the marine nitrogen cycle. I recommend publication in Biogeosciences after the authors consider some issues below that may improve the clarity.

R1. We thank Dr. Schwab for the time dedicated to review our manuscript and the positive assessment.

Q2. The discussion about possible causes, which may explain differences in the ecological niches of the AOA and anammox between both settings, is poor and not clearly structured. Maybe plots comparing the abundance/distribution of nutrients and oxygen with the specific biomarkers between both settings as in Fig. 3 would be useful. This might help to differentiate/characterize the effects of these factors on the AOA and anammox distribution between both settings. In Page 4846_upper lines, the authors suggested that different local circulation may explain such variations, whereas page 4848 line 5-10, they bring the possibility of difference source and availability of organic matter. I think all these hypotheses should be put and discussed together considering circulation, location, availability/concentration of NO3-, NO2-, NH4+ ,O2 and terrestrial organic matter input...

R2. We respectfully disagree with the assessment of Dr. Schwab that “The discussion about possible causes, which may explain differences in the ecological niches of the AOA and anammox between both settings, is poor and not clearly structured”. We believe that possible causes of the divergent distribution of the two microbes be-

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tween the two settings were already engaged in the Discussion section of the submitted manuscript and we are confident to have further improved the manuscript thanks to the stimulating comments received. With respect to the role of the nutrients required by AOA and anammox bacteria (i.e. NO2-, NH4+) in explaining the differences observed at the two sampling sites, in a preliminary version of the manuscript we considered plotting their concentrations versus the abundance/concentration of the biomarkers employed in the study (i.e. HPH-crenarchaeol and PC-monoether ladderane). However, since no evident relationship was found, those plots were excluded from the final version for submission: these plots are shown in the attached files Fig. 1 and Fig. 2. We will include a brief explicative statement on this matter in the Discussion section 4.2, page 16, line 3, of the revised manuscript.

Q3. Small comments: Table 1: Add NO3- concentration and concentration of the AOA and anammox biomarkers in the table. Fig.1: would be great to see the different currents in the figure.

R3. We are thankful for the suggestion. We will complement Table 1 with additional information as suggested. Regarding the currents in the ETNP ODZ at the time of our sampling campaign, satellite images do not show any specific feature such an eddy for instance that involves our sampling sites: the coastal site looks primary influenced by coastal currents, weather the open ocean one by oceanic currents. We attach two files (Fig. 3 and Fig. 4) showing this.

Interactive comment on Biogeosciences Discuss., 12, 4833, 2015.

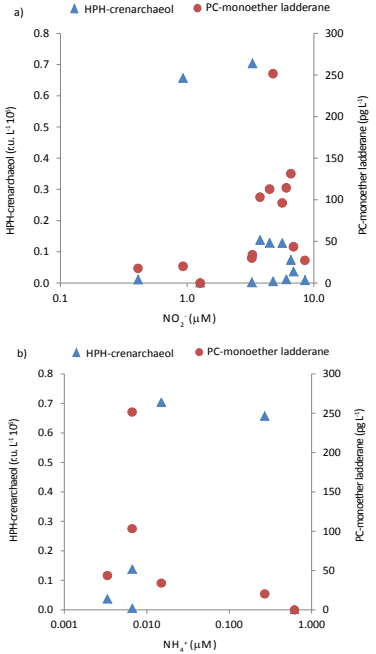

Fig. 1. Abundance of HPH-crenarchaeol (r.u. L-1) and PC-monoether ladderane (pg L-1) lipids versus (a) NO2- (µM) and of (b) NH4+ (µM) at the coastal site.

Fig. 1. Reply to Dr. V. Schwab (C243) - M. Sollai - Fig. 1

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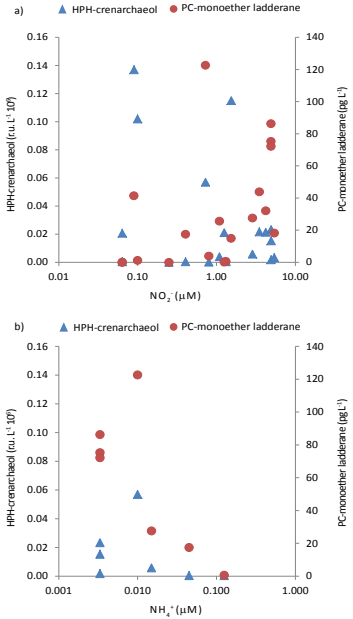

Fig. 2 Abundance of HPH-crenarchaeol (r.u. L-1) and PC-monoether ladderane (pg L-1) lipids versus (a) NO2- (µM) and of (b) NH4+ (µM) at the open ocean site.

Fig. 2. Reply to Dr. V. Schwab (C243) - M. Sollai - Fig. 2

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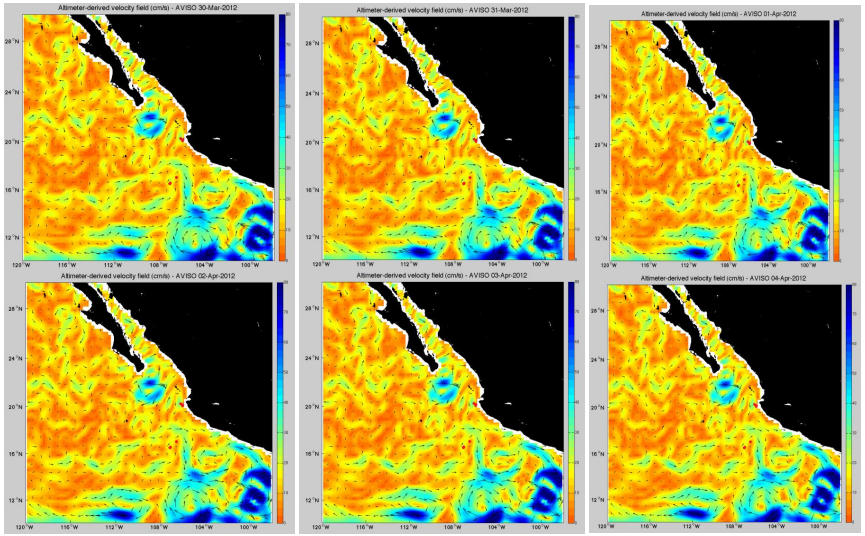

Fig. 3 Satellite pictures showing the currents in the ETNP ODZ during the ETNP (TN278) cruise (R/V Thomas G. Thompson, March-April 2012), relative to the coastal sampling sites (in red).

Fig. 3. Reply to Dr. V. Schwab (C243) - M. Sollai - Fig. 3

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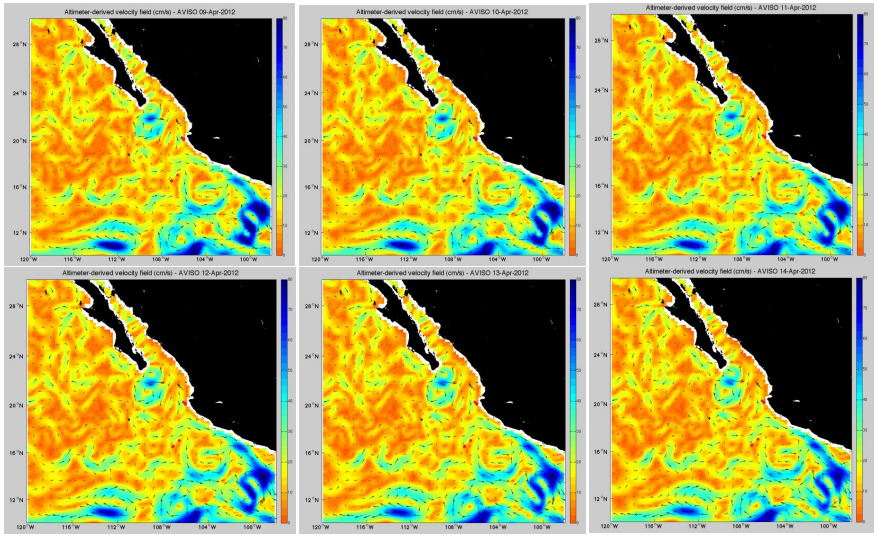

Fig. 4 Satellite pictures showing the currents in the ETNP ODZ during the ETNP (TN278) cruise (R/V Thomas G. Thompson, March-April 2012), relative to the open ocean sampling sites (in red).

Fig. 4. Reply to Dr. V. Schwab (C243) - M. Sollai - Fig. 4

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