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Biogeosciences Discussions

Interactive comment on "Transfer of diazotroph-derived nitrogen to the planktonic food web across gradients of N_2 fixation activity and diversity in the Western Tropical South Pacific" *by* Mathieu Caffin et al.

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The manuscript by Caffin et al. addresses the important question on how much fixed N is transferred to the dissolved versus the particulate planktonic pool. Caffin et al come up with a nanoSIMS based study to not only make this distinction, but to also show that the composition of the diazotrophic community has an impact on the subsequent channeling of N in the Ocean, and they could identify that Trichodesmium promotes a transfer to the dissolved phase, while UCYN-B would promote transfer to non-diazotrophic plankton (mostly picocyanobacteria, followed by heterotrophs). In-

triguingly, a higher share of the N pool was transferred to higher trophic levels when Trichodesmium dominated, however, an overall high transfer efficiency was observed in UCYN-B dominated environments. The manuscript is, to my knowledge, one of the first to address the channeling of N through the food web, with that it critically advances the understanding of N2 fixation in the Ocean. I thus highly recommend publication after addressing the following general and specific recommendations.

General comments:

Overall, the manuscript seems to need a bit of streamlining. I see, this is not an easy job to do and I appreciate the thorough introduction and methodological explanations, as well as the detailed description of the results. However, it seems a bit of an overkill given the obvious key results of the two modes of DDN channeling and its subsequent transfer to higher trophic levels. I recommend to reduce the length of the text in order not to dilute your findings.

In the context of the discussion of DDN transferred to zooplankton, either directly or indirectly, I would like to see a link to export production, which may be extremely important in the context of enhanced CO2 uptake through certain ecosystem compositions.

I am a bit worried about two things: first, some share of what you measured may be an artefact due to Trichodesmium's sensitivity to mechanical stress, second, samples were taken using two different methods, i.e. from Niskin bottles and from a pump system, the latter of which is suspected to disrupt cells. Please address those concerns.

Specific comments:

p.1

l. 15: What do you mean with atmospheric- I assume dust input? In a way N2 fixation is atmospheric.

l.16: Which technical limitations- such as tracing the isotope fractionation? That's possible at least to a certain degree

l. 25: this is somewhat difficult to understand as it seems contradictory to the previous sentences. Please clarify that you are referring to the pool that is transferred to plankton

l. 30: Please add an explanation, here, otherwise it seems contradictory to the previous statements

p.2

l.9: Add the study by Duce et al, 2008.

l. 14: I identified some archaea being important in the Pacific, feel free to add the reference (or even not, Löscher et al, 2014 in ISMEj)

l. 31 N2, 2 has to be in subscript

p.4

l.16, l.21: 15N, 15 in upper case

l. 20: Why would Trichodesmium be toxic?

p. 5

l. 15 onwards is largely the exact same text as in ' In depth characterization of diazotroph activity across the Western Tropical South Pacific hot spot of N2 fixation' by Bonnet et al. As there is no point to repeat that, I would recommend to refer to this manuscript instead of having such a strong overlap.

p.8

l.17, l.23, p.9, l.11: please mind the upper and lower cases

p.10

l.28: I would like to see the rates as per day

p.11

l.1 under the form of DON- sounds awkward, please rephrase

l.17 Sentence sounds awkward, please rephrase

l. 19 What bacteria? I assume, non-phototrophic ones. . .please clarify.

l. 29 down to what?

p.11

l.7: I don't quite get this conclusion.

p.12

l.5 + in upper case

l.27 This is actually worrying, thus all of it may be an effect of how Trichodesmium is treated during the experiments

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