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Biogeosciences
Discussions

Interactive comment on "Deep-sea sponge grounds as nutrient sinks: High denitrification rates in boreo-arctic sponges" *by* Christine Rooks et al.

Christine Rooks et al.

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Dear editor, dear reviewers,

Sorry for the delay and thank you for your patience. Please find our replies to all reviewers' comments uploaded. Here we summarize the most important changes in the manuscript:

1. We realized that the incubation experiments were not clearly described in the method section, in particular it was not clear which kind of 15N species was added to which experiment. This caused some fundamental misunderstanding about the

method for Ref 1 and 3. This is now corrected and explained. 2. Challenged by some critical comments by Ref 1 and 3 about calculation of denitrification rates, the first author CR re-calculated all the rates from scratch, going back to integration of peak areas and data plotting. This resulted in a change of some of the final denitrification rates, which however did not affect the main story of the manuscript. 3. By going through the entire raw data set again, CR discovered a column mix-up between 29N and 30N data, which has lead to the surprisingly high rates for coupled nitrification-denitrification in our previous manuscript version. The new rates make much more sense and make a better fit with previously reported values. 4. We updated figures and tables accordingly, an updated data set was sent to PANGAEA.

We are aware that in an ideal world, we should have discovered these errors already before the first submission. However, this also shows that the peer review system works, and we are grateful to the critical reviewers who helped to improve the manuscript.

Finally, we are aware that there are some mistakes in the format of the in-text citations and the reference list. Reference format is generated automatically through EndNote each time we open the document. We will do the final formatting manually when the manuscript is accepted and no references have to be removed or added.

I also would like to send the revised data set (the PANGAEA publication is not publicly available yet) but do not know how to do this (it is in excel format). I submitted the cleaned version of the manuscript (no tracked changes) as a figure as I did not find any other options to post it. I submit the revised manuscript including tracked changes as supplement file.

Please also note the supplement to this comment:
https://www.biogeosciences-discuss.net/bg-2019-135/bg-2019-135-AC1-supplement.pdf

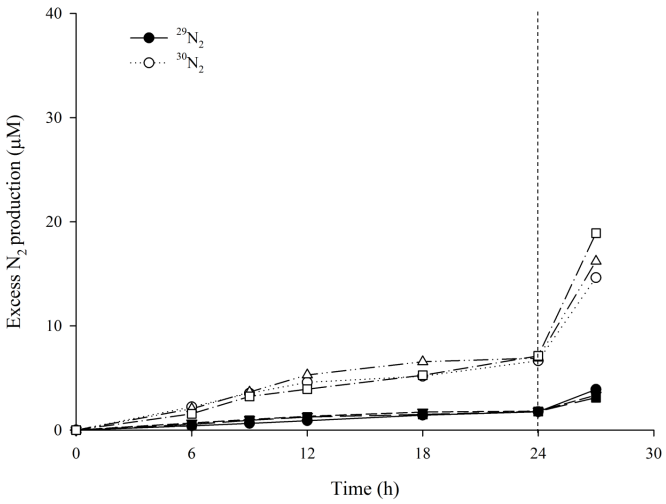
40
30
20
10
0
0
6
12
18
24
30
$^{29}N_2$
$^{30}N_2$
Excess N_2 production (μM)
Time (h)

Fig. 1.

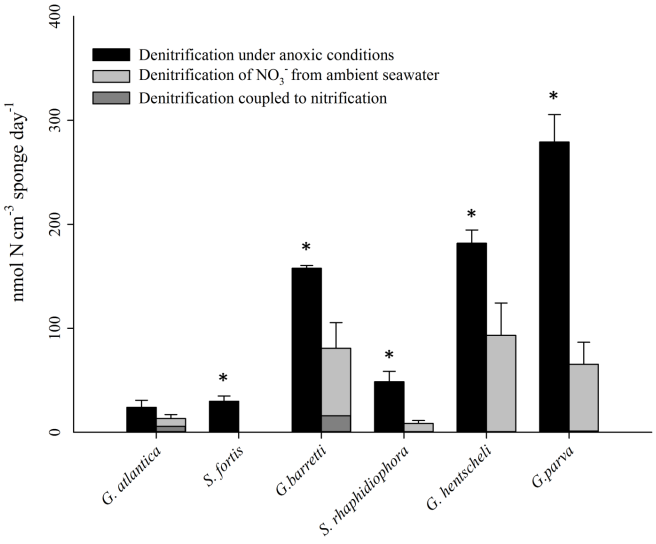
Denitrification under anoxic conditions
Denitrification of NO_3^- from ambient seawater
Denitrification coupled to nitrification
nmol N cm^{-3} sponge day^{-1}
0
100
200
300
400
*
G. atlantica
S. fortis
G.barretti
S. rhaphidiophora
G. hentscheli
G.parva

Fig. 2.

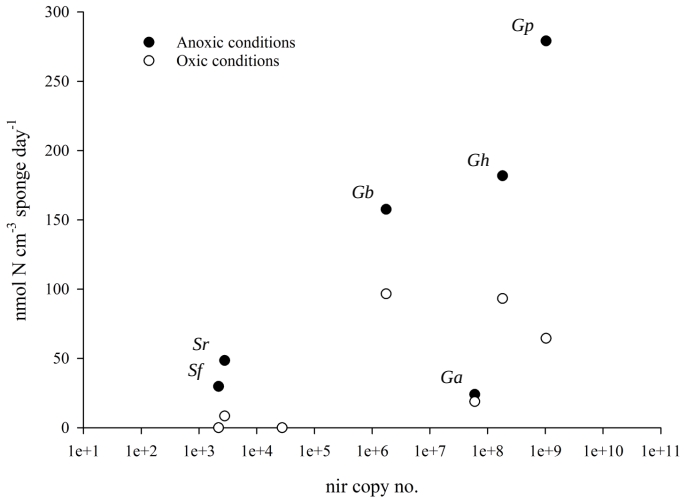
Anoxic conditions
Oxic conditions
nmol N cm^{-3} sponge day^{-1}
0
50
100
150
200
250
300
Gp
Gh
Gb
Sr
Sf
Ga
1e+1
1e+2
1e+3
1e+4
1e+5
1e+6
1e+7
1e+8
1e+9
1e+10
1e+11
nir copy no.

Fig. 3.

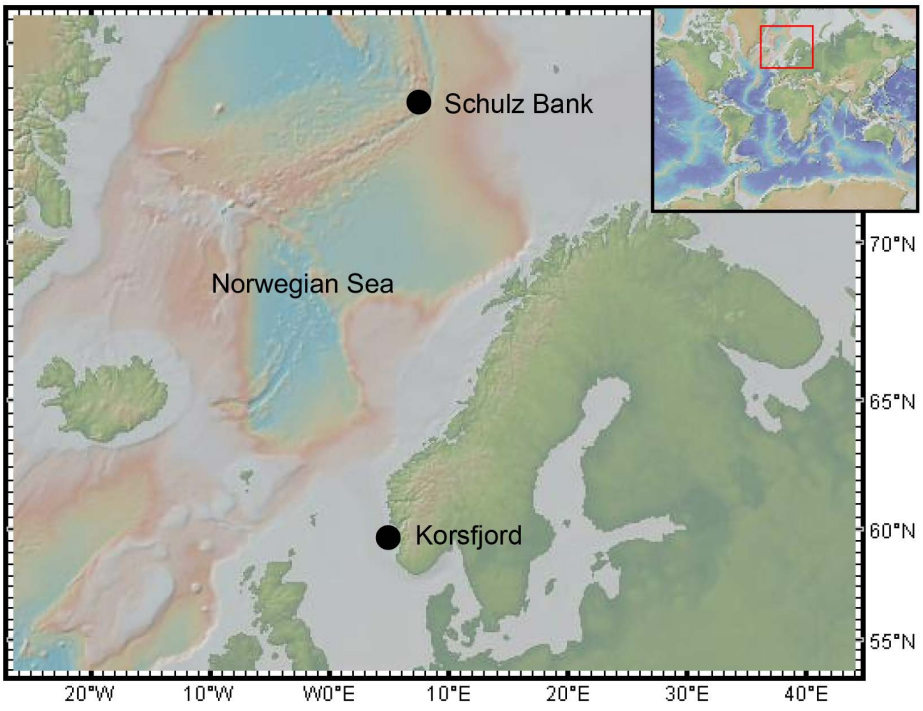

Fig. 4.

Deep-sea sponge grounds as nutrient sinks: High denitrification rates in boreo-arctic sponges

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Key words: Denitrification, nitrification, boreal, Arctic, deep-sea sponges, sponge grounds.

Fig. 5.