Interactive comment on “High denitrification and anaerobic ammonium oxidation contributes to net nitrogen loss in a seagrass ecosystem in the central Red Sea” by Neus Garcias-Bonet et al.

Anonymous Referee #3

Received and published: 20 September 2018

General comments: This manuscript presents the results of a field study comparing nitrogen (N) removal (denitrification, anammox) and fixation rates in a seagrass meadow sediments and adjacent bare sediments. The authors found that N removal exceeded N2 fixation in vegetated and bare sediments and that sediment OM and water temperature were important drivers of N processing rates. The manuscript is generally well written and provides valuable insight into N-cycling in seagrass beds. The inclusion of previously published N-cycling rates in the discussion provides useful context for the results. Specific comments: 1) As mentioned by the other referees, the discussion should mention the limitations of the acetylene reduction method for measuring N2 fixation.
2) One of the strong points of the study is the in-depth measurements of N-cycling rates. However, because there were so many comparisons, presenting these measurements can be difficult. Results section 3.2 (“Denitrification, anammox and N2 fixation rates”) is dense and difficult to follow. I would suggest breaking this section into subsections, either by experimental variable (i.e. effect of a) vegetation, b) sediment depth, c) OM, d) temperature on denitrification/ anammox) or process rate (i.e. a) denitrification, b) anammox, c) fixation in vegetated vs. unvegetated sediments, at different depths, relationship with OM and temperature). It would be helpful to readers to do a separate results section for plant material N2 fixation rates as well.

3) In some cases there are references to significant interactions with no description of what is occurring (e.g. L347-351) beyond references to the figures, which do not indicate statistical differences. Were these interactions ecologically meaningful? If not, it might be better to report these results in a supplemental table to keep the results streamlined.

4) Lines 450-450 of the discussion the authors argue that OM quality is an important driver of N2 fixation but do not present it in the context of their system. Are you arguing that E. acoroides in vegetated sediments and algal biomass in unvegetated sediments are providing labile OM sources to N2 fixers?

5) In the introduction (L99-107), consider stating objectives rather than what was measured to help readers better process the results.

6) L184: Include the equations in the text.

Technical corrections: L76: should be: Salt et al. (2017) L176: How much is a few? Do you have an actual detection limit? L210, 226: should be: “We ran” L322: “were large” –They really weren’t large compared to denitrification, and this qualitative description is not appropriate for a results section.


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