Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-377-RC1, 2017

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Cyanobacterial species richness and *Nostoc* highly correlated to seasonal N enrichment in the northern Australian savannah" *by* Wendy Williams et al.

Anonymous Referee #1

Received and published: 5 October 2017

Williams et al examined Cyanobacteria species present in biocrust along with many other parameters pertaining to biological productivity (N fixation and bioavailable N) across the rainy season with the overall finding that species richness correlates with N enrichment. Overall, the findings are critical for the biocrust (and overall soil) community especially because Cyanobacteria are such important features to these ecosystems. As expected, they demonstrate evidence supporting this claim.

However, there are some flaws in the methodology that are critical to the central findings of this article. These either need to be explained more thoroughly or additional experiments conducted.

Printer-friendly version

Discussion paper

Specific areas of concern include:

-Identification of species “richness”. The method by Anagnostidis is a very classical method of classifying cyanos based on morphology, but this is quite outdated and not a very reliable metric of species “richness”. From this approach, how exactly is abundance and richness determined? Can you really differentiate the different species (of, for example, Microcoleus) using this visual approach? If samples are still available, the authors should consider 16S sequencing. At the very least, they should extract the pigment Scytonemin as another proxy for the abundance of N-fixers present in their sample.

-The methods overall are a bit difficult to follow. Why were samples reactivated in a glasshouse? Which samples were reactivated (just for the ARA assay)?

-Please summarize the method used to measure bioavailable N.

-How were samples collected (were they cored) and how were samples stored after collection? Were they stored at all or were they analyzed immediately?

-More details are needed for the statistics section (2.3.4) especially pertaining to section 3.2. For example, how were significant differences determined?

-In the first sentence of the discussion, it says that isotopic signatures for 15N2 clearly demonstrate that cyanobacteria were the primary source of bioavailable N. The results that are presented do not “clearly” demonstrate that. It says that nitrogen fixation is correlated with cyanobacteria richness (and with certain species), but it can not be ruled out that other N-fixers are present. This is especially true for other biocrusts where the cyanobacteria are not the primary N-fixers.

Technical corrections:

-There are many missing commas especially at the beginning of sentences throughout the entire manuscript.

-P1 L12: “Many cyanobacteria fix dinitrogen. . .” (some don’t)

-P1 L18: “74% of the identified biocrust cyanobacteria in varying proportions. . .”

-P1 L20: This sentence doesn’t make sense. Maybe deleted “It was established”.

-P2 L3: “The northen Australia savannah. . .” (singular?)

-The Rossi et al, 2017 manuscript is now published.

-P3 L4: “Cyanobacterial mediated N fixation results in. . .”

-P5 L17: Bold

-P 6 L5/6: Again add “74% of the identified biocrust cyanobacteria”. Also, isn’t the range 51-93%? Delete “throughout the season”.

-P6 L14: change to “before decreasing by more than half across January. . .”

-P8 L1 and 2: confusing sentence. Maybe change to “It had been previously shown that the biocrust has high carbohydrate enzymatic activity relative to the underlying soil. . .”

-P8 L9: change “reabsorbed” to “consumed”

-P8 L21: “global averages of biocrust N-fixation. . .”

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2017-377, 2017.

Printer-friendly version

Discussion paper