

Biogeosciences Discuss., referee comment RC1
<https://doi.org/10.5194/bg-2021-52-RC1>, 2021
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Comment on bg-2021-52

Anonymous Referee #1

Referee comment on "Hydrographic fronts shape productivity, nitrogen fixation, and microbial community composition in the southern Indian Ocean and the Southern Ocean" by Cora Hörstmann et al., Biogeosciences Discuss.,
<https://doi.org/10.5194/bg-2021-52-RC1>, 2021

This study evaluated the impact on carbon and nitrogen uptake (i.e. primary productivity and N₂ fixation) on microbial community structure and diversity (including both prokaryotes and eukaryotes), along the hydrological gradient from the south Indian Ocean to the Southern Ocean. This study illustrated that the distinct physico-chemical factors could provide the unique microbial community structures and diversity in the oceanic zones. In addition, prokaryotic community composition and diversity were strongly involved in the N₂ fixation. Chemical and biological data are sufficient to support objectives of this study. Moreover, authors performed model analyses with ecological distance, productivity, and N₂ fixation, to evaluate the influence of environmental characteristics on the microbial community dissimilarity. I think it's very exciting results. A large amount of chemical and biological data in this paper will strongly facilitate the microbial oceanography in the south Indian Ocean and Southern Ocean. This manuscript is well written and topic are suitable for this journal. I recommend to publish this article in the Biogeosciences.

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Specific comments

L425: "negative correlation" Is it significant in the ISSG region? Maybe, Fig. S7 (e) shows the significance for all sampling data. Recheck it.

L439-443: It will be better to discuss about other bacterial lineages according to results of the SIMPER (e.g. Gammaproteobacteria SUP05 (contributor for dissimilarity between SSTC-

SO)).

L459: "So" -->"SO" ?

Figures

Fig. 4 c and d: Add the units of x axis.

L292, L330-331: Revise the unit (umol C L⁻¹d⁻¹) according to those in Fig. 4c and d. It is confusing.

Tables

L806-808: Explanation about colored bars is not needed. Remove it.

Supplementary information

Mismatch of the supplementary figures and figure legends. Where is the legend of Fig. S4 about PN : Chl. a ratio?

Fig. S4: Color bars above the figure are not linked legend symbol's colors. It's confusing. Revise them.

Fig. S7: Color bars (indicate ISSG, STF, SAF...etc) above figure are valuable for figures (a,

b, c, d), but not for figures (e, f, g, h). I think it's better to add the legend symbols to fig (e~g).