Biogeosciences Discussions

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Comment on bg-2022-91

Sven Uthicke (Referee)

Referee comment on "Acidification impacts and acclimation potential of Caribbean benthic foraminifera assemblages in naturally discharging low-pH water" by Daniel François et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2022-91-RC1, 2022

The MS submitted Francois et al presents a field study of the effects of ocean Acidification on (sub?) tropical benthic foraminifera communities, using a unique ecosystem in Mexico as environmental proxy for high pCO2. The study finds several trends in community and species shifts of previous studies confirmed, but also detected some trends opposite to those. In general, MS is well-written and analysed. However, I have several comments (listed below) which I believe should be addressed prior to publication.

Major comments:

- My main issue is that the MS needs to discuss and investigate in more detail if other factors then pH can be the cause of community shifts or species stress. The possibility that salinity (very highly correlated with pH) may play a role is dismissed with a citation (in the results, this should be in the discussion). I think this should (and can) be further tested. For example, the linear models showing species changes along a pH axis could also be run with salinity, and with salinity and pH in the same model. Models could then be compared with AIC. Other potential influences of 'unmeasured' parameters (e.g. heavy metals) should be discussed.
- It would be good to shorten the MS, and possibly omit some sections. In fact, with some extra effort this may even constitute 2 publications. At the present state, e.g., I find the microscopy a little unconvincing, with only 4 samples from each location statistics has little power to find differences.

- At some places the literature does not capture all relevant studies. I think all vent studies are captured, but several experimental studies (on pCO2 effects, but also e.g. on the mentioned nutrient effects) are omitted.

Minor comments:

- Abstract, ln 22: shift bracket not to imply 7.1 is the end of century prediction
- Introduction, Ln 30: 'to' missing in sentence?
- ln 46: 'became' = 'becomes'?
- ln 75 (an in other places: post mortem (2 words?)
- throughout: pH scale needs to be specified (I assume 'seawater' or 'total'?)
- ln 128: if only 'total' foraminifera are used as a metric, it seems redundant to describe the staining process?
- Ln 170: what are the groups the stats is conducted on for, define first
- Several analyses (linear models, correlations?) are not mentioned in the stats section. Mention details of analysis (including N, error structure, random factors?) here.
- Ln 237: I think you cannot call the first axis a 'gradient of acidification stress". It is a composite of several factors (including salinity)
- Fig, 4,5,6: simplify and make more usual graph style. There is no need to have axis labels on all 4 sides, some labels in composite graphs can be removed.
- Fig 6 (and respective text): is this adding much, or one of those sections which could beomitted/or in another MS?
- Fig 7: also a very nice and interesting analysis, but, again, could be part of a separate MS?
- Discussion, ln 399 several experimental studies on the effect of LBF on nutrients exist.
- ln 420: Kuehl et al: also a study by M. Glas. Also consider a study by S. Doo showing that LBF under OA are better off having photosynthesis or living on plants.