

Biogeosciences Discuss., referee comment RC3 https://doi.org/10.5194/bg-2021-96-RC3, 2021 © Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on bg-2021-96

Anonymous Referee #3

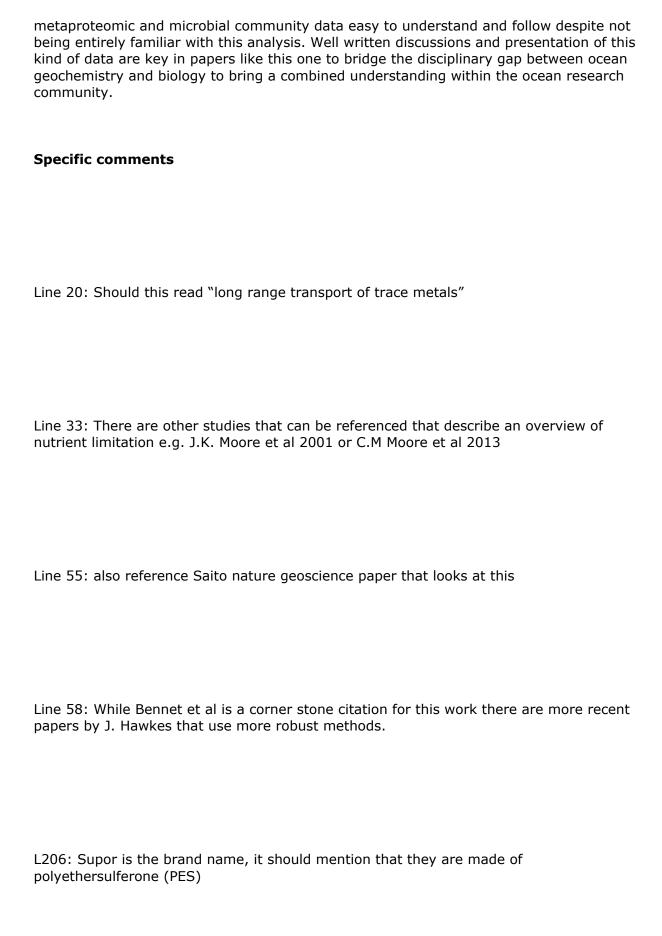
Referee comment on "Hydrothermal trace metal release and microbial metabolism in the northeastern Lau Basin of the South Pacific Ocean" by Natalie R. Cohen et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-96-RC3, 2021

General comments

The work presented by Cohen et al represents a significant contribution to scientific progress in the field of marine biogeochemistry which is within the scope of this journal. The study combines cutting edge metaproteomic with trace metal measurements representing a rare combination of detailed biological and geochemical data which is needed to further progress our understanding linkages between ocean biogeochemical cycles and microbial ecology. Several new ideas are suggested such as deep-sea organisms exploiting gradients in trace metals via metabolic plasticity, differences in transport proteins between distal hydrothermal plume and background samples reflecting utilisation of or protection from metals by deep-sea micro-organisms and the unexpected presence of proteins associated with photosynthetic processes mainly belonging to Prochlorococcus, either as a result of cell maintenance or present as degraded cells.

The scientific approach is valid, however comment the biological analysis is outside of my area of expertise. I have concerns about the use of the internal standard diluted in the elution acid (Indium) as a method of measuring the recovery of metals extracted from samples as they are loaded onto the chelating column. I would like to see further proof that this is a valid method of assessing and correcting for any losses in sample recovery. The pH at which the samples were loaded onto the column should be stated as this is the main control on recovery of metals from a seawater sample. I would also like to know if there were any checks performed on the recovery of metals from the filters? And further detail on the filter blank value used. The data looks oceanographically consistent and results for reference standards are broadly in agreement with consensus values, but I think addressing these points in the methods text more clearly is important for publication. Please see the specific comments on this section.

The data and manuscript are written in a clear and concise manner with appropriate well-presented figures. I have made minor suggestions for improving several figures/tables as well as adding references. In particular I found the results & discussion of the





GSC reference seawater against the consensus values? I appreciate that this only gives
recovery for those standards and that the In calculation maybe necessary to calculate
recovery for each individual sample, but perhaps a comparison of values obtained for GSC
vs consensus values to show whether or not you get a similar estimate of recovery as
using the In calculation? This would help to validate the approach of checking recovery in
this manner which I haven't seen before. I can see that most of the numbers in Table 1
are higher than the consensus values so it's possible applying this In correction may have
over corrected the values (with the exception of Zn which as you mention is more
contaminant prone and trickier to measure).

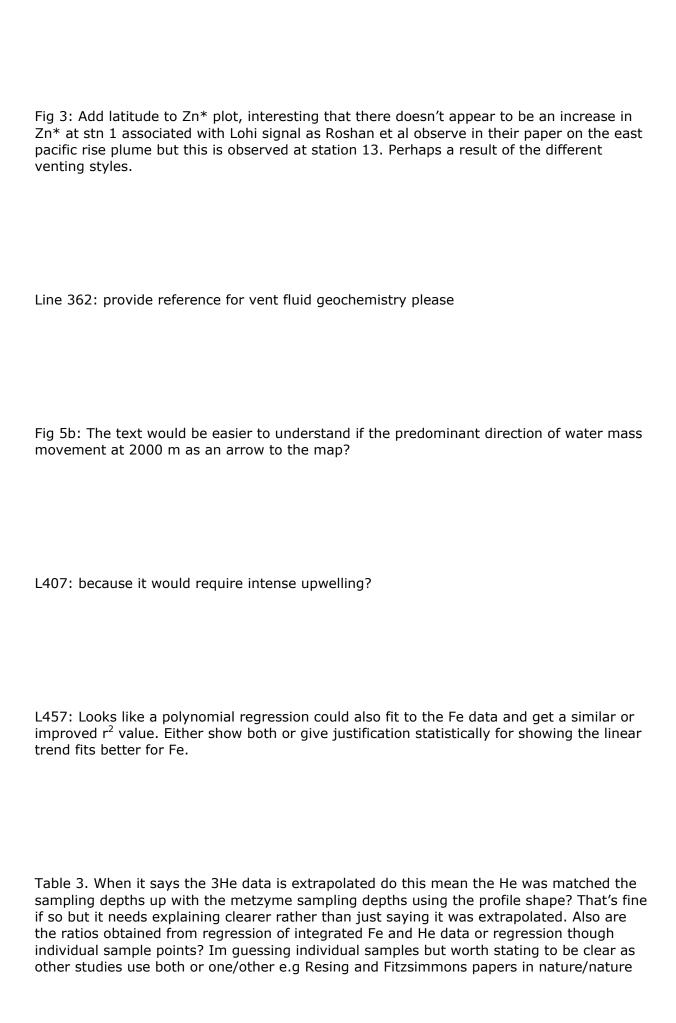
Another way to add some reassurance on the data quality here is to add additional columns to Table 1 comparing the average and stdev of deep ocean water concentrations measured on this section to the nearby GP13 section which has similar concentrations of macronutrients in deep waters.

Loading pH can be checked by adding the buffer and a sample together in the same mixing ratio as the seaFAST to check the pH and compare that pH to the elution profiles in the paper by Rapp and estimate recovery based on the elution profiles in that paper to see if this agrees with the 83 % In estimate.

L175: these measurements were performed on a collision cell iCAPQ and most of the data from the consensus values were likely measured on a sector field ICP-MS, could interference elements also have caused this?

L180: The sharing of consensus values is designed to intercalibrate lab results. The Cu value in table 1 is 1.36 times higher than the consensus value, if I multiply the previously measured dCu by Takano et al 2017 of 3.1 nM I get 4.2 nM which is what is measured here. Is this not evidence of a systematic offset in either this data or that of Takano et al 2017?

1200: Is there a reference for this claim that a fraction is lost oven after IIV expecure? If
L200: Is there a reference for this claim that a fraction is lost even after UV exposure? If the Co data has already been published previously you should state this clearly here.
L210: Can this procedure not be repeated in the lab by cleaning some more filters and rinsing them with seawater? What is the value from the 400 m OMZ sample used as a blank, this should be stated clearly here. Were there any reference materials dissolved in acid to check recovery of the acid digestion procedure. Encase its useful for future reference I have experienced contamination from Milli-Q water systems in the past as most models have a metal knut where the filter screws into the end of the dispenser and this can rust over-time.
L215: I defer to the experience of the other two reviewers on this part of the analysis as this is not my area of expertise.
L269: suggest upper is changed to Northern
L272: scavenging also includes aggregation of colloidal particles
L299: Then shouldn't there also be an increase in dMn in the same area?



geoscience.
L625: Is there an excess of sulphide relative to metals in Lau Basin vent fluids, or are metals present in greater concentrations in which case a lot of free sulphide might be consumed by metal-sulphide mineral precipitation? This data should be available from the InterRidge data set for the vents on your map.
L628: This paper by Hang seems relevant here https://www.nature.com/articles/s41586-020-2468-5
L677: might be better to say "similar rather than "rivals"?
Technical Corrections
Line 43: include not including?

Line321: started sentence with lowercase letter dCd

Line 329: upregulation of