

Interactive comment on “Benthic Archaea as potential sources of tetraether membrane lipids in sediments across an oxygen minimum zone” by Marc A. Besseling et al.

Anonymous Referee #1

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I agree with many of the modifications proposed by the authors. Most importantly, since they use an unpublished method, they will need to demonstrate in detail the separation of the different IPL-GDGT cyclized GDGT-headgroup combinations, and exclude, e.g. the co-elution of unsaturated GDGTs with regular GDGTs.

I appreciate that determining response factors for GDGTs is very challenging due to the lack of commercial standards but I think that this would have been perfectly feasible for the small number of compounds the authors have analyzed. I urge the authors to clearly state that they have not used response factors and how this affects interpretation of the results. It is not acceptable to cite the response factors from Van Mooy

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& Fredricks (2010) since they were measured on a different chromatographic method and different instruments and on compounds that are not comparable to GDGT-IPLs. GDGT-IPLs are twice the size of the standards measured in that paper and thus the relative ionization efficiencies will be dramatically different (this will also change the relative effect of one versus two glycosidic moieties). Further, ionization of GDGT-IPLs will heavily depend on elution time, since the method chosen by the authors uses a strong polarity gradient. This will strongly affect the efficiency of ionization of GDGTs relative to their retention time and will likely lead to a systematic underestimation of more apolar GDGT-IPLs (e.g. MH) that elute earlier when the mobile phase consists mostly of hexane (which is not beneficial for ionization).

Lastly, the authors should to assess why the fractional abundances of IPLs are so different between the current study and their earlier study on the same samples (Lengger et al., 2012)

References Lengger, S.K., Hopmans, E.C., Reichart, G.-J., Nierop, K.G.J., Sinnighe Damsté, J.S., and Schouten, S. (2012) Intact polar and core glycerol dibiphytanyl glycerol tetraether lipids in the Arabian Sea oxygen minimum zone. Part II: Selective preservation and degradation in sediments and consequences for the TEX86. *Geochim. Cosmochim. Acta* 98: 244–258. Van Mooy, B.A.S. and Fredricks, H.F. (2010) Bacterial and eukaryotic intact polar lipids in the eastern subtropical South Pacific: Water-column distribution, planktonic sources, and fatty acid composition. *Geochim. Cosmochim. Acta* 74: 6499–6516.

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