

Interactive comment on “Contribution of Marine Group II Euryarchaeota to cyclopentyl tetraethers in the Pearl River estuary and coastal South China Sea: impact on the TEX₈₆ paleothermometer” by J. X. Wang et al.

Anonymous Referee #2

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In this study, Wang et al. measured archaeal tetraether lipid concentrations in suspended particulate matter and surface sediments along a salinity gradient at three sites (river water, mixing water, and seawater) from the Pearl River out into the South China Sea and compared these data primarily to Marine Group II Euryarchaeota 16S rRNA gene abundances as determined by qPCR. Lipid data included both core lipids and intact polar lipids and was used to calculate TEX₈₆ and Ring Index values for comparison to sea surface temperature. Additionally, the archaeal community composition was determined through 16S rRNA gene sequencing.

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Major comments:

My primary concern with the manuscript is the strong language that is used to suggest that MG II are the source of the measured lipids. The title is already misleading by stating “contribution of MG II” to lipids, and the abstract claims the authors “characterize MG II Euryarchaeota-produced GDGTs” when they have done nothing of the sort. This work merely shows correlations between tetraether lipid concentrations and MG II 16S rRNA gene abundances. Thus the statements and conclusions found throughout the paper that claim MG II produce GDGTs are truly overstated as there is no direct evidence of this here.

That said, there is a positive relationship between the MG II 16S rRNA gene abundances as determined by qPCR and GDGTs 1-4. And if this correlation is actually driven by MG II producing GDGTs, then the authors nicely explain the potential implications for TEX₈₆. However, the qPCR results are not in agreement with the sequencing data in Figure 2 which shows relatively more MG II at the seawater site compared to mixing water, which calls into question the accuracy of either method in determining the number of MG II archaea in the total archaeal community. The discrepancies in the results between these two methods must be addressed in the discussion. If one was using Figure 2 in combination with the lipid data, they could conclude that the increase in MG I could be contributing the changes in GDGTs from mixing water to seawater. Additionally, the results of both methods show that MG II are at most on the order of 30

In the methods section, it appears that the suspended particulate matter samples were collected on glass fiber filters with nominal pore size of 0.7- μ m. From Thaumarchaeota cultures, we know that at least some of these MG I cells are smaller than this (occasionally they pass through 0.2- μ m), while some evidence exists that the MG II are particle-attached. Thus this sample collection technique may be biased in favor of the MG II and not giving a full picture of the archaeal community. Additionally, the methods indicate that no lysis step was performed on these filters for DNA extraction but just a simple washing with buffer. While little is known about the MG II archaea, this again

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could be biasing the results.

There are many missing articles (i.e., “the” or “a”) throughout the manuscript but primarily in the introduction, to the point that it is distracting for the reader. The entire manuscript needs to be checked and corrected thoroughly for these errors. For example, “the” should be added before “marine sediment record” in line 8 of the abstract and again in line 25.

Minor comments:

- Wuchter et al., 2006 is listed in the references but not cited in the text
- Tierney and Tingley, 2014 is cited on pg 12457, line 8 but missing from the reference list
- Section 2.3.2 in the methods is written in present tense while the rest is past tense, please correct for consistency
- Figure 4 caption notes colors (blue and black) but everything appears black in my copy of the figure
- Figure 5 caption should include “MG II” for the purple line description (“the abundance of **MG II** 16S rRNA genes”)
- Table 1 caption should include “abundances” after 16S rRNA gene and matter should have no s (“... 16S rRNA gene **abundances** for suspended particulate **matter**...”)
- pg 12465, line 17: “... has been suggested to attribute to ...” does not make sense, please correct
- pg 12468, line 16 and pg 12469, line 9: Euryarchaeota appears twice in a row (and is misspelled the second time)
- pg 12468, line 9: “since no more samples to quantify. . .” does not make sense, please correct

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- pg 12468, line 18: “In respect to. . .” should be “**With** respect to. . .”

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