Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2019-507-RC1, 2020

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Decoupling of water and air temperature in winter causes warm season bias of lacustrine brGDGTs temperature estimates" *by* Jiantao Cao et al.

Anonymous Referee #1

Received and published: 19 February 2020

The authors of this manuscript examine the brGDGT distributions in the water column and surface sediments of the Lake Gonghai and its catchment. They address a critical issue for brGDGT studies which is the warm season bias of brGDGT-derived temperatures obtained in lakes. They propose a new very interesting mechanism to explain this bias implying the decoupling of air and lake water temperature during the cold season due to ice formation. This finding will be useful for the community and is worthy to be published. However, some improvements can be made before publication.

Main comments 1. The new separation method of the 5 and 6-Me isomers should be mentioned in the introduction. 2. A figure with the different forms of brGDGTs could be

Printer-friendly version

Discussion paper

included in appendix. 3. Why don't you use recent regional soil calibrations for China as the one of Wang et al., 2016 for your soil samples? 4. The conclusion is incomplete, you could add that soil temperature reconstructions reflect the MAAT and I think that it is important to mention that brGDGT distributions in the water column change with seasons while brGDGT productivity does not seem to significantly change. This allows you to propose an alternative explanation to warm season bias in brGDGT-derived temperature that is currently mainly considered as linked with changing brGDGT productivity. 5. The manuscript should be carefully checked for grammar and language issues.

Abstract

l17 mean annual

l18 There are too many 'and'.

l29 I think that the use of 'believe' should be avoided and the sentence should be rewritten. Suggestion: we think that lacustrine brGDGTs actually reflect the mean annual LWT (. . .).

Introduction

l42 The abbreviations MBT and CBT should be defined.

l46 Some references could be added in particular, recent ones using the new separation method.

l53 Suggestion: brGDGTs could be produced in situ in lake environments and differ significantly from soil derived brGDGTs (. . .)

l106 'composition distribution of brGDGTs' sounds odd to me, I suggest you to change it in the entire manuscript and replace it by 'brGDGT distribution'.

l107 and further discuss . . .

Materials and methods

l112 Mention ‘N’ and ‘E’ for latitude and longitude.

l119 concentrated

l146 combination of

l146 and 150 ‘DCM’ and ‘MeOH’ could be used for dichloromethane and methanol defining the acronym at the first appearance.

l157 Mention what are ‘A’ and ‘B’.

l167 Remove the ‘;’ after(2)

l169 The authors could mention Martin et al., 2019 who modified the initial definition of the IIIa/IIa ratio proposed by Xiao et al., 2016.

l170 A word is missing as well as a punctuation mark.

l177 Add a figure in appendix describing the different brGDGT structures and refer to it here.

Results

l206 typical for in situ produced lacustrine (. . .)

Discussion

l221 This title is not very clear, maybe ‘Different sources of brGDGTs in the Gonghai Lake‘ or ‘In situ production of brGDGTs in the Gonghai Lake‘.

l226 and/or surface sediments. I would not mention brGDGT concentrations as a discriminant factor between soils and in situ production, differences of concentrations, alone, would not be a proof of the occurrence of in situ production as several other parameters could be involved.

l227 comparison of brGDGT distribution

l232 was similar to that of SPM . . . from that of soils

l236 The ΣIIIa/ΣIIa values in sediments and SPM were

l238 the ΣIIIa/ΣIIa ratio in sediments and SPM was significantly higher than in catchment soils.

l239 sediments are

l243 It does not appear very clearly that #Ringstetra were higher in sediments than in soils, a statistical test would be appreciated.

l257-258 in globally distributed lakes?

l270 You should provide the reader with the analytical error associated with the MBT indices in the method section for a better evaluation of the changes discussed here.

l274 You should add a reference to Fig. 2. You should at least mention that the deepest SPM shows an opposite trend which seems to indicate that at this depth, temperature is not the only parameter controlling brGDGT distributions.

l275 seasonal temperature changes?

l276 previously

l276-277 The phrasing sounds odd to me. Suggestion: suggest that both ... could respond to temperature changes.

l278-279 African ; the phrasing is not very clear here.

l283 I suppose that 0.3 corresponds to the difference of the mean temperatures obtained for September and July? You could specify it.

l284 remove the '.' after (16).

l286 multi-seasonal

l287 previously

l292 could also be

l293 the shallow water depth of the lake

l293-294 The sentence is not very clear and too long, you should maybe cut it into two sentences.

l296-299 Terrestrial inputs are almost not discussed, could they have a role in seasonal changes of brGDGTs?

l297 Be coherent with the notation of ΣIIIa/ΣIIa.

l300-304 You should mention here or in the previous paragraphs that SPM samples also reflect temperatures close to warm season AT.

l302 You could add a reference to the table 1. Is it 13.2 or 13.5?

l305 correlated significantly

l314 are thought to . . .

l314-325 You say in situ production is thought to be the main source of brGDGTs in many lakes so why do you only consider six lakes in fig 5? What about the others?

l319-325 Rephrase

l332 You should also mention that brGDGT distribution in water column seems to change seasonally in agreement with temperature, what you discussed in the 4.3 section.

l339 Rephrase

l350 Most of stratified lakes . . .

l365 Can you add a reference?

l378 universal

l383 compatible with the mechanism that we propose here

l391 Use cold season rather than ‘winter’.

Conclusion

l403 from that in soils

l403-404 indicating that lacustrine brGDGTs are mainly produced in situ . . .

l404 in surface sediments of Lake Gonghai

l406 water-air decoupling in Lake Gonghai

Figure 1

(a) northern limit ? (b) For the latitude replace ‘E’ by N l655 represent

Figure 3

fractional abundance l666 Maybe specify: water column (SPM). l667 Use degree of cyclisation rather than ‘cyclisation ratio’.

Figure 4

l670 soil calibration.

Figure 5

l679 A comma missing before Lake Donghu. l676 Mention the number of the equation used.

Table 1

l695 For b et c, mention the number of the equation used.

Table 3

l705-708 Mention the number of the equation used.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2019-507, 2020.