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Biogeosciences Discussions

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 #2

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General comments The mechanism of season bias of lake brGDGTs-derived temperature is not very clear, hence limit the application of brGDGTs index in lakes. The manuscript proposes a new idea about this hot topic. They conclude that decoupling of water and air temperature in winter causes warm season bias of lacustrine brGDGTs temperature estimates. Therefore, I recommend this manuscript for publication in the journal after improvement.

Detailed comments 1/ Many pervious researchers suggested that soil calibrations could not be applicable to lake sediments for temperature reconstruction, if aquatic production of brGDGTs is predominant over soil input (e.g. many papers). It is no new,

and not necessary to discuss too much in this point in your manuscript. And to focus on SPM.

2/ Seasonality is a major feature for almost all organic proxies . For example, Lake Huguangyan (Hu et al.,2016; Chu et al., 2017). Lake limnology is most important, for example, Lake Huguangyan is a monomictic lake.

3/ "Line 147-148: " There is no water column stratification whether summer or winter". You must revise this sentence. Based on the location and depth of the lake, it might be stratified in summer. And figure 2 shows a little stratification occurred in September(autumn).

4/ Line 360-365: I don't think the estimated temperature using the calibration of Dang et al. (2018) are close to the mean warm season AT in GH, even if the RMSE is being considered. It seems that the calibration of Ressell et al. (2018) may be more suitable for your explanation, and you'd get more discuss about this point.

5/ Line 450: The definition of warm season should be given earlier, and change "monthly temperature" to "average monthly temperature".

6/ Line 464-465: "For example, 464 MBT/CBT-derived temperature correlated better with warm season AT than with annual mean AT in the tropical Lake Huguangyan, suggesting a warm season bias (Sun et al., 2011)". To improve the discussion of seasonality in the paper, I recommend authors should detailed read the paper of Sun et al. (2011) carefully. And the author should see discussion about the seasonality of brGDGTs in Lake Huguangyan from Hu et al. (2016) and Chu et al. (2017). Seasonal biases may be due to seasonal brGDGTs production, and link to lake limnology and local climate.

7/ Please provide the component specific content of brGDGT as a Supplement.

8/ This manuscript is worth publish because something is new. But, authors should mention that the limited data in your manuscript, and more works are need to verify

this question.

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