

## ***Interactive comment on “Seasonal lake surface water temperature trends reflected by heterocyst glycolipid based molecular thermometers” by T. Bauersachs et al.***

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Received and published: 22 April 2015

Reviewer's comments:

Bauersachs and coworkers report on the distributions of cyanobacterial heterocyst glycolipids (HG) in water column particulate matter and surface sediments from Lake Schreventeich with the intent of evaluating how HG distributions might relate to surface water temperature, pH, and oxygen content. Variations in HG abundances and compositional changes, as indicated by proposed HG-indices, were observed to occur seasonally and were best correlated with temperature. Similarities between HG compositions in the water column, especially at the time of maximum productivity, and

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in surface sediments are taken as suggesting the HG indices might provide a means of reconstructing past lake water temperatures from the sediment record. Overall the manuscript is well written and the data presented do indeed indicate the potential of HG-indices as water-temperature predictors. Several suggestions for the authors follow:

1. Fig 3 – the dashed line in the figure showing the HG abundances needs to be made more visible. Also, it would help if the HG abundances were included in Supplemental Table 12 along with the fractional abundances for individual HG.

Reply: We increased the line thickness of the dashed line in Fig. 3 to improve its visibility. In addition, we now present data on HG abundances in Lake Schreventeich in Supplementary Table 2.

2. P 760, top of section 4.1 – to say that the HG were “first detected in mid-August” is a bit misleading since there are no data indicating that samples before this time were analysed and that in fact HG were not detected then. This statement could be clarified.

Reply: We agree that the current phrasing is somewhat misleading and now state that HGs were below detection limit in all water column samples collected before mid-August.

3. Fig. 3 – please note in the caption (to remind the reader who might have forgotten) that the results or the surface sediment are for 2 sediments from different locations.

Reply: We now indicate in the caption of Figure 3 that the fractional abundances of HGs in the investigated surface sediments represent average values derived from the investigation of core top sediments collected at two different locations.

4. P 766 and in section 4.4 on geochemical implications– the authors could add a bit more on what they may think about the HG preservation in sediments, beyond the fact that they are found in old sediments since the potential of the HG index-temperature reconstructions assumes there are no selective degradation/preservation issues.

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Reply: We agree with the reviewer that the preservation of HGs in general as well as their selective degradation in sediments is of crucial importance for the application of HGs as potential paleotemperature proxies and now extended our discussion on the preservation potential of HGs in natural environments.

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Interactive comment on Biogeosciences Discuss., 12, 751, 2015.

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