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Biogeosciences Discussions

Interactive comment on "A quest for the biological sources of the ubiquitous long chain alkyl diols in the marine realm" *by* Sergio Balzano et al.

Anonymous Referee #2

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Balzano et al. describe the attempt to attribute biological sources to long chain diols (LCDs), which are compounds with a great proxy potential and widespread both in the marine water column and sediments. The study relies on the analysis of suspended particulate matter in order to compare the distribution of concentration of LCDs to environmental parameters and abundance of potential LCD-producers. Unfortunately, this approach is not successful, and little information regarding LCD production can be gained. Instead, the authors provide an interesting discussion on the suitability of the combined biomarker-genetics approach. Overall, even if the results do not allow to narrow down the biological sources of LCDs, investigation is sound, and the paper is well written. A few comments are shown below.

General comments

-Abstract: In the abstract, the authors claim that "the contributions from two taxonomic classes to which known producers are affiliated... followed a similar trend to that of the concentrations of C30 and C32 diols". This statement seems to suggest a source relationship. However, in the manuscript the authors inform that correlation is low (l. 531) and that it might be that "co-occurrences are simply driven by other environmental conditions leading to similar spatial distributions" (l.533). In my opinion both statements are not consistent and the abstract should be rephrased in order to clearly state that no informative correlation between LCD and putative LCD-producers could be established

-Abstract: In the manuscript, three scenarios are discussed that explain why the correlation between LCD and potential LCD-producers is so weak: contribution of fossil LCDs, undersampling of potential LCD-producers because of their low number of rRNA gene copies per cell or LCD being produced by other species. However, in the abstract only the first hypothesis is mentioned. In my opinion, presenting all three scenarios would strengthen the manuscript.

-Discussion (from l.387 on): It is argued that the C28 1,13-diol can't be correctly interpreted because of its low abundance. However, C28 1,14-diol doesn't seem to be more abundant and is discussed with a lot of detail, and concerns regarding its abundance are not expressed.

-Discussion (from l.563 on): Regarding the possibility of fossil LCD contributing to the signal I have a few comments/suggestions. (1) Is there any information available on the residence time of SPM in a system like the one studied? Is the claim that LCD may accumulate as SPM for years (l. 581) consistent with such residence times? (2) Bale et al. (2018) employed very similar (or actually the same?) samples from the same location to study biological sources of cyanobacterial lipids and were quite successful. However, these lipids have also been shown to persist over longer time scales (e.g. Bauersachs et al. 2010). This should be mentioned and the difference to LCD discussed (3) I would appreciate some hypothesis on LCD production, even if they are fossil to some degree. Do the authors expect seasonal production and there-

fore absence of producers during sampling? Export from land/freshwater systems? Production by a small population and massive accumulation? Which are the sources fueling this hypothetical fossil pool of LCDs?

Minor comments:

-l.117 (also legend for figure 1), what does HCC stand for?

-when expressing ratios of, for example, solvents (e.g. l.159 “HCl: MeOH (1:1”) empty spaces before and/or after the colon are not employed consistently. Please check throughout the text.

-l. 184: as far as I know, it is recommended to write “m/z” (mass to charge ratio) in italics

-l. 296. Please use either “Station” or “Stn.” consistently

-Figure 1: do de dots represent sampling depths? Please explain in legend

-Figure 1: Bale et al. (2018) used chl-a obtained by fluorescence instead of the extraction-based approach used here, and those data seem to have a better coverage/resolution. Could you please explain why you are not using them?

-Should Figure 4 maybe also be in colour (like Fig. 1 and 2)?

-Consider adding P-values to figure 5.

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