

Biogeosciences Discuss., referee comment RC1  
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## Comment on bg-2021-204

Anonymous Referee #1

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Referee comment on "The influence of lateral transport on sedimentary alkenone paleoproxy signals" by Blanca Ausín et al., Biogeosciences Discuss.,  
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The authors present a data set of sedimentary alkenones, retrieved from continental margin and drift sites that is of interest because it contains combined proxy measurements for sea surface temperatures (SST) and productivity with size-fraction analysis and  $^{14}\text{C}$  dating. It is argued that the alkenone signals from the bulk sediment are altered depending on the size-fraction distribution of the sediment. Each grain size is affected by different hydrodynamic processes and exposure to oxic degradation: alkenones in clay and fine silt are affected by lateral transport, coarse sand alkenones are more prone to oxic degradation. This finding is important because it has implications for the use of alkenones as a paleotemperature and paleoproductivity proxy.

The manuscript is well written, the references are up-to-date and the data support the conclusions. I think the paper should be published in Biogeosciences after revisions. Although my suggested changes are minor, they are important, especially regarding the figures. The reader would profit from a more consistent naming of the axes and more descriptive figure captions.

### Specific comments:

Line 116: Table 1. the cores are in very different water depths, can you acknowledge that somewhere in the discussion, especially knowing that many deep-time paleotemperature and -productivity records come from open ocean deep-sea sediments.

Line 127: for the quantification, what standard and at what concentration was used? Did you run replicates?

Line 129: Mention the exact variables that were used for the Bayspline code (e.g. prior standard deviation). Also state measurement/calibration error. Is it possible to show this error in figure 5?

Line 152: Even though this study seems to have better recoveries than other previous studies using wet-sieves (85%, Magill et al., 2018, Tesi et al., 2016), how can you be sure that there wont be any preferential loss of C37:3 or C37:2, which could ultimately affect

your SST results? Could you comment on that?

Line 153: Can you explain the significant loss of alkenones during manual columns? Instead of comparing the fraction-weighted values to the bulk values did you also use an internal standard to account for the loss/recovery of alkenones?

Line 238: Can you state if you recorded C37:4 in BER, which also reflects advection of high-latitude alkenones (Rosell-Melé et al., 1998; Bendle and Rosell-Melé, 2004; Bendle et al., 2005)?

### **Minor comments/ technical corrections:**

Line 16: spell out OM and SST as first mention in manuscript

Line 28: (C37:2 + C37:2) should be (C37:2 + C37:3)

Line 33: also add latitude-dependent (Lutz et al., 2007)

Line 42: define 37:2, 37:3, e.g.  $UK37' = [C37:2]/([C37:2]+[C37:3])$ , where [C37:2] and [C37:3] are the concentrations of di- and triunsaturated C37 alkenones, respectively.

Line 44: reported precision in Prahl and Wakeham, 1987 is  $\pm 0.5^\circ\text{C}$

Line 55: wrong format for reference

Line 65: which hydrodynamic processes are we talking about? Maybe give an example in brackets?

Line 68: define OC

Line 95-103: for consistency, add oxic/suboxic conditions to NAT, NAM and BER in text.

Line 109: Figure 1: Out of curiosity: why was SHAK06 not described in this study? It was analyzed in Ausin et al., 2021 for OC in bulk sediment on continental margin sediments

Line 114: add abbreviation to clay, similar to fine silt and coarse silt, which is later used in figures and tables.

Line 115: The author refers in Ausin et al., 2021 to Magill et al., 2018 for the method. Might be worth mentioning here as well.

Line 168: Figure caption 2: Figure 2. C) should be C37:3 and D) should be C37:2

Define abbreviations for CS, FS, C

Line 171: briefly mention, why alkenone 14C ages in SBB, NAF, BER were not measured

Line 185: Figure 3 would be easier to read if you would change TOC-foraminifera to another symbol. It currently might be confusing because you use open symbols in panel A for bomb 14C.

Line 190: Figure 4: Define abbreviations for CS, FS, C

Line 192: Fig.5. to be consistent with the naming in figure 6C, rename y-axis in panel B

" $\Delta$ SST<sub>bulk-annual mean</sub>"

Line 275: Figure 7: In panel A, x-axis label is missing. To be consistent with the nomenclature of your manuscript rename label for y-axis to OC<sub>%</sub>. Also, insert is hard to read, maybe its enough to state the R<sup>2</sup> from Ausín et al., 2021 in the text, instead of having the insert. In panel B, add C37 to y-axis to be consistent with naming (in comparison to Fig. 2A)