

Interactive comment on “Salinity changes in the Agulhas leakage area recorded by stable hydrogen isotopes of C₃₇ alkenones during Termination I and II” by S. Kasper et al.

Anonymous Referee #4

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As the other reviewers I think the paper needs a thorough round of revision prior to be accepted for publication. I realize that almost all the problems I spotted were also identified by the other reviewers, so I try to summarize what can be done to improve the draft rather than listing all the problems already mentioned by the other reviewers.

The article generally suffers from a lack of focus. It deals with SST proxy differences, with regional salinity changes, it enumerates the biases likely embedded in salinity estimates, etc. But unfortunately neither it clearly focuses on just one point (which, to me, should probably be the regional salinity estimate during terminations and its connection with the Agulhas leakage), nor it develops enough all the difficulties associated with proxy uncertainties.

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My recommendation would be to start with identifying parts/data which are not essential to the story. For example, the TEX86 is not useful to the study, and the authors cannot provide any satisfactory explanation for why TEX86 is sometimes warmer, colder or in between alkenones and Mg/Ca. One obvious reason would be to state that TEX86 alternately records different seasons and different water depth during different time periods, but that's probably not something that can be useful to understand better the other isotopic proxies on which salinity estimates are based on.

I feel some of the fundamental debates about how ketones dD can be used to quantify salinity changes is missing. It is for example unclear to me why the authors choose to measure dD on the combined C37:2 and C37:3. The data from van der Meer, 2013, GCA, which seems to be used to justify the author's choice look strange to me. Unless I miss an important point, the dD of combined C37:2 and C37:3 should fall in between the dD measured on C37:2 and C37:3 alone, which is not the case. So why not measuring dD on only one (di- and/or tri-unsat.) as it also seems to be feasible in Texel? Also, it is still unclear to me whether the dD of ketones might have a high, medium or simply no sensitivity to salinity (as in Schouten 2006 Biogeoscience, Sachse et al. 2012 Annual Rev. Earth Planet. Sci., Schwab and Sachs, 2012, GCA respectively). These issues in fact are really important to consider as they can have large consequences on the magnitude of seawater dD changes. I kindly request the authors to not omit citing key references that can help the reader who is not familiar with alkenone dD to better understand the quantification of salinity changes.

I also think the discussion has to be more developed. The interpretation should have implications in terms of paleoclimate. If you can clarify the likely season/depth of forams and coccos, you might be able to do a step further toward understanding better the Agulhas leakage dynamics, something not discussed enough in the paper.

Minor comments:

page 3213, line 1, cite key references page 3213, line 3, consider Hönisch et al.,

C1708

GCA, in press here and in the following parts dealing with the salinity effect on Mg/Ca page 3213, lines 6-8, could you be more specific? chapter 3, that would be nice if you can show $\delta^{13}\text{C}$ data from alkenones on an extra figure page 3219, line 15-20, please provide information on how you can resolve different parts of the termination, and if possible try to better use figure 4. page 3220, line 11-13 and 24-25, cite key references page 3221, line 7-8, again here and after, consider Hönisch et al., GCA, in press page 3221, line 18-23, you must must develop and clarify your point there page 3222, line 10-13, your recipe sounds strange as it stands. Oceanic δD changes stemming from ice volume must be the same everywhere, please explain better your cooking in the text. page 3224, line 3-4, please be more careful with statements based on such limited dataset page 3224, please avoid repetitive statements (lines 8-11, 24-26, etc.)

Interactive comment on Clim. Past Discuss., 9, 3209, 2013.

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