EGUsphere, referee comment RC2
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Comment on egusphere-2022-23

Anonymous Referee #2

Referee comment on "Integrating plant wax abundance and isotopes for paleo-vegetation and paleoclimate reconstructions: a multi-source mixing model using a Bayesian framework" by Deming Yang and Gabriel J. Bowen, EGUsphere, https://doi.org/10.5194/egusphere-2022-23-RC2, 2022

In this manuscript, the authors use a modelling approach, based on Bayesian statistics under inclusion of chain-length distribution and carbon isotopes, to assess organic matter sources to sedimentary n-alkanes. Because of mixing processes, i.e. varying contribution of different sources to different chain-lengths, such novel approaches are needed to improve interpretation of proxy data in sediment cores (which so far mainly rely on relatively simplistic approaches).

This pilot study is well conducted and the first results are interesting and appear promising for future applications. I´m just wondering if Climate of the Past is the right journal for this work, which would probably better fit into GCA or OG. Especially under the terms, that a real exemplary application to a full paleorecord is missing (but would probably make this study too extensive).

In conclusion, this will be useful to paleoclimatologists which use organic geochemical methods, and I recommend publication.

Specific comments:

l27: I would say mid-chains are of likewise importance (just consider the many studies using Paq), i.e. I´d rather span the range to "C23 – C35".

l59 and other: general comment: I think references should be sorted by year, i.e. here start with Collister and end with Liu and An. (relevant for whole text)

Figure 1: even they are explained elsewhere, abbreviations (FLMC, etc) should be explained here in the Figure caption

Table 1: so high Paq means high influence of aquatic sources onto C27 (visible at somewhat higher d13C in this sample). Even though the focus is on C27, C29, C31, would it make sense to report data also for C23, C25?

l117: "we expect n-alkane δ 13C to follow a group-specific distribution pattern": I´m wondering how well this works for aquatic plants, because those have shown to be quite variable in their d13C values, even within similar species. This is also visible on the right panels in Figure 2 (pretty broad Gaussian blue curve overlay).

l245: micro or macroalgae? Macroalgae (e.g. Charophytes) further complicate the issue because they mainly produce mid-chains. Or are Chara sp. here included to macrophytes (because they are listed in the table EA-2 at github)? This needs clarification.

Table 3: is "MAP" the official abbreviation for Maximum A Posteriori probability estimates, or could an alternative shortening be used? Just because it´s easily confused with mean annual precipitation.

l313 and 313: what precisely is a "trade-off correlation"?

Supplement:

l12 and ff: it is unclear what EA-2, 3, 4 are referring to. Those tables appear in the github data sources. If this is the case, those should be referenced here in the supplement.

l16: two time "in"

Supplement tables: some “n” in n-alkanes are not italic