

Interactive comment on “Leaf wax n -alkane pattern and compound-specific $\delta^{13}\text{C}$ of plants and topsoils from semi-arid Mongolia” by Julian Struck et al.

Anonymous Referee #1

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General comments

The study “Leaf wax n -alkane pattern and compound-specific $\delta^{13}\text{C}$ of plants and topsoils from semi-arid Mongolia” by Julian Struck and colleagues presents novel data on content and isotopic signatures of plant waxes along two climate transects in Mongolia. Generally, the study is written in a clear and understandable way. The methods used are standard within the respective research community and the execution from sampling to data analysis seems robust. Also the presentation of data in terms of figures and tables is clear and straightforward understandable.

A major issue with the language is that the clarity could be improved at instances

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when comparisons are made. Here, it is often just stated that something is “higher” or “larger”, but it is often missing “compared to what”. Most of the time this could be traced from the sentence before, but I would suggest to always add this information in the same sentence for clarity. Thus, please check again the whole manuscript for statements where comparisons are made.

Another major issue concerning the science is that (especially in the conclusions section) contradicting statements are made. Here, it is stated that n-alkane homologue patterns are not influenced by climatic parameters, although they are strongly correlated to OEP, which is actually a numerical representation of (changes in) the homologue patterns. Thus, I suggest to carefully review this section, since in the present form it is unclear and contradictory.

Please find some more specific comments and technical corrections below.

Specific comments

L2 There are previous studies, which looked at n-alkanes in (semi-)arid regions. Just as a singular example (there are others): Feakins and Sessions (2010 in *Geochimica et Cosmochimica Acta*). Thus, I suggest to remove or rephrase this bold statement.

L29 Please specify “additional paleoclimatic information”.

L44-47 The paragraph does not fit very well here. Maybe it would be better to incorporate in the section L24-37?

L117 Please check equation 2 again. It is not clear what “v27” stands for.

L168-170 How did *Artemisia* grow in your study area: herbaceous or woody shrub? Please specify.

L189 Please give reference to the figure where the data is shown.

L190 Why “except *Larix*”? Please specify.

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L198-199 Please rephrase the sentence: “no significance” is redundant and it could be clearer

L243-267 The whole paragraph shows an extensive use of the word “strong correlation”. Could you please state (maybe already in the methods section), when you consider a correlation as “strong”? Is there a R2 threshold which you apply? Please specify.

L252 Please elaborate a bit more on the link with livestock grazing, since this is not obvious.

L265 I would remove the statement that the R2 of 0.683 “seems to be even stronger” than the R2 of 0.691. In my opinion they are similar.

L267 Please define WUE at some point (if not already done). I guess it is “water use efficiency”.

L288 It sounds contradicting that you state “the n-alkane homologue patterns from the topsoils are not influenced by climatic parameters, and thus the n-alkane ratio can reliably be used to detect and reconstruct differences between the vegetation forms of grasses and woody shrubs”. First, in the sentence before you state that n-alkane concentrations and OEP values are significantly correlated to climatic parameters. Second, what do you mean with n-alkane homologue pattern (the sum of n-alkanes concentrations, ACL, OEP or n-alkane ratio)? Please check again, since in the present form the sentence is unclear and contradictory.

L294 Please specify what you mean with “detailed identification of plant species”.

L296 Again also here: It is contradictory when you state that “homologue patterns are not biased by climatic influences”, although you show correlations of OEP with climate and describe these as “strong” in your discussion. In the end, OEP etc. are just numerical representations of the homologue pattern. Thus, please clarify the contradiction.

L298 Maybe “can be potentially used”, to weaken the conclusion a bit.

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Figure 3 The sentence “Plants originate from transect II.” Is redundant and can be removed.

Figure 6 Please indicate which regressions are linear and which are polynomial. Also I would suggest to add the p-values along with the R², to clarify the significance of the fit.

Table 1 Check decimal places in last row

Technical corrections

Title “patterns”

L1 “patterns”

L11 “correlated”

L16 “are synthesized”

L21 check order of references and hyphenation

L67 check order of references

L88 “accelerated”

L89 “dichloromethane”

L102 “Agilent”

L110 delete “sediment”, since it is either soil or plant material

L142 “Table 1 shows”

L249 Check brackets on reference

L250 Maybe better: “. . . OEP, which is strongly correlated . . .”

L269 "patterns"

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L272 "patterns"

L277 Two points at end of sentence

L288 "decrease with increasing"

L288 "patterns"

L292 delete "for"

L294 Two points at end of sentence

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