

REVIEW SUMMARY- Here, I review the submission “*Hydroclimate variations over the last 17,000 years as measured by leaf waxes in vegetation physiognomic and rodent middens from the south-central Atacama Desert, Chile*”. This paper makes a meaningful contribution by presenting the first leaf wax record recovered from ancient rodent middens found in the Atacama Desert of Chile. Perhaps most interestingly, their results show a strong correlation between precipitation, temperature and vegetation gradients along the western coast of South America. These correlations demonstrate that variations in local hydroclimate are driving patterns in the composition of leaf wax distribution/ACL values. Overall, this manuscript is worthy of publication and I mostly have minor (editorial) corrections. Most importantly, outside of Figure 1 (which is very well done) all other figures need some revision to clarified observed patterns.

Line-by-line editorial Comments

Line 11: rephrase “forms part of the necessary knowledge”

Line 21: make the semi-colon a comma (before ‘subdivided’)

Line 29: I am not sure what the ‘it’ is in the phrase ‘how it reconfigured...’ Do you mean it is not clear how the vegetation reconfigured in response to climatic dynamics?

Line 33: Consider using a different word than ‘recurrently’

Line 47: Add a few updated references to support this

Line 47-48: Maybe change to “The interest in leaf wax biomarkers is mainly due...”

Line 55: Remove the parentheses around the Contreras reference because it is part of the sentence. You could do Contreras et al. (2022). Also the sentence from Line 55-59 is too long and complex. I would consider making it two sentences or reorganizing to make it easier to read.

Line 61: define what n-alkyl lipids are, i.e., put n-alkanes and n-alkanoic acids in parentheses here

Additionally, be consistent with your use of n-alkane vs. n-alkanes. You switch around a lot when referring to n-alkane distributions (e.g., sometimes you say n-alkanes distributions, sometimes n-alkane distributions). I would use the singular form in these cases, but please pick one and be consistent through the text. Similar situation with n-alkanoic acids.

Line 62: I would start the sentence with ‘This’ rather than ‘the’

Line 66: change ‘for’ to ‘for these reasons’ because you are explaining why you used n-alkanes

Line 70: change ‘them’ to ‘their’ in the sentence ‘...for the first time them application...’

Line 78: remove ‘over’ and just say ‘extends more than...’

Line 90: remove parentheses around the reference names because this is part of the text

Lines 93-95: Please provide both Latin and common names for the plant species for clarity. Please do this throughout the text whenever you provide long lists of vegetation (e.g., again Lines 159-161).

Line 97: should be ‘located on the west hillside of...’?

Line 128: should be 'to test FOR the presence of...'

Line 143: should be 'concentration OF odd and even CHAIN lengths for...'

Line 145: C_{even} and C_{odd} should be switched here

Line 152: typo – bootstrapping

Line 153: should Python be capitalized?

Line 154: I don't think rodent should be capitalized?

Line 163: yes, here you define n-alkyl. You should also do this earlier when you first use the term. See comment above.

Line 172: recommend 'coincident with zones OF greatest species...'

Line 175: I think it should be 'chain-length distributions' rather than 'chain-lengths distributions.' I would change this throughout the text. Also add 'acids' after n-alkanoic

Line 183: typo – remove the extra C in 'n-C₂₆'

Line 184: recommend "For n-alkanes, carbon chain-length distribution...'

Line 187: section title recommend making both 'n-Alkane and plant macrofossil' plural

Line 197: change 'and slope exclusivities' to 'with slope exclusivities'

Line 199: say 'along WITH the chronology'

Line 205: I would say 'large group' and not 'great group'

Line 212: should be 'carbon chain length'

Line 213: fix typos with the per mil results

Line 216: should be 'abundances of n-alkanes' (make n-alkane plural)

Line 226: be consistent with text referring to your figures. Here you say 'fig-1' but in other places you write out 'Figure.' Just pick a format and be consistent. Same issue for Line 324.

Lines 259-264: I would recommend switching these sentences. Have the sentence about your study last to emphasize your findings.

Line 265: Title – recommend "sources of n-alkane leaf wax..."

Line 268: change to 'wax distributions were similar to those found in plants...'

Line 276: Should prepuna be capitalized? You also switch back and forth between hyphenating and not hyphenating, so please go through the text and be consistent

Line 278: change to 'analysis showed that the diets of different rodent species are closely...'

Lines 283-285: sentence reads a little awkward. Consider rewording because this is an important point.

Line 293: add the word 'pluvials' after 'relatively short-period...'

Line 317: I think you mean to say 'n-alkane' but you have 'n-alkene' here. If a typo, please fix. This happens a few times in the text.

Line 317: also fix 'by the linked' to 'by the link between...'

Line 332: change 'low levels' to 'there are low lake levels at lakes...'

Line 339: capitalize Meltwater Pulse 1A

Line 340: change to 'These data support...'

Lines 342-345: You need to more clearly explain the teleconnections between the North Atlantic and the SASM. It is very common for publications to draw these teleconnections without explaining them properly.

Line 347: consider changing 'preponderant' to 'predominant'

Line 349: typo – should be 'paleomidden'

Line 351: consider changing to '...described arid conditions...'

Line 353: change 'is' to 'are' for 'the timing and lapse of this aridity condition ARE...'

Line 356: You have Middle Holocene capitalized, but here 'late Holocene' is not capitalized. Be consistent and either capitalize both, or don't capitalize either one

Line 357: consider rewording to 'only partly explain present-day chain length distributions if we consider...'

Line 360: consider rewording to '...abundance of leaf waxes and records of climate change...'

Line 363: typo – change 'long' to 'length' because you are talking about chain lengths

Line 371: I would change the word 'proxy' here to something else, like source or archive. The middens preserve potential proxy records.

Line 376: consider changing to "...increased abundance of n-C₂₉ chain length.'

Line 381: change to "...better understand and quantify...'

Line 384: I would say 'across a wide spatial range'

Comments on figures/tables-

- **Figure 1:** This figure is extremely well-done and is also very clear. No comments.
- **Figure 2:**
 - I would consider colorizing the figure as it is kind of difficult to read in its current state. For example, in panel (c) fill in each box with some distinctive color. In panel (d) make the FAMES and n-alkanes different colors.
 - Increase font size of axes as the text is small and hard to read.
 - Maybe consider making lines thicker, especially in panels (a) and (b)

- **Figure 3:**
 - Importantly, you must define what the colored (purple) bands mean in this figure. Are these pluvial periods, for example? Don't make the reader infer what these bands mean.
 - Aesthetics for this figure could be improved. E.g., consider making the lines thicker.
 - Make the scales consistent. As it stands now, this figure is somewhat misleading because the scales are different from panel to panel.
 - I would also recommend making the font size larger for the axes. Hard to read now.

- **Figure 4:**
 - Same issue with the colored bands as mentioned above.
 - Same aesthetic issues as above.
 - Also, the scales are so different that you might have to log transform or somehow transform your data, so that they can be compared. If you do not want to transform the data, consider splitting into two different figures, or some alternative.

- **Figure 5:**
 - Panels (a)-(f) are difficult to read. Consider removing all of the light colored gray lines and just using a shaded error bar for the confidence intervals. Alternatively, you could make the main black line much thicker to help draw the eye to that.
 - Please clearly define what the two thick vertical dashed black lines are. Are you marking the onset of the Holocene with one of those lines, for instance?
 - The axes titles for panels (c)-(e) should have 27, 29, and 31 as subscripts (i.e., C₂₇)

- **Table 1:**
 - Consider adding a column that provides the common name for each species.
 - Also consider formatting the table to have alternating color bands for clarity/ease of readership

- **Table 2:**
 - Make sure to define all abbreviations used, e.g., 'sd' is standard deviation. You could define these in the captions.
 - Also be consistent with capitalization. All column categories should be capitalized, but right now some are and some are not.
 - I would also recommend adding a lower boundary line below the column categories just to improve aesthetics. You could also align the category names in the center of each cell, and bold these.