

Interactive comment on “Age and origin of leaf wax *n*-alkanes in fluvial sediment-paleosol sequences, and implications for paleoenvironmental reconstructions” by Marcel Bliedtner et al.

Anonymous Referee #2

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The authors of the manuscript investigate the age of sedimentary *n*-alkanes recovered from fluvial and paleosol deposits exposed at an outcrop in the upper Alazani valley in the Caucasus region. The manuscript describes analytical (i.e. pre-heating of the *n*-alkane fraction before ¹⁴C-dating) and procedural (estimation and correction for the contribution of petrogenic *n*-alkanes) improvements that will certainly be of interest to paleoclimatologists and biogeochemists using terrestrial biomarkers and their isotopic compositions in paleoclimate and paleoecology studies. It is a well-written manuscript supported by very detailed and finely executed figures. It fits the scope of this journal

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and should be considered for publication provided the authors address several comments provided below.

MAJOR COMMENTS

FIRST, the contribution of *n*-alkanes from microbial sources to fluvial and paleosol deposits Throughout the manuscript the authors make a careful distinction between petrogenic *n*-alkanes that derive from organic-rich sedimentary rocks (¹⁴C dead, Jurassic black shales, in this study) and other *n*-alkanes from fluvial and paleosol sediments. The latter group are referred to as “leaf wax *n*-alkanes”. While it is true that a major (and perhaps the largest) fraction in this group comprises leaf wax derived structures, it is quite likely that the group also contains microbial derived *n*-alkanes generated during pedogenic processes. Both molecular and isotopic composition of the “leaf wax” group can potentially be affected by the microbial source, e.g. Li et al. (2018, *Org. Geochem.* v. 115, 24-31), Wu et al. (2019, *Org. Geochem.*, v. 128, 1-15). The authors, however, never mention this potential microbial source of *n*-alkanes. I suggest adding a discussion as to why this source is not considered to be important in general, and particularly when correcting ¹⁴C results for mass-dependent fractionation using ¹³C isotopes and when interpreting the results in section ‘3.5 Implications for leaf wax *n*-alkane-based paleoenvironmental reconstructions from our FSPS’.

SECOND, the level of detail when describing the study site The amount of detail given on pp. 3-4 when discussing the study site (section 2.1 Studied Site) and its geomorphological features is too excessive for the purposes of this manuscript. I suggest reducing it to a short paragraph and perhaps combining it with section 2.2 Stratigraphy.

MINOR COMMENTS

p. 1, line 33: “in-situ produced leaf wax *n*-alkanes” The use of the word in-situ is somewhat confusing here. Leaf wax *n*-alkanes can hardly be called in-situ when referring to soils and/or sediments. The term would probably fit more those *n*-alkanes that were produced within the soil (see above) during pedogenic processes.

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p. 7, line 8: "All obtained ^{14}C -ages are found in Table 1." Instead of this one-liner, it would be useful to have a short paragraph reminding the reader about the main goals of this paper and how the results obtained here can help with achieving these goals.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2019-250>, 2019.