

## ***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  $^{14}\text{C}$ -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 ( $^{14}\text{C}$  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  $F^{14}\text{C}$  results for mass-dependent fractionation using  $^{13}\text{C}$  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  $^{14}\text{C}$ -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.

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