

## ***Interactive comment on “Environmental controls on leaf wax $\delta$ D ratios in surface peats across the monsoonal region of China” by X. Huang et al.***

**Anonymous Referee #1**

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General comments: I recognize that this manuscript report a nice data set for molecular (e.g., CPI and ACL) and D/H profiles of n-alkanes from six surface peat samples, which is novel and certainly interest for many biogeochemists. However, I strongly feel that this manuscript is not in a stage for considering the publication in Biogeosciences, because it is poorly organized. I had a question about a number of sentences in this manuscript. Indeed the authors discuss the correlation between n-alkane profiles (e.g., CPI and ACL) and peat water chemistry (e.g., DWT and ORP) based on Tables 2-5, but the n-alkane profiles did not shown in the Tables. I have read this manuscript several times but I cannot fully understand what the authors were hoping to achieve or what they did achieve. I have three big concerns in this manuscript. First is vague discussion of the relationship between n-alkane profiles and environmental factors. It is very much unclear how to judge correlation vs. non-correlation, or significant vs. weak

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correlation in this manuscript. Also, sample size is too small to find the correlation. Indeed, data from only six places are used but it seems to be that the authors sometimes arbitrary remove one from the six to find the correlation. Second, it is unclear what the authors argue the vegetation sources of these n-alkanes in the peat samples through the manuscript. Indeed, C23 and C25 n-alkanes are used as Sphagnum plant signals but C29 and C31 n-alkanes are used as vascular plant signals in many places in the manuscript. However, in some other places they are combined both or used as either Sphagnum or vascular plant signals. Also, the effect on microbial activity on the n-alkane profiles (e.g., CPI) is not clearly described in the manuscript, which leads to the following two questions. Q1: what factor(s) is controlling the CPI value? I think that the CPI value of plant leaf waxes is highly dependent on the environment where the specific plant grown. Q2: how can we identify the sources of n-alkanes and quantify the contribution ratio from different sources (i.e., Sphagnum vs. vascular plant signals) for the n-alkanes in peat samples, if the microbial activity significantly modify the CPI and reduce C23 and C25 abundances in the peat samples? Third, it is also very much unclear how to interpret the correlation observed in this manuscript. For example, it should explain why D/H of C31 n-alkanes is correlated with water pH, or what mechanism in it. In the same line, it is very much unclear how to achieve the last sentence in the Abstract and Conclusions from the insufficient discussions

Specific comments: 1. Equation (1) is totally incorrect. It should be  $\epsilon = 1000[(\delta D_{alk} + 1000)/(\delta D_p + 1000) - 1]$ . See e.g., Sessions et al., 1999. Organic Geochemistry 30, 1193-1200. 2. Tables 2-5 should include n-alkane proxies (e.g., CPI and ACL). 3. Figures 2 and 4 should include n-alkanes from Yichun and Tiandouyang. 4. Figure 5 needs correlation line and R<sup>2</sup> value if the relationship between the site-averaged  $\delta$ D value of n-alkanes and annual mean temperature (or precipitation) is discussed in text.

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