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Biogeosciences Discussions
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Interactive comment on "Environmental controls on leaf wax δD ratios in surface peats across the monsoonal region of China" *by* X. Huang et al.

X. Huang et al.

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Thanks for the comments that help us to improve the quality of the manuscript. We are sorry for the missing of tables on the correlation between alkane profiles and the water level and water chemistry. We add them as appendix tables in the new version of the manuscript. The changes were labeled in red color in the revised text.

In this study, we assemble surface peats from seven sites and try to understand how leaf wax ðİŻ£D ratios respond to the environmental controls especially air temperature and precipitation, which can be certainly to advance the applications of leaf wax ðİŻ£D ratios to peat or other archives in the monsoonal regions in East Asia.

I have three big concerns in this manuscript. Fist is vague discussion of the rela-

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tionship between n-alkane profiles and environmental factors. It is very much unclear how to judge correlation vs. non-correlation, or significant vs. weak 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. Reply: The peatland numbers in this study are seven not six. Peatlands except Zoige have similar plant community (dominated by Sphagnum), acidic pH and relatively low conductivity, while the Zoige has basic pH and quite high conductivity and no peat moss. Thus it is not arbitrary to remove Zoige from the peatland batch. For the correlation analysis, we argue the significant or no significant that is based on the p values. With p-values <0.05 or 0.01, we say it is significant. We admit that the higher correlation coefficient and good p-values do not mean the two parameters have absolute causality.

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 Sphagum 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 CIP 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? Reply: The sources of C23 and C25 n-alkanes are an interesting question in peat samples. Though these mediate n-alkanes are major consistent in the leaf wax of peat moss, once import into the sediments, the dilution effect of vascular plants and degradation will eliminate their predominance. In the original version, we have mentioned the influence of degradation on C23 and C25 n-alkanes (line 153-156). We have

BGD
12, C6906–C6913, 2015

added more discussion on this subject in the revised manuscript.

Q1: For the CPI, we agree with the thought of the referee that microbial activity is an important factor to control their spatial distributions (see line 189-196 in the original text). Just as shown in Fig 3, higher CPI values happen in cold Yichun and Zoige, while lower values in the warmer conditions. The close relationship between site-averaged CPI values and air temperature may result from the relatively similar plant community in peatlands, with herb and grass as the dominant.

Q2: It is indeed different to quantify the contribution ratios of vascular plants and peat moss if they suffer degradation. As we stated in the text, most of the peat samples were collected under Sphagnum lawns; however, the Paq values are not as high as fresh peat moss. Thus it is cautious of using the Paq ratio in conditions where degradation is popular such as the subtropical regions in central and south China.

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. Reply: We admit that it is hard to elucidate why D/H of C31 n-alkane correlate with water pH with the current data set. Maybe such a correlation inherits from the relationship between water pH/ ðİŻ£D of n-C31 and the water level. The water level and chemistry parameters present here are one-time data, while alkane ðİŻ£D ratios intergrade long-term environmental information. In this case, we are cautious of interpreting the apparent correlation between ðİŻ£D ratios and water chemistry. If we monitor water level and water chemistry in peatlands over seasons or years, we will have the chance to elucidate the reason for the apparent relationship between ðİŻ£D ratios and water chemistry. This is what we are doing in Dajiuhu peatland. Our ongoing monitoring program in Dajiuhu has shown that the water pH has strong positive correlation with the water level on seasonal timescale. In this peatland, the water level responds sensitively with precipitation and the associated evaporation.

BGD
12, C6906–C6913, 2015

Specific comments: 1. Equation (1) is totally incorrect. It should be epsilon = 1000[(deltaDalk+1000)/(deltaDp+1000)ôĂĂĂ1] . See e.g., Sessions et al., 1999. Organic Geochemistry 30, 1193-1200. Reply: We have changed the equation.

2. Tables 2-5 should include n-alkane proxies (e.g., CPI and ACL). Reply: We have added new tables as appendix to include the correlation results between alkane ratios and water level and chemistry.

3. Figures 2 and 4 should include n-alkanes from Yichun and Tiandouyang. Reply: Added.

4. Figure 5 needs correlation line and R2 value if the relationship between the site averaged delta D value of n-alkanes and annual mean temperature (or precipitation) is discussed in text. Reply: Added.

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/12/C6906/2015/bgd-12-C6906-2015-supplement.pdf

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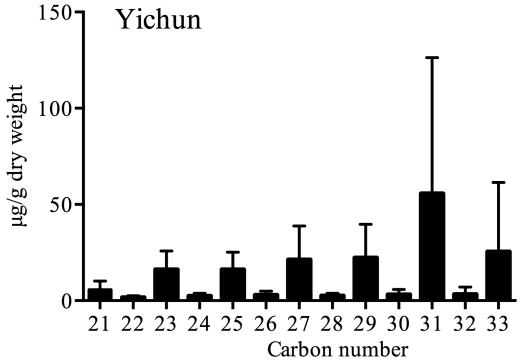
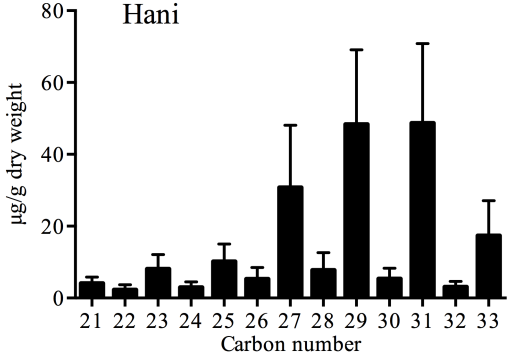
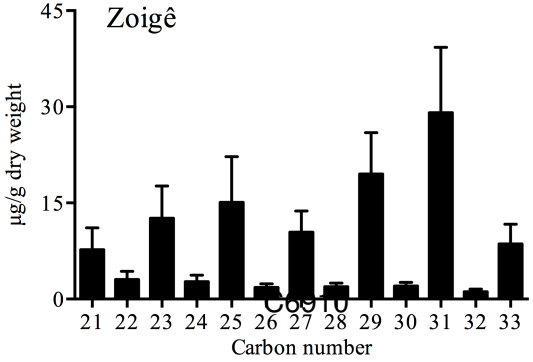
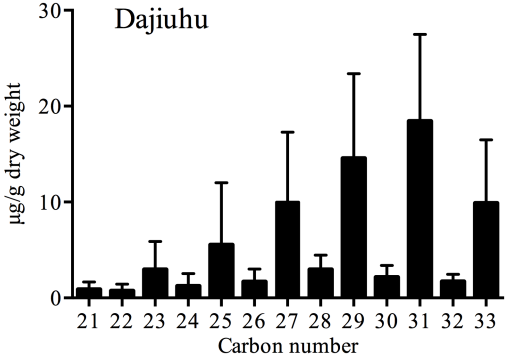
Interactive comment on Biogeosciences Discuss., 12, 15157, 2015.









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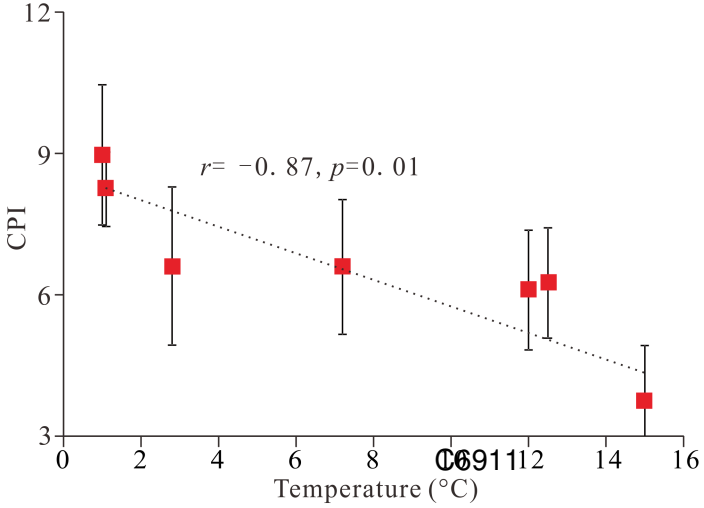

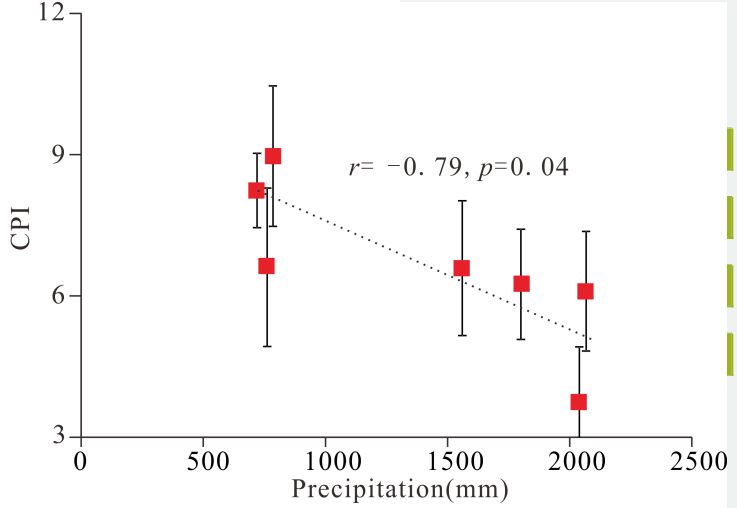

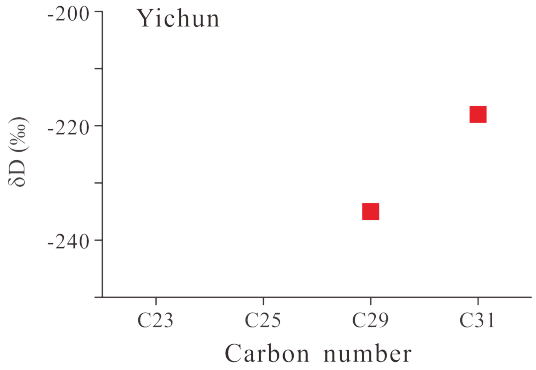

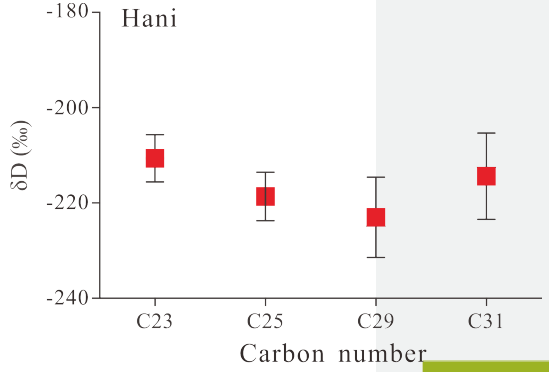

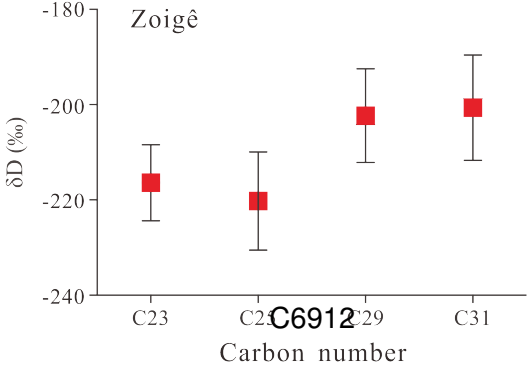

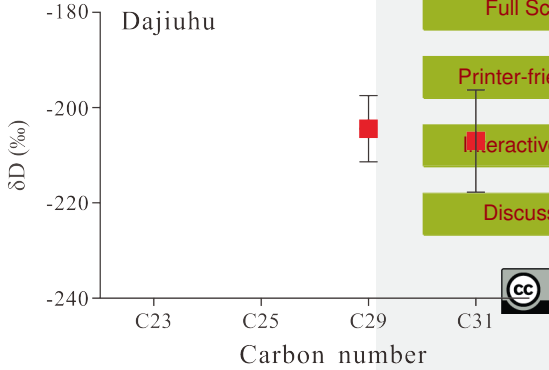

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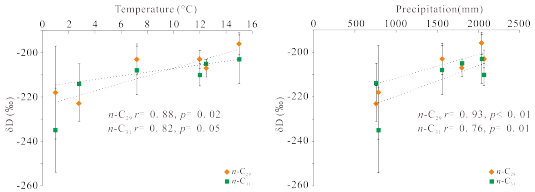

Fig. 4. revised fig 5

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12, C6906–C6913, 2015

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