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## ***Interactive comment on “Stable isotope paleoclimatology of the earliest Eocene using kimberlite-hosted mummified wood from the Canadian Subarctic” by B. A. Hook et al.***

### **Anonymous Referee #1**

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The author devoted the oldest tree ring width and dual-isotope ( $\delta^{18}\text{O}$  &  $\delta^{13}\text{C}$ ) analysis at annual and subannual resolution from cellulose from mummified wood in early Eocene when the global temperature was high. That is quite interesting for the paleoclimate study in the Subarctic and climate forecast in future. Here are some comments on this paper: 1. The author introduced the sample location at present. It is at ( $64^{\circ}42'49''$  N,  $110^{\circ}37'10''$  W). However, as we known, the earth is composed by seven moving Plates. At the early Eocene, 53.3Ma ago, the geographic location would not be same as present. When the author discuss the paleoclimate in Subarctic area, it would be more reasonable if the geography transition is considered. 2. In the hot early Eocene, the concentration of greenhouse gas  $\text{CO}_2$  was believed to be 680–3300 ppmv. Which

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role did the high  $p\text{CO}_2$  play on the relation between atmospheric  $^{13}\text{CO}_2$  and that in plant cellulose remains question. The value of  $C_i/\text{Ca}$  in Eq.(4),  $\Delta R_{\text{pc}}$  in Eq.(5) are determined in the lower atmospheric  $p\text{CO}_2$ . A discussion on the influence from higher atmospheric  $p\text{CO}_2$  on the relationship between  $\delta^{13}\text{C}_{\text{atm}}$  and  $\delta^{13}\text{C}_{\text{cellulose}}$ , such as the results from FACE experiment maybe helpful to make the calculation more valuable. 3. Generally,  $\delta^{18}\text{O}$  in cellulose from tree rings varies within a little range of 4‰. Figure 1 shows a great increase of  $\delta^{18}\text{O}$  in the tree ring from TR42 (?) in subannual resolution, very different from that of former ones, please explain why. 4. The font size in figure 1, figure 2 should be larger. It would be better for the author to add words, such as “a, b, c, d” to denote the diagrams in figure 1. Please make clear TR39-42 in figure 1.

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**BGD**

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