

Interactive comment on “Modelling tree-ring cellulose $\delta^{18}\text{O}$ variations of two temperature-sensitive tree species from North and South America” by Aliénor Lavergne et al.

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We thanks a lot Reviewer#1 for all his comments and suggestions. We are responding to each of his comments below as Author Comment (AC).

Comments p. 35, ‘tree rings’

AC: We changed this part as proposed by Reviewer#1 (L30).

p. 101-102, ‘which is an angiosperm deciduous species dominating’

AC: We changed this part as proposed by Reviewer#1 (L103).

C1

p. 111-112, ‘In western Argentina, precipitation is largely concentrated from late fall to early spring followed by a drier and mild period during summer and early fall’: isn’t late fall to early spring summer in Argentina, and therefore the following ‘mild period’ would be during the Argentina winter and early spring?

AC: In western Argentina, precipitation is concentrated in late fall to early spring (May-November) followed by a drier and mild period during summer and early fall (December-April). We specified the respective months for each period in the text (L112-114).

p. 188, ‘for *N. pumilio*, and therefore the’

AC: We changed this part as proposed by Reviewer#1 (L199).

216-217, ‘we also used modelled daily data from the GCMs described above for both the western Argentinian and northeastern Canadian sites’

AC: We changed this part as proposed by Reviewer#1 (L230-231).

221-222, ‘For the years 1950-1957,’

AC: We changed this part as proposed by Reviewer#1 (L235).

240 (and 159), the authors refer to ‘dampening factor f_o ’, but Eqn1 suggests it is actually the fraction of the tree-ring $\delta^{18}\text{O}$ signal that derives from xylem water: perhaps they are synonymous?

AC: The ‘dampening factor’ is defined in the literature (e.g. Saurer et al. 1997) as the proportion of oxygen atoms that is exchanged between sucrose and xylem water during cellulose synthesis. It is modelled as a coefficient in Eqn1 to take into account the part of $\delta^{18}\text{O}$ signal derived from xylem water during this exchange that is incorporated in the cellulose $\delta^{18}\text{O}$.

287, in “temperature and precipitation dependences”, the authors seem to mean “temperature and precipitation coefficients”, i.e., a and b .

C2

AC: Yes, the temperature and precipitation dependences are modelled as coefficients a and b, respectively.

289, "more strongly"

AC: We changed this part as proposed by Reviewer#1 (L307).

319, what is the "reference one"? perhaps "reference simulations"?

AC: Yes, it is the reference simulations. We changed it in the text (L342).

320, what is the "source one"? perhaps "than are the XW_source simulations"?

AC: Idem, we changed it in the text (L343).

325, what does "these results are limited upstream" mean?

AC: We removed this sentence in the text that was not clear (L352).

341-342, change "ratio in a high amount of precipitated water" to "ratio increased higher precipitation"

AC: We have simplified the sentence to be more understandable: 'Consequently, in the Tropics, the $\delta^{18}\text{O}/\delta^{16}\text{O}$ ratio in the meteoric water has been observed to decrease with increasing amount of precipitation and/or relative humidity.' (L365-367).

362-363, why is it 'interesting(ly)' that "the $\delta^{18}\text{O}$ signal in northeastern Canada is comparatively more depleted than in western Argentina". Given the latitude of northeastern Canada, I would expect $\delta^{18}\text{O}$ to be isotopically lighter.

AC: We expanded a little bit the explanation of why the $\delta^{18}\text{O}$ signal in northeastern Canada was comparatively more depleted than in western Argentina, following Reviewer#1 recommendations (L397-399).

363, "northeast"

AC: We decided to keep 'northeastern', which is often used (L394).

C3

385-386, "GNIP stations" AC: We changed this part as proposed by Reviewer#1 (L414).

434-435, "tree growth is inhibited, leading to a decrease of"

AC: We changed this part as proposed by Reviewer#1 (L484).

465, "tree rings"

AC: We changed this part as proposed by Reviewer#1 (L507-508).

719, are the "mean simulated $\delta^{18}\text{OTR}$ levels" (here in caption and in B y-axis labels) actually " $\delta^{18}\text{OTR}$ values"? or " $\delta^{18}\text{OTR}$ output"

AC: Yes, they are the simulated $\delta^{18}\text{OTR}$ values. We decided to stay with 'simulated $\delta^{18}\text{OTR}$ levels' because in this figure we want to show that some parameters are affecting the mean levels of $\delta^{18}\text{OTR}$ values (L890).

REFERENCES The "13"s and "18"s in isotope designations in titles need to be superscripted. DeNiro and Epstein 1979, Rozanski et al. 1993, Yakir and Deniro references: too many words in title begin with upper-case letters

AC: We have corrected all the errors detected by Reviewer#1 in the reference list.

Figure 4, shouldn't the label on the y-axis be "kernel density"?

AC: We think that the y-axis as 'kernel density estimates' is fine (L908).

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C4