Please find in attachment, the manuscript entitled "A millennial summer temperature reconstruction for northeastern Canada using oxygen isotopes in subfossil trees" which has been modified following the comments of referees. Their comments appear in black while our responses are in blue characters. Every response is numbered following the order of comments. We thank referees for their useful comments and suggestions, our answers are listed below.

M.Naulier

Valérie Daux comments

Figures :

1. 1B) triangles are almost invisible. Please enlarge them.

We have increased the figure size.

2. 4A) maximal (not maximale) temperature

Done.

3. 6A) maximal (not maximale) temperature. Word "Oort" not properly positioned

The "e" of maximal has been removed but concerning the word "Oort", we think that it is properly positioned.

Text:

4. Line 56: suitability to reconstruct summer temperature: Please add Daux et al., EPSL 309, 2011.

Reference has been added (line 56).

5. Line 76: "inter-tree" is unclear. "Tree pooling" may be better. You could refer to Treydte et al., 2001 as well.

We have changed the sentence "inter-tree" by "… different sub-sampling methods have been developed such as tree pooling" (line 76).

6. Lines 171, 261: 5-year, 9-year (correct this form throughout the manuscript)

Done (lines 171, 198, 260, 263, 277).

7. Line 239: “different” instead of “various”… “the water supply of trees” instead of “their water supply” (trees is not the subject of the previous sentence.

Done (line 239 and 240).

8. Line 339: use LIA instead of Little Ice Age (already explained in line 312).

Done.

9. Line 352; +0.2°C: is it significant? Please add the uncertainty.

Good point. The uncertainties have been added to the text presenting the interpretation and we have modified the related sentence accordingly. Thus, the difference between the medieval climate anomaly (MCA) and the modern temperature high is 0.2±0.5°C, which still implies that the modern high is not warmer than the MCA. The new text in the interpretation part is: «In the present study, we compared the i-STREC mean of maximal summer temperatures for MCA (1000-1250), LIA (1350-1850) and the modern period (1950-2000 as defined in IPCC, 2014) and found without surprise that the MCA was warmer than the LIA (+0.4±0.5°C). Moreover, there is no significant temperature difference between the MCA and the modern period (ΔT=0.2±0.5°C) in our study area.» and in the conclusion: «6. Overall, i-STREC shows that the Medieval Climate Anomaly (997-1250) was characterized by a temperature range similar to the one of the modern period in the study region.»

10. Line 397: millennium not millennial

Done (line 397).

11. Line 413: what is “Naulier et al” cited for? Shouldn’t this reference appear at the end of the sentence?

Done (line 415).

12. Line ‘&-: “it is important to recall”: can be remove for conciseness

Done (line 419).

13. Line 428: this sentence is unclear: Do you mean "which are not as extreme as those…"?

No, we have changed the sentence (line 428-430) to: «… distillation and precipitation (Rayleigh process) are not limited to a temperature range, and may record temperature lows modulated by solar minimums.»

14. Line 434: "fashion" is inappropriate.

"Fashion" has been replaced by "way" (line 438).

Hans Linderholm comments

I think that authors have done a good job responding to the comments. I would suggest a slight language check especially the new sections)

Done for 3 main parts:

Lines 258-265. «Although the cohort sampling method presents many positive points, it is important to highlight some of its downflaws. Indeed, the sampling strategy produces a $\delta^{18}O$ series smoothed with a centered 9-year filter. This smoothing leads in some cases to series requiring more precaution than non-smoothed series before they can be interpreted or used. For instance, the calibration of our smoothed $\delta^{18}O$ series required a centered 9-year filtering of the climatic series. Consequently, correlations between isotopic and climatic series are improved by smoothing due to the sampling method. Nevertheless, these correlations represent solid and real links, and do not create artefacts (see also section 3.2.1, and Naulier *et al.*, 2014).»

Lines 328-335. « In contrast, the AMO influences spring and summer temperatures (Fortin and Lamoureux, 2009) and is partly responsible for the recent sea surface temperature warming of northeastern Canada (Ding *et al.*, 2014). However, the state of the AMO at the beginning of the millennium and its potential influence on climate during the MCA are unknown. Recently, Sicre *et al*. (2014) have demonstrated that during the MCA, the Northern Annular Mode (NAM) was effective concomitantly with a strong ice-

loaded Labrador Current (LC). This combination could be responsible for a decrease of fresh air from the Arctic to eastern Canada, and consequently, for an increased temperature along the continent. »

Lines 348-371. « In the present study, we compared the i-STREC mean of maximal summer temperatures for MCA (1000-1250), LIA (1350-1850) and the modern period (1950-2000 as defined in IPCC, 2014) and found without surprise that the MCA was warmer than the LIA (+0.4±0.5°C). Moreover, there is no significant temperature difference between the MCA and the modern period (ΔT=0.2±0.5°C) in our study area. These results contrast somewhat with Northern hemisphere temperature reconstructions that have determined that the mean annual temperature of the modern period was the warmest in northern Canada (Mann *et al.*, 2009; Ljungqvist *et al.*, 2012). Indeed, the data available for these hemispheric reconstructions in the last IPCC report are scarce for north-eastern Canada (Viau *et al.*, 2012). Clearly, both the i-STREC and STREC (Gennaretti *et al.*, 2014) results indicate that the MCA in northeastern Canada has been the warmest period of the last millennium (Figure 5). The similarities between MCA and the modern period were expected considering that the MCA has been widely studied for its similarities with the modern warming period. Nevertheless, the causes that triggered these similar climatic periods are likely different (i.e., Landrum *et al.*, 2013; Way and Viau, 2014). Indeed, if the MCA is solely controlled by natural processes, it seems that the warming during the modern period results from a combination of natural and anthropogenic causes (i.e., Mann *et al.*, 2009; Viau *et al.*, in press). By using empirical statistical modeling and global climate models for the 1881-2011 period in Labrador, Way and Viau (2014) have shown that up to 65% of the variance in annual air temperature was explained when also including anthropogenic forcing in the model. Even if summer temperature has increased at a lower rate compared to annual air temperature in Labrador, the observed warming (+1.9°C) between 1970 and 2000 in the region of L20 is one of the fastest over the last millennium. In the next decades, if warming continues at this rate, temperature will reach a record for the last millennium. »

…and also thet that authors use the Medieval Climate Anomaly rather than the Medieval Warm Anomaly: indeed both trouet et al and Mann et al use the MCA...

Good point. In fact, Mann *et al.,* 2009 and Trouet *et al.,* 2009 used medieval climate anomaly (MCA) or medieval warm period (MWP). In order to respect the appropriate form and conforming to the literature, we have changed the MWA by MCA in all the text.