This paper presents a short varve chronology from Labrador along with various hydroclimatic interpretations. The identification of varves in this particular region is important due to the limited availability/identification of palaeoenvironmental proxies in the Boreal region of eastern Canada. This work proposes to help fill that gap. The authors suggest a potential for a longer-term record to emerge from this lake – this would greatly benefit hydro-climate reconstructions in this region. The palaeohydrologic interpretation of the varve record is robust, supported by independent dating and multiple statistical approaches.

Overall, the sedimentary analyses and interpretations are sound. Most of my comments below focus on the reporting of the statistical analyses. The figures are well drawn. There is a heavy reliance on acronyms which take some time to get familiar with. In many places, a comma is used instead of a period for quantities (eg, Fig 9 vs Table 1) – from a Canadian perspective it doesn't matter which is used but pick one convention for consistency. Four research objectives are identified in the introduction, and the paper discusses each of these sufficiently.

I would recommend publication of this manuscript with the below comments/suggestions/questions addressed.

> Reply:
>
> We thank reviewer #1 for his positive comments on our manuscript. The use of acronyms will be reduced to facilitate the reading of the manuscript. Also, a descriptive table grouping the main acronyms used in this study could be a good way to help readers familiarised with acronyms and make the reading more fluid. The used of the period for quantities will be uniformized.

Line 111-113: how are "winters" and "summers" defined? Later in the paragraph the snowmelt season is defined as AMJ, but there is no similar definition of the seasons. Assume JFM and JAS?

> Reply:
>
> Winter (DJFM) and summer (JJA) will be defined in the revised version.

Line 189: "counts were executed repeatedly". How were the counts made? Multiple counters? Multiple counts per counter? There is a mention of counting difficulty (line 382). If multiple counts were made, how consistent were those counts? Given the clear images and laminae it would seem to be fairly clear-cut, but I'd like to see some mention of the accuracy/precision of the counting process to fortify that.

> Reply:
>
> Due to the great quality of the varved sequences, two counts were made by one counter (AGP). As mentioned in the text, counting difficulties occur within varve years 1952-1953, 1935-1934, 1918-1919. The error percentage between the 2 counts will be mentioned in the text to further demonstrate the accuracy/precision of the counting process.

Line 244-245: Only 1 of the 5 instrumental records goes back to 1966 (incomplete data 1966-68?). Is this good enough to extend the composite instrumental record back to 1969? "Strong positive correlations" are stated but not shown – could these be added to Table 2? Also, the extension crosses pre- and post-diversion boundary – is it still reasonable extend the record back past 1971?

> Reply:

> There is an error in the Tab. 2, the Eagle series goes from 1969 to 2016, not 1966 to 2016. This will be corrected. Dinis et al., 2019, produced an observed river index of summer regional discharge in Labrador for the 1969-2009 period. They normalised and average hydrometric data from the Eagle River; 1969–2009, Alexis River; 1978–2009 and Little Mecatina River; 1979–2009. As this paper has been accepted and published in the international journal *Climate Dynamics*, we think it is reasonable to use the same methodology to produce our Labrador region mean annual discharge series.

> Dinis, L., Bégin, C., Savard, M. M., Marion, J., Brigode, P., and Alvarez, C.: Tree-ring stable isotopes for regional discharge reconstruction in eastern Labrador and teleconnection with the Arctic Oscillation, Clim. Dynam., 53, 3625-3640, https://doi.org/10.1007/s00382-019-04731-2, 2019.

> The significant positive correlations between the four streamflow series (Tab. 2) with Naskaupi River discharge mentioned in the section '' 3.4 Hydro-climatic variables used'' (line 242) are rather shown in the result section ''4.5 Relation between varve series and instrumental record'' (line 455) because we believe that these are results. A note in section 3.4 will be added to guide readers (i.e. see section 4.5 for details on correlations).

> We think that it is useful to extend the regional mean annual discharge series back past diversion boundary with the Eagle River hydrometric data because this produce a longer calibration period using a large watershed of the Labrador region which is devoid of anthropogenic modifications. This also allows to calibrate the few varves pre-diversion with discharge data. We think this are valid justifications to extend the regional record beyond 1971, otherwise we still could use the Eagle data from 1978-2016 (or 1973-2016) to standardize with other regional basins.

Line 252: linear regression models. "simple linear regression" is used to model the relationship between varve thickness and hydrometric variables. Adjusted R2 is listed as an evaluative statistic. Adjusted R2 should be reserved for multiple regression, since it adjusts the coefficient based on the number of independent variables. With only one independent variable, the unadjusted R2 is appropriate (listed as Multiple R-squared in R). Similar with Figs 8 & 9.

> Reply:

> The unadjusted R2 will be used instead of the adjusted R2 as the linear regression model implied only one independent variable.

Line 371-374: This triggered a flag for me – why did the 1971 changes result in a thick and coarse unit? It is explained later on (section 5.2) but left me wanting more explanation here in the results section.

> Reply:
>
> We agree that it would be useful to include in the revised version of the manuscript a short explanation why did the 1971 changes result in a thick and coarse in this section of the text.

Line 411-: a lot of p-values shown here using a 0.05 threshold (and Table 1). This defeats the purpose of using p-values which are intended to show the actual probability of attaining the particular statistic. Really this is just the same as accept or reject at 95% confidence, which is far too arbitrary. Can these threshold values be replaced with actual p-values to make the analysis more objective? To make matters worse, the threshold value changes to 0.01 in Fig 6. Reporting actual p-values will help with consistency. In line 435-438 there are several r values with no p-value attached. They are "significant" correlations, but no indication of how significant. I would suggest actual p-values to 3 decimal places would suffice.

> Reply:
>
> We agree with that comment. P-values shown in the manuscript using threshold values (0.05 and 0.01) will be replaced with actual p-values to make the analysis more consistent and objective.

Line 474: "1972 is considered as an outlier". Is this a subjective consideration or is it supported by the statistical analyses? For example, does the leverage for 1972 appear high when evaluating the regression analyses?

> Reply:
>
> The fact that the varve of the year 1972 is considered as an outlier is supported by the statistical analyses. When evaluating the regression analyzes, 1972 is far high from the cloud. Indeed, this lamination is interpreted as not being caused by natural hydrological conditions but rather by anthropogenic modification of the watershed. The thickness and the grain size from this varve don't match the annual hydrological instrumental data. Adding 1972 would have the effect of changing the position of the least squares line and inducing an error in the linear regression between variables.

Line 32: take[s]

> Reply:
>
> OK

Line 69: method[s]

> Reply:
>
> OK

Line 79: switch "into" and "the" around

> Reply:
>
> OK

Line 135: [a]eolian [this is very picky]
> Reply:
> OK

Line 157: [an] undisturbed or undisturbed area[s]
> Reply:
> OK

Line 211: Using [a] custom
> Reply:
> OK

Line 227: replace indice with index
> Reply:
> OK

Line 244: allows [an extension to the] instrumental
> Reply:
> OK

Line 249 Table 2: km2 - add superscript
> Reply:
> OK

Line 255: Model[s]
> Reply:
> OK

Line 275: station[s]
> Reply:
> OK

Line 279: "thanks to the. . ." – this is rather informal compared to the rest of the writing. Change to "using the Oudin et al. . ."? Same on line 304.
> Reply:
> OK

Line 378-379: structures allowed [to build] a robust age-model reproducible among cores [to be constructed].
> Reply:
> OK

Line 379: why is the 1 – 5 km distance "significant"? Significant with respect to what? Suggest removing the word.
> Reply:
> OK

Line 392: ([F]ig. 6a)

> Reply:
>
> OK

Line 401/415: "slight" – what does this mean? Can this decrease in TVT/DLT be supported statistically?

> Reply:
>
> We will support this decrease statistically in the revised mansucript.

Line 444: [since]

> Reply:
>
> OK

Line 490: 1887-1991 – should this be 1887-1891?

> Reply:
>
> Yes, this will be changed.

Line 491-493: this sentence is incomplete. Perhaps solved by removing the "While" at the beginning.

> Reply:
>
> OK

Line 500: varve[s]

> Reply:
>
> OK

Line 514: replace on with for

> Reply:
>
> OK

Line 538/589: important. What does this mean? It seems to be used as a synonym for significant, but it doesn't fit well. The sentences work without the adjective.

> Reply:
>
> OK

Line 552: Beaver[s]

> Reply:
>
> OK

Line 583: "floods of [the years] 1972 CE [has (have)] remobilized"

> Reply:
>
> OK

Line 588: bank[s]

> Reply:
> OK

Line 589: [r]iver

> Reply:
> OK

Line 595: replace for with to

> Reply:
> OK

Line 625: good – another of those pesky vaguely meaningful words. What does it mean in this case – what is a good correlation? Can 'significant' be used here instead?
Line 634: global. Do these cores contain a global hydro-climatic signal? Or is it regional (see line 92)?

> Reply:
> That will be clarified.

Line 685: recorded in [the] Grand Lake. . .

> Reply:
> OK

Line 699: discharge[s]

> Reply:
> OK

Line 746: record[s]

> Reply:
> OK