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Climate of the Past Discussions

Interactive comment on "Reconstructing past hydrology of eastern Canadian boreal catchments using clastic varved sediments and hydro-climatic modeling: 160 years of fluvial inflows" *by* Antoine Gagnon-Poiré et al.

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This paper presents a short varve chronology from Labrador along with various hydro-climatic 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.

Specific comments:

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?

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.

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?

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.

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.

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.

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?

Technical corrections: remove/add what is in [ ]

Line 32: take[s]

Line 69: method[s]

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

Line 135: [a]eolian [this is very picky]

Line 157: [an] undisturbed or undisturbed area[s]

Line 211: Using [a] custom

Line 227: replace indice with index

Line 244: allows [an extension to the] instrumental

Line 249 Table 2: km2 - add superscript

Line 255: Model[s]

Line 275: station[s]

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.

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

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

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

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

Line 444: [since]

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

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

Line 500: varve[s]

Line 514: replace on with for

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.

Line 552: Beaver[s]

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

Line 588: bank[s]

Line 589: [r]iver

Line 595: replace for with to

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)?

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

Line 699: discharge[s]

Line 746: record[s]

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