

Interactive comment on “Influence of North Pacific Decadal Variability on the Western Canadian Arctic over the past 700 years” by François Lapointe et al.

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Firstly, we would like to thank the first referee for the constructive comments. These will increase the quality of the manuscript.

General comments

1. We agree that additional discussion of dating accuracy should be included in the main text. Furthermore, it would make it easier for the reader to have this discussion in the main text body instead of in the supplemental material. This will be placed in section 2.3. Thanks for this comment. The lower frequency climatic signal in the varve record is seen when a 25-year low-pass filter is applied to both our record and the

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millennial MacDonald and Case (2005) PDO (Supplemental Figure S5). This could also be inserted in the main text.

2. While we find that this is a very interesting point, it is not the scope of this paper to make a link between the AO and PDO, but we agree that this relationship should be more deeply analysed in modern and instrumental climate studies. We hope that our work will attract the attention of researcher working on that topic. Nevertheless, we think the PDO (NPI) and the AO partly share the same signal since they are correlated over the past 100 years ($r = 0.45$). Therefore, we added some text (highlighted in yellow) in the section mentioning the potential influence of the AO and we added references that further explain the potential relationships between the AO and PDO (NPI).

3. We totally agree with this comment and since our record looks quite convincing when correlated to the PC1 of the PDOs used here, this hypothesis makes a lot of sense; We will thus add this comment to the discussion.

4. There is one other varve record located nearby, Nicolay Lake (Lamoureux 2000), Cornwall island, located 470 km northeast of CBEL. It is negatively correlated to the PC1 of the PDOs at the annual scale ($R = -0.21$, $p = 0.003$) and using a 5 year-running mean it only increases slightly ($R = -0.28$). This record is shorter: 500 years. Moreover, compared to Cape Bounty, we have a less comprehensive knowledge of the processes occurring within Nicolay Lake's watershed. Nicolay Lake system seems to working differently, and has so far been shown to be mainly sensitive to rainfall events. Therefore, we think it is not appropriate to compare the two records in this paper, although we are planning on going back to Nicolay Lake to apply the new techniques (XRF, Grain-size from thin-sections) that have been developed since Nicolay Lake has been investigated in the 90s.

5. Ok, thanks.

6. An english native has passed through it now.

Minor points

- References in the abstract were removed. Thank you.
- We reworded the negative correlation for the past century (instrumental) and for the last 7 centuries (reconstructed-PDO).
- ENSO: added reference by Rob Allan, thank you.
- Cape Bounty East Lake is 320 km southeast of Mould Bay: added in the methods, section 2.2.
- Show varve site on map: OK.
- Mantua is now added before (1997).
- Ok, a discussion on errors in dating is added for this 2.3 section
- MSLP is now being used instead of mslp, thank you.
- erosive bed: we reformulated this sentence.
- Factor loadings of the PC1 are 0.58 (D'Arrigo et al. 2001), 0.68 (Gedalof and Smith 2001) and 0.65 (MacDonald and Case 2005). This is now included in the main text.
- The 18 and 28 year lag are indeed large offsets. Unfortunately, in varves studies from the Arctic (and probably in other environment), it is clear that missing and/or adding extra varves might occur (Ojala et al. 2012; full citation found in the text). Also, in arctic areas, the hypothesis that the upper part of a lake was ice-frozen for years can not be ruled out. If this would occur, no clastic input would reach the lake bottom, making offsets unavoidable. The huge lack of similar high-resolution records in this region impedes a more reliable chronological control. Nevertheless, as explained in the text, all of the present-day teleconnection using instrumental and reanalysis correlations support our assertion that this region is influenced by these climate modes.

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