



## ***Interactive comment on “A climate index for the Newfoundland and Labrador shelf” by Frédéric Cyr and Peter S. Galbraith***

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Dear Reviewer,

Thank you for your comments. Please find below a point-by-point reply to your comments. In order to better answer, the relevant part of your comments associated to our answer has been re-copied here in italic.

*The objective of this paper is to combine 10 climate sub-indices into a new index for describing the environmental conditions on the Newfoundland and Labrador shelf. Generally, the manuscript is well written and easy to follow. The authors devote a lot of space and figures to describing the 10 subindices. However, the significance of intro-*

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*ducing such a new index is ambiguous. The literature review is not comprehensive and too simple. There are some critical points to be clarified. Additional assessments are also required to verify the reliability and superiority of the new index. Therefore, major revision is warranted before publication.*

### **Specific comments:**

*1. The sections of Abstract and Introduction are too simple. The research gap and motivation of this study are missing. Are existing indices not good? It is desired to clarify the deficiency of previous indices, even though the authors claim that the proposed index has been used in annual reports on the physical oceanographic and meteorological conditions.*

We acknowledge this aspect. The Introduction has been completely rewritten (and the abstract amended). This new index is produced because the previous one had been abandoned when one of our colleagues retired. The context in which this new index has been developed has now been clarified and a new Table 1 now details the different historical versions of these indices.

*2. Line 3: The contribution of the 10 subindices is equal. Is it reasonable? Please explain.*

We generate the index in the simplest possible way: the arithmetic average of the 10 subindices. We have no justification to make it otherwise, but by providing the 10 subindices, users can generate their own custom index if needed.

*3. The proposed climate index is introduced in a previous study by the authors and their colleagues. I find that the previous study is similar to this paper. Please explain the difference between them.*

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The previous study mentioned above is not peer-reviewed in an international journal and few details are given about this climate index. In addition, the climate index presented here has been changed compared to the one presented previously. Differences now explained in the Introduction (see L.49).

4. *The authors give too many details on the 10 subindices in Section 2, but there is no statement on the methodological contribution. I am also confused about the calculation of the proposed index. How is the index calculated based on the 10 subindices?*

Simple arithmetic average of the 10 normalized anomalies (see L. 230)

5. *Lines 181-182: "The sign of some subindices have been reversed". Is this a common procedure?*

Yes, this is common practice because anomalies would otherwise cancel each other out when averaged. For example, a negative sea ice anomaly implies warm conditions, and thus need to be reversed to match, for example, warm positive/warm air temperature anomalies. Note that the subindices are also provided in their natural sign in the dataset. We are sorry if this was not clear, we have modified the text near L.228.

6. *Figure 13 and Line 215: Figure 13 indicates that quite a few subindices are correlated significantly, so I disagree with the authors' statement that the subindices are "relatively independent".*

We acknowledge that these subindices are correlated (see discussion starting in L.235). What we mean with this statement is that since no correlation

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greater than 0.9 is found, each subindex captures a different part of the variance of the NLCI. This is contrary to the previous versions of the climate index where repetition was found in the 28 subindices (several air temperatures, several SSTs, several bottom temperatures, etc.). We now make this clear L.270.

7. *Figure 14: The authors compare the proposed climate index and the CEI, and find a good correlation between them. So, what is the superiority of the proposed index? Is it better than previous indices?*

The goal of this study was not to demonstrate a superiority from a previous version of the index, but rather to ensure continuity from a previously abandoned index after the retirement of a colleague. In addition, the goal here is to make this new index stable, fully transparent and open access. We see a good correlation with the previous version(s) as a good thing (for continuity reasons), given that this new index is simpler (only 10 sub-indices rather than 28). We hope that this study will also give some stability to this "NL climate index" for which the definition has been constantly changing over the past 15 years. Finally, this index is also based on more modern data (e.g. better ice product, better SST product, etc.).

8. *Line 221: Why is the new index useful for ecosystem studies, fish stock assessment, and forecast models? According to the Introduction section, the new climate index is designed to better inform fisheries scientists and managers. However, there is little related evaluation in the paper. Please provide more related background or evidence.*

We have completely re-written and augmented the Introduction to address this comment.

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