

This manuscript aims at disentangling the relative contribution of environmental factors *versus* trophic interactions in determining the taxonomic and functional composition of phytoplankton and zooplankton communities across boreal lakes. To this purpose, the authors collected phytoplankton and zooplankton from lakes situated in three environmentally and geologically distinct regions of Québec, and measured key environmental variables characterizing the lakes' morphometry and water quality. Phytoplankton and zooplankton communities were characterized both taxonomically and functionally, based on a suite of functional traits known to play a role in phytoplankton-zooplankton trophic interactions. The coupling between phytoplankton and zooplankton composition, at taxonomic and functional traits levels, was tested through Procrustes analyses, before and after controlling for environmental variables.

The main conclusion of the study is that a coupling is found at the taxonomic level, but not at the functional level, and that this taxonomic coupling disappears after controlling for environmental variables. This suggests that trophic interactions play a negligible role in the biogeographical coupling observed between plankton groups, compared to environmental variables. Overall, phytoplankton responded mainly to water quality, while zooplankton was mostly affected by lake morphometry.

I think it is an interesting study, and overall the paper is well written and organized. I however have a few comments, of varying importance, which I give below.

General comments:

(1) My main concern is about the difficulty to fully distinguish between environmental and trophic interactions effects on biogeographical coupling. For example, it is known that water quality (e.g. phosphorus, nitrates, etc.) affects the phytoplankton community structure (e.g. by inducing cyanobacterial blooms), which in turn can trigger a response at the zooplankton level (e.g. because of changes in phytoplankton edibility). The resulting coupling between phytoplankton and zooplankton may be erroneously interpreted as a concordant response to the environment, while it is actually the result of trophic interactions. Then, it is not clear to me how it is possible to distinguish between environmental and trophic interactions effects, and to draw strong conclusions about the absence of trophic interactions effects. This problem is mentioned by the authors in the discussion (P19), and it is, I think, a possible weakness of the study.

(2) I am wondering if considering additional functional traits, potentially important in trophic interactions, could change the results. For example, some cyanobacteria produce toxins, which have negative effects on grazers and impact the zooplankton composition. In turn, zooplankton tolerance traits (e.g. selective feeding, detoxification, etc.) can contribute to a top-down control of these cyanobacteria, and thus affect phytoplankton structure.

Specific (minor) comments:

(3) P3, I think "have never been tested" should be replaced by "has never been tested", and the comma after "between" should be removed.

(4) P6, first sentence: add “to” after “compared”.

(5) P9: Canonical Analysis of Principal Coordinates, if I am correct, is based on distance or dissimilarity measures. The authors should mention what distance index was used in the analysis.

(6) P11 (and table 1): it might be interesting to provide the average values of environmental variables for each of the three regions (in table 1), and to refer to that table in the first paragraph of P11.

(7) P11 and Figure 3: the average percent occurrence cited in the text for the phytoplankton does not seem to be exactly the same as in figure 3. In addition, in Figure 3, it might be interesting to show the average taxonomic composition of the three regions.

(8) P12 and Figure 4: In the text, it is mentioned that regional differences were less pronounced in phytoplankton than in zooplankton, but when looking at the graphs I would have intuitively concluded the opposite. Maybe it is just an impression, however.

(8) P27, Table 3: Phytoplankton and Zooplankton in the table are not abbreviated by the letters “P” and “Z”, as mentioned in the legend.

(9) P32, Figure 5: the y axis name is missing.

(10) P34, Figure 6: in the legend, it is mentioned that taxa and functional traits are represented by crosses, but the authors does not explain what dots correspond to. In addition, there are no arrow in the figures.

I hope my comments will be useful to the authors.