L&O Letters Guidelines (<https://aslopubs.onlinelibrary.wiley.com/hub/journal/23782242/aims-and-scope/read-full-aims-and-scope>)

Manuscripts will be selected based on their broad interest to the field, the strength of their empirical and conceptual foundations; their insightful, succinct and elegant conclusions; and their potential to advance knowledge in the aquatic sciences. Submissions must be short-format articles that are concise, highly focused analyses, with few display items.

Short-format articles that present original innovative research advancing knowledge in an area of aquatic science. Authors must articulate how knowledge is advanced and the potential influence of their work and they must write clearly and concisely for a broad aquatic science audience.

*- 3,000 words maximum (includes introduction, methods, results, and discussion; excluding abstract, significance statement and all other text) and 3-5 visuals (tables, figures, or boxes); 30 cited references (authors may petition to have more citations at the time of submission)*

*- Letters should include:* Significance statement, abstract, introduction, results, discussion, and references

Title:

Target journal: Limnology & Oceanography Letters or Biogeochemistry Letters

Authors: Dustin Kincaid, DongJoo Joung, Andrew Schroth, Carol Adair, . . .

Background:

* The majority of global lakes are north of 45 deg. N latitude {Verpoorter:2014dk} and freeze during the winter
* Extended freezing periods can decouple lakes from their catchments and ice cover influences the physical environment of lakes with consequences for the biology and chemistry of these environments
* Although studies focused on under ice dynamics are limited, a few recent studies suggest that nitrogen is actively cycled despite low temperatures and limited light availability:
  + {Powers:2017bn} found that ice duration was positively correlated with nitrate accumulation in northern oligotrophic and mesotrophic lakes, and that nitrification likely generated the majority of the nitrate
  + {Cavaliere:2018cb} found that winter and summer rates of denitrification did not differ in 9 Canadian lakes with a broad range of DIN concentrations
* These studies suggest that N cycling during winter months may influence N availability in the biologically productive summer months
* While N cycling under ice may influence in-lake winter N dynamics, melt events reconnect frozen lakes to their catchments and hydrologic forcing (and primary productivity?) could potentially modulate this winter signal and influence spring water column N concentrations and speciation
  + The extent to which melt events influence in-lake N dynamics depends on:
    - melt event provenance and severity
    - lake-watershed physical configurations (lake area, lake : catchment area ratio)
    - biological productivity

Value/contribution of this study:

* These lakes are eutrophic and hyper-eutrophic systems, whereas Powers et al. studies were in oligotrophic-mesotrophic lakes, but Cavaliere & Baulch (2018) included a few lakes with elevated DIN concentrations
* Time series includes under ice time series during both frozen and thawing periods, the latter of which are challenging data to collect and may be rare
  + First comparison: the frozen period for two years (2014 & 2015) for Missisquoi Bay, in which the years differed in freeze severity (i.e., 2014 = slower ice growth, more mid-winter freeze-thaw cycles & 2015 = persistent subfreezing temperatures)
  + Second comparison: the 2015 freeze and thaw dynamics for two lakes: Missisquoi Bay (eutrophic, low lake : catchment area) and Shelburne Pond (hypereutrophic, greater lake : catchment area)
  + Comparison of interannual variability of
* Builds on {Joung:2017ko} by including DIN data

Results main points

1. Ice dynamics impact dissolved oxygen dynamics which impact N cycling (specifically NO3- removal) – comparison of 2014 vs. 2015 at MB – NO3- depletion occurs only when ice impacts DO dynamics
2. Thaw dynamics impact lake physicochemical and DIN dynamics, but response depends on thaw severity/provenance AND lake:catchment area ratio (2015 comparison of MB & SB)