

1. What is the name of the YouTube video with Lake Superior that was just shown? Would love to be able to find that! (she meant the tracer.2yrs video)

It is not posted on YouTube, but I will try to accomplish this now that you mention it. (Note: we'll try to post the video along with the webinar archive)

2. What is CO₂ evasion?

Outgassing of CO₂ from a water body across the air-water interface.

3. Do you think *Diporeia* are sensitive to water temperature? Lake Erie is very shallow and warm - maybe the temperature is a contributing reason why *Diporeia* were extirpated from the lake?

Possibility so. Not something I have studied.

4. Would studying the gyre formation re pH changes remove some of the spatial/temporal variability encountered?

Certainly physics is a critical part of the observed pH variation. If we get enough data, the potential to filter data based on different physical states may present itself. At present with only 8-20 points in each April and each August, this really is not enough data to (1) understand physical variability and its impact on pH and then (2) select data that might be more representative of the lake-wide mean.

Back to the question of higher blood consumption rates in the eastern basin of Lake Superior, couldn't it also be partly explained by very high siscowet populations (more prey) found there compared to western basin?

We show a greater INCREASE in blood consumption in the eastern basin. With a greater background concentration in the east compared to the west, yes, I agree that this might be a reason why the increase with warming would be larger. Thank you for this interesting comment / question.

Couldn't the observed rise in pH also be a result of increased primary productivity due to increasing nutrient inputs and recycling (remineralization and Dreissenid mussels)?

Fahnenstiel et al. (2010) show large declines in spring productivity in Lake Michigan and attribute it to the quagga mussels ability to filter out the spring bloom prior to stratification. We do not have enough data to study productivity trends in Superior, and I am not versed in the literature on the other lakes.

For Superior, I have shown that observed April-August mean pH from EPA is not a good indicator of the lake-wide mean, based on the OSSE. Also, I have shown that interannual variability is likely exaggerated by the sampling. I attribute this to sampling across periods of intermittent productivity in the lake and so if you catch a productive moment, you get high pH. If its less productive where you sample, it is lower. You can see from the Lake Superior SAMI that the pH variability over just a week in one location can be greater than 0.6 units.

Despite all of the above, it is important to recognize that our understanding of the drivers of pH variability in both space and time in the Great Lakes is insufficient. How do drivers such as

eutrophication and invasives, and patterns of impact and recovery with management, all imprint themselves on the April-August mean pH from EPA are important topics for research.

Fahnenstiel, G. *et al.* Recent changes in primary production and phytoplankton in the offshore region of southeastern Lake Michigan. *J Great Lakes Res* **36**, 20–29 (2010).

You said the pH data from the monitoring is not proper for at as a trend, what you think about the nutrient data, such as TP, TN? Can they tell trend?

This is something we should consider with the OSSE approach we have used for pH. It is quite possible that similar problems exist.