

Abstract/Introduction

Otsego County has many waterways, including Lake Otsego, the Susquehanna River, and numerous streams, ponds, and creeks. Many of these waterways connect to the Susquehanna river eventually emptying into the Chesapeake Bay.

This study sampled water throughout Otsego County for isotopic ($\delta^{18}\text{O}$ and δH) and trace element analysis. We compare our results to previous similar research projects. Few projects like this one have been conducted in the region; these only sampled from a few waterbodies and subsurface sources.

Oxygen ($\delta^{18}\text{O}$) and hydrogen (δH) isotopes help us understand aspects of the local water cycle and can be used in forensic, archaeological, and climatological studies. Trace element data inform us about pollution, water mass mixing, bedrock weathering, and other aspects of water quality and chemistry. Collecting more detailed observations such as weather, dissolved oxygen (DO), air and water temperatures, humidity, and other parameters can provide more information to contextualize geochemical results.

When choosing site locations, we targeted easily accessible open access sites. We then mapped them on Google maps to visualize their distribution across Otsego county. Once samples were collected, we also recorded them in an Excel spreadsheet with their GPS coordinate, air temperature and speed, and general environmental observations.

After we collected the water samples, they were transported to Louisiana for analysis. We expect our data to vary geographically and in correlation with water body size/type and local weather environmental conditions.

Acknowledgements

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Data Collection and Field Methods

- Collection began in the last week of May and ended the last week of June. Two samples were collected from 32 sites and one sample from two sites totaling 66 water samples. Every sample was kept in a cooler during transport, then stored in a refrigerator. Samples were then transported to Louisiana for isotopic and elemental analysis.
- Onset HOBO water data loggers were placed in 2 different lakes and set to automatically collect water temperature and light intensity every hour from June to August. I also transcribed data from Fetterman 2001 into an excel spreadsheet for comparison. All data were broken down per month and by each element or isotope.

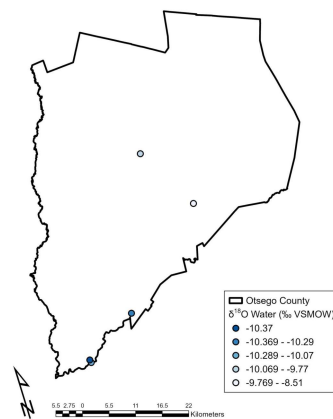
Results

Fig. 1: Previously published in situ Otsego County $\delta^{18}\text{O}$ values (retrieved from waterisotopes.org). These values represent 4 subsurface samples and one river/creek sample.

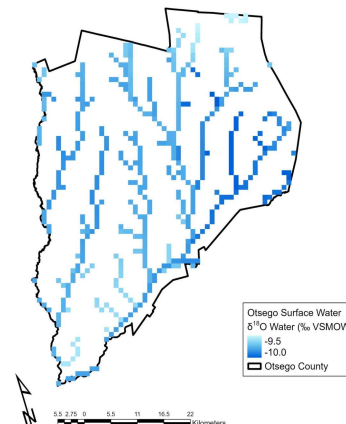


Fig 2: Previous modeling work (Aggarwal et al., 2010) suggests that surface water $\delta^{18}\text{O}$ should range from -10.0 to -9.5‰ (VSMOW).

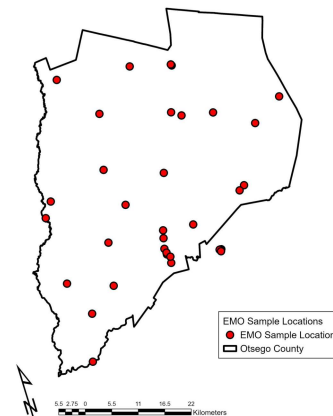


Fig. 3: Locations sampled for this project.

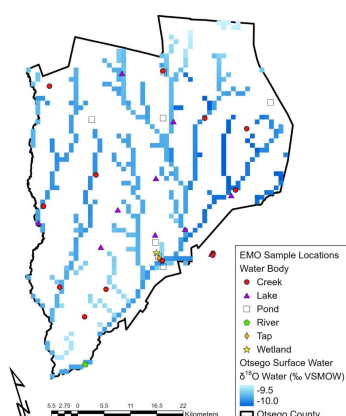


Fig. 4: Sample locations overlaid over model data.

Conclusion and Future Steps

- Surface water isotope values vary across Otsego County more than models predict. Most of the accessible waterways clustered in the middle strip of Otsego County. Future places to sample include the northeast corner and the west side of Otsego County.
- Isotope values reflect local precipitation, evaporation, and water source. Isotope values also vary by size and type of water body. There are also still spatial gaps in our understanding of the isotopic and trace element composition of water in other counties in central New York.
- Further research is needed to capture seasonal differences.
- Further collection of water temperature, pH, humidity, and specific species information including fish, snails, microorganisms, and water bound plants would also improve our contextualization of the data.

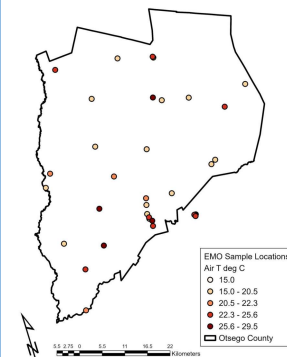


Fig. 5: Air temperature data during sample collection.

References

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Waterisotopes.org (last accessed 08/28/2024)