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Rachel Daley

Cleveland State University

Fasong Yuan

Cleveland State University, f.yuan06@csuohio.edu

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Climate change from oxygen isotopic variation of pore water from sediments in Punderson Lake, Northeast Ohio

College of Sciences and Health Professions

Student Researcher: Rachel Daley

Faculty Advisor: Fasong Yuan, Ph.D.

Abstract

The environment in Ohio has changed over time. The hydroclimate, which is the climate of the water, shows changes from the Industrial Revolution to the present. Evidence for these changes can be found in levels of $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotopes in the layers of sediment and water in the lakes of Northeast Ohio. Mass spectrometry can be used to test the levels of $\delta^{18}\text{O}$ and $\delta^2\text{H}$ isotopes from pore water samples within sediment cores. In this study, surface soil and water samples were collected from cores in Punderson Lake at Punderson State Park in Newbury, Ohio. Pore water was extracted from the sediment core every centimeter. Next the oxygen isotope composition ($\delta^{18}\text{O}$) and the levels of $\delta^2\text{H}$ of the pore water in the sediment layers were measured using a Picarro Cavity Ringdown Spectrometer. A record of the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ of Punderson Lake was then recorded to determine the climate variability over a period of approximately 350 years. Changes in the $\delta^{18}\text{O}$ and $\delta^2\text{H}$ of lake water can be used to see changes in precipitation and water balance. Determining past climate and hydroclimate changes can help us predict future changes in the climate of Northeast Ohio.