Variability in $\Delta^{17}O$, $\delta^{18}O$, and δD across six hydrologically diverse lake systems

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The study of triple oxygen isotopes in waters and carbonates has demonstrated potential as a tool for understanding the (paleo)hydrology of ancient and modern lakes [1, 2], but combined $\Delta^{17}O$, $\delta^{18}O$, and δD data from lakes remain sparse. More observations of $\Delta^{17}O$ along with the long-utilized water $\delta^{18}O$ – δD system are needed to precisely constrain the effects of turbulence, humidity, and evaporation on lake water $\Delta^{17}O$, as well as water – mineral fractionation in natural carbonates.

We present water $\Delta^{17}O$, $\delta^{18}O$, and δD data from six lakes across the United States with different hydrologic and climatic settings: Bear Lake, ID, Ore Lake, MI, Pyramid Lake, NV, Lake Tahoe, CA, Utah Lake, UT, and Walker Lake, NV, including measurements from their inflow and outflow streams. In Lake Tahoe, high-resolution sampling across the lake surface and at a range of depths (0 to 50 m) allows us to describe spatial variability of all three isotopic parameters in a hydrologically complex but well-studied system. We also present carbonate $\Delta^{17}O$ data (bulk carbonates, gastropods, and/or bivalves) from each lake.

These lakes span a hydrologic and climatic range from temperate flow-through conditions to highly evaporative closed-basins. Preliminary water isotopic results broadly agree with modeled values given local humidity and evaporative fluxes. In Lake Tahoe, however, significant spatial variability in surface water $\Delta^{17}O$ (> 20 per meg) has important implications for modern and geological hydroclimate reconstruction. These data also demonstrate the capabilities of a new carbonate and water $\Delta^{17}O$ line at the University of Michigan.

[1] Surma *et al.* (2018) Sci. Reports **8**, 1-10. [2] Passey *et al.* (2014) GCA **141**, 1-25.