Environmental controls on leaf wax δ^2H values across the tundra–boreal forest transition of Northern Alaska

K. F. O'Connor*, M. A. Berke

University of Notre Dame, Notre Dame, IN 46556, USA
(*correspondence: koconn23@nd.edu)

Stable water isotopes (δ^2H and δ^{18}O) are commonly used as modern environmental tracers and are also valuable tools for paleoenvironmental reconstructions. The δ^2H values from terrestrial leaf wax compounds preserved in sediments and soils are an increasingly used proxy for paleoenvironmental reconstructions from high latitudes. However, these records are reliant on modern calibration and advanced understanding of water isotope fractionation from high latitude systems and vegetation, which may vary from lower latitude systems [1,2,3]. Tundra and boreal forest ecosystems have different environmental and ecophysiological controls on isotope fractionation than lower latitude systems, such as continuous sunlight, limited growing season, and the presence of permafrost [2,4].

Plant and soil samples were collected along an 800 km Alaskan transect from the boreal forest of Fairbanks to the tundra of Deadhorse. Xylem and leaf water δ^2H values were compared to leaf wax *n*-alkanes and *n*-alkanoic acid δ^2H values from the same individuals to constrain fractionations associated with soil evaporation and leaf evapotranspiration across multiple species and plant morphologies. Environmental water isotopes were used to determine the local evaporation line and compared to existing field and modelled isotope data available for Alaska in order to examine water sources of vegetation. Using a wide variety of vegetation across a large spatial range, we aim to constrain the environmental and ecophysiological controls on water isotope fractionation that are important to consider for future high latitude paleoenvironmental reconstructions.

[1] Shanahan et al. (2013) *Geochimica et Cosmochimica Acta* **119**, 268-301. [2] Porter et al., (2016) *Quaternary Science Reviews* **137**, 113-125. [3] Daniels et al. (2017) *Geochimica et Cosmochimica Acta* **213**, 216-236. [4] Yang et al. (2011) *Organic Geochemistry* **42**, 283-288.