

## **Evaporation in the Dry Valleys of Antarctica: A Model of Fractionation across Riparian Zones**

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**Abstract.** A unique environment exists in the Dry Valleys of Antarctica, characterized by shallow active layers (<1 m), high evaporation rates, limited precipitation, and cold temperatures. Eleven wetted zone sites, evident as surface wetted soils, were studied along lakes and streams in the Dry Valleys during the Antarctic summer. Soil pore water was extracted along transects extending from the water's edge across the riparian zone into the dry-soil area, and then analyzed for the isotopic ratios of deuterium (D) and  $^{18}\text{O}$ . It was determined that in general, the pore water becomes isotopically enriched in D and  $^{18}\text{O}$  with distance from the lake or stream. Patterns of deuterium excess (equivalent to  $\delta\text{D} - 8\delta^{18}\text{O}$ ) become increasingly negative from wet to dry, indicating substantial evaporation across these wetted zones. In situations where the pore water isotopic signature does not become more enriched with distance from the water's edge, a more dynamic riparian zone or patch of late snow melt can often explain the discrepancy. Evaporation pans were also set up to determine the rate of evaporation as well as the degree of fractionation occurring both in open water and saturated soil. It was found that over the period of a few days, deuterium excess changed from -14 permil to -49 permil in the open water sample.