

## **Tritium concentration in winter precipitation within a high alpine catchment in Salt Lake City, UT**

**WILLIAM D MACE, DOUGLAS KIP SOLOMON AND  
PAUL D BROOKS**

University of Utah

The use of tritium ( $^3\text{H}$ ) as a direct indicator of groundwater age is becoming increasingly common. However, estimating the initial  $^3\text{H}$  concentration in recharge relies on the assumption that  $^3\text{H}$  in precipitation is close to the annual mean value. In the western USA both the  $^3\text{H}$  activity and precipitation amount have high temporal variability. While models exist to estimate the mean annual  $^3\text{H}$  value in precipitation, their accuracy remains uncertain in regions dominated by winter precipitation, as  $^3\text{H}$  levels typically reach and maintain seasonal lows during the winter [1]. Furthermore, redistribution of  $^3\text{H}$  due to vapor transport in the snowpack can alter values from individual events[2], and variations in  $^3\text{H}$  in the catchment resulting from spatial variations and altitudinal effects are not known. As a result, the  $^3\text{H}$  inventory in high alpine snowpack is not well characterized, leading to uncertainty in the initial  $^3\text{H}$  value used for groundwater recharge. To address this, we analyzed  $^3\text{H}$  in precipitation by collecting individual snow events and bulk samples at peak snowpack within an alpine catchment in the Wasatch Mountains near Salt Lake City, Utah, USA. During the accumulation period, individual snow events were sampled for  $^3\text{H}$  by  $^3\text{He}$  in growth, and the snow water equivalent was determined using the bulk density of total accumulation. At peak snowpack—around April 1—nine snow pits were excavated across different aspects and elevations of the catchment to quantify  $^3\text{H}$  input from melt water and assess its variability.

1. Michel, R. L., Jurgens, B. C., & Young, M. B. (2018). *Tritium Deposition in Precipitation in the United States, 1953–2012*. <https://doi.org/10.3133/sir20185086>
2. Dinçer, T., Payne, B. R., Florkowski, T., Martinec, J., & Tongiorgi, E. (1970). Snowmelt runoff from measurements of tritium and oxygen-18. *Water Resources Research*, 6(1), 110–124. <https://doi.org/10.1029/WR006i001p00110>