AGU 100 FALL MEETING
Washington, D.C. | 10–14 Dec 2018

PP21F-1478: Triple oxygen isotopes in Central Andean precipitation

Tuesday, 11 December 2018
08:00 - 12:20
Walter E Washington Convention Center - Hall A-C (Poster Hall)

Triple oxygen isotopes are an emerging tool in hydrological and paleoclimate research. However, the utility of these measurements is limited without a robust understanding of the mechanisms that drive variation in ^{17}O-excess in modern waters. Here we present oxygen and hydrogen isotope data from precipitation collected from six locations in the Central Andes that span a large elevation (~4000 m) gradient and wide ranges of δ^{18}O values (>25 ‰) and deuterium-excess (>40 ‰). Isotope values from all sites fall along the global meteoric water line and exhibit no evidence of evaporation. At the lowest elevation site, δ^{18}O values range from -15.0 to 0 ‰ with a strong seasonal cycle while ^{17}O-excess is less variable with a mean of 30 ± 5 per meg. Although ^{17}O-excess is not expected to vary with elevation, on the high elevation Altiplano ^{17}O-excess values have a pronounced ~15 per meg seasonal shift with greater values (34–54 per meg) in the dry season and lower values (29–39 per meg) in the wet season. Deuterium-excess and ^{17}O-excess are moderately positively correlated, with highest values for each parameter (41.8 ‰ and 54 per meg, respectively) from an Altiplano site. In concert with d^{18}O values and deuterium-excess, the lack of seasonal variation in ^{17}O-excess may be used to detangle moisture sources and processes that generate precipitation in the Central Andes. As an example, the steady ^{17}O-excess values from precipitation at the moist, eastern lowland site may indicate that the isotopic fractionation of precipitation is governed primarily by Rayleigh distillation at that location, whereas the seasonal shift of ^{17}O-excess on the Altiplano may suggest that the vapor source and fractionation processes are seasonally distinct. These data demonstrate the utility of ^{17}O-excess measurements to expand our understanding of the processes that control stable isotopes in modern waters.

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