Hydrogeological responses in tropical mountainous springs

Salas-Navarro, J¹, Sánchez-Murillo, R¹*, Corrales-Salazar, L¹, Esquivel-Hernández, G¹.

¹Stable Isotope Research Group, Chemistry School, Universidad Nacional, Heredia, Costa Rica, P.O. Box: 86-3000.

Abstract

This study presents a hydrogeochemical analysis of spring responses (2013-2017) in the tropical mountainous region of the Central Valley of Costa Rica. The isotopic distribution of \( \delta^{18}O \) and \( \delta^2H \) in rainfall resulted in a highly significant meteoric water line: \( \delta^2H = 7.93 \cdot \delta^{18}O + 10.37 \) (\( r^2=0.97 \)). Rainfall isotope composition exhibited a strong dependent seasonality. The isotopic variation (\( \delta^{18}O \)) of two springs within the Barva aquifer was simulated using the FlowPC program to determine mean transit times (MTTs). Exponential-piston and dispersion distribution functions provided the best-fit to the observed isotopic composition at Flores and Sacramento springs, respectively. MTTs corresponded to 1.23±0.03 (Sacramento) and 1.42±0.04 (Flores) years. The greater MTT was represented by a homogeneous geochemical composition at Flores, whereas the smaller MTT at Sacramento is reflected in a more variable geochemical response. The results may be used to enhance modelling efforts in central Costa Rica, whereby scarcity of long-term data limits water resources management plans.

Esta obra está bajo una licencia de Creative Commons Reconocimiento-NoComercial-SinObraDerivada 4.0 Internacional.