Geophysical Research Abstracts
Vol. 21, EGU2019-11991, 2019
EGU General Assembly 2019

Spatially-distributed isotopic and water quality sampling to conceptualize the runoff generation in large-scale, humid tropical catchments.

Sebastián Granados (1), Alicia Correa (1), Ana María Durán Quesada (2), Ricardo Sanchez Murillo (3), Vanessa Solano (1), Marco Martínez (1), Kenneth Gutierres (1), Katherine Vargas (1), Nelson Venegas (1), Sara Blanco (1), Rafael Quesada (1), Edgar Espinoza (1), Christian Birkel (1,4,5)

(1) Department of Geography, University of Costa Rica, 2060 San José, Costa Rica (sebastian.granados@ucr.ac.cr) , (2) Geophysical Research Center (CIGEFI), University of Costa Rica, 2060 San José, Costa Rica., (3) Stable Isotope Research group, National University of Costa Rica, Heredia, Costa Rica., (4) Northern Rivers Institute, University of Aberdeen, Aberdeen, Scotland., (5) CATIE, Turrialba, Costa Rica.

Spatially-distributed isotopic and water quality sampling to conceptualize the runoff generation in large-scale, humid tropical catchments.
Sebastian Granados1, Alicia Correa1 ,Ana María Durán Quesada2, Ricardo Sanchez Murrillo3, Vanessa Solano1, Marco Martinez1, Kenneth Gutierres1, Katherine Vargas1, Nelson Venegas1, Sara Blanco1, Rafael Quesada1, Edgar Espinoza1 and Christian Birkel1,4,5

1Department of Geography, University of Costa Rica, 2060 San José, Costa Rica
2Geophysical Research Center (CIGEFI), University of Costa Rica
3Stable Isotope Research group, National University of Costa Rica
4Northern Rivers Institute, University of Aberdeen, Aberdeen, Scotland.
5CATIE, Turrialba, Costa Rica.

Corresponding author: sebastian.granados@ucr.ac.cr
(Poster HS2.1.9)

The scientific evidence base for understanding how rainfall is generated and partitioned into different hydrological processes in Costa Rica and the wider humid tropics is limited due to the scarcity of basic hydrological data. This makes it difficult to conceptualize the dominant runoff generation processes and severely hinders our ability to track water source dynamics. Stable isotope tracers play a crucial role to help generate low-cost additional information on hydrological water sources, fluxes and flow paths. With this background, a spatially distributed isotope monitoring in combination with basic water quality indicators is essential to strengthen hydrological analysis and to provide insights into the runoff generation processes that might facilitate conceptualization of suitable hydrological models.

A spatially-distributed isotope monitoring was established in the San Carlos River catchment (2632km2), in the north-east of Costa Rica covering an elevation range between 0 and 2,320masl. Monthly isotope sampling started in June 2018 with sample collection in 45 rivers that also cover longitudinal profiles of the most important water bodies. These surveys are supported by daily rainfall sampling for isotope analysis at one headwater site together with three historical isotope records of stations across the catchment. Further to the isotope monitoring, we collect pH, electrical conductivity, water temperature and the redox potential at all sites. Longer-term daily discharge data is available at three nested sites (3.2, 154 and 1600 km2) and complemented by 11 two-year daily historic records throughout the catchment.

A preliminary picture of the isotope hydrology of the San Carlos River showed a Local Meteoric Water Line (LMWL, δ2H =7.4δ18O+8.8, R2=0.93) with slope of 7.4 close, to that of the Global Meteoric Water Line (GMWL, slope=8). Monthly surface water isoscapes of δ2H samples presented spatial variations from 1.5‰ to -34‰Ṫemporal variations indicated a direct relationship to climate as the catchment is influenced by the Caribbean (enriched signatures) trade winds and to a lesser degree from Pacific (depleted signatures) precipitation. The water quality indicators showed a wide range of rivers influenced by volcanic and sedimentary geology, as well as some influence of geothermal waters.

The generated information is potentially useful to spatially evaluate a tracer-aided hydrological model in our rather data-scarce humid tropical catchment and to test if high-spatial resolution at lower-temporal sampling frequency of isotope data is able to reduce parameter uncertainty providing more robust simulations.