Using 18O and 2H isotopes to identify water dynamics and origin in a tropical montane cloud forest, Ecuador

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The research aims to study the hydrochemical processes in a tropical mountain catchment, situated in the Andes of southern Ecuador. The altitude of the San Francisco catchment (75.3 km^2) ranges between 1600 and 3100 m a.s.l.. The catchment is composed of different narrow valleys primarily covered with rain forest and pasture. The underlying bedrock consists of interbedding of palaeozoic phyllites, quartzites and metasandstones belonging to the 'Chiguinda unit' of the 'Zamora series' (Hungerbühler, 1997). According to Myers et al. (2000), the region is listed among the world's 25 major hotspots of biodiversity. This study is part of an international research project funded by the German Research Foundation (DFG) with focus on biodiversity and sustainable management of the southern mountain ecosystems in Ecuador, and fits within the sub-project 'Hydro-biogeochemical catchment modeling framework'.

Water samples were taken weekly to biweekly in 8 subcatchments by grab sampling and stored in tightly closed glass bottles. We also took event samples to include high flows. Isotopes (2H, 18O) were measured by a direct-inject liquid-water isotope analyzer (DLT100, Los Gatos Research). With this method, the accuracy of the $^{18}O/^{16}O$ and D/H isotope ratios in liquid-water samples is better than 0.3%¸ and 1.0%¸, respectively. Based on this data, subcatchments were classified according to their response times by the use of multivariate statistics. Mean residence times will be estimated and flow paths will be identified for the different subcatchments. It could be shown that reaction times for all subcatchments are very fast and precipitation rapidly leads to

runoff. The information obtained on runoff-generation will be used to improve two types of mesoscale catchment models, the fully distributed process-oriented catchment modeling framework (CMF) and the semi-distributed Soil Water Assessment Tool (SWAT).

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