Title: **Quantifying Soil Percolation Dynamics & Biogeochemical Transport in Tropical Soils near Manaus, Brazil**

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Project Abstract:
Understanding soil moisture dynamics & associated transport of biogeochemical species is challenging in tropical systems because of the physical nature of tropical soils and the coupled ecohydrological impacts on flow & transport. We utilized an unusual type of passive wick flux meter (or drainage lysimeter) to measure real-time percolation fluxes & to sample percolation chemistry & stable isotopes along two topographic transects at the ZF2 field area near Manaus, Brazil (Rodrigues et al., 2019). Percolation flux is often an inferred or modeled process & as such has significant uncertainties especially in forested soils where preferential flow paths are often important. Direct continuous measurement of fluxes provides a way to inversely calibrate hydrological model parameters which should yield more representative simulations of actual field conditions. In addition, by coupling percolation flux measurements with biogeochemistry we can understand transport dynamics of nutrients and other geochemical species. Results indicate that percolation is frequent on a daily basis, occurring 63%, 73%, & 79% of the time in the plateau, slope & valley locations, respectively. It is also highly pulsed & varies greatly with rainfall amount & season. Overall temporal percolation patterns are similar in the three topographies, but the amounts of percolation vary substantially and cumultative percolation flux was found to be greatest in the valleys, intermediate on the slopes, and lowest on the plateaus.
Percolation water biogeochemistry also varies with space & time. Nitrate concentrations are extremely high at all locations. Stable isotope results indicate microbial nitrate production, but with substantial denitrification events. Nitrogen appears unlikely to be a co-limiting nutrient in these forests. Phosphate concentrations are consistent with a phosphorus nutrient limitation.