20.6: Significant seasonal and event-driven changes of carbon and nutrient fluxes to first-order streams of an Amazon forest

Mark S. Johnson, Cornell University, msj8@cornell.edu (Apresentador / Presenting)
Johannes Lehmann, Cornell University, CL273@cornell.edu
Evandro Carlos Selva, Universidade Federal de Mato Grosso, evandroc@cpd.ufmt.br
Eduardo Guimarães Couto, Universidade Federal de Mato Grosso, couto@cpd.ufmt.br
Mara Abdo, Universidade Federal de Mato Grosso, maraabdo@hotmail.com
Erick C.M. Fernandes, Cornell University, ecf3@cornell.edu
Susan Riha, Cornell University, sjr4@cornell.edu

Carbon and nutrient inputs to streams show significant seasonality in forested and human-impacted watersheds throughout the Amazon Basin. Both higher and lower concentrations during low-flow than high-flow conditions have been reported. Our results from four forested headwater watersheds in seasonally-dry southern Amazonia show DOC and nutrient concentrations to be inversely related to stream discharge on a seasonal basis, while these seasonal dynamics are significantly affected by storm-flow events. Rainfall rapidly generates overland flow and responses in stream discharge are observed within 5 minutes after the beginning of a storm. Streamflow increases rapidly and recedes quickly, generally within 30 minutes following the end of a rainfall event. Concentrations of DOC in streamflow increase four-fold during storm events, whereas K tended to increase slightly by 12% and Ca, Mg, NO3, NH4 decrease compared to baseflow. Large increases in stormflow DOC compared to baseflow DOC concentrations appear to be independent of season, while both baseflow and stormflow concentrations become more dilute through the rainy season (from 3 and 12 mg/L early in the rainy season to 2 and 8 mg/L by mid-rainy season, base flow and storm flow respectively). A greater litterfall during the dry than the rainy season and a resulting larger accumulation of litter on the soil surface explains both larger DOC concentrations originating from overland flow, as well as inputs of coarse organic matter (>2mm). Coarse organic matter fluxes in streams are high during the dry-to-wet season transition, but drop off substantially by mid-rainy season. Large fluxes of coarse organic matter were mobilized by large storm events early in the rainy season, while storms of similar magnitude transported little of this material during the mid- and late rainy season. Particulate organic carbon (POC) (

20.7: The role of sorption in retention of dissolved organic carbon in soils of the lowland Amazon basin

Sonya M Remington, University of Washington, School of Oceanography, sunny9@u.washington.edu
Vania Neu, CENA-Universidade de Sao Paulo, bioneu@inpa.gov.br
Jeffrey E. Richey, University of Washington, School of Oceanography, jrichey@u.washington.edu
Erin Ellis, University of Washington, elliserin@yahoo.com (Apresentador / Presenting)

Ecosystem processes in river corridors represent a significant pathway for the export of carbon fixed on land in the humid tropics at a globally significant level. The quantity of dissolved CO2 in surface waters of tropical river systems is the product of a long sequence of complex biological, hydrological and geochemical processes. Sorption is an important geochemical process that removes dissolved organic carbon (DOC) from water percolating through soils, which may eventually flow into the river channel (via groundwater and subsurface flow) where it may be respired to CO2. Soil properties, such as texture, Fe- and Al-oxide content, mineral surface area and organic carbon content, are known to affect the concentration of DOC in soil pore water and, therefore, the quantity of DOC transported to river channels. These soil properties vary with soil type. We collected samples from two depths of three different soil types typically found in the lowland Amazon Basin for use in equilibrium and kinetic laboratory "batch" experiments. Batch experiment results showed that the soils of the plateau and slope sorbed ~60% of new DOC input, while valley soils sorbed ~30%. Most DOC was sorbed within the first four hours of the 24 hour batch experiments. The role of respiration in DOC loss from solution during the experiments appeared to be small relative to loss by sorption. Understanding and quantifying DOC lost to sorption as a function of soil properties is an important step in understanding the export of carbon fixed on land and transported to rivers.

20.8: Hydrologic nitrogen losses from tropical forest soils -- patterns and implications.

Lars O Hedin, Princeton University, lhedin@princeton.edu
Megan McGroddy, Princeton University, mcgroddy@princeton.edu (Apresentador / Presenting)
Ben Houlton, Princeton University, houlton@princeton.edu
Emilio F. Moran, Indiana University, moran@indiana.edu
Mateus Battisella, EMBRAPA Brasilia, mb@cnpm.embrapa.br

Tropical forest soils often tend to be rich in nitrogen but poor in phosphorus. We have measured hydrologic nitrogen and phosphorus losses from soils across a soil fertility gradient in the central Amazon basin. We have found significant differences in both nitrogen and phosphorus species and concentrations at regional scales. When considered in combination with data on nutrient concentrations and 15N stable isotopes from other tropical forests worldwide, these data support the idea that tropical soils develop nitrogen sufficiency over time. We will discuss the paradoxical nature of mechanisms needed to support this apparent pattern.

20.9: Key Connections in Amazon Stream Corridors: Using ^{15}N to Trace N Transformations and Transport

Linda A. Deegan, Marine Biological Laboratory, ldeegan@mbl.edu (Apresentador / Presenting)
Christopher Neill, Marine Biological Laboratory, cneill@mbl.edu
Reynaldo L. Victória, Centro de Energia Nuclear na Agricultura/USP, reyna@cena.usp.br