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decomposed into their constituent dynamics by representing bulk carbon as a sum of carbon fractions divided by molecular weight (to account for the observed increase in degradation state as the molecular size decreases, and to facilitate the parameterization of organo-mineral associations), mobilized by hydrologic flow paths. We are exploring this hypothesis for the Amazon River system within the construct of a "River Basin Organic Matter and Biogeochemistry Synthesis" (ROMBUS) model. Within ROMBUS each of the organic and inorganic carbon pools are represented by state variables that characterize the nitrogen-to-carbon ratio (for the OM pools), δ13C signature and age (via Δ14C). The model is implemented as pixels within a geospatial model of the landscape, and flow paths are computed via a hydrology model.

S4: Sessões Especiais - Controle do Solo na Biogeoquímica dos Rios. (*Soil Control on Stream Biogeochemistry*)

20.1: A hydrological framework for biogeochemical studies

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The ecosystem fluxes of many nutrients are tightly coupled with the flow of water, and the quantification of these fluxes therefore requires quantitative knowledge of hydrological flowpaths. This presupposes that the hydrological functioning in terms of the partitioning of rainfall into various flowpaths is known, because without this knowledge, any field monitoring program for the quantitative assessment of nutrient fluxes is bound to be biased. And yet, many, if not most, nutrient cycling studies pay scant attention to the hydrological functioning of their systems. Instead, the monitoring design of many such studies seems to be predicated on the belief that vertical flowpaths prevail. In particular, this belief rules out lateral flowpaths near the soil surface.

This belief can be traced back to both an outdated view of hydrological processes and to successful biogeochemical studies of systems whose flowpaths happened to be predominantly vertical, hence justifying the monitoring design employed. In view of the now well-documented diversity of ecosystems with respect to their hydrological functioning this belief in the prevalence of vertical hydrological flowpaths has become untenable, and so has the unreflected application of monitoring designs motivated by this belief.

We explore how the interpretation of biogeochemical studies may go astray if a traditional monitoring design based on the verticality assumption is applied to an ecosystem with lateral hydrological flowpaths, and we present the blueprint of a minimal hydrological field assessment designed to select a field monitoring program for biogeochemical studies that is commensurate with a site's hydrological functioning.

20.2: Hydrological Processes in Small Forest and Pasture Catchments of the Eastern Amazonia

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In order to evaluate the effects of land use change on hydrological processes, we monitored two small catchments ($^{-1}$. Median near surface Ksat values were 230 mm h^{-1} in forest and 3.7 mm h^{-1} in pasture. Annual precipitation was 1640±190 mm, which was partitioned as throughfall (84±4%), forest canopy interception (16±4%), overland flow (4±2% in forest and 14±6% in pasture) and subsurface flow (1% on both sites). Ephemeral channels discharged 3±1% of annual precipitation in forest and 14±6% in pasture.

Soil moisture and Penman-Monteith evapotranspiration (ET) estimates were calculated using a simple bucket model, coupled with a surface conductance (gc) model to restrict ET. Soil tension was measured and volumetric water content (VWC) calculated from tensiometer data. Coupled bucket model estimates were compared to VWC observations to evaluate model fitness and sensitivity.

From measured and modeled storages and fluxes for the two catchments we were able to quantify the effects of forest-to-pasture conversion on the water balance and the runoff components. Soil properties and fluxes results indicate that forest-to-pasture conversion caused: (1) decreased evapotranspiration; (2) increased overland flow and channel discharge; (3) increased water storage in soils; (4) modified relative distribution of the water balance components.

20.3: Physical and Anthropogenic Controls of the Biogeochemistry of the Ji-Paraná River Basin (Western Amazônia)

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