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Soil physical constraints impacts on forest structure drive CWD stocks across central Amazonia

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South Hall (Herradura San Jose)

Demetrius Lira Martins, Instituto Nacional de Pesquisas da Amazônia, Brazil

Juliana Schiatti, Instituto Nacional de Pesquisas da Amazônia, Brazil

Ted Feldpausch, School of Geography, University of Leeds, United Kingdom

Flavio J Luizao, National Institute for Amazonian Research - INPA, Brazil

Oliver L Phillips, School of Geography, University of Leeds, United Kingdom

Ana Andrade, Biological Dynamics of Forest Fragments Project, National Institute for Amazonian Research - INPA, Brazil

Carolina Castillho, Empresa Brasileira de Pesquisa Agropecuária, Brazil

Susan G. W. Laurance, Centre for Tropical Environmental and Sustainability Science, School of Marine and Tropical Biology, James Cook University, Australia

Atila Oliveira, Coordenação de Pesquisas em Ecologia, Instituto Nacional de Pesquisas da Amazônia, Brazil

Ieda Amaral, Coordenação de Biodiversidade/Botânica, Instituto Nacional de Pesquisas da Amazônia, Brazil

Jose Julio Toledo, Universidade Estadual de Roraima, Campus de Rorainópolis, Brazil

Laynara Lugli, National Institute for Amazonian Research - INPA, Brazil

Erick Oblitas, National Institute for Amazonian Research - INPA, Brazil

Carlos Alberto Quesada, Instituto Nacional de Pesquisas da Amazônia, Brazil

Coarse woody debris (CWD) stocks are an essential component in tropical forest ecosystems and vary widely in different forested landscapes.

Relationships between CWD, soil, forest structure, and other environmental factors were analysed to understand the drivers of CWD variation in different soil types across Central Amazonia. To estimate CWD stocks and density of dead wood debris, 79 plots of 0.5 ha were assessed along a transect spanning ~700 km in undisturbed forests from north of the Rio Negro to south of the Rio Amazonas. Soil physical properties were evaluated by digging 2 m deep pits and taking auger samples. Vegetation data were obtained from permanent plots. Soil physical properties were the best predictors of CWD. Soil anoxia and soil depth explained the most variation in CWD (35% and 30%, respectively). CWD stocks on non-restrictive, deep, unsaturated soils (33.1 Mg ha⁻¹) were twice those on highly restrictive soils (16.0 Mg ha⁻¹). A topographic index, which describes the spatial distribution of soil moisture, also explained significant variation in CWD stocks. Forest structure (average biomass per tree) was controlled by soil physical conditions which in turn had a strong influence on local CWD stocks. Vegetation parameters, biomass per tree were also important drivers explaining about 20% of the variation. Soil physical restrictions hamper tree establishment and survival decreasing average residence time of trees, resulting in a forest population of thinner and shorter trees that store individually less biomass. On the other hand, forests on soils without physical limitations tend to be populated by larger trees, simply because they can live longer. As a consequence, the death of individuals with higher biomass results in higher mass mortality input and, therefore, higher CWD stocks.

Presentations

[Demetrius_Martins_Soil_physical_constraints_impacts_on_forest_structure.pdf](#) (2.0 MB)

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Meeting Information

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San Jose, Costa Rica