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Geology, Soils and Basin-wide variations in Amazon Forest Structure and function

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Forest productivity, tree turnover time and above ground biomass vary across the Amazon Basin in an east-west gradient in a pattern which coincides with variations in soil nutrient availability and geology. Forest productivity rates are higher on the most nutrient rich soils close to the Andes while is lower in the ancient, highly weathered soils of central Amazonia. On the other hand above ground biomass is lower in the most productive forests and higher on the least, this being a consequence of higher tree turnover rates in the forests over less weathered and nutrient rich soils. Major geological events have influenced Amazonian soil characteristics profoundly and play an important role in explaining Basin-wide variations in forest biomass, growth and stem turnover rates. Here we show how geology and soil development combine to shape the functioning of Amazonian forests and its carbon stocks and fluxes. To assess the importance of edaphic properties in affect forest structure and dynamics, soil samples were collected in a total of 154 different forest plots across nine different Amazonian countries. Samples were analyzed for exchangeable cations, C, N, pH with various P fractions and soil physical properties also determined. Overall, forest structure and dynamics were found to be strongly and quantitatively related to edaphic conditions.