



## **Regional and large-scale patterns in Amazon forest structure and function are mediated by variations in soil physical and chemical properties**

C. A. Quesada, J Lloyd, and the RAINFOR Team

University of Leeds, Earth and Biopshere Institute, Leeds, United Kingdom (j.lloyd@leeds.ac.uk)

Forest structure and dynamics have been noted to vary across the Amazon Basin in an east-west gradient in a pattern which coincides with variations in soil fertility and geology. This has resulted in the hypothesis that soil fertility may play an important role in explaining Basin-wide variations in forest biomass, growth and stem turnover rates. To test this hypothesis and assess the importance of edaphic properties in affect forest structure and dynamics, soil and plant samples were collected in a total of 59 different forest plots across the Amazon Basin. Samples were analysed for exchangeable cations, C, N, pH with various P fractions also determined. Physical properties were also examined and an index of soil physical quality developed. Overall, forest structure and dynamics were found to be strongly and quantitatively related to edaphic conditions. Tree turnover rates emerged to be mostly influenced by soil physical properties whereas forest growth rates were mainly related to a measure of available soil phosphorus, although also dependent on rainfall amount and distribution. On the other hand, large scale variations in forest biomass could not be explained by any of the edaphic properties measured, nor by variation in climate. A new hypothesis of self-maintaining forest dynamic feedback mechanisms initiated by edaphic conditions is proposed. It is further suggested that this is a major factor determining forest disturbance levels, species composition and forest productivity on a Basin wide scale.