



Spatial variability and seasonal dynamics of soil respiration in a tropical rainforest in French Guiana.

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The processes at the origin of the belowground sink strength for carbon are still not well known in rain tropical forests. The objective of this study was to analyse the factors explaining seasonal dynamics and spatial variation in soil respiration in a tropical rain forest of French Guiana.

We measured soil CO₂ efflux with additional environmental factors over a 2-yr period in a trench plots/intact plots design. The temporal variation of soil respiration was determined predominantly by soil moisture, not by soil temperature. Century, a "semi-mechanistic" model simulating soil organic matter dynamics (Parton et al, 1987), was used to identify the underlying determinants of spatial variation in soil respiration. To study the effects of tree species diversity on soil carbon functioning, we collected data to get species-specific ranges of leaf litter mass, root mass, and leaf and root chemical composition (nitrogen, lignin, cellulose). Simulations of daily soil CO₂ flux obtained using averaged parameters of mass and chemical contents were tested by comparing with actual flux recorded on trench plots. In a second step, we performed a sensitive analysis of the model according to the observed spatial variability of plant characteristics.