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## Seasonal Changes of Photosynthetic Activity in the Tropical Forest of the Araguaia River Floodplain, Brazil

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### Abstract

High variation in seasonal environmental patterns in tropical floodplain forest influences carbon storage in the biomass. We searched for factors limiting photosynthetic activities (A) and hypothesised that the species of diverse successional status differ in photosynthetic performance. The measurements were done in a South-East Amazonian forest on the Araguaia river (Bananal island) during an aquatic (flood), terrestrial dry and terrestrial wet vegetation phase. The highest A, with an average of  $14.17 \mu\text{mol}, 8729 \text{m}^{-2}$  and  $8729 \text{s}^{-1}$ , was found on the species *Piranhea trifoliata* during the terrestrial dry phase. During the aquatic phase, A in this species was reduced by 42%. Also, A in the evergreen species *Amaioua guianensis* declined from  $10.73 \mu\text{mol}, 8729 \text{m}^{-2}$  and  $8729 \text{s}^{-1}$  during the terrestrial wet phase by 23% during an aquatic phase. Decline of A during the aquatic phase was also observed in other species. We did not identify any reduction in stomatal conductance and transpiration rate by the trees during the aquatic phase, therefore we assume that the reduction of A was caused by the anaerobic soil conditions and reduction of photosynthetic active radiation. Less reduction of A was found during the terrestrial dry phase. Stomatal limitation in form of high leaf temperature (T(leaf)) and reduction in stomatal conductance was noted. Phenological observation confirmed pronounced loss of leaves by the evergreen species *Amaioua guianensis* and the pioneer species *Vochysia divergens*. This fact resulted in higher water use efficiency in the remaining leaves. The pioneer species *Vochysia divergens* presented an elevated rate of stomatal conductance and WUE, implying a higher capacity to overcome seasonal limitations. We identified leaf temperature as the most important limiting factors during the terrestrial dry phase, with an inverse correlation between A and T(leaf). Reduction of radiation during the aquatic phase and stomatal limitation during the terrestrial dry phase were the most evident limiting factors for A in the forest of the Araguaia river floodplain.

**Keywords:** Carbon storage, photosynthetic activity, tropical forest