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Secondary Forest as a counterbalance on the deforestation effects: its role on evapotranspiration and water use efficiency

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Since the 70's, the Amazon basin is under constant pressure first because of agricultural expansion, and recently also because of resources extraction. The conversion of pristine forest to other types of land cover as pasture and agriculture, affects the local water balance diminishing the evapotranspiration and increasing the discharge. Those changes can buffer the climate change effects and vice-versa. On the other hand, secondary forest growth resulting from abandoned deforested areas presents higher evaporative fraction (Giambelluca, 2002), leading to higher evapotranspiration rates than pristine forests, what can compensate the effects of deforestation on energy and water balances. In this work we will show four years of eddy flux measurements of a pristine forest and of a secondary growth about 20 years old, located in Central Amazonia, comparing the evapotranspiration and water use efficiency of both sites. The innovative aspect of the present work is the measurement of fluxes above a secondary growth forest in a relatively advanced stage. The measurements of eddy covariance are in accordance with the increase of evaporative fraction with the age of secondary forest presented by Giambelluca (2002). The yearly evaporative fraction (ratio of energy used for evapotranspiration to net radiation) on the primary forest was 0.74-0.81, while in the secondary forest it was 0.85-0.87. On the other hand, secondary forest shows a water use efficiency of 1.9 g C kg-1 H_2O, while the pristine forest gives 2.9 g C kg-1 H_2O.