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Moisture stress constrains carbon flux rates in an Eastern Amazonian regrowth forest

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Rates of carbon uptake and accumulation in forests are strongly influenced by climate. In Amazonian regrowth forests, more attention has been focused on land-use impacts on carbon accumulation than on climatic constraints, although a recent synthesis indicates that most of the intersite differences in aboveground carbon accumulation in those forests are related to differences in the length of the dry season and soil texture. To test the effects of altered dry-season moisture availability on carbon flux rates in an Eastern Amazonian regrowth forest, we initiated an irrigation experiment in a 15-year-old stand near Castanhal, Pará. During the first year of treatment, we added 5 mm day^{-1} to four 400 m^2 plots from August through December; all measurements were made in 100 m^2 sample areas nested in the center of the treatment plots. Compared to control plots in the same stand, preliminary results of the irrigation experiment included significantly higher soil CO_2 efflux during especially droughty periods and significantly higher maximum photosynthetic capacity (A_{max}) throughout the dry season in *Miconia ciliata* (Rich.) DC, a common understory species. Leaf water potentials were significantly higher for both *M. ciliata* and *Vismia guianensis* (Aubl.) Choisy, a common overstory species. *V. guianensis* A_{max} values did not differ significantly between treatment and control plots, but instantaneous water-use efficiency (A_{max}/G_s) was lower under irrigation. These preliminary results suggest that above- and below-ground carbon fluxes in this Eastern Amazonian regrowth forest are constrained by moisture stress during the dry season.