10) POSTER

A MULTI-LAYER BIOPHYSICAL MODEL CALIBRATION TO AMAZONIA: TEST OF AN INTEGRATED MODEL

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Abstract

An integrated model of canopy micrometeorology and exchanges of mass and energy was tested for an Amazonian rain forest. In this model, plant canopies are divided vertically into multiple layers. After obtaining profiles of air temperature, water vapor and CO2 partial pressures inside plant canopies using the Localized Near-Field (LNF) theory, canopy-scale fluxes were obtained by integrating these exchanges over the canopy depth. The model was tested against of diurnal measurements of canopy net radiation, sensible heat flux, water vapor flux, CO2 flux, friction velocity, and profiles of air temperature, water vapor partial pressure and CO2 concentration. The NEEs output was decomposed into contributions from different ecosystem elements and analyzed. The results showed that daytime exchanges of energy and mass in this tropical forest were largely controlled by its LAI. However, the degree of dominance varied for sensible heat, water vapor and CO2 from daytime to nighttime. Relative contributions of different ecosystem elements to NEEs of sensible heat and water vapor remained largely unchanged from day to day during the testing period. In contrast, relative contributions of different ecosystem elements to NEE of CO2 fluctuated significantly from day to day in responses to changes in environmental conditions. The role of the understory was most significant for the CO2 exchange and least significant for the sensible heat exchange with the water vapor exchange being intermediate. The soil and stem respiration balanced much of the foliage CO2 absorptio during the daytime while during the nighttime they dominated the CO2 exchange.