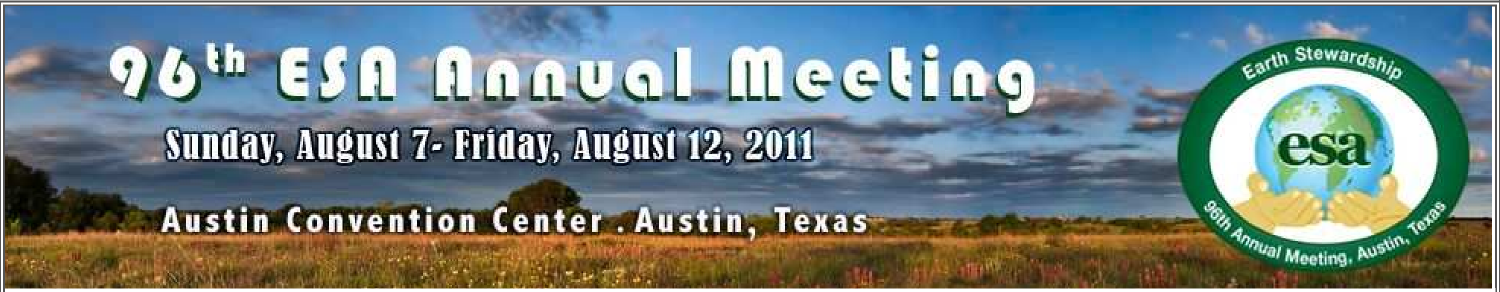

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COS 55-6 - Simulated drought in the Amazon: Impacts on soil solution and nutrient fluxes

Wednesday, August 10, 2011: 9:50 AM
6A, Austin Convention Center

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Background/Question/Methods

To assess the effects of changing climate on lowland tropical rainforests in the Amazon, a throughfall reduction experiment was conducted in the Tapajos National Forest, Para, Brazil from 1999 to 2006. Rainfall, throughfall, litter leachate, and 25 and 200 cm soil solutions were collected in two 1-ha plots for 1 year prior to throughfall exclusion, during four years of exclusion, and two years after release from exclusion. A system of plastic panels and gutters suspended above the soil was used to exclude ~60% of throughfall. We hypothesized that solution concentrations would increase during exclusion due to effects of evapoconcentration and potentially due to death of vegetation or slowing of plant growth and nutrient demand. We hypothesized a rapid flush of nutrients that had built up during exclusion would be observed after the exclusion treatment ended.

Results/Conclusions

The seven years of solution chemical analysis, paired with modeled solution fluxes, indicated increased concentrations in litter leachate and soil solutions in response to decreased water inputs. During exclusion, tree mortality was observed but increasing solution concentrations due to decomposition of necromass or reduced plant uptake were not clearly evident. Post-exclusion, a large flush of Ca and NO_3 were observed at 25 cm depth in the soil. Increased fluxes at 200 cm depth were also observed for Ca but not for NO_3. The experiment confirmed that water fluxes dominate as a driver of solution chemical fluxes and that the importance of change in chemical concentrations will be outweighed by changes in water flux with respect to nutrient flux. Changes in soil water volume may, however, alter other processes such as microbial decomposition or equilibrium exchange reactions. Finally, increased dry periods followed by increased nutrient flushing may limit surficial plant root uptake, but plants in this environment are deeply rooted and likely well adapted to capturing nutrient flushes.

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