Findings for MBL MEL Project DEB-0108960

Findings

Findings are listed by paper, the citations for which can be found in the citations section.

Herbert et al. 2003: We applied MEL to secondary growth in the Amazon Forest in both a C-N and a C-P configuration to assess limitation by N and P after pasture abandonment. Our analysis indicates that the early stages of re-growth are N, rather than P, limited because a large amount of N is lost from these forests when they are cut and burned. The forest reverts to P limitation later in succession.

Herbert et al. 2004: We analyzed competition for light and nutrients across a nutrient gradient to assess the effect on species diversity. Diversity was highest at intermediate total community biomass but increased monotonically with both productivity and nutrient supply. The highest diversity was also found at intermediate values of the ratio of community leaf area to root length, indicating a condition where the community as a whole was co-limited by light and nutrients.

McKane et al. 2002: Support from this project helped in the interpretation of a 15-N labeling experiment designed to assess plant niche partitioning based on NH4, NO3, glycine as sources on N, early versus late season uptake, and shallow versus deep soil N foraging. Productivity among species increased as the pattern of uptake of various sources on N by the species approached the pattern of supply of those sources in the soil.

gradient around roots. In response to elevated CO_2, warming, and increased rainfall, upslope

Allocation of Uptake Effort: We refer to the internal assets (biomass, proteins, carbohydrate...) allocated toward the acquisition of a resource as the uptake effort for that resource. We assume that the total uptake effort that can be expended toward the acquisition of all resources is limited, but increases with the vegetation biomass. The fraction of the total effort that is allocated toward the uptake of resource $\boldsymbol{i}$ is represented by the variable $\boldsymbol{V_i}$ (no units), which can change through time as the availability of, or requirement for, resource $\boldsymbol{i}$ changes. Because $\boldsymbol{V_i}$ represents a fraction of the total uptake effort, the sum of the $\boldsymbol{V_i}$ for all resources muTw 12 0 0 12 18resource

$$\frac{dV_i}{dt} = a \ln\left(\Phi \frac{\overline{R_i}}{\overline{U_i}}\right) V_i$$

where a is a rate parameter (day $^{-1}$), $\overline{R_i}$ and $\overline{U_i}$ are the running means of R_i and U_i over the previous 365 days, and Φ is a variable that is selected to ensure that the dV_i/dt sum to zero:

$$\Phi = \prod_{j=1}^{n} \left(\frac{\overline{U_j}}{\overline{R_j}}\right)^{V_j}$$

At steady state, all the dV_i/dt equal zero, which can only occur if

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plant will tap the top two substitutable resources. Those yields will decline until they match the third highest yield etc. until the total requirement is met. This successive tapping of substitutable resources with successively lower yields will stop as soon as the yields of the depletable resources match the yield for any non-depletable