CD08 - Carbon Dynamics in Vegetation and Soils

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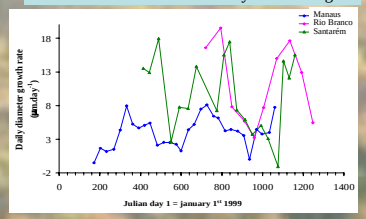
Dynamics of C in Wood

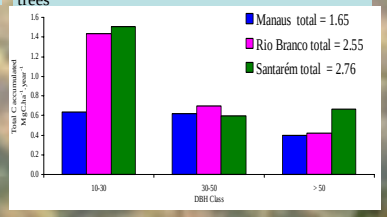
1. Installation of permanent plots to monitor growth, recruitment and mortality

Site	Latitude S	Longitude W	Size class (DBH in cm)	Area sampled	Dendrometers
			10 - 35	3	32
Manaus	-2° 58'	-60° 11'	> 35	3	47
			10 - 35	4	227
Santarém	-2° 85'	-54° 95'	> 35	20	135
			10 - 35	1	110
Rio Branco	-10° 07'	-67° 62'	> 35	10	193

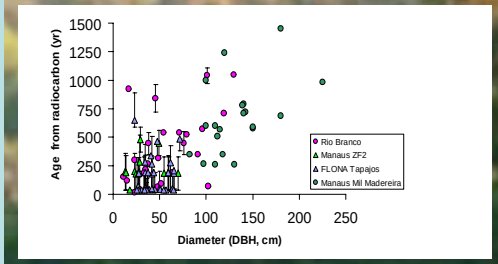
2. Monthly growth increment with dendrometer shows effect of dry season length



3. Variation in annual C allocation to above-ground tree biomass among areas and size class of trees



4. Ages of tropical forest trees from Radiocarbon (n=107 trees to date). Points with error bars are based on a single radiocarbon measurement in the center; points without error bars are based on extrapolation of recent growth rates into the past. Dark green circles are from Chambers et al (1998 Nature v. 391: 135-6); errors average +/- 50-100 years. These were selected to be the largest trees; other points are randomly selected from 3 size classes. **The data show that trees in Amazônia can reach ages of >1000 years, and ages of several hundred years are common.**

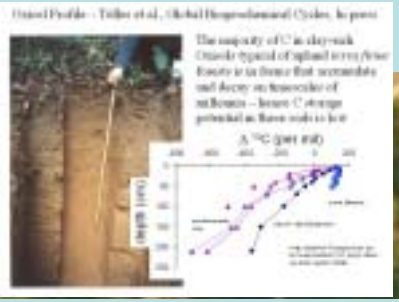


Overall Goals:

(1) Quantify the stocks and residence times of C pools in primary tropical forest

(2) Use models to estimate potential for C storage and loss in forests on interannual to decadal timescales in response to climate variability and disturbance

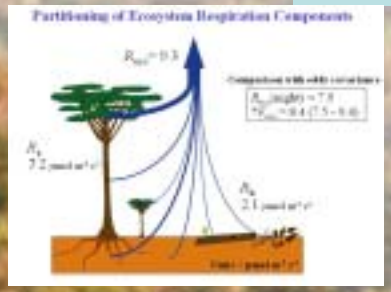
Below-ground C dynamics

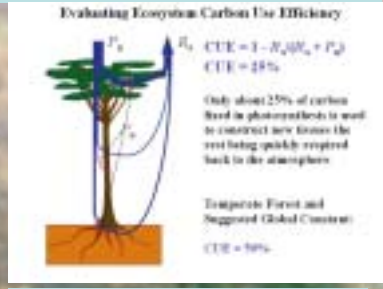


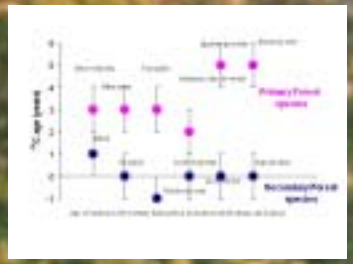
5. Radiocarbon of respired CO_2 indicates significant lags (in living vegetation) between photosynthesis and respiration (Salazar et al., in preparation)

Ecosystem Respiration

Scaling of component fluxes to the whole ecosystem (Chambers et al., Ecological Applications, in press) demonstrates low carbon use efficiency in primary tropical forest. Component fluxes vary with climate variables and season.

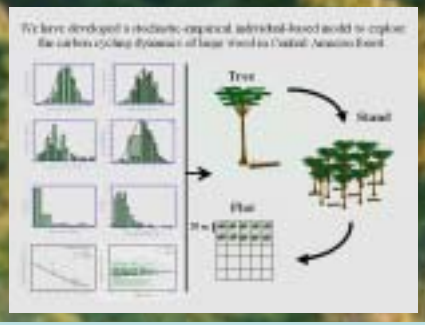


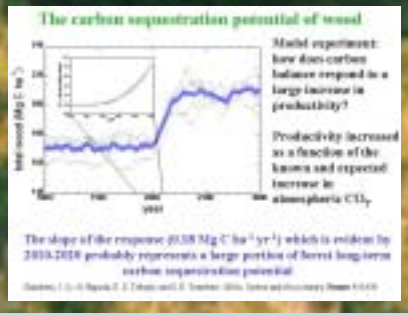


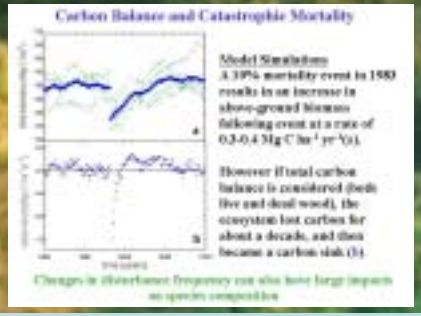


Radiocarbon of respired CO_2 indicates significant lags (2-5 years) between photosynthesis and respiration (Salazar et al., in preparation).
Much of the time lag is in living vegetation (roots and leaves). We are using radiocarbon to determine leaf and root ages in Manaus and Santarem sites.

Modeling Ecosystem Response to CO_2 fertilization and disturbance (wood C pool will dominate)







Major conclusions:

-Trees are older than expected, and less C is allocated to growth

-Response to disturbance is bigger than to CO_2 fertilization

-Time lags between photosynthesis and respiration create potential for interannual variation in NEE

Phase II Activities: Continue monitoring of wood and below-ground C dynamics, add wood density measurements to reduce uncertainties in biomass extrapolations, increase modeling across scales (site C balance compared to eddy covariance towers to regional C balance), increase measurements of C-14 in leaves, roots, and soil respiration.