A first Amazon CH_4 budget and its controls based on atmospheric data from vertical profiles measurements

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The role of tropical regions in the global CH_4 balance remained uncertain, due these regions have until recently been poorly observed with large-scale integrating in-situ observations. To contribute in understanding the CH_4 balance in tropical regions, we have started a lower-troposphere greenhouse gas-monitoring program over Brazilian Amazon Basin consisting of regular vertical profile greenhouse gas observations at four sites. Samples are collected regularly each 2 weeks, using light aircraft. We will present an analysis of these data and what they tell us about the Amazon CH_4 cycle and its contribution to global CH_4 concentration. We estimate fluxes upwind of the sites from the profile data using a column budgeting approach (Miller et al., 2007). Over the full period (2010-2017) the Amazon Basin was a source of CH_4, but with regional variations. There are comparably high and highly variable emissions from the eastern part of the basin exhibiting strong variability, with particularly high CH_4 fluxes in two different periods of the year (beginning of the wet season and in the dry season). In contrast to this, a clear seasonality was observed at the other three sites, with the largest emissions occurring at the beginning of the wet season (January to March). Emissions from biomass burning contribute with a small part of the total flux at each site. We will finally discuss what is the influence from precipitation and temperature in the Amazon CH_4 emissions. Acknowledgment: FAPESP, NERC, CNPq, MCTI, NOAA, IPEN and INPE.

Understanding the relationships between local deforestation and CO_2 atmospheric measurements in the Brazilian Amazon

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Amazon forests play a fundamental role in the global carbon balance as a carbon sink, but temperature elevations and frequents extreme events as droughts and floods could make the forests a source of CO_2. Local atmospheric measurements of greenhouse gases are needed to better understand how forest will respond to climate change. The lower-troposphere greenhouse gas (GHG) monitoring program over Brazilian Amazon Basin, has been collecting biweekly GHGs vertical profiles in four sites since 2010. We aim to understand the relationships between local deforestation and CO_2 aircraft measurements in the Brazilian Amazon. We calculated annual deforestation (using the Amazon Deforestation Calculation Program - PRODES), land use and cover change data (using the Brazilian Institute of Geography and Statistics - IBGE) and fire data (using the Fire Monitoring System) in each annual influence area at the four flight measurement sites of the Brazilian Amazon from 2010-2017 (and also in the mean influence area of all years by sites). We found that when we see total deforestation, it has a relationship with global CO_2 emissions in the Brazilian Amazon biome. Fire has a strong relationship in the drought years, mostly in 2012. Looking at each site, we found specific correlations with deforestation, fire and land use. The biggest challenge was to compare spatial analyzes of land use change and fire with punctual data of airplane GHGs measurements. This study will contribute in our understanding of anthropogenic activities over the Amazon forest in a changing climate.

D4c: VALUATION ISSUES FOR WOOD AND NONWOOD FOREST PRODUCTS TO BALANCE BIODIVERSITY AND ECOSYSTEM SERVICES IN MANAGED FORESTS

A spatially-explicit empirical model for assessing conservation values of conifer plantations

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Plantations are expanding globally and dominate landscapes in many parts of the world. Older plantations can provide habitat for some native trees and associated biota, and the amount of native trees may be a simple indicator of conservation value of plantations. We modeled basal area (BA) of native broad-leaved trees in Japan's conifer plantations. We quantified relationships between rates of increase in BA of broad-leaved trees and plantation tree species, density of planted trees, climatic, topographic and landscape covariates using the extensive plot data from the National Forest Inventory. Identity of plantation species had a strong effect on the BA of native trees. Japanese cedar *Cryptomeria japonica* and hinoki cypress *Chamaecyparis obtuse*, which are two primary plantation species in Japan (both from the cypress family), had low rates of increase in BA of broad-leaved trees with increasing stand age. In plantations of other species (pine, larch, fir and spruce from the pine family), broad-leaved trees started to increase in BA at 20 years old. Planted tree density also had important, but nonlinear effects on the BA of broad-leaved trees in plantations. Stands with fewer planted trees had higher rates of increase in the BA of broad-leaved trees. Management practices such as selection of plantation tree species, intensive thinning and long rotation time would greatly contribute to the conservation value of plantations. Native trees can also regenerate in plantations depending on environments, and their retention during silvicultural practices can have a positive benefit for conservation.