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Board T-24: Increasing of Carbon Emission from Biomass Burning due to the Temperature Rising and Precipitation Reduction in the Amazon

Tuesday, 27 August 2019

18:40 - 20:30

Scripps Seaside Forum - Samuel H. Scripps Auditorium

Abstract

Recent droughts have increased the magnitude and frequency of the forest fires in the Amazon (Aragão et al. 2018). As a consequence, the Amazon has become a Carbon source due to the rising of the Carbon emission from biomass burned in the El Niño events. Faced with climate change and the likely acceleration of temperature in tropical regions, we hypothesize that Amazon will become a Carbon source even in non-droughts years, due to the increase of forest fires. Therefore, we compared 7 years of atmospheric profiles of CO2 obtained from aircraft overfly at four sites of the Amazon, since 2010, with temperature, precipitation, and fire counts (FC). Carbon emission from fires was obtained by the ratio of CO/CO2 and differs by site and year. The FC and climatic variables were extracted from quarterly influence areas by site and weighted by the amount of trajectories within a cell of one degree resolution. The fire emissions released by the Amazon is about 0.38 ± 0.086 Pg.C.yr-1, which represent roughly 17% of the annual global fires emissions (Werf et al. 2017). However, there are markedly divergences in the Fire emissions across Amazon. For instance, the emission from the Eastern is 400% higher and account of an average 60% more FC than observed in the Western. FC were positively and significantly correlated with Carbon from fires at all sites (ρ = 0.55-0.83, α = 0.05, *p-value*<0.001), being higher in the Southeastern of Amazon (Alta Floresta and Santarém sites), and lower in the Northwest of Amazon (Tefé site and Rio Branco Sites). This discrepancy may occur due to the Southeastern of Amazon be located inside the “Arc of deforestation” where the dynamic of the Land-Use Land-Cover Change is more pronounced. We also found a strong relationship between FC and temperature and precipitation (r^2 *adj* = 0.44-0.67, *p-value*<0.001). Temperature is positively correlated with FC and explains circa of 90% of their variability in the linear model (r^2 *partial* = 0.4-0.59, α = 0.05, *p-value*<0.001). It means that an increase of one degree (1°C) in the Amazon represents an increase of about 13600 fire counts; and the reduction of 100 mm precipitation means an increase of 315 in the fire counts. In the balance of the Fire emissions, it would add 1.27 Pg Pg.C.yr-1 at each degree celsius of increase and 0.2 Pg.C.yr-1 at each 100 mm of precipitation reduction. (p n:2018/14423-4)

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Understanding the seasonality and interannual variability of Amazon CH_4 budget and climate feedbacks based on atmospheric data from vertical profiles measurements

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