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Board W-31: Understanding the seasonality and interannual variability of Amazon CH_4 budget and climate feedbacks based on atmospheric data from vertical profiles measurements

Wednesday, 28 August 2019

18:10 - 20:00

Scripps Seaside Forum - Samuel H. Scripps Auditorium

Abstract

Currently tropical land regions, like Amazon, are still poorly observed with large-scale integrating in-situ observations although they host some of the largest wetlands/seasonally flooded areas on the globe. The role of these regions in the global CH_4 balance and the climate feedbacks have remained uncertain. To help this situation we have started a lower-troposphere greenhouse gas-monitoring program over tropical South America consisting of regular vertical profile greenhouse gas and carbon monoxide (CO) observations at four sites along the main airstream since 2010. Vertical profiles are sampled using light aircraft, high-precision greenhouse gas and carbon monoxide analysis of flask air, fortnightly between 2010 to 2017. Over the full period the Amazon (total area of around 7.2 million km^2) was a source of CH_4, of approximately 46 ± 6 Tg/year, which represent 8% of the global CH_4 flux to the atmosphere. CH_4 emissions from different parts of the basin vary markedly. There are comparably high emissions from the eastern part of the basin exhibiting strong variability, with particularly high CH_4 fluxes in the early part of the wet season (January to March). A second period of high emissions occurs during the dry season. The cause of the high emissions is unclear. In contrast to the eastern Amazon site a clear seasonality was observed at the other three sites located further downwind along the main sir-stream, with the largest emissions occurring at the beginning of the wet season (January to March). In addition, these data show an interannual variability in emissions magnitude, so we discuss how these data can be correlate to temperature, precipitation, terrestrial water storage anomalies (from GRACE) and Fire counts (human-driven changes) that could be influencing this variability. Using a CO/CH_4 emission ratio calculated in this study we find a biomass burning contribution varying between 10 and 23% of the total flux at each site. Also, we discuss what the data tell us about possible ongoing feedbacks to possible changes in temperature, precipitation and biomass burning and indicating what variables can be contributing to CH_4 emissions from Amazon.

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