Tracking Nighttime Methane Signals at the Amazon Tall Tower Observatory (ATTO).

Botia, S.; **Gerbig, C.**; **Marshall, J.**; **Fisch, G.**; **Lavric, J. V.**

During the last decades global methane growth rate has been variable with a stabilization period between 1999-2006, and a steady increase since 2007. The most important individual source of methane globally are wetlands, which in the Amazon rainforest are abundant. Wetland emissions in the Amazon represent 15% of the global wetland emissions. Therefore, understanding the main drivers of methane emissions in this region is vital to constrain its global variability. At the Amazon Tall Tower Observatory (ATTO), an unprecedented 6-year record of methane concentrations at half-hourly intervals provides a unique opportunity to understand methane variability at different temporal scales. Methane concentrations show a seasonal pattern at all 5 measurement levels, with a peak during the dry season. Interestingly, the maximum values are found at the highest measurement inlet (80m). Our data record shows that for some years this dry season peak is mainly driven by a nighttime methane enhancement at the highest level, when the nocturnal boundary layer is under stable conditions and there is almost a complete absence of vertical mixing. Here we present a detailed analysis of the atmospheric conditions within and above the canopy for this nighttime methane enhancement, showing that the main process responsible for the majority of vertical exchange is intermittent turbulence; a characteristic of the nocturnal boundary layer in the Amazon. In addition, we provide a footprint analysis to derive the source of this nocturnal methane by using high-resolution atmospheric modeling (WRF-STILT). Preliminary results show that this footprint could vary from 80 to 150 km, when the predominant wind is from the northeast.

Publication:
American Geophysical Union, Fall Meeting 2018, abstract #B33A-04

Pub Date:
December 2018

Bibcode:
2018AGUFM.B33A..04B

Keywords:

0365 Troposphere: composition and chemistry;
ATMOSPHERIC COMPOSITION AND STRUCTUREDE: 0428
Carbon cycling;
BIOGEOSCIENCESDE: 0475 Permafrost; cryosphere;
and high-latitude processes;
BIOGEOSCIENCESDE: 0497 Wetlands; BIOGEOSCIENCES