Geophysical Research Abstracts
Vol. 12, EGU2010-12185, 2010
EGU General Assembly 2010

Methane flux and gradient measurement in a Brazilian Amazonian forest site

Carlos Querino (1), Paul Smeets (1), Ivan Vigano (1), Rupert Holzinger (1), Veber Moura (2), Luciana Gatti (3), Alexandre Martinewski (3), Alessandro Araújo (2), Antonio Manzi (2), and Thomas Röckmann (1)

(1) (c.querino@uu.nl) Utrecht University - Institute for Marine and Atmospheric Research – IMAU. Princetonplein 5, 3584 CC, Utrecht University, Utrecht, Netherland, (2) Instituto Nacional de Pesquisas da Amazônia – INPA, Large Scale Biosphere-Atmosphere Experiment in Amazonia - LBA, (3) Instituto de Pesquisa Energéticas e Nucleares – IPEN. Lab. Quimica Atmosférica - CQMA

During the last century significant changes in the atmospheric concentration of long-lived greenhouse gasses have been observed. Methane is the second most important anthropogenic greenhouse gas, and its concentration almost tripled since pre-industrial times. Recent studies have shown that tropical forests play an important role in the methane global cycle. We present some preliminary results from measurements of methane concentrations, gradients and fluxes in the tropical forest area of the Reserva Biológica do Cuieiras, about 60 km north of Manaus. The methane flux measurements were performed at 53 m above a 35 m high canopy using a Fast Methane Analyser (FMA, Los Gatos Research) in combination with a sonic anemometer (Campbell CSAT3, Campbell) and an open-path CO2/H2O gas analyzer (LI-COR LI7500). In addition, 6 hourly CH4 gradients were measured within the canopy using custom made air samplers at 3 different levels (2, 16 and 36m). The methane profiles within the canopy indicate a continuous methane source at the surface. The methane fluxes above the canopy are small but consistently show an upward flux maximum early in the morning. The nighttime methane production at the surface accumulates within the canopy and is ventilated as the overlaying boundary layer becomes unstable. The fluxes of CO2 show the same signature in agreement with earlier studies. The monthly averaged daily cycles of CH4 show concentrations that decrease during daytime and increase during nighttime. The magnitude of the concentration difference between day and night gradually increases during the dry season. Simple calculation shows that the local CH4 flux, necessary to sufficiently increase the CH4 concentration in the shallow stable nighttime boundary layer, has a maximum of about 3 nmol m-1 s-1 in July. As the measured nighttime CH4 fluxes are much smaller we assume that there is an unknown source of CH4 nearby from which air is advected, and which strength increases throughout the dry season.