Geophysical Research Abstracts
Vol. 20, EGU2018-15573, 2018
EGU General Assembly 2018

Effect of local airflow on flux chamber measurements

Thomas Laemmel (1), Manuel Mohr (2), Martin Maier (1,3)

(1) Soil Ecology, University of Freiburg, Freiburg, Germany (thomas.laemmel@bodenkunde.uni-freiburg.de), (2) Environmental Meteorology, University of Freiburg, Freiburg, Germany, (3) Forest Research Institute Baden Wuerttemberg, Freiburg, Germany

Gas exchange between soil and atmosphere is of high interest in the current debate of climate change. The chamber method is a common tool used to measure greenhouse gas fluxes at the interface soil/atmosphere. However, studies reported that the measurement chamber modifies the surrounding area of measurement (e.g. soil moisture and temperature) and showed contradictory flux results due to the interaction between the chamber and the local airflow. In this work we wanted to further study the effect of the local airflow on flux measurement at a forest site using a tracer gas.

Thus, CF4 was continuously injected in a forest soil over a measurement period of two months. The CF4 flux above the injection point was measured using a state-of-the-art chamber (LI-8100A, LICOR, Lincoln, Nebraska, USA) with a symmetric valve specially developed to reduce the effect of local airflow on the flux measurement. The chamber was connected to a photoacoustic gas analyzer (Innova 1412 Photoacoustic Field Gas Monitor, LumaSense Technologies, Ballerup, Denmark), which measured the CF4 concentration continuously. The chamber was closed automatically each 30 minutes for 5 minutes. Local 3D wind speed and air pressure were simultaneously measured close to the chamber.

During the periods where the chamber was closed, the CF4 concentrations showed clear increases so that reliable fluxes can be determined. During the field campaign, also periods with high wind speed occurred. Thus, we plan to correlate the measured fluxes with the local airflow and expect to be able to give some hints about the effect of airflow on flux chamber measurements. This work promises interesting results because we used an inert tracer gas so that any biological interaction with the surrounding soil can be ruled out.