

CH₄ and N₂O fluxes at SMEAR II Hyytiälä

The forest floor CH₄ and N₂O fluxes were measured in 2006-2015 with one automatic non-steady-state soil chamber made of stainless steel, consisting of a permanent collar installed in the soil and an upper chamber that was closed on top of the collar. The chamber was made of stainless steel (width×length×height 0.40×0.80×0.32 m). It was equipped with two fans, a thermocouple for chamber air temperature measurement, and a vent tube to minimize pressure disturbances.

The chamber was closed automatically for 60 min 1-4 times per day. During each enclosure, a minimum of 4 gas samples were taken from the chamber headspace by a custom made autosampler (MaSa, Pohja-Metallityöpaja, Juupajoki, Finland). The concentrations of CH₄ and N₂O in the gas samples were analyzed by a gas chromatograph (Hewlett Packard 6890) equipped with a flame ionization detector (for CH₄) and an electron capture detector (for N₂O).

The fluxes [$\mu\text{g m}^{-2} \text{s}^{-1}$] were calculated from outlier-filtered raw data collected during 45-min closing time using different fitting methods (see Equation report). Using linear fit is recommended for N₂O, exponential fit can be applied to CH₄ although the method is sensitive to data quality. The chamber system suffered from technical problems, such as incomplete closing, in the last years.

Further reading:

Korhonen et al., 2013. Nitrogen balance of a boreal Scots pine forest. *Biogeoscience*, 10, 1083-1095. doi:10.5194/bg-10-1083-2013.

Pihlatie et al., 2007. Gas concentration driven fluxes of nitrous oxide and carbon dioxide in boreal forest soil. *Tellus*, 59B, 458-469.