

Greenhouse gases flux data

When using these data, please cite:

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Introduction

In this data sheet all measured greenhouse gases flux data per soil plot are shown. These data entail the plot id, site id, average carbon dioxide (CO₂) fluxes under light and dark conditions and average methane (CH₄) fluxes, under light and dark conditions.

Table 1. General information

project_name	ETH+ Arctic Greening
creation_date	2025-01-15
last_modification_date	2025-03-05
sampling_period	2022-07-09 – 2023-08-09
creator	Annina Maier
contact_1	annina.maier@usys.ethz.ch
contact_2	sdoetterl@usys.ethz.ch
number_samples	43
processing_status	ongoing
upload_status	ongoing

Table 2. Variable overview

variable	explanation	unit
plot_id	plot_id of a respective observation	-
CO2_mean_dark	Average CO ₂ flux under dark conditions, averaged over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CO2_sd_dark	Standard deviation of CO ₂ flux under dark conditions, over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CO2_SE_dark	Standard error of CO ₂ flux under dark conditions, over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CH4_mean_dark	Average CH ₄ flux under dark conditions, averaged over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CH4_sd_dark	Standard deviation of CH ₄ flux under dark conditions, over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CH4_SE_dark	Standard error of CH ₄ flux under dark conditions, over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CO2_mean_light	Average CO ₂ flux under light conditions, averaged over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CO2_sd_light	Standard deviation of CO ₂ flux under light conditions, over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹

CO2_SE_light	Standard error of CO ₂ flux under light conditions, over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CH4_mean_light	Average CH ₄ flux under light conditions, averaged over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CH4_sd_light	Standard deviation of CH ₄ flux under light conditions, over 2 – 3 replicate measurements within a soil plot	mol m ⁻² h ⁻¹
CH4_SE_light	Standard error of CH ₄ flux under light conditions, over 3 – 4 soil plot measurements	mol m ⁻² h ⁻¹

Methods

Sample processing

All greenhouse gas fluxes were measured in situ, except for the Pyramiden location, which was measured ex situ.

Greenhouse gas fluxes

In situ soil fluxes of CO₂ and CH₄ were measured with a microportable greenhouse gas analyser (Los Gatos Research - or ABB microportable gas analyzer (GLA131-GGA, Quebec, Canada)). To measure the CO₂ and CH₄, PVC base collars of 11 cm height and 10 cm diameter were driven into the soil up to 10 cm and covered by an airtight transparent acrylic glass respiration chamber with the same dimensions. If the ground was too shallow, the PVC base collar was changed to one with a lesser height to have 1 cm of collar above the soil. The continuous measurements were taken for 5 mins in light conditions. The measurement of the dark CO₂ flux was done by covering the transparent chamber with a blacking out fabric for 10 min prior to the 5 min of continuous measurements. Gas fluxes were then calculated with the ideal gas law and regression of concentration against time in R version 4.2.0, using the gasfluxes package version 0.4-4 (Fuss, 2024).

References

Fuss R (2024). gasfluxes: Greenhouse Gas Flux Calculation from Chamber Measurements_. R package version 0.7, <<https://CRAN.R-project.org/package=gasfluxes>>
<https://doi.org/10.32614/CRAN.package.gasfluxes>