**Procedures**

**Grounded Collar:**

In order to take accurate soil fluxes, the chamber needed to form a seal with the soil it was measuring. To accomplish this, PVC collars were pounded into the ground using the following procedure:

1. Collar Construction

First, 4 inch diameter PVC pipe was cut into segments 4 inches long. Each segment then had one rim ground to a rough edge.

1. Collar Installation

Each collar was then pounded into the soil (edge side down) until the rim of the collar just barely emerged from the soil. Collars were left to sit at least 24 hours before any measurements were taken on them in order to minimize the disturbance effects from pounding them in.

1. Chamber Measurement

Fluxes were measured using an ultra-portable greenhouse gas analyzer connected in a recirculating loop to a cylindrical chamber (4 inch diameter, 18 cm in height).

The height between the soil inside the chamber and the rim of the chamber was measured before each set of measurements at collar in order to adjust for chamber volume changes.

Before each measurement, the chamber was allowed to equilibrate with surrounding atmosphere. Then the chamber was set on the collar (with a good seal) for 5 minutes, while measuring at a rate of 1 Hz. Each collar was measured three times consecutively.

All chamber measurements were made in parts per million.

All ultra-portable greenhouse gas analyzer times and dates are in UTC.

**Floating Collar:**

At some sites, the water content of the soil was too high to hold a collar in place, or there was open water instead of soil. In both cases, a floating collar was used instead of the grounded collar. Only one floating collar was made and was used across all required sites.

1. Collar Construction

First, a 4 inch diameter PVC pipe was cut into a 4 inch segment. Then, the collar was surrounded by a thick (1 inch) rectangle of foam, with the collar emerging through.

1. Collar Deployment

The foam encased collar was set on top of the water’s surface. At each aquatic measurement site, a flag was planted into the substrate below. The flag was used as a reference point, with the flag representing the far left corner of the floating collar from the technician’s perspective.

1. Chamber Measurement

The same method was used as the Grounded Collar chamber measurement.

**Soil Temperature:**

To gather soil temperature, an infrared thermometer was used at each collar. The thermometer was pointed at the soil within the collar, from a distance of about 2 feet. All temperatures were measured in degrees C.

**Soil Moisture:**

Soil moisture was measured using a common gardening soil moisture probe at each collar. Soil immediately adjacent to the collar was used rather than the soil in the collar in order to preserve the structure of said soil. The probe was pushed in until refusal or up to the handle, whichever came first. All soil moistures were measured in percent saturation.

**Atmospheric Conditions:**

At the beginning of each measurement run at a site, the atmospheric CO2 and CH4 concentrations were measured off the ultra-portable greenhouse gas analyzer. Additionally, atmospheric pressure was measured off the same instrument.

The concentration measurements were not used in any formal calculations and instead serve as context to the flux data. All concentrations are parts per million.

Pressures were used in the flux calculations as a corrective measurement. All fluxes were measured in torr, but converted and entered in hectoPascals.

**Data Processing:**

While in the field, the beginning and end of each 5 minute flux measurement was recorded off the ultra-portable greenhouse gas analyzer’s internal clock. Then, an R script (originally developed by John Crawford), named LGR\_SoilFluxer.r, used those times to subset the ultra-portable greenhouse gas analyzer files and find a line of best fit for the subset. This code sources two other scripts, named CH4flux.r and C02flux.r (also developed by John Crawford) in order to calculate the fluxes.

All calculated fluxes are in mol per square meter per day.