

## ***Interactive comment on “Soil Greenhouse Gas Emissions under Different Land-Use Types in Savanna Ecosystems of Kenya” by Sheila Wachiye et al.***

### **Anonymous Referee #1**

Received and published: 15 November 2019

#### Overall comments:

The manuscript describes a study in four typical land use types in Kenya, Africa. Soil fluxes of CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> were measured manually 8 times over the course of a year. The main strength of the manuscript is that it produces flux estimates of these greenhouse gasses in under-represented ecosystems. Correlations with driving factors of moisture, soil C content, and vegetation activity (NDVI) were explored. The main weakness of the manuscript is the sampling campaign and methods are very limited and coarse, and thus interpretation of the driving factors of the fluxes are much more speculative than could be with greater initial and supporting data. My suggestion

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would be to reduce the length of the manuscript to focus just on the data collected and acknowledge the weaknesses in the data set. A shorter, more concise, manuscript would be much more effective to get the data out there.

## Abstract

Ln 25 – the N<sub>2</sub>O flux was more than double the cropland than bushland, why do you say it was not different between the four sites?

Ln 31 – Over the course of the measurement period or between sites, CO<sub>2</sub> was correlated with soil moisture?

Ln 30-40 - The abstract does not have a clear message. Soil C is important, but soil moisture is driving fluxes, but NDVI is correlated. What is the take home point?

## Introduction

The introductory paragraph never says what produces and consumes GHGs from the soil?

ASALs is an acronym that could be avoided by using drylands, or arid ecosystems. Overall there are many acronyms used that could be avoided.

## Methods

Ln 187 – ssp

Ln 240 – This is a large assumption. Does the sampling really represent the average flux of the day for your ecosystem? At least one of those references is for a temperate forest where they did measure the 24 hour cycle, which likely has a very different cycle than these ecosystems due to differences in vegetation type and environmental variables.

Ln 252 – The pooling method reduces the sample # to 3 for each LUT time period instead of 9?

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Ln 290 – was temperature measured in the chamber?

## Results

Ln 385 – What are the errors on the fluxes? They are so small for soil CO<sub>2</sub> fluxes. Report error and sample size.

Figures 4 and 5 are good. Keeping the color scheme the same would be helpful.

Figure 6 – put in same color scheme.

Figure 7 – this is at such a large scale, I don't find it very informative. Fig 6 shows the data used.

## Discussion

Different terms are being used, soil respiration, soil CO<sub>2</sub> emissions, ecosystem soil respiration (?) Make this consistent.

There is quite a bit of speculation in the discussion. It would be better shortened and more focused on the data collected, not the data lacking that could explain the patterns. This is true for CO<sub>2</sub> and N<sub>2</sub>O sections. Interesting CH<sub>4</sub> just gets one sentence because it is small. . . but this is important too!

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Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2019-407>, 2019.

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