

## Reviewer comment to Authors

Angarife-Escobar et al studied the effect of temperature and moisture on CO<sub>2</sub> respiration to understand the stability of carbon in peatland and grassland. The paper presents interesting insights and is clearly well written. Nonetheless, I have few observations.

### General comments

Throughout the paper the Authors refer to heterotrophic CO<sub>2</sub> diffusion rate from the soil as CO<sub>2</sub> respiration. Please note that you did not measure CO<sub>2</sub> respiration but measured the diffusion rates of CO<sub>2</sub> from the soil. I am aware that many Scientists use this terminology but is not entirely correct as not all the respired CO<sub>2</sub> diffuses out of the soil. I would advise to acknowledge this in the beginning that you measured CO<sub>2</sub> diffusion rate as a close proxy of CO<sub>2</sub> respiration.

Further note that you did not measure autotrophic or total CO<sub>2</sub> diffusion rate but the incubation performed measured heterotrophic CO<sub>2</sub> diffusion rate. It is useful to refer to your respiration rate as heterotrophic CO<sub>2</sub> respiration.

### Specifics

**Line 141: Incubations for each subset ended simultaneously until every sample had an estimated concentration of CO<sub>2</sub>-C in the headspace equivalent to ≥2mg of C, enough for radiocarbon analysis.**

This statement is not clear to me. Further for how long did it take to achieve a CO<sub>2</sub> flux of ≥2 mg of C ? Was there pre-incubation period?

**144. For sampling headspace air, 50-ml vials were filled with 12 g of soil (± 1.5 g) and placed inside 0.5 L glass flasks along with 0.2 ml of water at the bottom of the flask (away from contact with the sample) to avoid possible drying (Dioumaeva et al., 2002); thereafter the flasks were sealed with rubber plugs and screwed with plastic caps. Flasks with samples were flushed with synthetic air (CO<sub>2</sub> free) to remove atmospheric CO<sub>2</sub>. This flushing marked the starting day of the incubations.**

How did you make sure the disturbed soils were repacked to a bulk density similar to that of undisturbed field soils?

The headspace volume is not mentioned. What headspace volume were left when the 12g of soil were packed in 50 mL. Were the headspace left uniform for all samples throughout? Were headspace volume corrected for in the flux calculations?

The CO<sub>2</sub> respiration was measured within what time interval? every minute, 10 minutes or what exactly?

How were the CO<sub>2</sub> concentrations converted into fluxes? This should be stated in the methods.

## Results

**Fig. 4:** The symbols for WFPS at 60 and 95 % are not visible in the graph.

At such a high WFPS of 95%, doesn't C emission shift to CH<sub>4</sub> pathway rather than CO<sub>2</sub>?

**Fig 5 C and D:** You measured the CO<sub>2</sub> respiration at four different temperatures. With this result you can derive and compare an important parameter of C transformation. i.e. the coefficient of temperature sensitivity of CO<sub>2</sub> respiration Q<sub>10</sub>.