**Date:** Saturday, November 30, 2024

To,

Russel Dickerson
Handling Editor
**Atmospheric Measurement Techniques**

Subject   Submission revision RC3 of research paper **egusphere-2024-2041**
to   Atmospheric Measurement Techniques

Dear Sir,

We are resubmitting herewith a revised version of our research paper on **"A simplified system to quantify carbon dioxide, water vapor and heat within a maize canopy (egusphere-2024-2041)". We** are grateful to the reviewer for a careful and helpful analysis of our manuscript. On the basis of his comments, the manuscript has been significantly improved. All the reviewer's comments are reasonable, and we have corrected the MS in accordance with the comments and suggestions

Thank you for receiving our manuscript and considering it for further processing. The authors appreciate your valuable time and look forward to your response.

Sincerely yours,
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This manuscript (egusphere-2024-2041) deals with the use of a new multiport vertical profile measurement system to examine energy balance closure in an agricultural environment. It is conventionally assumed that storage in the canopy is negligible compared with the other terms, and the procedures for closing the energy balance are not completely standardised.

The methodology used is appropriate for identifying and quantifying this storage term. It aims to respond to the usual technical difficulties (loss of data, multiple devices not operating over common periods, or multiple sensor drifts/offsets, etc.). The system implemented is therefore based on a single device that simultaneously measures temperature, water vapour and CO2. The sampling system therefore enables these variables to be analysed at several heights over short time steps (a few seconds).

1. On the pure technical elements, it is clear that the analysis for each of the tubes merits the exclusion of residual air, estimated at 3.2 seconds, but it is not clear how this calculation of the purge delay is made. You could better explain this section.

✓ Air sampling through the system is controlled by the four, 3-way solenoid valves. Data logger controls the switching of the valves that switches the air between the sampling pump and purging pump sequentially. The sampling pump draws air from the height of interest and passes it to the analyzer (IRGA) for 7.5 seconds. The first 4.4 seconds of data allows the logger to equilibrate and the next 3.1 seconds with the reading of the sample. The delay of 4.4 seconds before the reading of the data logger is based on the equilibration of the system and purging of air from a separate height. This has been briefly explained in the revised manuscript.

2. Regarding figure 2, I didn't understand the change from 4.9 seconds to 3.2 seconds. You could better explain this section.

✓ We made a mistake. In fact, actual timing for measurement was 3.1 seconds and 4.4 seconds were ignored during the $CO_2$ reading by the analyzer. This has been briefly explained in the revised manuscript.

3. Lines 205 and 206 give an average temperature and precipitation, but two values (a range of values) are given. I didn't understand the reason for this two averages. In my opinion, only one average is possible.

✓ We have changed into average temperature and precipitation 13.5 $^{\circ}$C and 54 in respectively.

4. Figure 4 doesn't provide much information. I suggest deleting it.

✓ We have removed figure 4 in the revised manuscript.

5. In my opinion, there is a lack of information on the maize crop. At the very least, we need information on the sowing and harvest dates, if the ris no infiormation about the average LAI over the period, and ideally the maize variety. It would be important to provide the soil depth that can be explored by the root system to get an idea of the water reserve (large or small) available to the plant (and therefore potential water stress).

✓ The current study was for 6 weeks from growth stage V2 to growth stage VT (last week of April 2023 to last week of June 2023). We have not recorded the LAI till July 2023. The maize variety was "Dent corn". We have not measured the root systems but in literature it is reported that maize root length varies between 1 and 1.5 meters.

6. Figures 5 and 6 could be improved (font size, box, grid, etc.).

✓ Figures 5 and 6 have been improved according to reviewer suggestion.

7. I do not recommend using "approximately" or "around" (line 298), which are not « countable ». I suggest giving a range or an average value or any other indication that is not open to interpretation by the reader.

✓ We have replaced it with an average value of $3\,W\,m^{-2}$

8. Figures 5, 6 and 7 show envelope curves. What does the envelope correspond to? Unless I'm mistaken, I don't have the information. I think it's important to mention this in the legends so that each of these figures can stand on its own.

✓ We have changed the figure 5, 6, and 7 in the revised manuscript. In the revised figures, symbols correspond to different heights of measurements with bands corresponding to +/- one standard error.

Despite these comments, many of which are formal, I find this new system interesting and relevant for such energy storage estimates.

Thank you for your thoughtful feedback and for finding our system interesting and relevant for energy storage estimates. We greatly appreciate your recognition of the potential of our work.

We have carefully considered all the comments you provided and have addressed them in the revised manuscript.