Geoscientific Instrumentation Methods and Data Systems Discussions

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC1
https://doi.org/10.5194/gi-2021-20-RC1, 2021

Comment on gi-2021-20

Anonymous Referee #1

Referee comment on "Wind speed influences corrected Autocalibrated Soil Evapo-respiration Chamber (ASERC) evaporation measures" by Bartosz M. Zawilski, Geosci. Instrum. Method. Data Syst. Discuss., https://doi.org/10.5194/gi-2021-20-RC1, 2021

The subject treated by the manuscript corresponds perfectly to the thematic considered by the Geoscientific Instrumentation, Methods and Data Systems journal. The author developed a carful procedure that avoids disturbances of the quantity measured by the experimental device. The result is a system capable of measuring soil evaporation, which until now has been difficult to achieve. The objectives are clear but the text need great improvements in its structure and language (see General Comments). The question of the validity of the results for other atmospheric conditions (turbulence, temperature,…) could be raised and have to be argued before to accept the MS.

General Comments:

- The wind velocity influence on soil evaporation, which is studied here, depends on numerous factors like the level of turbulence (friction velocity), the air temperature or the vertical component of the wind speed. Logically the difference between the real evaporation and the measurements one, obtained with a chamber having specific values for these factors, will be dependent on theses values. The results obtained would therefore not be generalizable to all weather conditions but only applicable when these factors have same value as in the experiment presented. It is therefore difficult to understand how to exploit in a general way the notion of susceptibility proposed by the author
- Wind is used to signify wind velocity modulus, that should be corrected)
- The text is difficult to read and would need an editor to improve the English writing.
- The manuscript should be shortened to gain in readability. I suggest removing all the text and graphs concerning the impact of the external gas analyzer and its corresponding tubing system (e.g. in section 3.1.1 about the delay + L255-269 & Fig 3 + the discussion about the start & end points in Section 3.1.2). The same for the parts not giving element for correcting or calibrating the chamber measurements (e.g. section

- A Theory section should be created and contained all the theoretical considerations proposed in the Results & Discussion section (see Specific Comments)
- The author presents a general comparison between real evaporation and measured ones and after explains the difficulties due to the influence of soil water content. It's not clear if the solutions proposed to overcome these difficulties (Eq 11 &13) are included in the first comparison

Specific Comments:

- M&M: Recall the formula for calculating the Measured flux of Evaporation (*ME*) from the temporal evolution of air moisture
- L105-107: Remove the description of all the material that is not used in the manuscript
- L112-114: How the additional variable volume is taken into account for the calculation of the flux
- L126: There are two points of contact between the chamber support system and the collar. Doesn't this influence the weight measurement made by the scale?
- L132-133: How accurate is the measurement with the scale? Is it sufficient to have a good temporal follow-up of the real evaporation?
- L137: The logarithmic profile is not applicable near a surface
- L141: Replace "the wind speed" by "the external wind speed"
- L148: Replace "fan influence" by "external wind influence"
- L158: Add "mass" between "bucket" and "with dry"
- L169: This exponential rise is indeed often used but it must be specified that it is to reflect the accumulation of a scalar of interest whose emission flux accumulates in a closed volume and with flux value depends itself on the concentration in this volume
- Eq 2-5: Why use C and then q for the concentration of the gas of interest here?
- Eq 5: The equation is not correct; the measured flux depends on the volume of the chamber and the intercepted surface. The units of the left hand side are grams of water vapor per m^2 per second while the units of the right hand side are grams per m^3 per second.
- L230: It's not completely evident how a "simple simulation" can be realized to simulate the impact of the sensor response time, please give more information
- Section 3.1.3 contains only theoretical considerations and should be move in a Theory section that should be implemented
- Fig 4: Indicate what the red and blue dots correspond to in the legend and in the corresponding text.
- L338: "As we can see" indicate which figure you are referring to. What is the quoted configuration and how to see the similarity with wind influence?
- Fig 5: It's the logarithm of *ME* and not *ME* that is represented
- Eq 8: It is difficult to understand why the average of ME_{10} and ME_{30} must be multiplied by *Z* if it is indeed the one that appears in the exponential of Eq 7
- L368: How can we deduce from the fig 7 that *m* is not temperature dependent?
- L394-424 (Section 3.2. and Fig 9): Why do you use *RE* in the equation and *ME* in the Figure ? Why do you present *ME* values in the Figure when you have shown just before that *ME* has to be corrected by Eq. 8 and 9 before to be considered equivalent to real evaporation? What is the benefit of this part of the manuscript in the process of correction of chamber measurements to give the real evaporation?
- L425-470: All the theoretical considerations and equations of the Section 3.2.1 should be move in a Theory section. It's not clear how the process describes here intervenes in the calibration of the measurements made with the chamber or in their correction
- Fig 11: Why show the evolution of *ME* after the wind has stopped rather than showing

values of *ME* for different wind values if it is to discuss the influence of the latter on *ME*?

- L 525-528: Are the different values of the proposed constants valid for all PMW?
- L565-610 (section 3.2.2): This part is not necessary since it refers to the influence of cracks on real evaporation but doesn't bring new element for correcting or calibrating the chamber measurements.