

Geosci. Instrum. Method. Data Syst. Discuss., referee comment RC1
<https://doi.org/10.5194/gi-2021-34-RC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.



Comment on gi-2021-34

Leonardo Montagnani (Referee)

Referee comment on "The Soil heat flow sensor functioning checks, imbalances' origins and forgotten energies" by Bartosz Marian Zawilski, Geosci. Instrum. Method. Data Syst. Discuss., <https://doi.org/10.5194/gi-2021-34-RC1>, 2022

Referee comment on 'The Soil heat flow sensor functioning checks, imbalances' origins and forgotten energies', by BM Zawilski

The author presents an interesting study on a topic somewhat neglected, the soil heat flux (G) quantification and its uncertainty. The author shows data from a single experimental study carried out at the ICOS site of FR-Lam (Class 1 ecosystem station),

The author provides interesting points of discussion, like the role of the geothermal energy input, the role of liquid precipitation generally not accounted for, the role of the possible presence of shading objects, the possible role of unaccounted liquid passage through the roots.

The paper is relevant since it poses a basic question related to G measurements. In the end, what is the uncertainty related to G measurements? Should we add other heat flux plates, since there is a problem of spatial heterogeneity, or the overall accuracy and precision are too low, so G measurements are nearly useless, and it would be better to concentrate the efforts on multiple net radiation instruments instead? An answer to this question would be relevant in the flux community.

In my opinion, this paper can be a benchmark for this specific topic, but at the current stage, several shortcomings exist.

One problem quite evident is the language. I am not a native English speaker, but I notice several basic errors (like a singular verbal form after a plural subject) that should be corrected.

A second weakness is about a possible synthesis, which is lacking in my view. I propose to organize the different topics into groups based on the fact they are producing random errors (so the error tend to zero in the long term) or systematic or selective-systematic errors. See Moncrieff et al. 1996.

Another point on which I disagree is the use of the annual sum of G as a benchmark if is close to zero. This leads for example, to the suggestion of the removal of geothermal energy. In my view, all the soil heat flux plates located in the footprint of an eddy covariance tower should be representative of the actual energy flow and not corrected. I

would place the sensors on the shade, in the partial shade and in full sun since the scope of the measurement is to assess the average value of the selected variable and its standard deviation

Specific comments

Line (L) 11 'latent heat conversion...' into liquid water?

L26: Many process->many processes (I report a few examples only of grammar errors).

L46: the plates are not a technique.

L49: 'biased by inhomogeneities'. As mentioned above, I believe that all inhomogeneities should be adequately measured in proportion to their contribution to the overall flux.

L65: 'de Beeck'-> Op de Beeck.

L83: ...11.2% sand, 2.8% organic matter. Here, granulometry and chemical composition are mixed up.

L91-92: This sentence is explained in the following paragraph only.

L97: 'glocalization': geographical location?

Around L 165 (Figure 3)., but why not use the data coming from partial shade? In a savanna, should all the trees be avoided? If we perform a stratified sampling, all the strata should be sampled. If we use random sampling, why not measure at specific, randomly selected, locations? I believe that this reasoning introduces a bias, not the contrary.

L200: 'the deep roots absorbed water has lower temperature than the soil surface temperature.'. Not always, in winter the contrary happens.

L231: Rainfall has always a negative effect or it could be positive, for instance when the rain is liquid and the soil is frozen?

L270: I cannot understand why the geothermal flux should be added or removed from the measured flux.

Figure 10: Could you place more intuitive units along the X-axis? $2.5 \cdot 10^7$ s is about 289 days.

L293: I am getting lost here. I do not see any graph, Figure 6 was earlier, depicting the rainfall effect.

L306: 'It is important to carefully chose the installation place and check the possible imbalance by a yearly integration.' Besides 'chose' (choose), I disagree with the concept expressed. I would prefer a fully random selection of the location places or stratified sampling, but always avoiding subjective 'expert selection'.

L327: The possible role of water table temperature is not discussed in the text.

Reference cited:

John Moncrieff, Yadvinder Malhi, Ray Leuning, 1996, The Propagation of Errors in Long-Term Measurements of Land-Atmosphere Fluxes of Carbon and Water, Global Change

Biology, <https://doi.org/10.1111/j.1365-2486.1996.tb00075.x>