Biogeosciences
Discussions

Interactive comment on "Energy balance closure on a winter wheat stand: comparing the eddy covariance technique with the soil water balance method" *by* K. Imukova et al.

Anonymous Referee #2

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General

The energy balance closure of winter wheat stands is analyzed. Different methods to close the energy balance gap are compared: the Bowen ratio method, assigning the complete gap to the latent heat flux, or assigning the complete gap to the sensible heat flux. A comparison is made with a water balance method, which is taken as truth. It was found that assigning the complete gap to the sensible heat flux gives in general the best results.

My main concern is the quality of the water balance method given the uncertainty with respect to the gradient of the hydraulic potential and the hydraulic conductivity function.

I believe we have a large uncertainty and the uncertainty of ET with this method is very high. A further aspect is that precipitation is uncertain as well, and might often be underestimated with standard methods. Therefore, ET would be underestimated as well with water balance methods. I think a more thorough assessment of the uncertainty of the water balance method, insights and discussion of its limitations are needed for the paper.

My second main point is that it is unclear what we learn from this paper. The authors have a nice summary of all results obtained with respect to the energy balance gap in the discussion. Sometimes the best performance is obtained with energy balance closure using the Bowen ratio method, sometimes using a H closure, and sometimes a LE closure. In this case it could be the LE closure. It is only a result for a single site among many sites. Additional motivation is needed for the publication of these results. I suggest therefore major revision.

Detailed comments

P6784, L24-L25: Rephrase.

P6785, L11-L12: In other works those storages were included, and later you argue that they could play a major role. I would therefore reformulate this sentence.

P6789, L5: Repetition.

P6790, L7-L10: Given the usual strong spatial variability of soil hydraulic parameters, can fluxes be reliably estimated?

P6792, L14: "matrices" instead of "matrixes".

P6793, L16-L27: This comment relates to the comment before. Both the gradient of H with respect to z and the function K(h) are very uncertain. From the measurements, and given measurement errors and spatial variability it seems to be difficult to precisely estimate deltaH/deltaz. Concerning the estimation of K, it can be expected that lab estimates of K and field values differentiate substantially, given the very different scales.

P6795, L4-L6: Is there a bias in the estimated soil moisture content as machine tracks have a very different soil moisture content compared to the areas between the machine tracks?

P6796, L17-L18: How is this determined? Which method? What does this exactly mean?

P6797, L11-L14: the order of figures should be changed here: Figure 5 is introduced before Figure 4. Before Fig. 8 was already introduced, so this does not seem to be very logical.

P6798, L10-L12: Why?

P6799, L8-L25: This complete text block was not analyzed in this paper. It fits in the introduction, but should not be repeated in the discussion, or only very shortly, indicating that physical mechanisms on the energy balance gap were not analyzed in further detail in this paper.

P6800, L13-L14. A similar conclusion was reached by Alexander Graf et al. in a recent paper in WRR. However, a possible explanation could also be the underestimation of precipitation by tipping bucket measurements.

P6801, L3-L4. Another study was by Gebler et al. (2015, HESS), where they found that adjusting ET from EC by the Bowen ratio method gave the best fit with ET measured by lysimeter.

P6801, L27-L28. It is not so clear then, if ET is already measured, why we still would want to install an EC-tower.

P6802, L19. Rephrase.

P6803. Conclusions. The conclusions cannot be read independently from the rest of the paper. Introduce some details about the sites (e.g., where) and re-introduce again the abbreviations.

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Table 2. This table is not very informative like this. Think how to present these data in a better way. A possibility is to present anomalies. You could use the unit per day.

Interactive comment on Biogeosciences Discuss., 12, 6783, 2015.

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