**Hydrology and
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Discussions

Interactive comment on "Actual evapotranspiration and precipitation measured by lysimeters: a comparison with eddy covariance and tipping bucket" *by* S. Gebler et al.

Anonymous Referee #2

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This paper compares the evapotranspiration and the precipitation estimates by six lysimeters, on the one hand, and eddy covariance and tipping bucket rain gauge, on the other, for a grassland in Germany. The publication is of interest for instrumentalists as well as modelers looking for typical figures of uncertainty in those two components in this type of climate/vegetation conditions. However, for precipitation at least, the added value of the comparison is not shown since the reference set-up is rarely used when solid precipitation can't be neglected. For the evapotranspiration measurement, it's clear that the lysimeter performs well in this type of homogenous and simple vegetation cover, however for more complex crops the method can't be used for anything

but evaluate a mere component, such as soil evaporation. This should be pointed out. The reference crop coefficient method should be substituted by a more complex energy balance equation in unstressed conditions, which leads to a modeled value that can be easily computed with the same amount of input data (plus some available parameters such as height and albedo, and allometric relationships well known for grass; did you measure LAI ?) as the crop coef method.

Major comments:

1- A weighing rain gauge with wind shield (such as the Geonor one) is usually recommended to measure solid and liquid precipitation, often in conjunction with snow pillows and snow height measurements. The underestimation of solid precipitation could be decreased by this system, it should be pointed out in the document. I guess using a combination of those instruments (which are easier to install than a lysimeter and have similar measurements footprints) could lead to a difference in total rainfall of the same order as that of the total evapotranspiration. Did you try classical wind correction algorithms for raingauge systems (even if you acknowledge that the error residual do not correlate well with wind)?

2- What is the difference between the 6 lysimeters with respect with the other components of the water balance (drainage, integrated soil moisture storage) ? (it could be useful to show cumulative differences between the 6 instruments and those 2 fluxes)

Minor comments:

P13808: error in relating eq. 6 and 7 and the methods to derive P and ETa (lines 4-6) P13809L17 andd L27: why 3h ? why 7 days ? Those 2 figures sounds fairly large to me, please justify; moisture status can change a lot in 7 days. P13810L7: I don't understand how EBD3h(EF) is computed. P13818L23: why didn't you compute Eta with the full Combination Equation instead of the empirical Kc method ? (using actual roughness length derived from vegetation height for instance, esp. for such a well known grass cover)