**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Partitioning of evaporation into transpiration, soil evaporation and interception: a combination of hydrometric measurements and stable isotope analyses" *by* S. J. Sutanto et al.

S. J. Sutanto et al.

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Anonymous Referee #2

We would like to thank the second reviewer for the detailed reading and valuable suggestions. In particular we appreciate your suggestions in the general comment section. In the revised manuscript we will only focus on the comparison of results from the isotope mass balance approach and the HYDRUS-1D model. We will add detailed

information about the HYDRUS-1D model and remove the total evaporation analysis.

Main issues: 1. We decided to exclude the Penman-Monteith method for our comparison analysis. We will only focus on the isotope mass balance and HYDRUS-1D model. 2. We stated that this study partitions the evaporation flux into soil evaporation and transpiration fluxes with consideration of interception (p.3661, L.13). We agree that we did not measure interception in our lab set-up, but used a simple interception model with parameters derived from field observations by Gerrits (2010) in the Netherlands for a grass setup. We believe that our results are more reliable since we consider the interception flux in our analysis. Partitioning studies with and without taking into account the interception flux will give a different result. 3. We will elaborate the discussion section by discussing: the major impacts of this study to improve the methods of evaporation partitioning, what can be learned from this study and the next steps for future research.

Specific points: 1. We agree and change the title into: "Partitioning of evaporation into transpiration, soil evaporation and interception: A comparison between model results versus isotope mass balance approach".

2. We will change the abstract.

p.3659, L.24: We define best practice agriculture as the agriculture which optimizes the water use, thus most of the water is not lost (e.g. evaporated back to the atmosphere, lost by drainage, deep percolation and surface runoff) but completely used by plants to produce biomass. This definition will be added to the text.

p.3660, L.5-15: We meant with widely proved that many studies using isotopes to analyze the evaporation flux have been carried out successfully. The difference between other studies and ours is that we partition the evaporation flux with taking into account the interception flux in our analysis. Many studies tried to partition evaporation flux into soil evaporation and transpiration fluxes only. They did not consider the interception flux as an important component in evaporation. Moreover, we used a liquid water

isotope analyzer, which is widely available nowadays compared to the classical mass spectrometers, and we used simple and widely available hydrometric measurement devices. The mentioned references will be added.

p.3661, L.19: We changed grassland into grass and corrected the sentences. Furthermore, we merged section 2.2 and 2.3 into 2.1.

Sec 2.4: The isotope measurements have been carried out bi-weekly in the beginning of the experiment and more frequent towards the end of experiment (e. g. in January). We will add this information in our paper.

Sec 2.5.1 will be shortened since we will focus only on two methods (mass balance and HYDRUS-1D) for comparison.

Sec 2.5.3: In this section we focus on the HYDRUS-1D model. The interception part is stated in section 2.6. We can add a sentence for referring interception to section 2.6. We chose to structure this section in this way, because we consider the interception flux in our analysis both in the HYDRUS-1D and isotopes mass balance.

In the HYDRUS-1D model, the optimization parameters can be done automatically by using inverse modeling based on Marquardt-Levenberg Optimization Algorithm. HYDRUS produces a correlation matrix, which specifies degree of correlation between the fitted coefficients (Simunek et al., 2008). HYDRUS will run the optimization process until it finds the highest R2 values which can be obtained. This goodness of fit test (R2) is describe in figure 1.

Sec 2.5.4, p. 3669, L.18-19: Yes the soil water is affected by the history of processes that happened in the soil column before the sample was taken; this includes fractionation processes due to soil evaporation. The assumption we mentioned in the manuscript is about the fact that the isotopic composition of percolated water and the uptake of soil water for transpiration by a plant is not affected by fractionation (see references about this p.3668, L. 23-25).

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The equation numbers in p.3669, L.25 and p.3670, L. 1-4 are indeed wrong. We will correct them and add more detail in this section as also suggested by reviewer 1.

p.3670, sec 2.6 will be moved and the definition of SCF will be added.

p.3673, L.11. Yes, the effect of evaporation in the soil occurs until 20 cm deep. The new rainfall event can push the soil water deeper but then the isotopic composition after 20 cm will be depleted in heavy isotope since diffusion processes is occurring in this location. The enrichment of isotope only occurs in the top layer until 20 cm when the vapor diffusion is taking place. We add this discussion to the manuscript.

L14-16: This isotope fractionation is a process caused by a phase change from the liquid phase into the gas phase; in this case evaporation. The isotopic composition of the soil water can be a mixture of isotopes from the specific layer and isotopes from the top layer through infiltration.

L16: We do not have Fig. 6b.

P3674 L21: Changed.

L23-25: We agree and will only refer to Figure 8.

p.3674, L. 26: We will not present the Penman-Monteith results in the comparison analysis and we will just focus on the isotope mass balance and HYDRUS-1D model .

P3675 L3-6: Changed.

The figures will be improved and changed based on your suggestions. We agree that we will remove some the dates for clearness. We will also remove Figure 5.

$$r^2 = \frac{\left[\sum w_i \, \hat{y}_i \, y_i - \dfrac{\sum \hat{y}_i \sum y_i}{\sum w_i} \right]^2}{\left[\sum w_i \hat{y}_i^2 - \dfrac{(\sum \hat{y}_i)^2}{\sum w_i} \right] \left[\sum y_i^2 - \dfrac{(\sum y_i)^2}{\sum w_i} \right]}$$

Fig. 1.

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