Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2019-213-RC2, 2019

Hydrology and Earth System Sciences
Discussions
Open Access
EGU

Interactive comment on "Estimating water flux and evaporation losses using stable isotopes of soil water from irrigated agricultural crops in tropical humid regions" *by* Amani Mahindawansha et al.

Anonymous Referee #2

Received and published: 30 July 2019

Review of Hydrology and Earth System Sciences Manuscript: hess-2019-213 Title: Estimating water flux and evaporation losses using stable isotopes of soil water from irrigated agricultural crops in tropical humid regions Authors: Amani Mahindawansha et al.

This manuscript presents seasonal variations in the soil water isotopic profiles and the fraction of evaporation (FE) for different crops (wet rice, dry rice and maize) under flooded and non-flooded irrigation management practices. This topic is interesting for understanding water cycle and water conservation in agricultural fields. However, there are some issues within the manuscript that requires substantial interpretation and

Printer-friendly version

Discussion paper

improvement. The following is my detailed comments.

(1) Abstract: Since only FE values were calculated and no water flux of evaporation were determined in this study, the second sentence (P.1,Lines 13-15) should be changed. Other evidences should be given to prove the occurrence of piston type matrix flow or preferential flow besides the isotopic data in the text (P.1,Lines 22-24). It is helpful to supplement important data in the abstract section to clarify the new findings of this study. (2) Introduction: Determination of the soil evaporation flux (E) and the fraction of E in ET (FE) have been widely studied using several methods and techniques for different irrigated crops (Liu et al., 2002; Kool et al., 2014; Sprenger et al., 2016; Zhou et al., 2016). The new scientific merits in this study are not very clearly clarified. (3) Material and Methods: There are straw and non straw applications conducted for different treatments in the experiments (P.3,Lines 20-21). How does the straw application affect the seasonal variations in the FE for different irrigated crops? Please describe in detail how to determine the time when a water shortage occurred in dry rice and maize fields (P.3,Lines 26-27). The gravimetric soil water content is determined traditionally by oven-drying method. Smaller values might be resulted by using the soil water loss in cryogenic water extraction process to determine the soil water content (P.4,Lines 19-20). Root length density was analyzed as described in the P.4, Lines 21-22 in the "Material and Methods" section, but non detailed results were shown in the "3 Results" section. (4) Results: The lc-excess was developed/introduced by Landwehr and Coplen (2006) in respect to River Water Line. They used the lc-excess to determine how the isotopic values of river waters differed from their sources (i.e., precipitation). However, the authors use lc-excess to estimate the deviation in the isotopic values of the soil samples from regional precipitation. I do not find any good argument why the authors use lc-excess since there is no river water sampled during their experiments. The lc-excess is not necessarily needed in this study (P.7, Lines 9-16). Instead, the deviation of soil isotopic values from LMWL/GMWL is already indicating the evaporation process and it is more commonly used method. Lower <delta> indicates condensation process and higher <delta> indicates evaporation process. (5) Discussion: The authors

estimate the annual average reference evapotranspiration rates in dry season and wet season, respectively. Does the "evaporation of ∼50-80%" in P.11, Line 28 mean evapotranspiration? What is the difference between evapotranspiration and evaporation in this study? (6) Conclusion: Seasonal distribution of soil water content and isotopic profiles was analyzed in this study, but no fluxes of unproductive soil water losses were found. Therefore, the sentence in P.13, Lines 24-25 is required to be reorganized. (7) The English writing of this manuscript should be polished further. There were some grammar errors in this paper and some sentences were confusing.

References: [1] Liu, C.M., Zhang, X.Y., Zhang, Y.Q., 2002. Determination of daily evaporation and evapotranspiration of winter wheat and maize by large-scale weighing lysimeter and micro-lysimeter. Agr. For. Meteorol. 111, 109-120. [2] Kool, D., Agam, N., Lazarovitch, N., Heitman, J. L., Sauer, T. J., Ben-Gal, A., 2014. A review of approaches for evapotranspiration partitioning. Agric. For. Meteor. 184, 56-70. [3] Zhou, S., Yu, B.F., Zhang, Y., Huang, Y.F., Wang, G.Q., 2016. Partitioning evapotranspiration based on the concept of underlying water use efficiency. Water Resour. Res. 52, 1160-1175. [4] Sprenger, M., Leistert, H., Gimbel, K., Weiler, M., 2016. Illuminating hydrological processes at the soil-vegetation-atmosphere interface with water stable isotopes. Rev. Geophys. 54, doi:10.1002/2015RG000515.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2019-213, 2019.

Printer-friendly version

Discussion paper