

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.

Matthias Beyer (Referee)

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In their manuscript ‘Estimating water flux and evaporation losses using stable isotopes of soil water from irrigated agricultural crops in tropical humid regions’ (hess-2019-213), Mahindawansha et al. investigate the effect of different crop rotations (wet rice/dry rice/maize) in seasonally flooded/ irrigated rice fields. The authors quantified the fraction of soil water evaporation in irrigated agricultural fields while also taking into account the effect of crop species and various growing stages using the Craig-Gordon model.

The topic of the study is interesting and timely but, in brief, I have mixed feelings on the manuscript. While it is clearly visible that the collected dataset can be valuable

C1

for addressing the objectives of the study, there are several points that need to be addressed in order to make this contribution really valuable for the reader. First, I have the feeling that the manuscript is lacking some internal review before publishing. The grammar is partially very poor, and I feel that several aspects (e.g. clear statement of the objectives and focus on those in the results/discussion section) should have clarified before submission. I started correcting/improving the grammar, but gave up fast on it because it became clear that major efforts are needed which I as reviewer cannot provide. Second, the combined effect of Transpiration and Evaporation should be much better addressed throughout the manuscript. Recent studies proved that transpiration is generally a much greater flux compared to Evaporation, and in a study like the presented those two need to be looked at conjunctively. In that regard, also the title is confusing, because when reading ‘estimation of water fluxes’, one would actually expect a water balance for the different systems, but effectively the only flux quantified is evaporation. In addition, I was confused multiple times because I was not sure if the authors speak about evaporation or evapotranspiration? (see later comments). Also, I was wondering multiple times if the authors really refer to soil evaporation when speaking of wet rice? If the field is flooded, it would be more open water evaporation? Having that said, I cannot recommend publishing this manuscript as is. Though the topic and study are interesting and have great potential, this is often not fully explored. With more precisely stated objectives and a subsequent focus on addressing those, I encourage the authors to improve the manuscript and increase the quality and impact of the publication. I wish the authors good luck with the revision of the manuscript. Kind regards, Matthias Beyer Down below, further detailed comments can be found. The authors state: ‘None of the studies conducted so far have quantified the fraction of soil water evaporation in irrigated agricultural fields while also taking into account the effect of crop species and various growing stages. Does it make sense to calculate the evaporation from soils for wet rice, which is cultivated in a flooded system (as the authors state) → evaporation would be from open water surface anyways Suggested objective: study the effect of crop species and various growing stages on evaporation

C2

in rotation systems

Title: why first singular (flux) and then plural (losses)? - The abstract needs to be improved. There are many sloppy formulations and bad grammar. The results section of the abstract should be underpinned with numbers. What are the implications of this study and how does it help to improve management or our understanding of such systems? - How to compare an irrigated/flooded rice field with a field under natural conditions in terms of water isotope interpretations? - While reading the introduction, I wonder if the authors solely mean soil evaporation when they use the wording "evaporation" or if they actually mean "Evapotranspiration" (sometimes, evaporation is used for ET). The authors state that they are interested in studying soil evaporation, but can you look at one (E) without the other (T) in a combined system? - Methods - Extraction at 200 degrees Celsius. . .good, because very clay-rich. . .but. . .was organic contamination checked? (upper soil layers and plants) - Craig and Gordon modeling part should be written more concise. What is the difference between the isotopic signal of the soil and the original isotopic signal of soil water? (do the authors mean the 'initial signal after rain/irrigation?'). How justified are the assumptions made (and those are many)? For the results, it would be interesting to see if the fraction calculation fits with the modelled results

P1.l. 13 advance better: improve P1.l.18: progressed through the growth – bad grammar P1.l.23 compared to over P2 l.6-11: not only in recent years, this has been studied since Allison et al. in the 80's. . .has not been studied as much compared to what? p.2.l.13 it p.2.l.20-32: this is well-written! p.3.l.5: Our objectives during this study are the objectives of this study are p.3. l. 5-8: Objectives should be formulated clear and concise p.3. l. 21: constancy consistency p.3. l. 20-23: if the mung bean plot was not used it is not necessary to mention it here p.4. l. 6: the model controls?...grammar p.4. l. 8: mixing from macropore flow from cracks?...grammar p.6. l. 25/26: the shape of the isotopic profiles in the shallow soil water changed depending on the crop and growth stage. → only because of that or also other factors – irrigation water isotope

C3

values, precipitation, radiation? What are the conclusions of the authors regarding the magnitudes of evaporation? (Are these numbers given as fraction of total evapotranspiration?) Fig. 3: bad resolution Section 4.3.: the statements here are very interesting and it is appreciable that the authors introduce this discussion. unfortunately they question parts of the isotopic data presented in the study Conclusion: - throughout the manuscript, the phrase 'redistribution via plants/roots/etc. appears frequently', but it is not discussed anywhere. I suggest leaving this out or providing further evidence. - 'the conclusion that isotopic profiles develop via diffusion processes in the shallow soil and are then transported by advection in the matrix or in macropores or cracks' → please rephrase, poor grammar p.13., l. 13: Do the authors really mean Evapotranspiration or rather Transpiration?

Please use continued page-numbering for revised version

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

C4

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Kind regards,

Matthias Beyer

Down below, further detailed comments can be found.

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Suggested objective: study the effect of crop species and various growing stages on evaporation in rotation systems

Fig. 1.

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