

***Interactive comment on “Estimation of
Evapotranspiration and Other Soil Water Budget
Components in an Irrigated Agricultural Field of a
Desert Oasis, Using Soil Moisture Measurements”
by Zhongkai Li et al.***

Anonymous Referee #3

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General comments:

Arguments of this paper need to be stated more clearly. Sub-sections 3.1, 3.2 and 3.3 should be moved to the Section 2. Conclusion section repeats the results to significant extent, while responding to the arguments very weakly. The novel contributions of this work should be presented explicitly. Readers may feel confused by finding out the focusing points: the improvement of methodology or new scientific findings?

Specific comments:

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1-2: Estimation of Evapotranspiration and Other Soil Water Budget Components in an Irrigated Agricultural Field of a Desert Oasis, Using Soil Moisture Measurements

Comment: (1) evapotranspiration is one of the soil water balance components. Is it necessary to let it stand out here? (2) what are the key issues to be addressed in this paper. A clear definition to the problem is needed.

14-15: water cycle is principally driven by irrigation (I), drainage (D), and evapotranspiration (ET) in desert oasis settings

Comment: Water cycle is primarily driven by evaporation demand under influence of irrigation. Soil water percolation may occur when too much water applied to the root zone. Anyway, it is not proper to say that water cycle is driven by irrigation and drainage.

24-25: ... through a data-driven method that combined both the soil water balance method and the inverse Richards function.

Comments: (1) It is not very common to say 'Richards function'. Instead, Richards equation is the most popular description. (2) data-driven? According to the manuscript, it is a soil-moisture data based method. This method is not uncommon.

31-32: ..., suggesting that the irrigation amounts had limited influence on the accumulated ET throughout the growing season.

Comment: With regard to this study, sufficient water was applied to each treatment and caused significant percolation, indicating that crops grew under non-water stress condition. However, it cannot be concluded generally that irrigation amount had limited influence on the accumulated ET. Otherwise, this may mislead both understanding and practice.

45: Traditional irrigation

Comment: What is the traditional irrigation? It should be defined specifically because it is different from place to place around the world.

58-50: In desert oasis settings, the water cycle is principally driven by irrigation (I), drainage (D), and evapotranspiration (ET). None of these drivers is easily measured in practice, however.

Comment: It is not proper to call all these components drivers of water cycle.

65-66: . . . , and its estimation is only possible through the application of mathematical models, and is commonly calculated by relying on reference ET(ET₀) or potential ET (PET)

Comment: “only possible”? You might have not said it.

79-80: . . . oasis. So far, however, no works have been published on testing the potential of using a soil moisture database as a data-driving method in this region.

Comment: As prerequisite condition, it should not be locally limited. Otherwise, the value of the research could be discounted.

161: With no water shortage

Comment: It is better to phrase it as under non-water stress (condition)

164: The potential ET during that day

Comment: How is the potential ET calculated here? Reference ET, potential ET, maximum ET are different concepts.

199-200: The upper boundary of the calculation was set as the atmospheric boundary condition, and the calculation involved actual precipitation, irrigation, and potential evapotranspiration rates for the crop cover.

Comment: (1) how is the film mulching effects considered for the upper boundary condition? (2) how is the bare soil evaporation estimated as the upper boundary condition? (3) how is the upper boundary condition defined for the inter-cropping treatment? And the alternative mulching strips?

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226: In Table 4

Comment: Table 2?

237: The profile averaged values of saturated drainage velocity ($\delta\dot{I}\ddot{R}_{\dot{z}}\delta\dot{I}\ddot{S}\ddot{a}$) were 119, 129.36, 286.04, 189.42, 207.92, and 216.14 cm day⁻¹ at...

Comment: It is not necessary to list these values in the text because they are already given in the table.

269: ...irrigation crop demand...

Comment: Irrigation demand, crop demand are meaningful concepts in crop water requirement studies. What does the irrigation crop demand mean?

292: ..., a slow-down or even a very light increase...

Comment: A slow down decrease or even light increase?

293-295: We checked all the soil moisture time series of NT1-NT6 during the entire growing season period (Fig.5), and no constant water content throughout the entire soil profile was detected in any of those selected plots, suggesting that our previous hypothesis that no steady-state flow took place during any irrigation events was supported.

Comment: What is the purpose of this sentence? For any frequently irrigated soil profile, it is hard to reach a steady flow state.

298: ...and strong potential evaporation may have hampered any effective infiltration from those precipitation events.

Comment: It is the insufficient precipitation that attributes to the negligible infiltration rather than the strong evaporative demand.

310: ...and increased gradually as LAI became greater with crop development, ...

Comment: LAI has never been mentioned previously in the paper although it is very

important information supporting discussions in the later sections.

315-316: The relative facility with which an excess of water in the soil was produced caused an important deep percolation, which became greater as it progressed further up the irrigation gradient.

Comment: This sentence should be rephrased. It is confusing.

340: ..., the soil moisture data-driven method...

Comment: The soil moisture data based method, might be a better description to this work.

341: ...the best...

Comment: "the best" among which and which?

344-345: ..., which in turn suggested that both cropping systems and agronomic manipulation had limited influence on the accumulated ET during the growing season, ...

Comment: This is correct when preconditioned only.

365: 4.2 Other estimated SWBCs

Comment: Does it mean the other SWBCs in this study or the SWBCs given by other people in the literatures?

401: 4.3 Long-term effects on soil water budgets

Comment: Does this manuscript involve any long-term issues, either the parameters or the water balance budgets?

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