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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Groundwater Dynamics under Water Saving Irrigation and Implications for Sustainable Water Management in an Oasis: Tarim River Basin of Western China" *by* Z. Zhang et al.

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General Comments:

Overall this is an interesting paper on an important topic. The data collection methods seem thorough, and use current technology to quantify previously difficult to obtain fluxes. The water balance model is quite simple and in some ways not explained thoroughly. The paper could benefit greatly by omitting much of sections 2 and 5, improving the description of the methods, especially the calculations, and ensuring that the Discussion and Conclusion focus explicitly on the results of the experiment

and work in this paper.

Specific Comments:

-The history of the TRB is interesting, but not needed to support the paper conclusions.

-Statement that water saving irrigation mitigates soil salinization is arguable. I can't find the paper (Ma et al, 2010) in English. If this was a conclusion of that paper, then it should be introduced as a hypothesis, or at least stated with respect to areas with shallow water tables only.

-Section 2 can be shortened to include only the relevant material for the project.

-Do you calibrate between the two SWC methods, hydra sensors and gravimetric method?

-Lateral flow is ignored in Eq 1 because it's negligible in the control volume, however it's included in Eq 2. Is LF needed to close the water balance in this case? Please explain why it is needed here and not before.

- Please explicitly define ΔS, ΔS_D, and S_D and make sure their use is consistent. When you discuss in section 4 changes in the soil water, does this refer to ΔS or ΔS_D?

-$(\theta_{sat} - \theta')\Delta Z_{wt}$ is the change in water storage associated with the change in water table, and the description of ΔS_D makes it sound like the change in water storage between the water table (the bottom of the control volume) and the upper boundary of water table variation (where the water table was?). These appear to be the same. Please clarify the text to differentiate between these two, and confirm that they complete the right-hand-side of the mass balance without counting anything twice.

-Clarify Figure 2 to illustrate what areas ΔS and ΔS_D apply to – this will also be clearer when you define them in the text (previous comment).

-p1790, ln 21. How did you measure the porosity? Did you also determine θ_{sat} from

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any saturated SWC measurements?

-Section 5. The discussion on human-water systems, including the review of water use in the area seems like an appendix to the paper, rather than an integrated part of the methods, experiment, and results. It should either be omitted from the Discussion or shortened significantly and justified by integrating with the results of the paper.

-The paper would benefit from a limitations section in the discussion.

-The conclusion does not seem to include any conclusions drawn explicitly from this paper, but rather summarizes the motivation for the study instead of than the findings.

Technical Corrections:

-Several language issues p1781 ln 22, (and elsewhere in text) "mainstream" should be "main stream" or "primary channel"

-overuse of the word "serious" and "seriously"

-p1781, line 27, start new paragraph with "Large-scale irrigation..."

-p1784 ln 4, "conveyed" should be "conveying" or "routing"

-Section 4.2. Please revise and clarify the first sentence.

-Table 1 needs more explanation. Should 2012 and 2013 listed be the same year? Please also list the year for the bottom two rows.

-Figure 1. Can't read the lat/lon values in the top two maps, too small.

-Figure 3. Hard to distinguish between two grays. Perhaps flip y-axis for exchange flux to show negative flux going up.

-Overall could benefit from an English language review, I did not edit for language throughout the manuscript.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 1777, 2014.