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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.

Anonymous Referee #2

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The Manuscript is about modelling the ground water dynamic considering the new irrigation system introduced to Tarim River Basin.

I found the topic interesting and important however in my point of view the paper is not well structured. The research question is not clear enough and was not answered properly. The authors started from a very broad and general problem of sustainable groundwater level to a very specific field-scale study and again tried to generalize it by introducing a longer time series of groundwater level record for the Tarim River Basin. But how the field-scale observation and modelling is transferred to a longer period of general groundwater behavior remains unclear to me as many factors like deep wells

and other irrigation methods are simply neglected.

The conclusion is too general, this conclusion and behavior of groundwater dynamics can be anticipated even without any calculation. I am wondering what is the novelty of the result and this work.

The presentation of model is not enough and clear. First of all, I ask the authors to clearly distinguish between fluxes and states. Fluxes and states cannot be summed or subtracted without considering time steps. I would suggest to change the labels into single letters with appropriate subscripts (e.g. I_{S}). I also suggest the authors to conceptualize the soil column and each layer clearly by explaining the states and fluxes one by one and their interactions. A flux can be positive or negative but this should be clearly explained. In the abstract there are positive and negative values which are reported, I suggest to remove them as you mentioned the upward or downward directions. The exchange flux (EF) is introduced in introduction but to my point of view it is too generic to be mentioned in this way as almost all the fluxes in a hydrologic systems can be considered as exchange fluxes.

I would suggest the authors to make one figure with different panels with equal axis out of figures 3-6. This way they make it much easier for the reader to compare the fluxes, groundwater fluctuations and rain during different periods.

I am not personally agree with the argument that any work must include uncertainty analysis. However for this study as the fluxes and states are estimated it would be interesting to see how the final finding, which in my point of view is not a surprise, will be affected.

In general, I think the paper needs a major revision before being accepted for publication.

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