Revision Notes (HESS2018581)

June 1, 2019

Dear Professor Nunzio Romano,

Thank you for allowing us to resubmit the minor changed manuscript Hess-2018581 entitled “A Unique Vadose Zone Model for Shallow Aquifers: the Hetao Irrigation District, China”. Your latest evaluation of the manuscript was as follows:

> “Your revised paper was much improved and is in a good shape now. I still suggest that some minor revision should be done accounting for the last refining comments from one of the reviewers.”

Below we have replied to the comments of reviewer#1 point by point. In our response and in the revised manuscript we show in blue the changed text.

We are grateful to you and the reviewers for the comments and your time. We are looking forward to hearing from you whether additional changes are needed.

With high regard

Zalin Huo, Tammo Steenhuis and Zhongyi Liu

Responses to the comments of Reviewer #1:

Comment 1. L52 The 7500 m^3 can be computed from the volumes given next in the sentence. Thus, there is no point in giving redundant information. Please delete it.

Response: Thank you for your suggestions. In the revised manuscript, the sentence was revised as "The available fresh water per capita decreased from 13400 m^3 in 1962 to 5900 m^3 in 2014 (World Bank, 2019)" in line 52-53.

Comment 2. L76-80. The point being made in L76-80 is only developed in L81-90. Therefore, I suggest removing the paragraph in L80.

Response: On the sound advice of the reviewer, we removed L76-80 in the revised manuscript.

Comment 3. L96: Models can also take quite some time when applied to scenarios…

Response: The sentence was revised as "These models have long run times when applied to scenarios simulations for real world problems" in line 91-92 in the revised manuscript.

Comment 4. L108: There seems to be an extra "with" in the sentence.

Response: Apologies for not catching this before submission. The word "with" in the sentence was deleted in the revised manuscript. The sentence is revised as "Finally, surrogate models might be able to deal better with the self- organization of complex system prevalent in hydrology than the full models (Hoang et al., 2017)" in line 103-104 in the revised manuscript.

Comment 5. L123: The Yellow River Basin in general and Hetao in particular have been the focus of quite a few modelling studies. Please add more references here.

Response: We are grateful for your suggestion and we have added more references in the revised manuscript on lines 117-120 in the revised manuscript. It has been revised as "In the Yellow River basin various water accounting models have been developed to simulate the soil water content and water fluxes (Xu, et al., 2012; Chen et al., 2014; Xue and Ren, 2017; Yang et al., 2017; Ren et al., 2019). Numerical implementations are the finite element model HYDRUS-1D by Ren et al. (2016) and Luo and Sophocleous (2010) and a finite difference model by Moiwo et al., (2010)".

Comment 6. L134: Please delete "thus"

Response: Thanks for your suggestion. We delete "thus" in the revised manuscript. The sentence was revised as "In summary, for shallow groundwater at less than 3.3 m from the surface equilibrium is reached (i.e. fluxes negligible)….." in line 130 in the revised manuscript.

Comment 7. L279: References missing.

Response: Apologies for the references missing and we added the references in line 279 in the revised manuscript.

References:

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Ren, D., Xu, X., Engel, B., Huang, Q., Xiong, Y., Huo Z., Huang, G.: Hydrological complexities in irrigated agro-ecosystems with fragmented land cover types and shallow groundwater: Insights from a distributed hydrological modeling method. Agr. Water Manage., 213:868-881. https:// doi.org/ 10.1016/j.agwat.2018.12.011. 2019.

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Xue, J. and Ren, L.: Assessing water productivity in the Hetao Irrigation District in Inner Mongolia by an agro-hydrological model. Irrigation Sci., 35:357-382. https:// doi.org/10.1007/s00271-017-0542-z. 2017.

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