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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Decomposition technique for contributions to groundwater heads from inside and outside of an arbitrary boundary: Application to Guantao County, North China Plain" *by* Ning Li et al.

Anonymous Referee #2

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This is an interesting study, focusing on splitting inside and outside contributions to groundwater head changes. The studied issue is commonly encountered by groundwater modelers. I believe this work is helpful for large-scale groundwater simulation study. A minor revision is suggested by the reviewer.

1ïijŐThe detailed boundary conditions, especially the upper boundary (irrigation, evaporation and evapotranspiration), should be presented when running Hydrus 1D. We recommend a soil water balance study in the NCP (Hu, X., Shi, L., Zeng, J., Yang, J., Zha, Y., Yao, Y., & Cao, G. (2016). Estimation of actual irrigation amount and its

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impact on groundwater depletion: A case study in the Hebei Plain, China. Journal of Hydrology, 543, 433-449). The authors may refer to some of balance components from this paper. Four years of tracer experiment data were also given in this paper. I also recommend few other papers for the soil moisture dynamics simulation in the NCP to refine the Hydrus 1D simulation. (Li, X., Zhao, Y., Xiao, W., Yang, M., Shen, Y., & Min, L. (2017). Soil moisture dynamics and implications for irrigation of farmland with a deep groundwater table. Agricultural Water Management, 192, 138-148.; Min, L., Shen, Y., Pei, H., & Jing, B. (2017). Characterising deep vadose zone water movement and solute transport under typical irrigated cropland in the North China Plain. Hydrological Processes, 31(7), 1498-1509.)

2. It will be more convincing to add a discussion or cite reference to support the way of handling channel infiltration, river infiltration, and infiltration from these smaller sub-channels in the manuscript. Some details may be provided to increase the validity of model development.

3. Moreover, the determination of the sources and sinks inside and outside Guantao is critical for the decomposition. The spatial location and the number of pumping wells are highly unknown in this area since there is no official statistical data on these. Under this condition, it may be more reasonable to use to areal sink/source terms (area-averaged discharge) while not using point sink/source terms. Due to importance of sources and sinks during the simulation, a discussion on the modeling uncertainty is required.

4. Some minor comments are provided: 4.1 There are far too many figures (17 figures) in this manuscript. It is better to remove some less relevant ones. 4.2 Is there any groundwater abstraction for domestic use and industrial use in Guantao? I notice that except March, April, May, June, and October, there is no groundwater abstraction in other months during the simulation.

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