

***Interactive comment on* “Quantifying the impact of groundwater depth on evapotranspiration in a semi-arid grassland region” by M. E. Soylyu et al.**

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We would like to thank “Anonymous Referee #3” for their constructive review. We have made significant revisions to the paper that address the various comments from the reviewers and editor. Specific point-by-point responses to the comments from Referee #3 are provided below.

1) Ferguson and Maxwell (2010) (which could be added to the references),

Authors’ Response (AR): Ferguson and Maxwell (2010) has now been added as a reference.

2) Page 3, Line 4: change “the Richard equation” to “Richards’ equation”.

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AR: Instead of “Richards’ equation” we corrected it to “the Richards equation,” which is how we refer to it in the rest of the paper.

3) - Page 2, Line 11: change “profiles” to “content” - Page 3, Line 14: van Genuchten (add c) - Page 6, Line 14: change “phenomena” to “processes” - Page 6, Line 24: It is called “moisture diffusivity” rather than “diffusion coefficient”.

AR: All of the above corrections have been made.

4) Page 12, Line 29: were hourly soil moisture data used in the comparison with the Hydrus and IBIS models? This would possibly make the fit of these models better as hourly soil moisture data are more variable, as are the hourly model outputs of Hydrus and IBIS.

AR: In the comparisons of observed data with the IBIS and Hydrus-1D models, we used daily mean soil moisture (to be consistent with the G-E model comparison). Aside from a slight diurnal cycle, the hourly soil moisture content does not show significant deviations from the daily mean (see Figure 1 below). Therefore, we used daily data in all plots to show the variations in the most objective manner.

5) Page 15, lines 8/9: rephrase. Using a uniform root distribution does not reduce uncertainty but rather eliminates an additional source of variation when changing grid spacing.

AR: This portion of the text has been rephrased.

6) Page 19, Line 29: I am not sure if increasing the number of soil layers is such a good idea if the soil physical properties of such layers cannot be determined and if this also implies using smaller time steps to resolve the soil moisture profile in time.

AR: The number of soil layers in IBIS was increased for two reasons: 1) to be consistent with the Hydrus-1D simulations, and 2) to capture variations in groundwater level (which, for our field site, typically varied by $\sim 10\text{--}30$ cm and, at most, 60 cm). Keeping the IBIS soil layers at their “default” values would not have allowed for a meaningful

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comparison.

7) Page 20, Line 14: what is meant by “more field validation”? Explain this. In fact, here it becomes evident that one type of information is lacking from the experimental setup of this research: independent observations of actual evaporation under conditions of different water table depth using e.g. eddy covariance measurements or lysimeters.

AR: By “more field validation,” we mean precisely what the reviewer has suggested. Lysimeter measurements were not available at our field site, and eddy covariance would have been problematic, given the heterogeneity of the landscape. Therefore, we were limited to comparing simulated and observed soil moisture content to evaluate the model simulations. However, we agree that future work should be devoted to explicitly comparing modeled and observed rates of evapotranspiration as a function of groundwater depth. This would be a valuable contribution, and we have clarified this a bit more in the summary section.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 6887, 2010.

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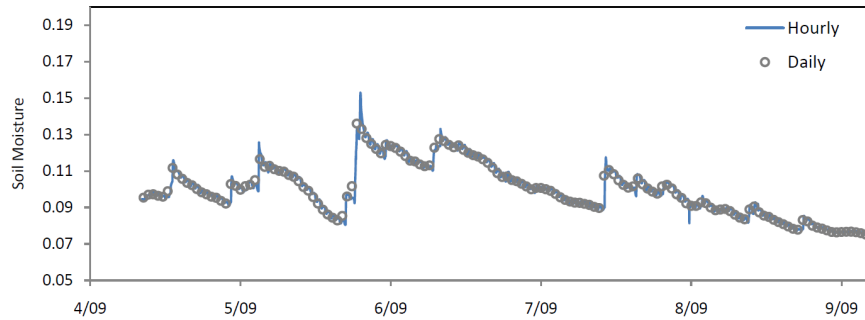


Figure 1. Daily and hourly mean observed soil volumetric water content at the wetland field site.

Fig. 1.