

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

M. E. Soylyu et al.

evrensoylyu@gmail.com

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We would like to thank Gerrit de Rooij for his additional comment on our paper. Our response to this comment is provided below.

1) Dear authors, As I studied your text in detail I noted your soil physical parameters include air entry values (Table 2). Under equilibrium conditions these values give the vertical extent of the capillary fringe when expressed in equivalent water column height (as you do). Yet, in the last line of section 2.2 you use literature values for the thickness of the capillary fringe for various general texture classes, and these values are different from the corresponding air entry values in Table 2. Please elaborate a little on your rationale for doing so.

Authors' Response: The literature values for the capillary fringe thickness (Mausback, 1992) were only applied to the IBIS simulations, not the Hydrus-1D or G-E model simulations. And even then, they were only used to impose an appropriate "depth to saturation," since IBIS uses a θ -based version of the Richards equation and, therefore, does not simulate a capillary fringe. We have now made this more clear in section 2.2 and have added a reference to Yeh and Eltahir (2005), who apply a similar adjustment in IBIS to account for depth-to-groundwater. As far as why we used the Mausbach (1992) values instead of the "default" IBIS values in Table 1 (Rawls et al., 1982), the reason is simply due to the narrower range of values reported by Mausbach (1992) and the fact that the values were reported for wet soils (i.e. for areas with a shallow water table). The thickness of the capillary fringe is difficult to measure, and there is significant uncertainty in determining its mean value. As shown in Table A below, the range of values from Mausbach (1992) generally lies well within the range reported by Rawls et al. (1982). The differences in mean capillary thickness between the two datasets are 2.2 cm, 11.8 cm, 12.4 cm, and 4.8 cm for sand, silt loam, silt clay loam, and clay, respectively. The range of values from Mausbach (1992) is also less than one standard deviation of the values reported by Clapp and Hornberger (1978). Thus, the differences in capillary fringe thickness are very small compared to the range in depth-to-groundwater plotted in Fig. 5. And since the imposed capillary fringe adjustment does not vary with time, the choice of values would also have minimal impact on the results shown in Figure 3.

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Table A. Maximum and minimum air entry pressures reported by Rawls et al. (1982) and Mausbach (1992). Also shown are the mean and standard deviation of the air entry pressures reported by Clapp and Hornberger (1978). All units are in cm.

	Rawls et al. (1982)		Mausbach (1992)		Clapp and Hornberger (1978)	
	<i>Min.</i>	<i>Max.</i>	<i>Min.</i>	<i>Max.</i>	<i>Mean</i>	<i>St. Dev.</i>
Sand	1.4	38.7	1	9	12.1	14.3
Silt Loam	3.6	120.4	25	40	78.6	51.2
Silty Clay	5.6	141.5	20	30	35.6	37.8
Loam						
Clay	7.4	187.2	25	40	40.5	39.7

Fig. 1.