Supplement of

Improving soil moisture prediction of a high-resolution land surface model by parameterising pedotransfer functions through assimilation of SMAP satellite data

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S1 Supplementary material

For the supplementary material we include additional plots comparing JULES soil moisture values when the model is run with a 5 cm and 10 cm top soil layer thickness in Figure S1. The output of the data assimilation experiment when JULES is run with a 5 cm top layer in Figure S2 and a 10 cm top layer in Figure S3 and a visualisation of the effect the model spin-up period has on the initial soil moisture state for three unique pedotransfer function parameter sets at the Cardington COSMOS site in Figure S4.

![Figure S1](image)

**Figure S1.** Comparison of top layer soil moisture values for JULES when the model is run with either a 10 cm top layer (blue solid line) or a 5 cm top layer (orange dashed line).
Figure S2. Optimized parameter distributions for DA experiment when using a JULES model with a 5 cm top soil layer. Light grey: prior parameter distributions, dark grey: posterior parameter distributions.

Figure S3. Optimized parameter distributions for DA experiment when using a JULES model with a 10 cm top soil layer. Light grey: prior parameter distributions, dark grey: posterior parameter distributions.
**Figure S4.** Effect of model spin-up on soil moisture state at Cardington COSMOS site. Different colour lines correspond to unique soil moisture trajectories defined by different sets of soil parameters (these are constant in time). The spin-up is performed using 2015 driving data.