



Supplement of

Climate-model-informed deep learning of global soil moisture distribution

Klaus Klingmüller and Jos Lelieveld

Correspondence to: Klaus Klingmüller (k.klingmueller@mpic.de)

The copyright of individual parts of the supplement might differ from the article licence.



Figure S1: Time series of the observed and predicted daily volumetric soil moisture values in the grid cell centred at 21.4° N 46.9°E on the Arabian Peninsula.



Figure S2: Time series of the observed and predicted daily volumetric soil moisture values in the grid cell centred at 34.5° N 43.1° E in Mesopotamia.



Figure S3: Details from the time series shown in Fig. 5.



Figure S4: Correlation coefficient of all observation-prediction pairs (light blue, corresponding to Fig. 2) and the temporal correlation averaged over all grid cells (dark blue, corresponding to Fig. 4) using DNNs trained on different predictor combinations (from left to right): all predictors (reference DNN presented in the main article), excluding the season, excluding the spatial coordinates, excluding both season and coordinates, excluding the meteorological parameters.



Figure S5: Time series of the observed and predicted daily volumetric soil moisture values in the grid cell centred at 34.5°N 43.1°E as in Fig. 5 using the climate model informed DNN presented in the main article and the "No meteorology" DNN from Fig. S4, trained only on season and coordinates.



Figure S6: Sensitivity of the predicted soil moisture in the grid cell centred at 49.4°N 7.5°E as in Fig. 5 to variations of the predictor variables. Temperature, rain and specific humidity predictors including the corresponding lagged values were decreased (green) or increased (red) by half of their standard deviation in the complete data set. Negative values obtained by decreasing were replaced by 0. The season predictors $\sin(2\pi t/a)$ and $\cos(2\pi t/a)$ where set to either winter (15 January, blue) or summer (15 July, orange).



Figure S7: As Fig. S6 but for the grid cell centred at 21.4°N 46.9°E on the Arabian Peninsula.



Figure S8: As Fig. S6 but for the grid cell centred at 34.5°N 43.1°E in Mesopotamia.



Figure S9: Global distribution of the observed and predicted volumetric soil moisture on a northern hemisphere winter (15. January 2015) and summer (15 July 2015) day in the test period.