Supplement of

A 1 km soil moisture dataset over eastern CONUS generated by assimilating SMAP data into the Noah-MP land surface model

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Introduction

This supporting information includes Figure S1 which presents the contrast in precipitation rate between the NLDAS-2 and Stage IV products using the snapshots valid at 00 UTC on August 30, 2016, as an example. Figure S2 illustrates the SM evaluations using the observational data measured by the SCAN network. The 2-D histograms for (a) SMAPDA, (b) OL, (c) ERA5-Land, (d) GLASS SM, (e) SMAP AM, and (f) GLEAMv4.1 are displayed. In Figure S3, the ACCs computed against SCAN network are displayed. The ACC differences between SMAPDA and other estimates are illustrated. Similar plots for RMSEs are given in Figure S4. The comparison of Biases is demonstrated in Figure S5. Figure S6 displays the SM RMSE anomaly timeseries (against SCAN data) over the year of 2016 among all SM estimates. Similar to Figure S4, Figure S7 illustrates the site-wise RMSEs but for the OKMet sites. Figures S8 and S9 presents a composite comparison to demonstrate soil-texture and landcover dependent soil moisture RMSEs for SMAPDA. The RMSEs are calculated using valid SCAN and USCRN observations over the study domain.
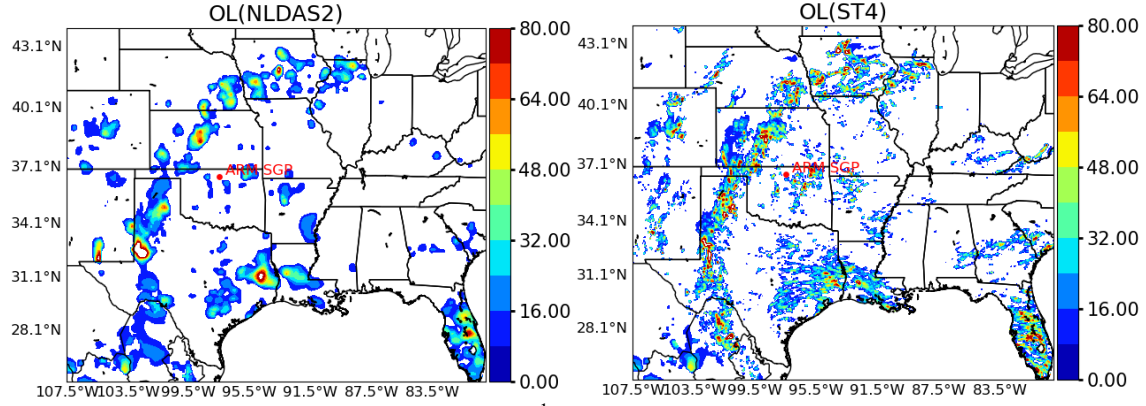
Figure S1. Precipitation rate (unit: mm day^{-1}) maps extracted from the OL simulations forced by the NLDAS-2 precipitation (left panel) and Stage IV precipitation (right panel) at 00 UTC on August 30, 2016.
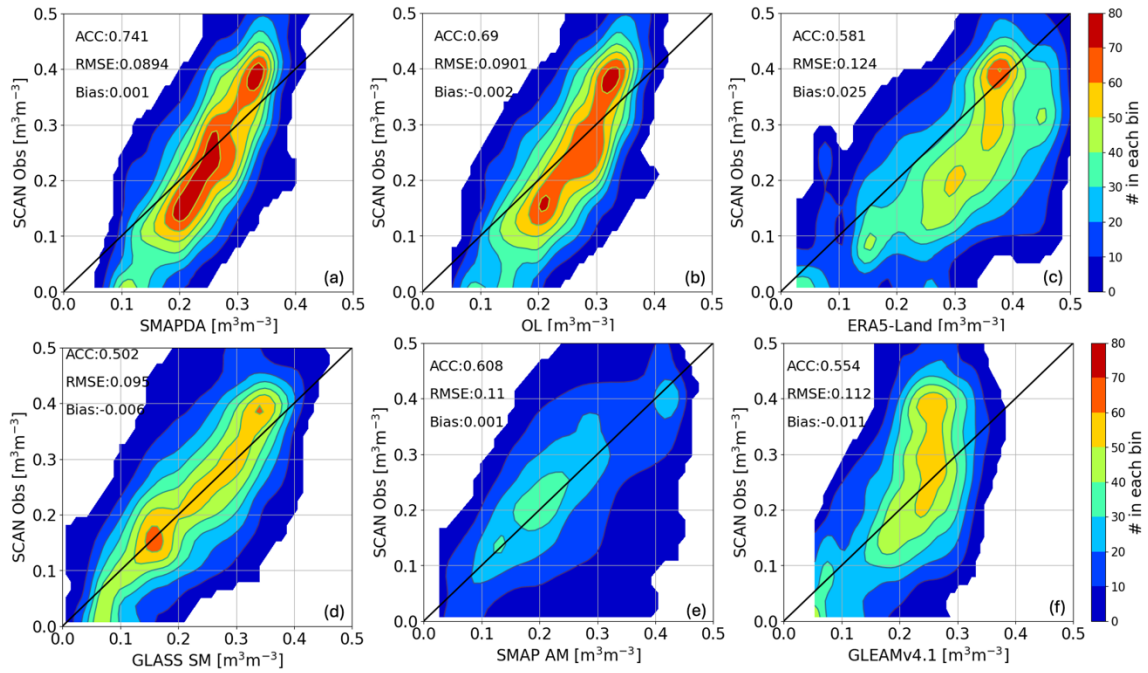

Figure S2. 2-D histograms summarizing the SM evaluation results using the observational data measured by the SCAN network. Panels (a) to (f) represent results of SMAPDA, OL, ERA5-Land, GLASS SM, SMAP AM, and GLEAMv4.1. 50 bins are used to generate the 2D histograms. Anomaly correlation coefficient (ACC), RMSE, and Bias are given in the upper left corner of each panel.
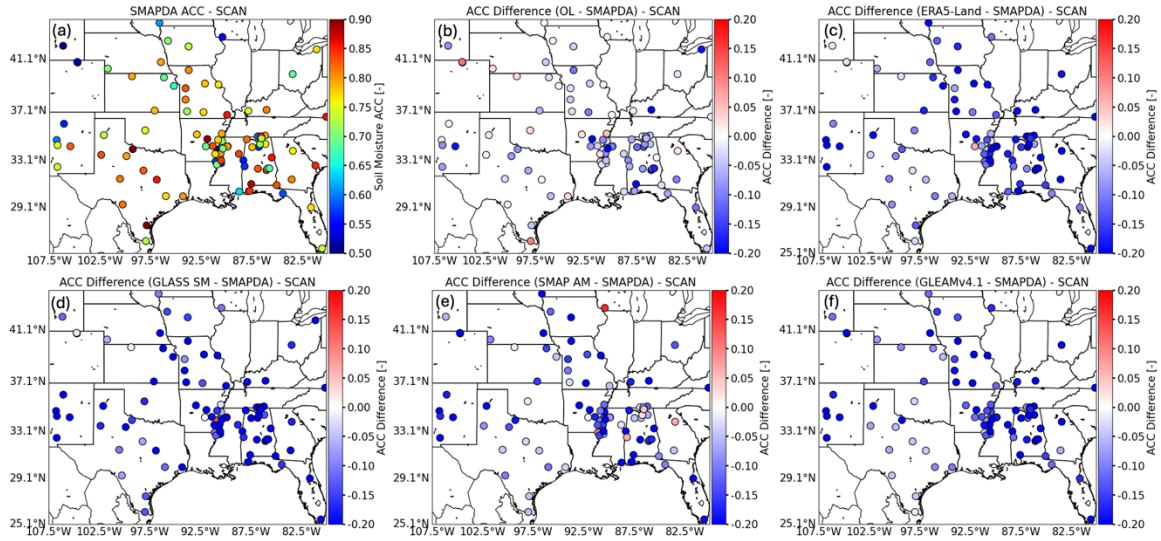
Figure S3. (a) Site-wise SM ACC computed for SMAPDA using the SCAN observations. The SM RMSE differences subtracting SMAPDA results from (b) OL, (c) ERA5-Land, (d) GLASS SM, (e) SMAP AM, and (f) GLEAMv4.1 are also illustrated.
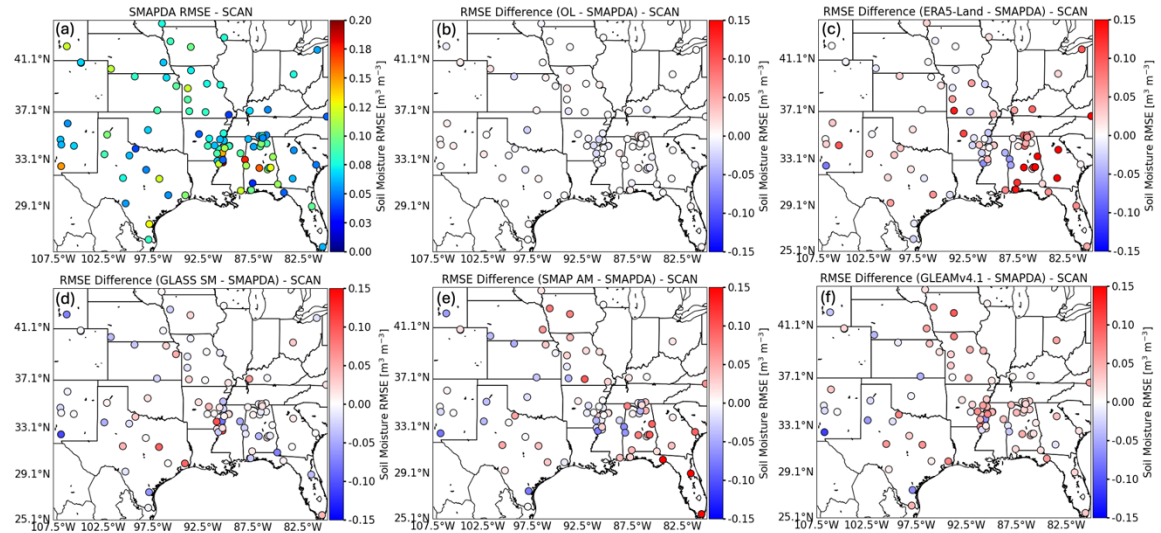

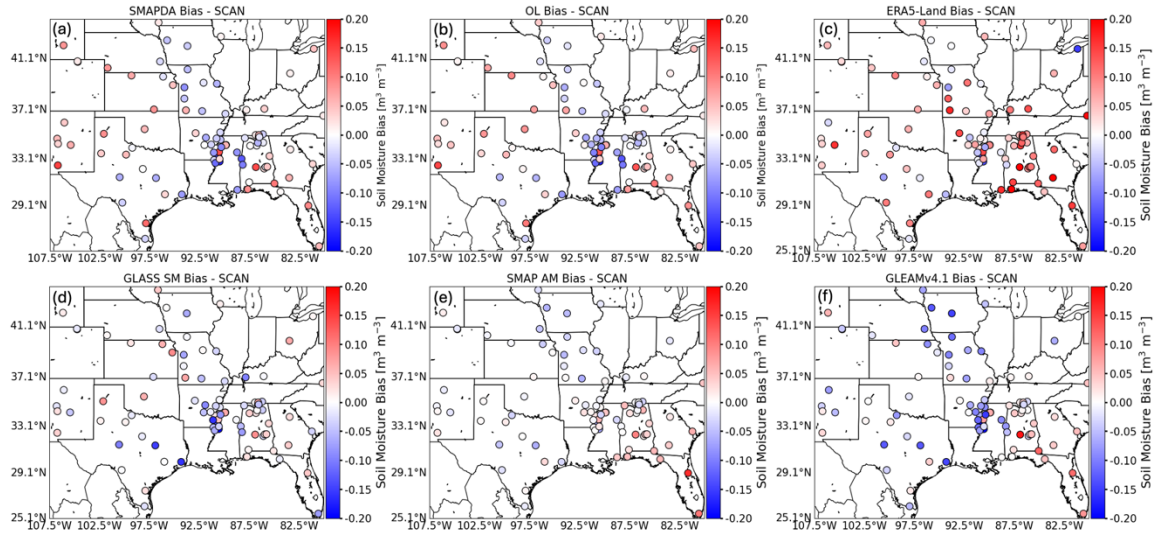Figure S4. Similar to S3, but for results of SM RMSE.

Figure S5. Site-wise SM Bias computed using the USCRN observations. Results for (a) SMAPDA, (b) OL, (c) ERA5-Land, (d) GLASS SM, (e) SMAP AM, and (f) GLEAMv4.1 are illustrated.
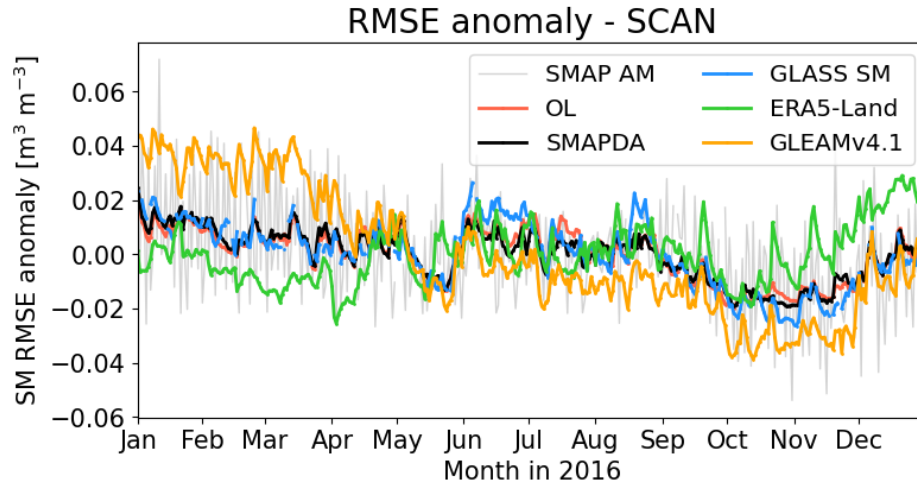
Figure S6. The SM RMSE anomaly timeseries computed against SCAN observations during 2016. Results of SMAP AM, OL, SMAPDA, ERA5-Land, GLEAMv4.1, and GLASS SM are denoted by colored lines as indicated in the legend.
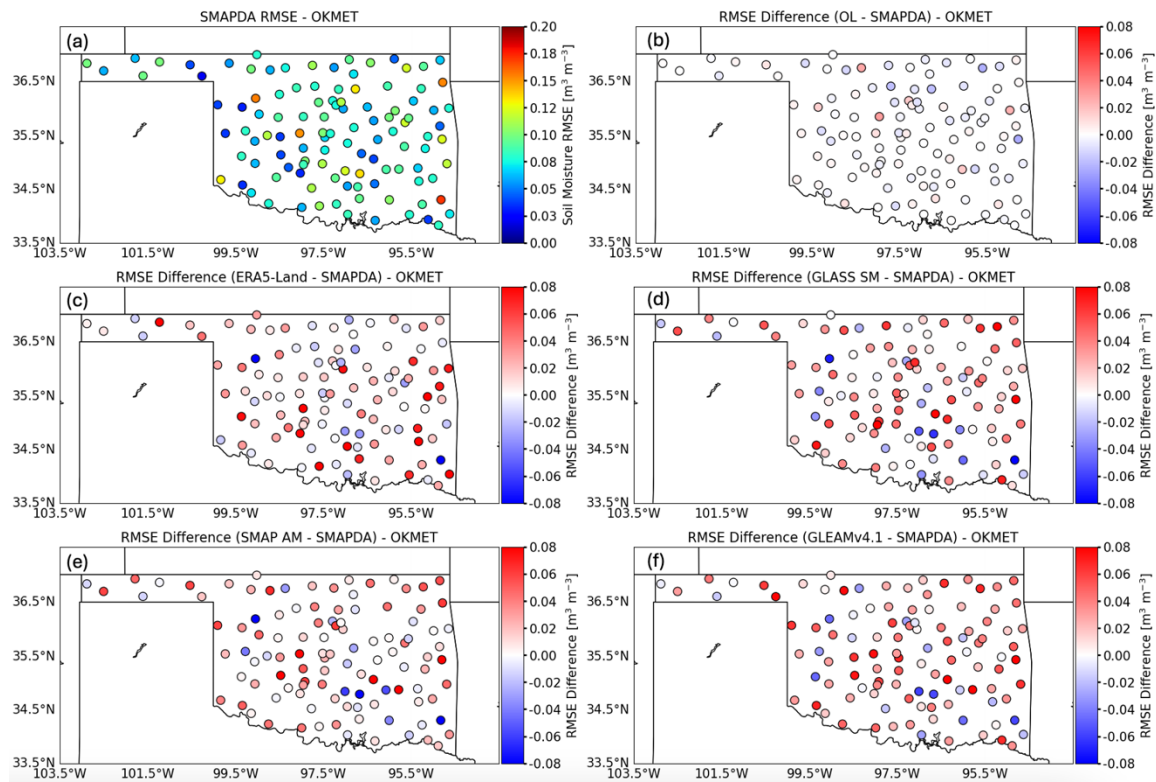

Figure S7. Similar to S4, but for results computed against OKMet observations.
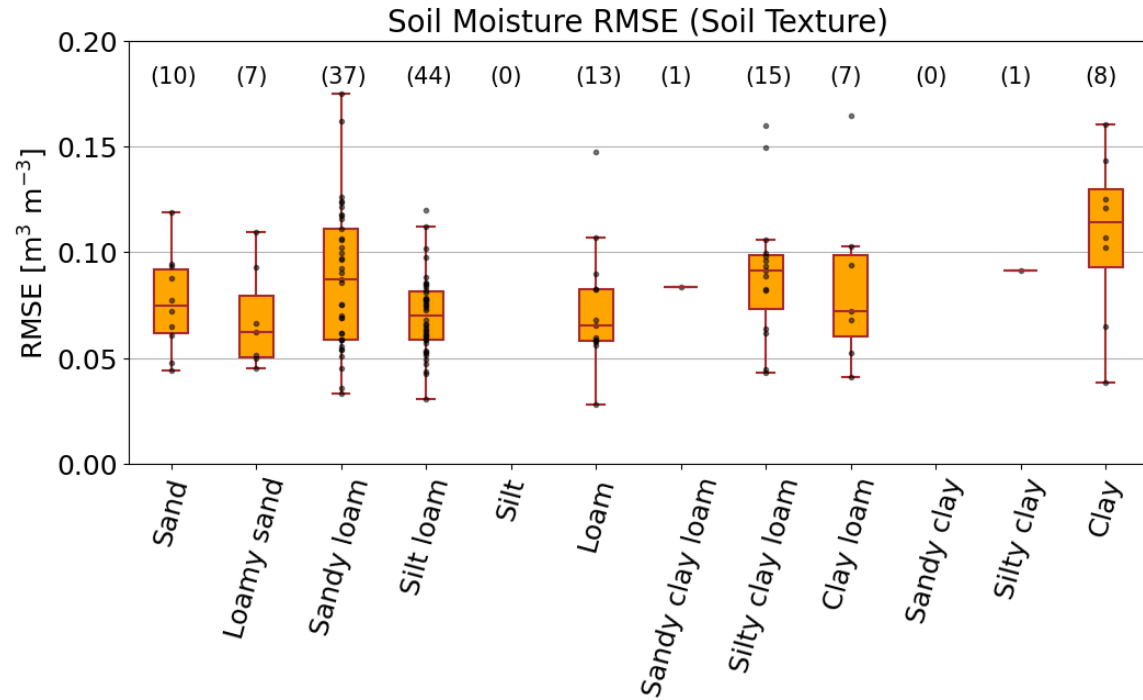
Figure S8. SMAPDA soil moisture RMSE computed against all SCAN and USCRN observations as a function of soil texture. The number of samples for each soil texture type is given in the parenthesis.
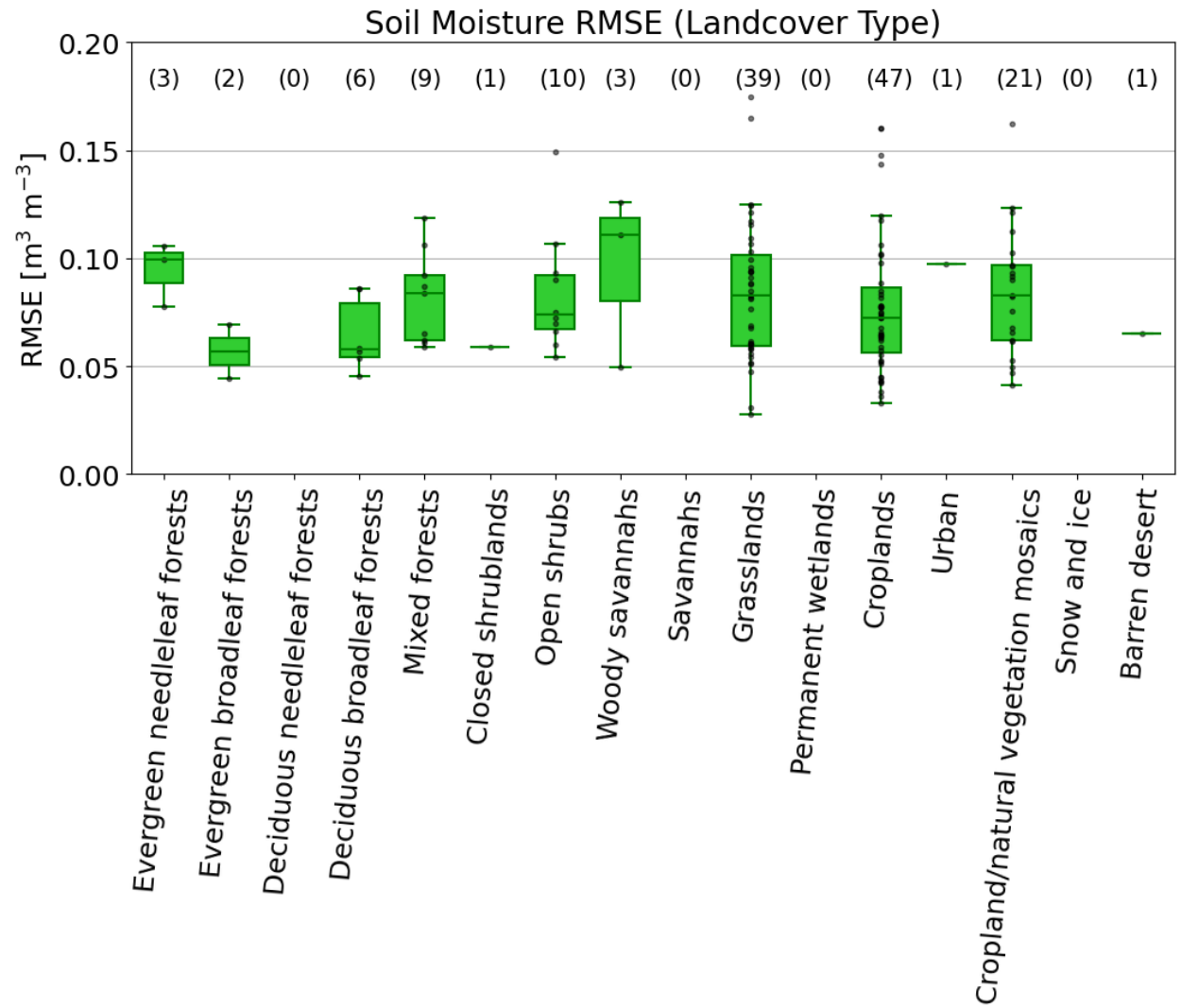
Figure S9. Similar to Figure S8 but for landcover types.