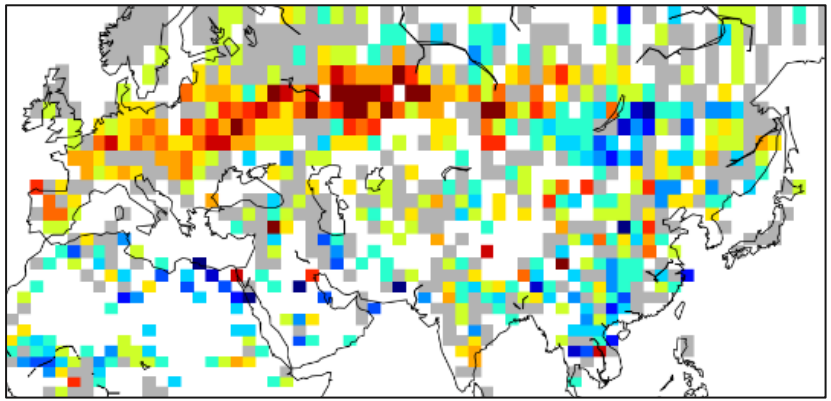
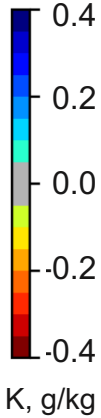
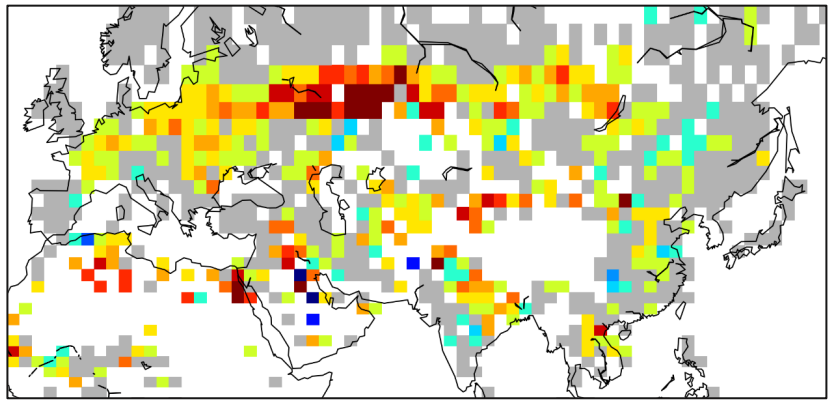
Assimilation of Satellite Soil Moisture for Improved Atmospheric Reanalyses

Change in the root-mean-square error of Daily Maximum Two-Meter Temperature [K]





Change in the root-mean-square error of Two-Meter Specific Humidity [g/kg]



The plots illustrate the impact of additionally assimilating satellite soil moisture observations in the MERRA-2 reanalysis system. They show the difference in root-mean-square error (RMSE) with and without soil moisture assimilation for daily maximum 2-m air temperature ($T2m_{max}$; left) and average 2-m specific humidity (q2m; right). The RMSE is computed versus independent station observations for Apr. 14 to Aug. 31, 2013. Red colors indicate better performance (reduced RMSE) with soil moisture assimilation.

In a large region spanning from Western Europe across southern Russia, the soil moisture assimilation decreased the RMSE of $T2m_{max}$ by up to 0.4 K and the RMSE of q2m by up to 0.5 g/kg, compared to those of the default MERRA-2 system without soil moisture assimilation.