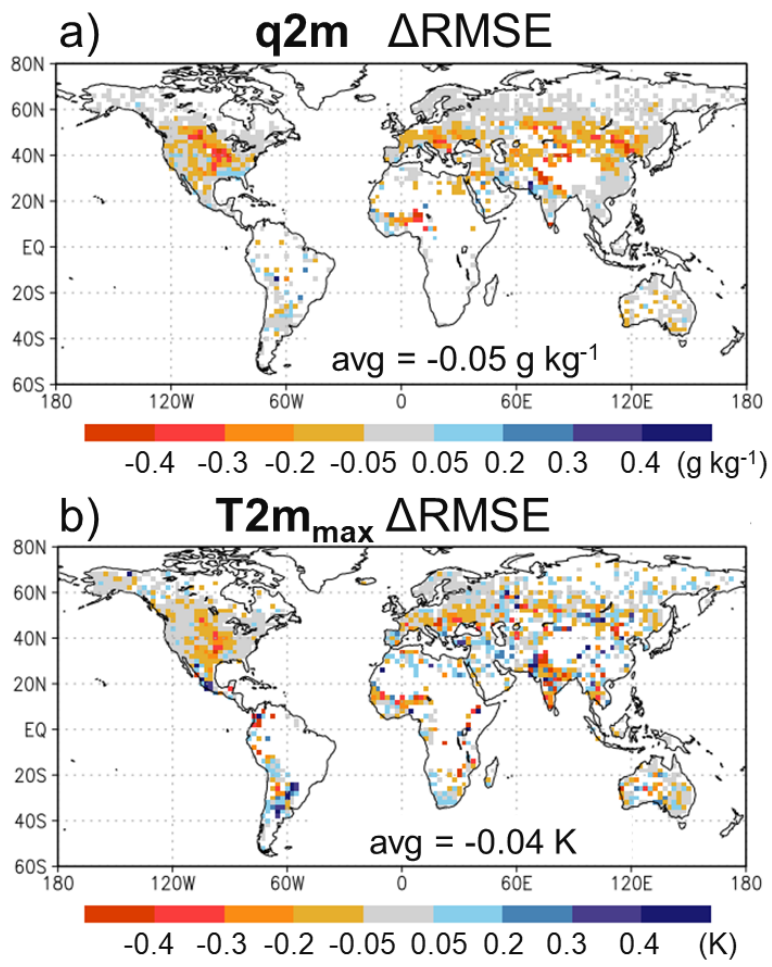
Assimilation of SMAP Brightness Temperature Observations in the GEOS Land-Atmosphere Data Assimilation System

Problem: Can SMAP brightness temperature (Tb) observations improve estimates of near-surface atmospheric conditions in a global weather analysis system?

Finding: Assimilating SMAP Tb observations in the weakly-coupled GEOS land-atmosphere assimilation system during boreal summer 2017 improves the skill of soil moisture compared to a system without SMAP assimilation (not shown). Consequently, screen-level (2-m) air specific humidity (q2m) and daily maximum temperature ($T2m_{max}$) also improve, by up to 0.4 g/kg and 0.3 K, respectively, in some regions (Fig. 1).

Improvement in specific humidity extends into the lower troposphere (not shown).

Impact: Results demonstrate the potential of SMAP Tb observations for improving global operational weather analysis and forecasting systems.



Reichle, R. H. et al. (2021), IEEE JSTARS, in press, doi:10.1109/JSTARS.2021.3118595.

Fig. 1. *Difference in RMSE for simulated a) q2m and b) $T2m_{max}$ with and without SMAP Tb assimilation. RMSE computed vs. in situ measurements for Jul-Aug 2017. Red colors indicate that SMAP Tb assimilation improves skill.*