SMAP Radiance Assimilation Over Land Improves GEOS Medium-Range Forecasts of Near-Surface Air Temperature and Humidity

Problem: Can SMAP brightness temperature (Tb) observations improve forecasts of near-surface atmospheric conditions in global weather prediction?

Finding: Assimilating SMAP Tb observations using a weakly-coupled land analysis in the Goddard Earth Observing System (GEOS) during Jun-Aug 2017 significantly improves forecasts of screen-level air temperature (T2m) and specific humidity (q2m) at lead times up to 5 days, compared to a control (CTRL) experiment without SMAP assimilation.

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

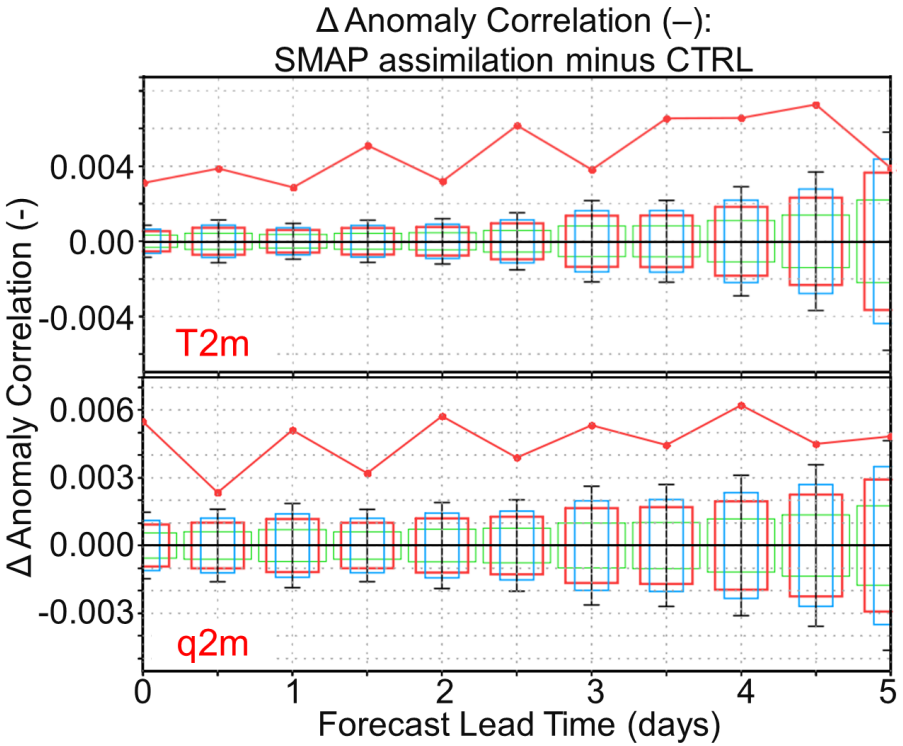

Fig. 1. *(Top) T2m and (bottom) q2m forecast skill difference with and without SMAP Tb assimilation as a function of lead time. Skill measured by anomaly correlation vs. operational analysis from the European Centre for Medium-range Weather Forecasts for Jun-Aug 2017. Confidence levels indicated by boxes (green: 68%, red: 90%, blue: 95%) and error bars (black: 99%).*

Reichle, R. H. et al. (2023), QJRMS, in press, doi:10.1002/QJ.4486.