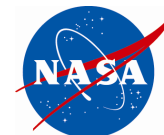




IMERG Satellite Precipitation Improves the SMAP Level-4 Soil Moisture Product



Problem: SMAP Level-4 Soil Moisture (L4_SM) is derived by assimilating SMAP brightness temperature (Tb) observations into a land surface model driven with observation-based precipitation.

Can using satellite precipitation improve L4_SM?

Finding: Beginning with L4_SM V6, the land model precipitation forcing outside of N America uses satellite-based IMERG observations, replacing the gauge-only product used there in earlier versions. Using IMERG improves the anomaly time series correlation skill of L4_SM surface soil moisture by up to ~0.3 and reduces typical observation-minus-forecast Tb misfits by >1 K in large parts of South America, Africa, Australia, and East Asia (Fig. 1), where the precipitation gauge network is very sparse.

Impact: The high quality of IMERG satellite precipitation across otherwise data-sparse regions improves L4_SM soil moisture data and is critical for soil moisture estimation in model data assimilation.

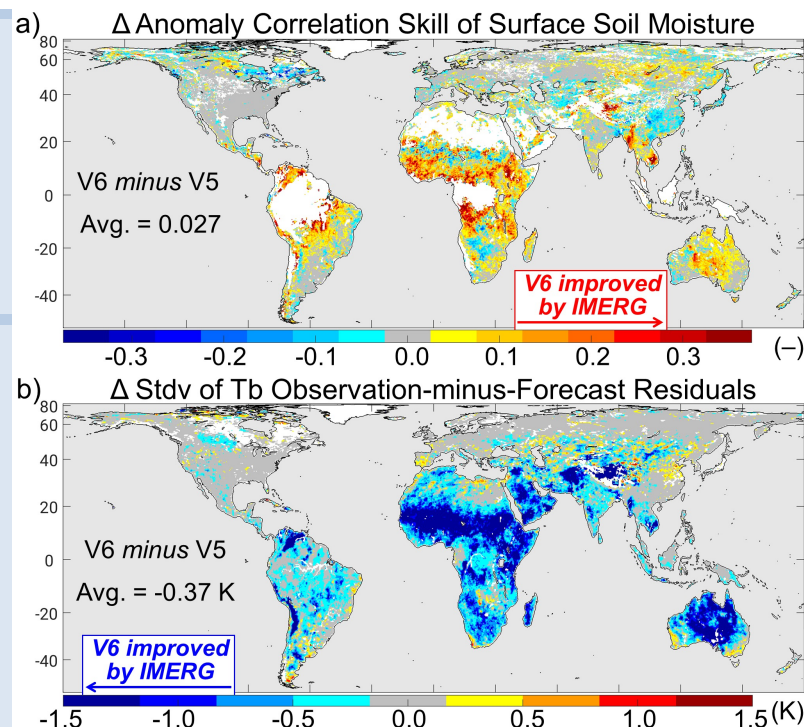


Fig. 1. Diff. in (a) surface soil moisture skill and (b) typical observation-minus-forecast Tb misfits betw. L4_SM V6 using IMERG satellite precipitation and V5 using gauge-only precipitation. Skill in (a) is the anomaly time series correlation, estimated using independent satellite retrievals. Typical misfit in (b) is measured by the standard deviation.