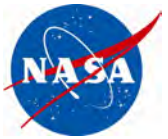# Global Assessment of Added Value in the SMAP Level-4 Soil Moisture (L4_SM) Product

Problem: Can we assess the value added by the assimilation of SMAP observations globally?

Finding: The L4_SM algorithm assimilates SMAP brightness temperature observations into the Catchment land surface model. In situ measurements for validation are only available in select regions. A single noisy but independent soil moisture product (ASCAT) can be used to globally quantify the added value of soil moisture data assimilation

$$\frac{R_{\text{L4\_SM}}}{R_{\text{model−only}}}$$
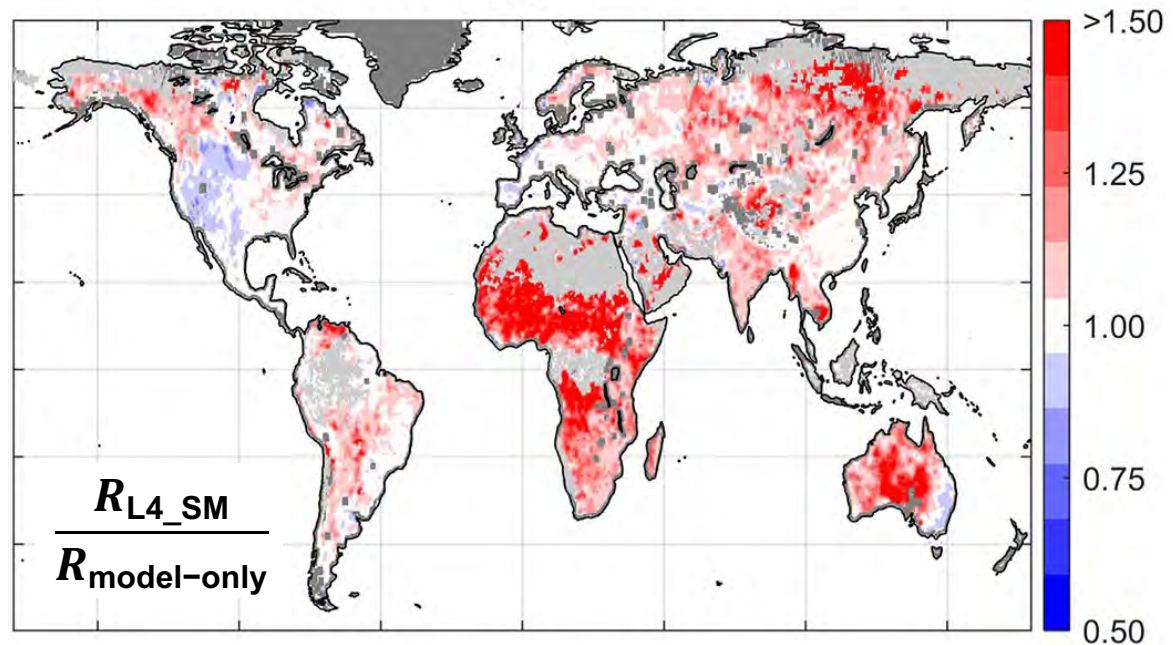
SMAP L4_SM skill relative to that of a model-only simulation. Red shading indicates areas where L4_SM has improved surface soil moisture skill relative to a model-only baseline. Skill is measured in terms of the anomaly time series correlation coefficient (R).

Impact: The SMAP L4_SM product provides the most value versus a model-only baseline in data-poor and lightly-vegetated regions, incl. much of Africa & central Australia. Because previous L4_SM assessments focused on data-rich regions such as the US & Europe, they underestimated the contribution of SMAP data assimilation.

Dong, Crow, Reichle, Liu, Lei, Cosh, 2019: A global assessment of added value in the SMAP Level 4 soil moisture product relative to its baseline land surface model, *Geophysical Research Letters*.