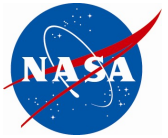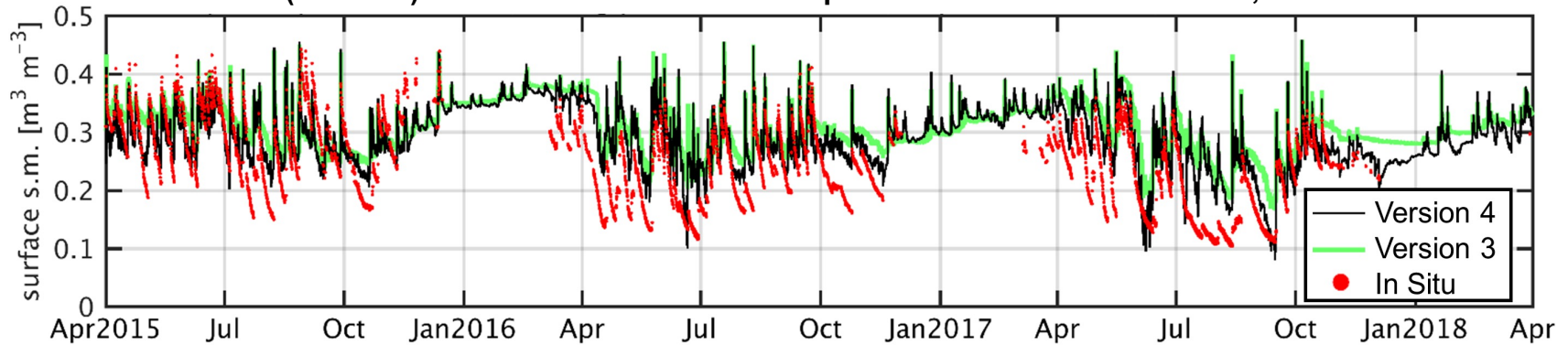# Version 4 of the SMAP Level-4 Soil Moisture Algorithm and Data Product

Problem: Soil moisture estimates in Version 3 of the SMAP Level-4 product are biased.

Surface soil moisture from (black) Version-4 L4 estimates, (green) Version-3 L4 estimates and (red dots) in situ measurements at a representative site in South Fork, Iowa.

Finding: The Level-4 (L4) algorithm assimilates SMAP brightness temperature observations into the Catchment land surface model. Model bias adversely impacts L4 estimates. The model bias was caused in part by excessive coupling between the surface and deeper-layer soil moisture. The upward recharge of surface soil moisture from deeper layers was reduced in the Version-4 system, resulting in model and L4 estimates with reduced bias and improved dynamic range.

Mean surface soil moisture bias at 18 core validation sites.

$(m^3 \, m^{-3})$	V3	V4
Model-only	0.040	**0.027**
L4 product	0.048	**0.029**

Impact: Surface soil moisture estimates from Version 4 of the L4 product are 46% less biased and have improved dynamic range compared to earlier versions.

Reichle, Liu, Koster, Crow, De Lannoy, Kimball, et al., 2019: Version 4 of the SMAP Level-4 Soil Moisture Algorithm and Data Product, *Journal of Advances in Modeling the Earth System*.