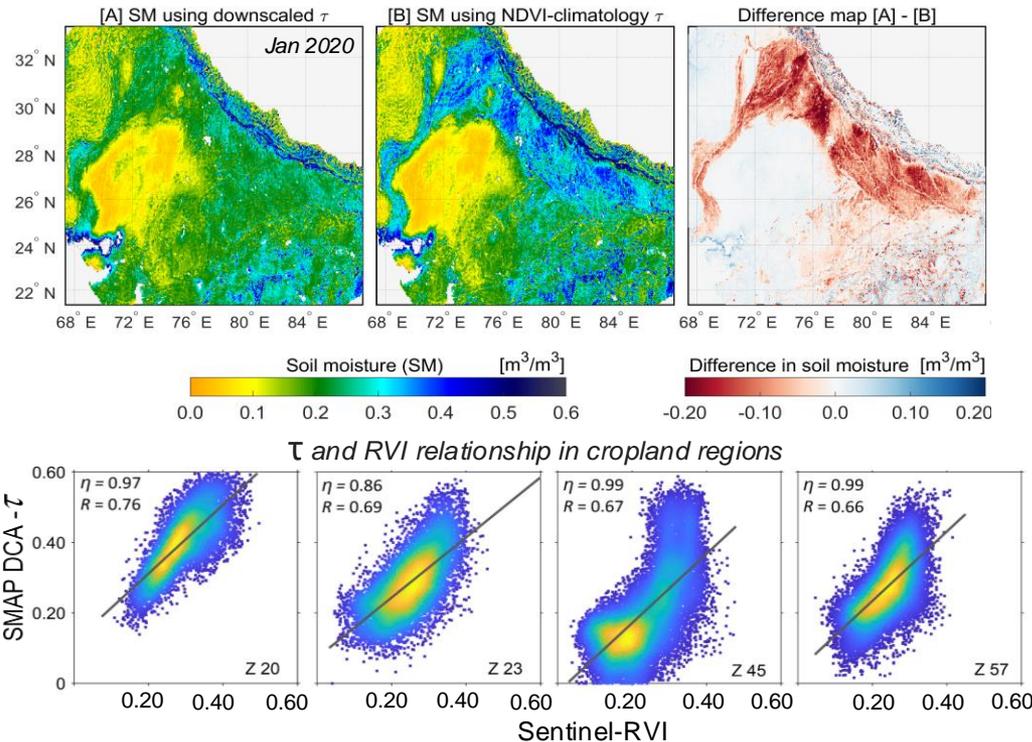


Improving SMAP-Sentinel Global Soil Moisture Product by Integrating Sentinel-1 SAR Vegetation Attributes



Problem: Integrating near-real-time vegetation attribute (i.e., τ) from Sentinel-1 SAR backscatter into the SMAP active-passive algorithm to eliminate the need for NDVI-climatology, enhancing performance of SMAP-Sentinel product, especially in croplands with rapidly changing vegetation.



Finding:

1. Study demonstrates that the Sentinel-1 dual polarimetric SAR backscatter has the potential to downscale 33 km SMAP DCA τ retrievals at resolution of 1km and 3km.
2. Validation at SMAP Cal./Val sites show that the SMAP-Sentinel product using downscaled τ approach performs better, with lower bias and RMSE, compared to the baseline SMAP approach that relies on NDVI climatology-based τ .

Impact: This study significantly enhances accuracy of the SMAP-Sentinel soil moisture product, reducing bias and error, particularly in agricultural regions, leading to more reliable hydrological and agricultural applications and supporting more effective water management decision-making.