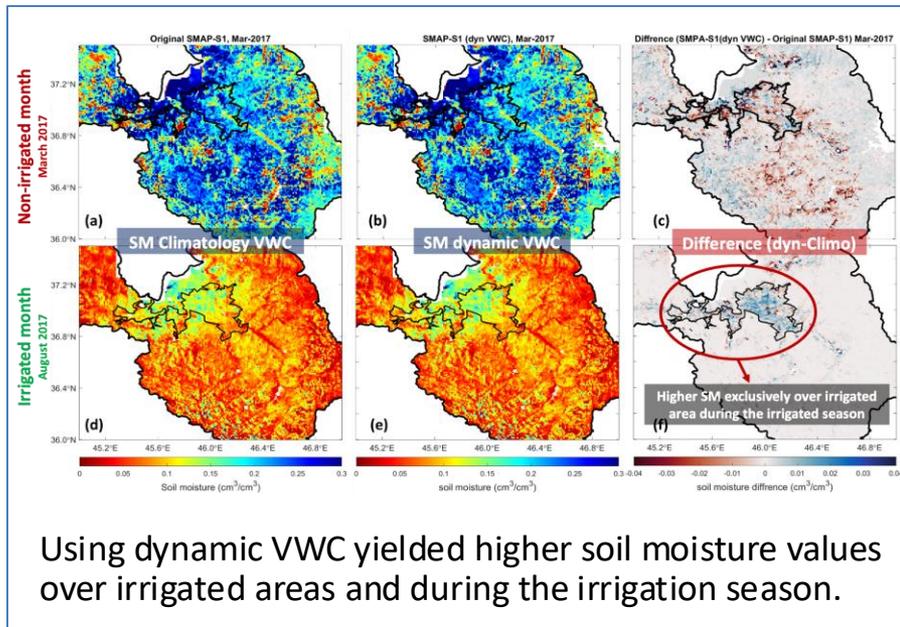# Irrigation Detection with SMAP/Sentinel-1 Enhanced by Dynamic VWC

Problem: SMAP observations struggle to capture fine-scale human-driven processes like irrigation, likely due to spatial mismatch or climatology-based ancillary layers (e.g., VWC). This study utilizes high-resolution 1 km SMAP/Sentinel-1 data and real-time VWC to detect irrigation signals within the SMAP footprint.

Using dynamic VWC yielded higher soil moisture values over irrigated areas and during the irrigation season.

Finding:

- The SMAP-enhanced product misses irrigation signals on small agricultural plots.
- SMAP/Sentinel-1 shows higher mean soil moisture and greater variability in irrigated areas compared to non-irrigated areas.
- Using dynamic VWC increases soil moisture values over irrigated areas, especially during the irrigation season.

Impact: The SMAP/Sentinel-1 1 km soil moisture data, enhanced by dynamic VWC, captures irrigation signals. Assimilating this product with a land surface model could improve estimates of irrigation water use, the largest consumer of freshwater resources globally.