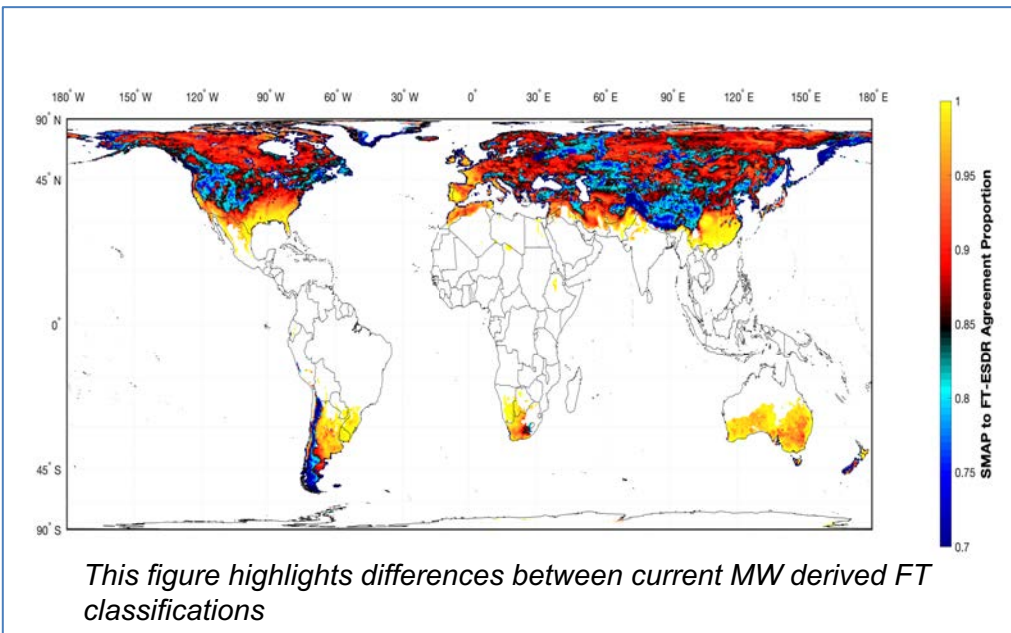




Moving towards Next-Generation Freeze/Thaw Classification Using SMAP Radiometer Observations

Problem: Freeze/thaw (FT) state definitions based on passive microwave observations are not well characterized leading to uncertain classifications of FT depending on climatology and soil moisture state (among other factors). General uncertainty remains regarding which land surface components (skin, soil, snow) are being observed by current FT retrieval methods



Finding:

- FT observations are more related to LST than soil temperatures
- FT detection algorithms are notably lacking in mountainous, dry, and mid-latitude regions
- SMAP-FT classification less sensitive to snow and the land surface, but threshold for frozen transitions varies dependent on location leading to ambiguity in frozen classifications

Impact: By comparing SMAP FT records to other global records, inconsistencies as well as opportunities are revealed. The use of multiple bands, machine learning, new classifiers, and LST-based downscaling are being employed to improve global FT classification