



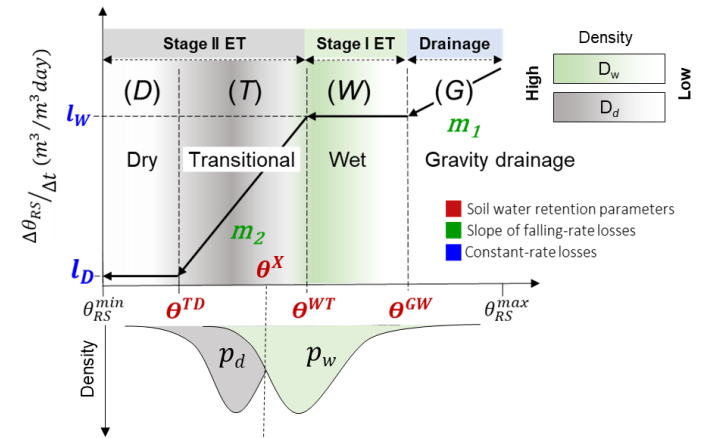
Preferential Hydrologic States and Tipping Characteristics of Global Surface Soil Moisture



Problem: Critical terrestrial ecosystem processes are moderated by the dynamic transition of soil between moisture- and energy-limited state. Characteristics of these transient mesoscale soil hydrologic states changes remained unknown.

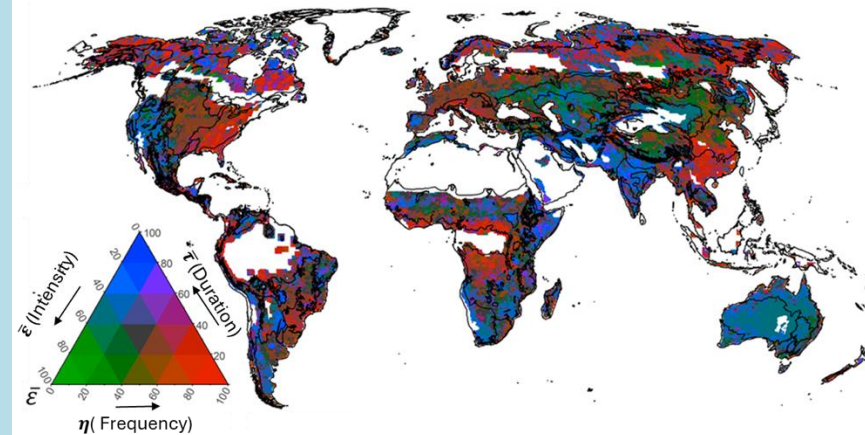
Finding: Mesoscale soil hydrologic regimes demonstrate preferential states with implications to key biogeochemical processes. The intensity & frequency of soil hydrologic tipping are climate controlled. Soil texture and vegetation exert a second-order control over its hydrologic tipping intensity and duration.

Impact: Soil hydrologic tipping characteristics (intensity, frequency & duration) follow the coexistence patterns of soil, vegetation & climate, thereby providing a satellite-based approach to monitor shifts in global ecosystem boundaries.



A schematic representation of the piecewise soil moisture drydown curve at remote sensing scale

Surface soil moisture tipping characteristics



A ternary color composite of the hydrologic tipping characteristics of SMAP soil moisture with overlapping boundaries of global biomes