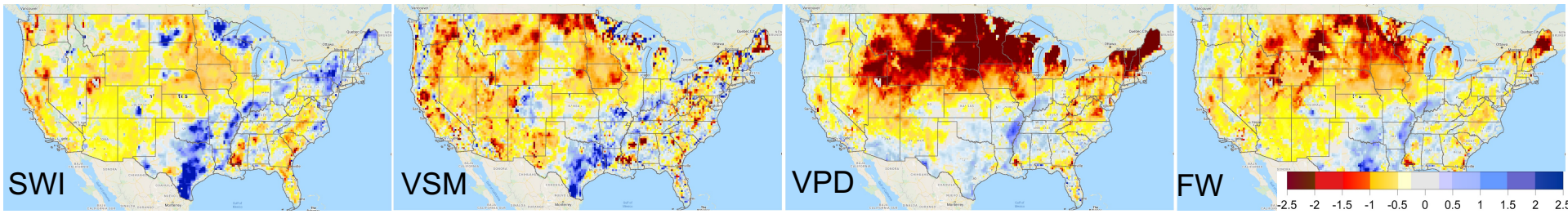
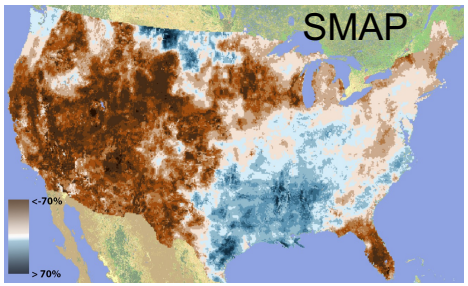
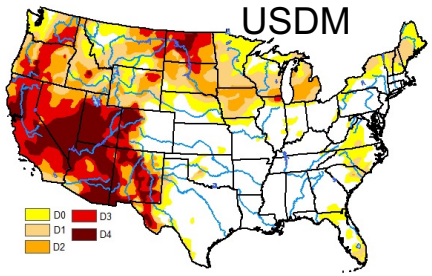
Satellite multi-component assessment of global surface wetness extremes and vegetation responses

Problem: More frequent and intense hydrological extremes are expected to profoundly affect global vegetation health and food security under projected climate warming; combined analysis from multi-source satellite observations can improve global monitoring of these events and clarify the associated vegetation responses.



Top: AMSR Surface Wetness Index ([1]SWI) depicting combined effect of Atm. vapor pressure deficit (VPD), volumetric soil moisture (VSM) and fractional water cover (FW) anomalies for Jun 7-13, 2021.





Left: SMAP surface VSM anomalies for Jun 7-13, 2021; and US Drought Monitor (USDM) for Jun 8-14, 2021.

Finding: (a) Satellite multi-frequency (K, X, C-band) microwave observations of water cycle components enable effective monitoring of extreme events and lagged (up to 3.4 mos) vegetation health impacts;

(b) Potential SWI enhancement enabled through the addition of SMAP L-band soil moisture.

Impact: Independent satellite multi-component assessment of global droughts and pluvials with promising early warning forecasts for natural ecosystems and agriculture.

[1]Du, Kimball, Sheffield, Velicogna, Zhao, Pan, Fisher, Beck, Watts, and Wood, 2021: Synergistic Satellite Assessment of Global Vegetation Health in Relation to ENSO-Induced Droughts and Pluvials, *JGR Biogeosci. 126, 5,* https://doi.org/10.1029/2020JG006006.