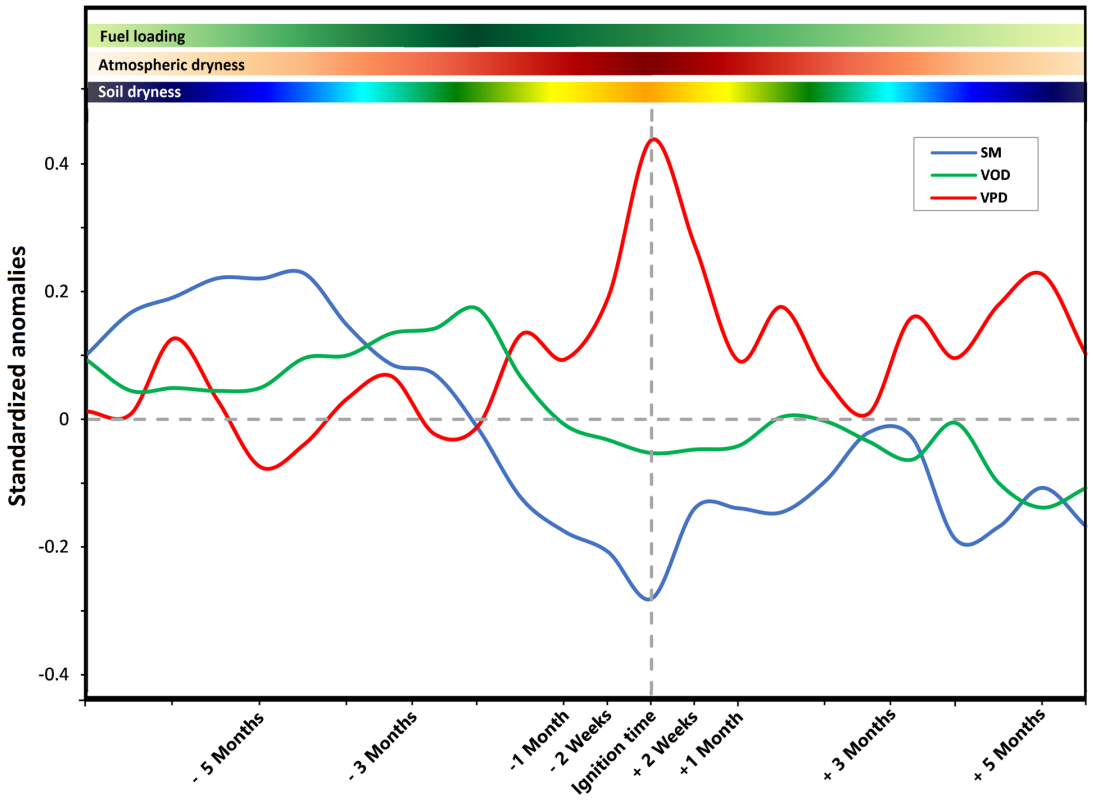
Pre-Season Wet Soils Produce Fire-Prone Conditions



Across the Western US, soil moisture (SM in blue) is above-average about five months before ignition (timing shown as vertical dashed line). This leads to increases in fuel loading two months later (as indicated by SMAP vegetation optical depth VOD series in green). Closer to the ignition time, drops in soil moisture and rapid rise in atmospheric dryness (vapor pressure deficit VPD in red) create conditions for combustion. Dynamics shown here are based on N=1751 fire events in the 2015-2022 period.

Problem: How do soil moisture, vegetation water content, and atmospheric conditions contribute to fuel-loading and conditions leading to wildfires?

Finding:

- Increased soil moisture five months before wildfires leads to vegetation growth and fuel accumulation, setting the stage for subsequent rapid dehydration and favorable fire ignition conditions in the western US.

- Soil moisture dynamics are a key factor in evaluating wildfire risk.

Impact: Findings give insight into precursors of wildfires and provide basis for fire risk early-warning.

Alizadeh M. R., J. Adamowski and D. Entekhabi, 2024: Land and atmosphere precursors to fuel loading, wildfire ignition and post-fire recovery, *Geophysical Research Letters*, 51(2).