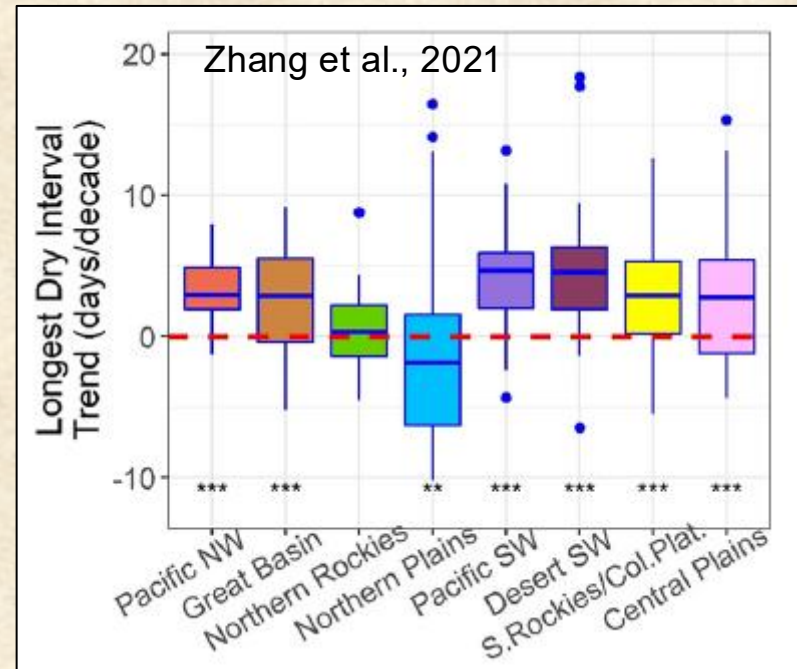
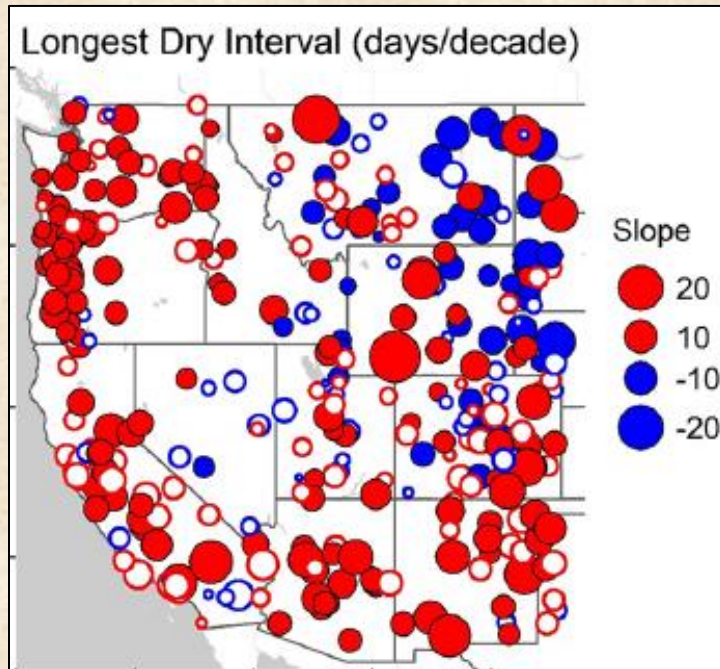


RainMan-SR

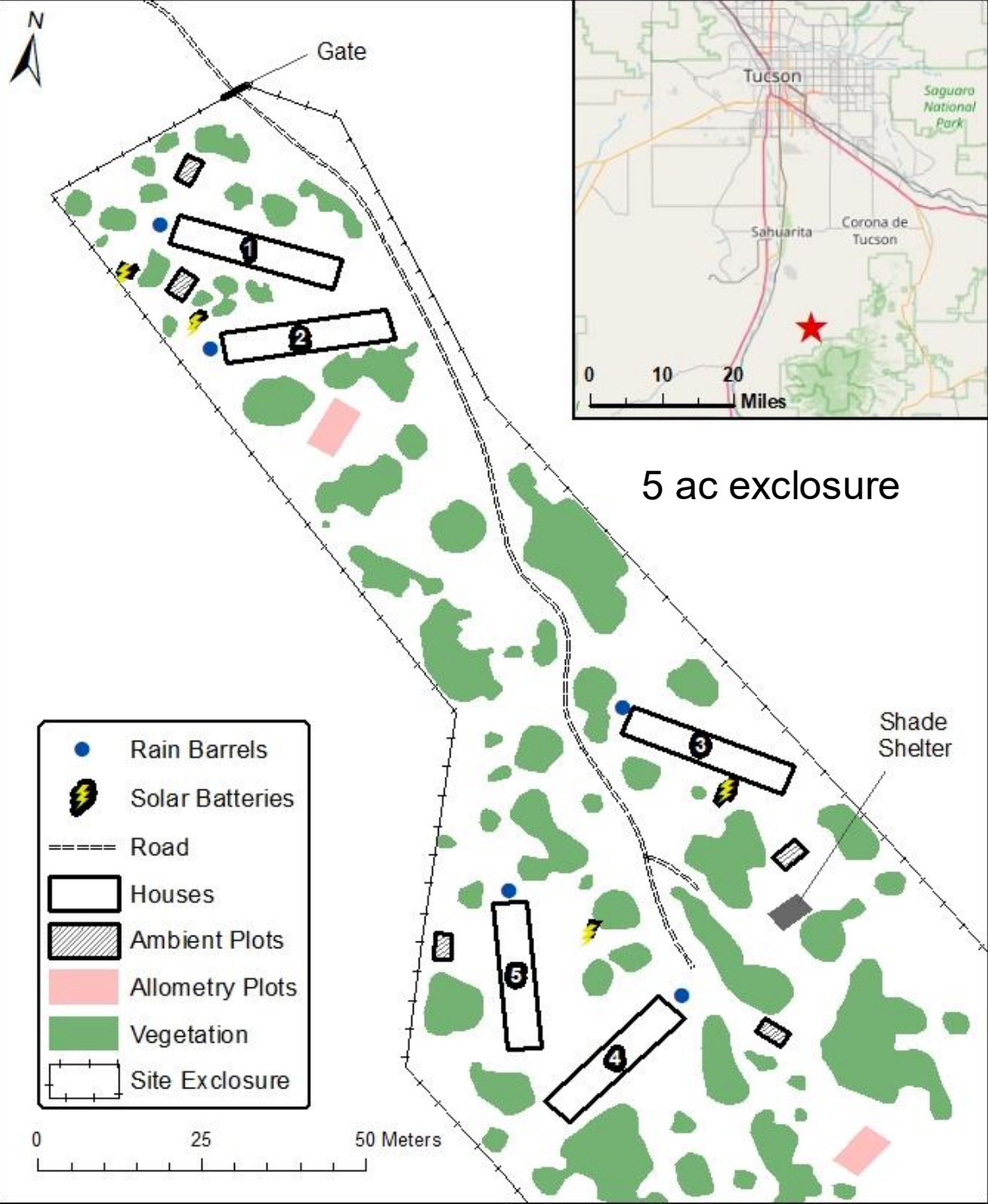
Rainfall Manipulation in the Santa Rita Experimental Range



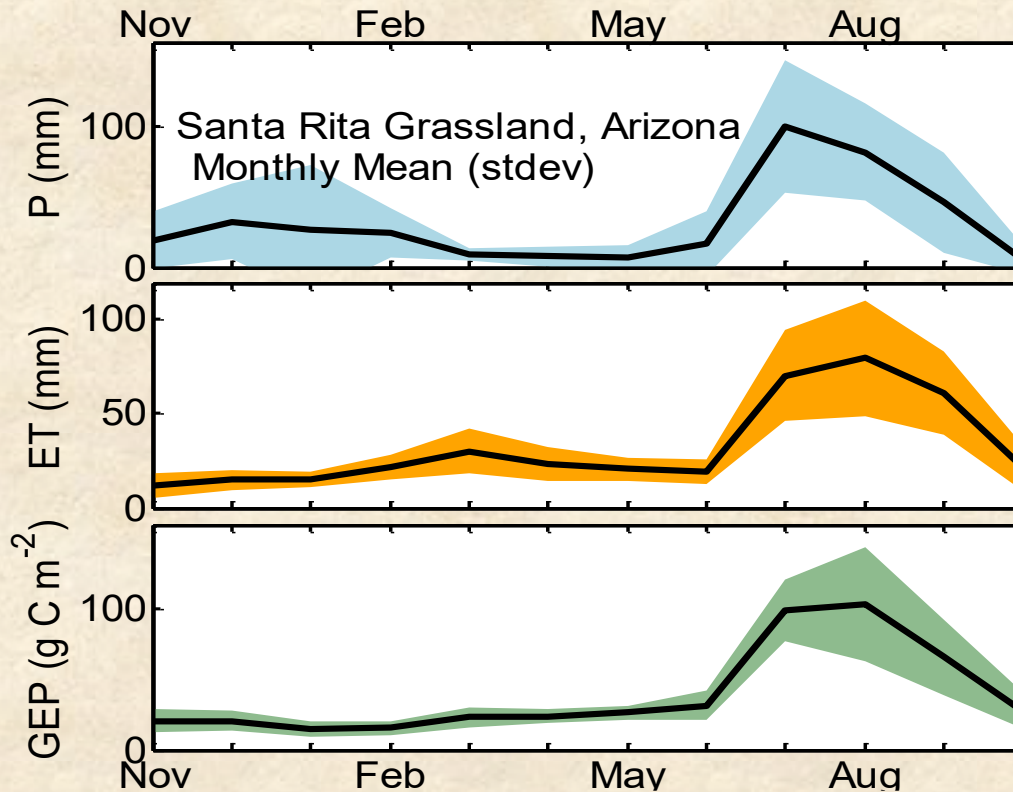
Temporal repackaging of rainfall



- The longest dry interval per year increased an average of 20 days in the Southwest (usually spring)
- TNC Research at LCNCA showed “extended spring” was a primary driver of perennial grass die-off (Bodner and Robles, 2017)
- Rainfall has been “repackaged” into fewer, sometimes larger storms with longer dry intervals between



What's special about RainMan?



- Bimodal growing season of Sonoran Desert
- Fully manipulated rainfall allows altered *timing*
- Proximal Remote Sensing Test Bed

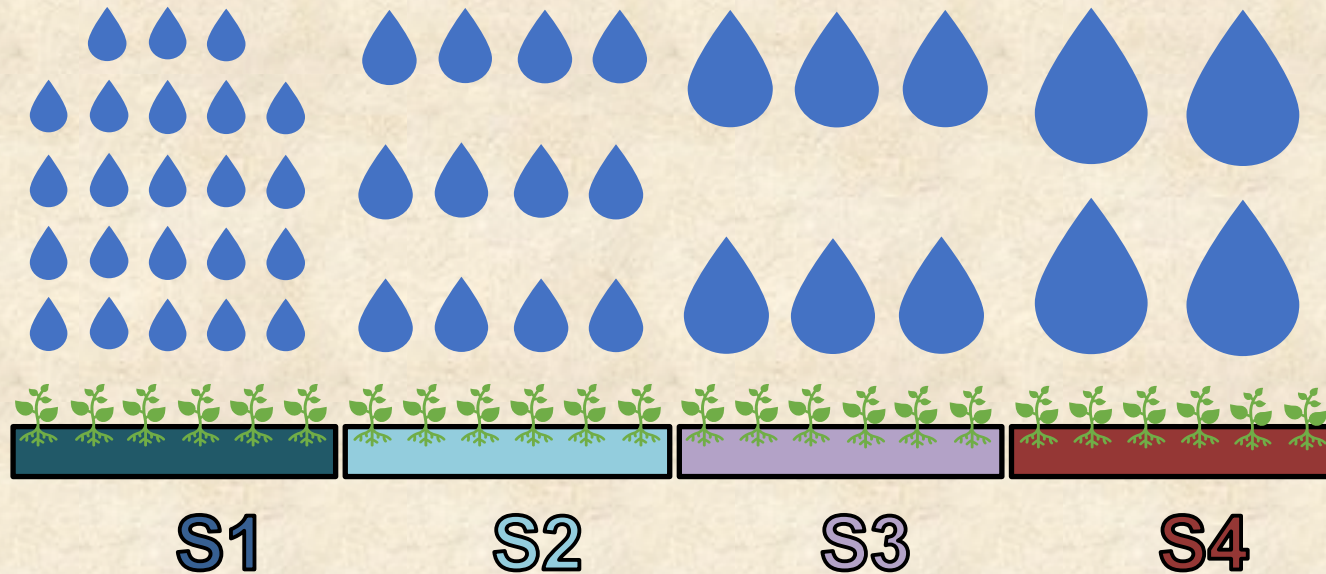


- Plots are hydraulically isolated
- Instrumented with ~50 soil moisture probes
- Temperature, Humidity inside/outside houses





Experiment 1: **temporal repackaging of summer precipitation**: fewer, larger storms and longer dry intervals:



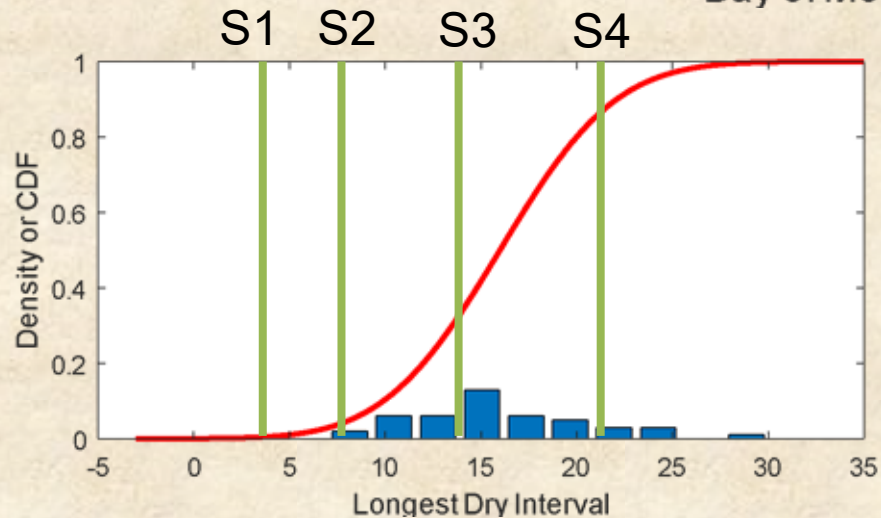
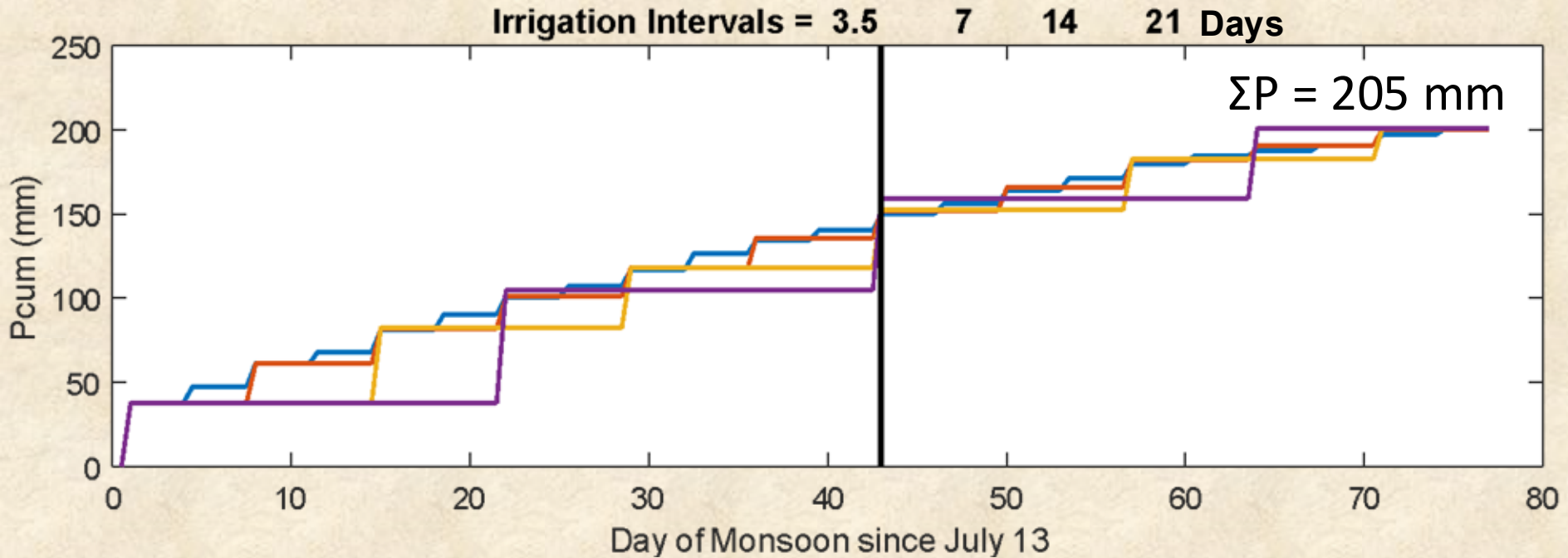
Design: 60 plots (4x5') in 5 blocks of 12. 4 treatments (n = 15). One initial ecosystem. Treatments are the same every year. Control is manipulated

Q1: What plants will be successful? We hypothesize that rooting depth of perennial plants promotes survival and growth under fewer/larger rainfall events.

Q2: What are the consequences for CO₂ uptake and water evaporation?

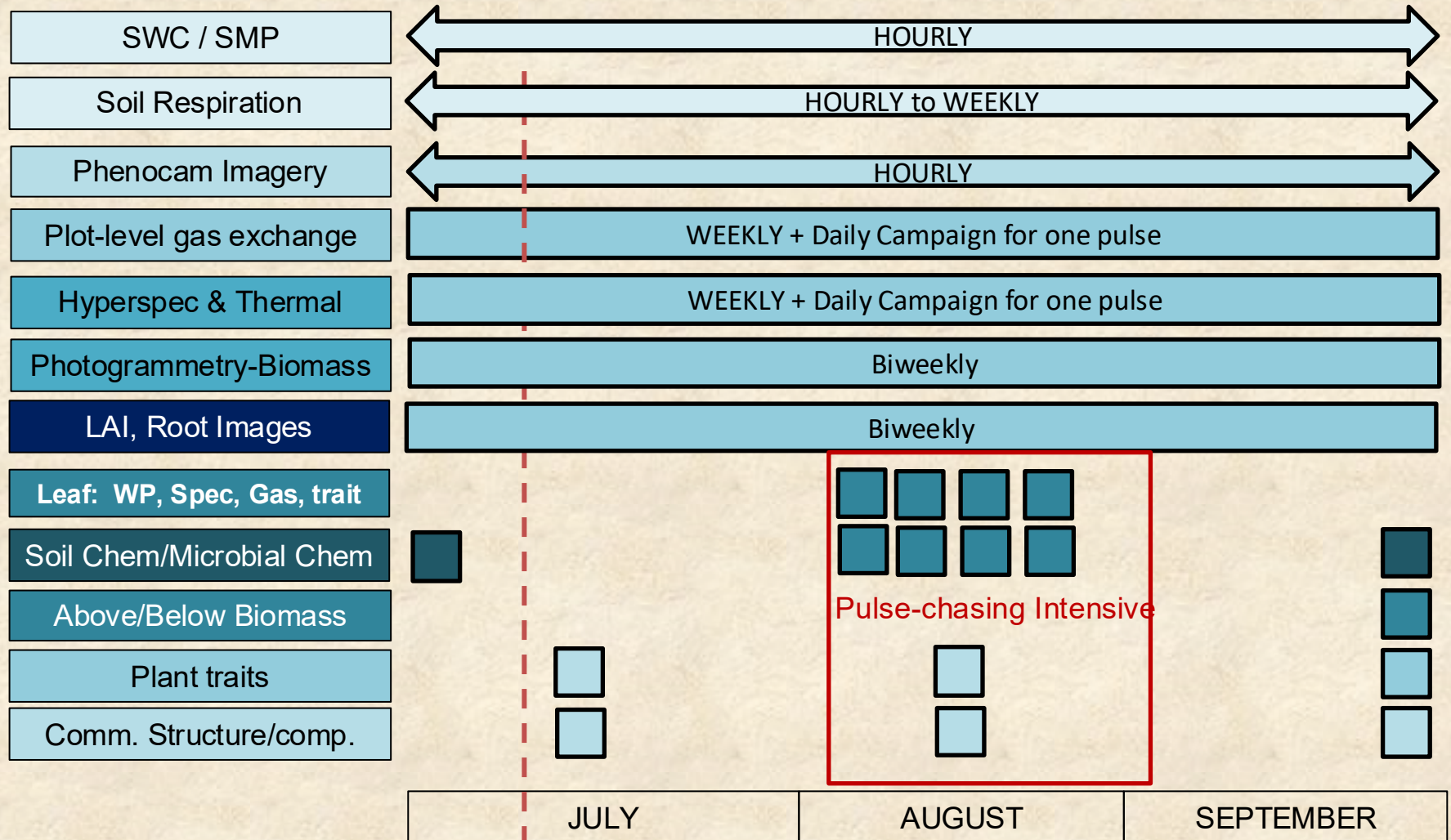
Q3: What ecosystem-scale spectral sensing information accurately represents carbon and water exchanges? Informs satellite remote sensing

Temporal Repackaging of Summer Rainfall

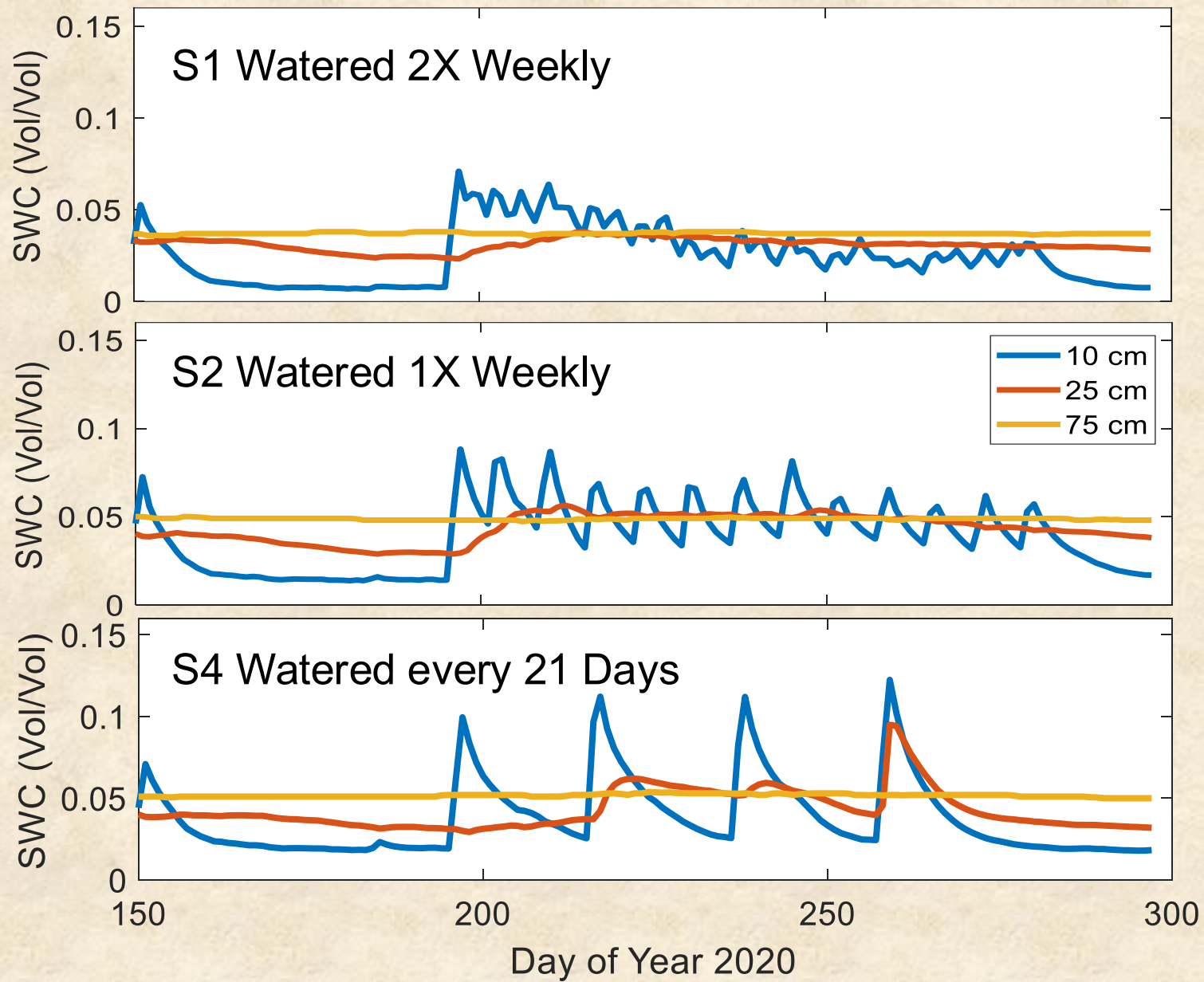


Treatments span annual longest dry interval between rainfall events (since 1974)

Measurements Above & Belowground from hourly to seasonal time scales capture rapid dynamics of pulse-driven dryland ecosystems.

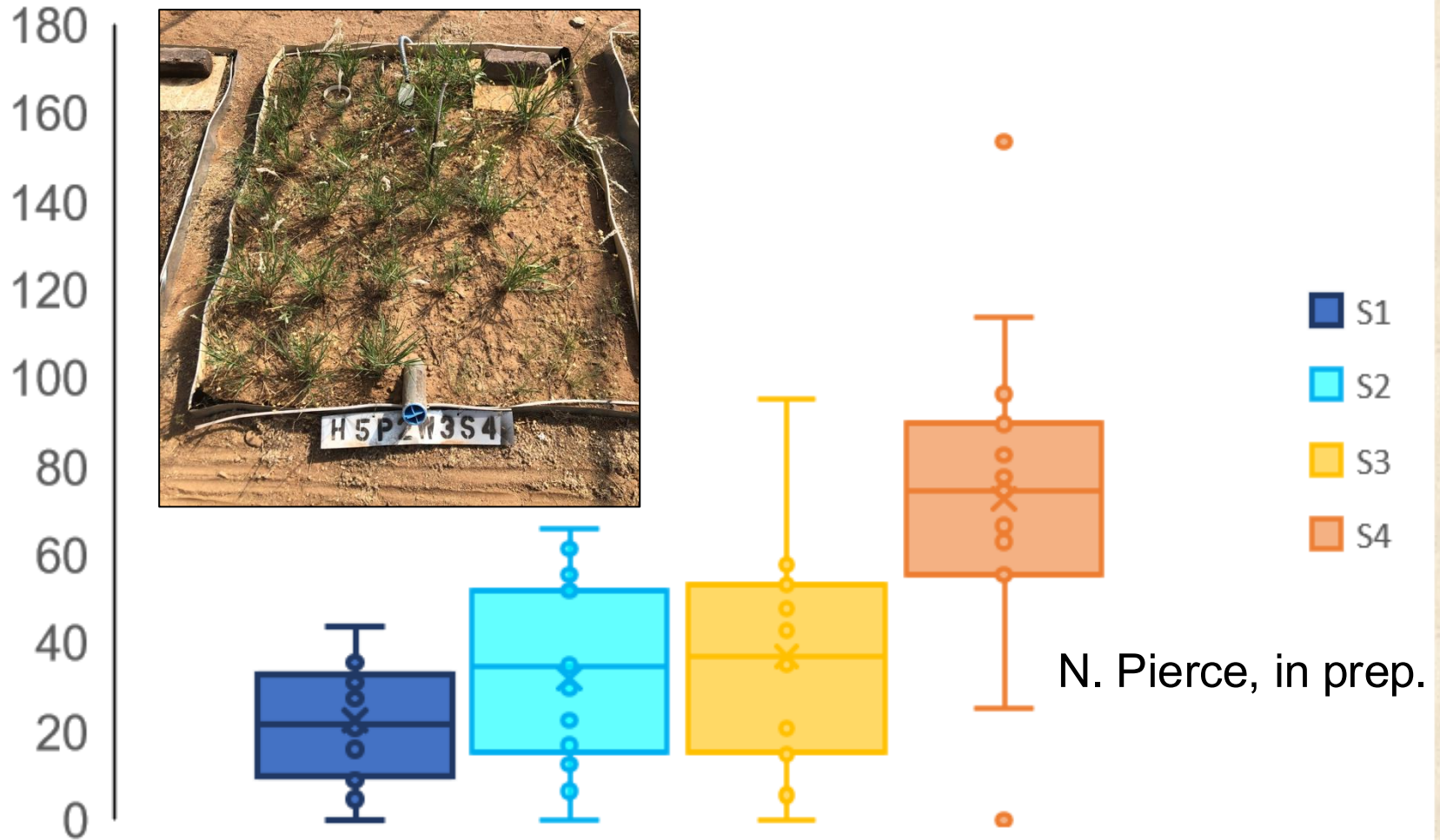


Fewer, larger rain events promote higher soil water at 25 cm, in the rooting zone of perennial grasses



Packaging into fewer, larger rainfall events *increases* perennial bunchgrass ANPP by 3-4 times

Arizona Cottontop (g plant⁻¹)



CO2 Release was increased by many small events (S1) and decreased by few large events (S4) as

