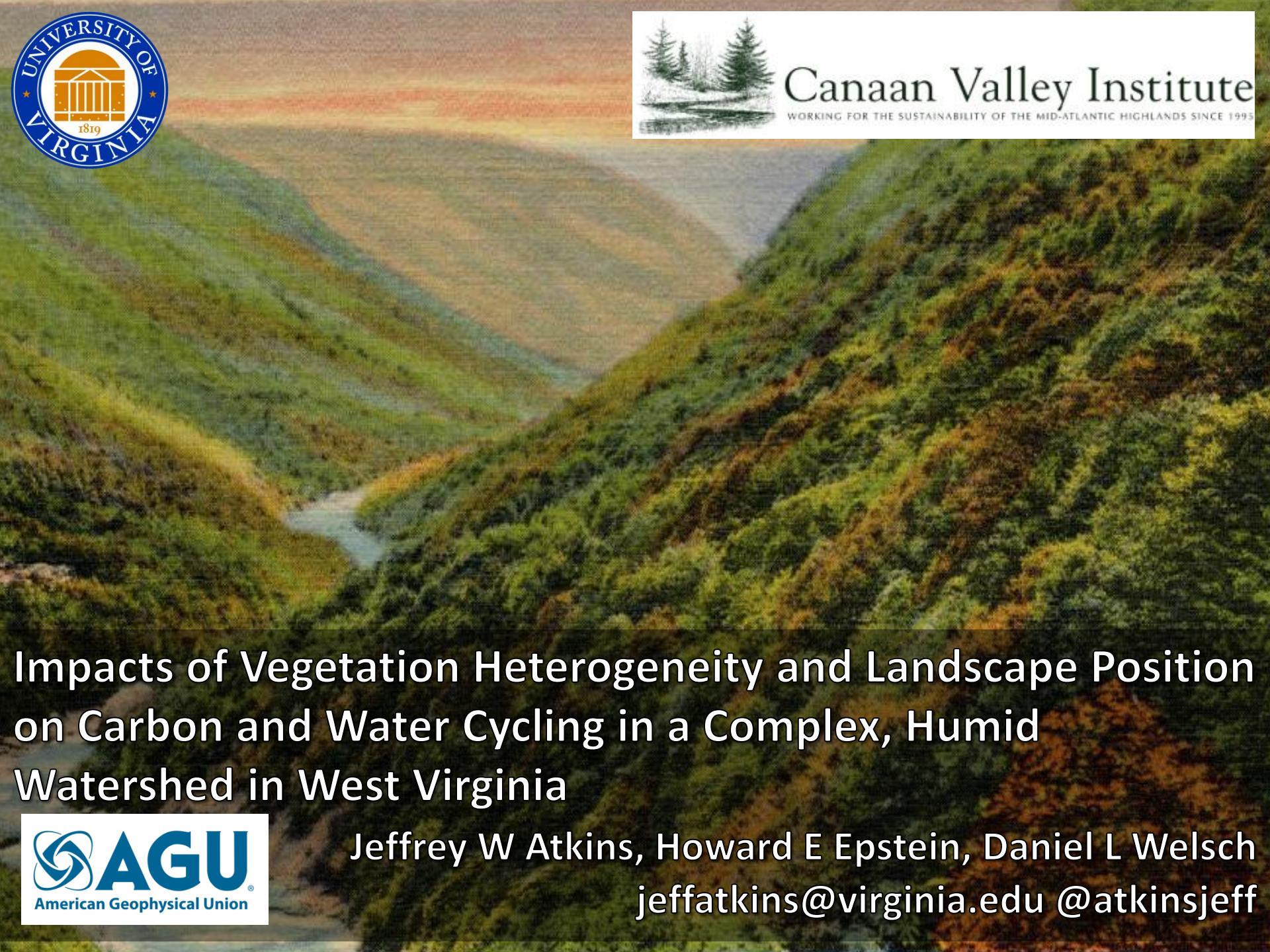




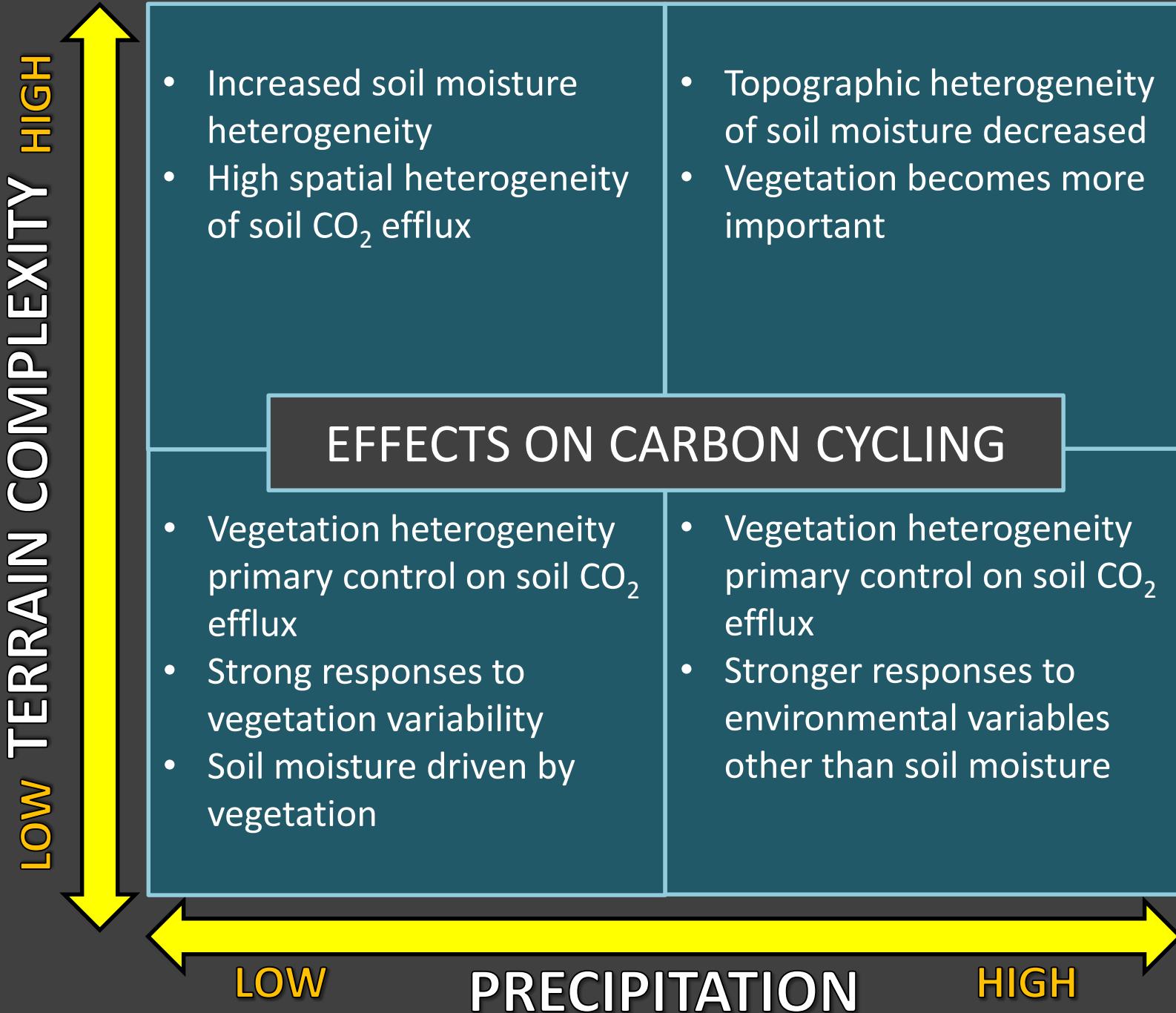
Canaan Valley Institute
WORKING FOR THE SUSTAINABILITY OF THE MID-ATLANTIC HIGHLANDS SINCE 1995

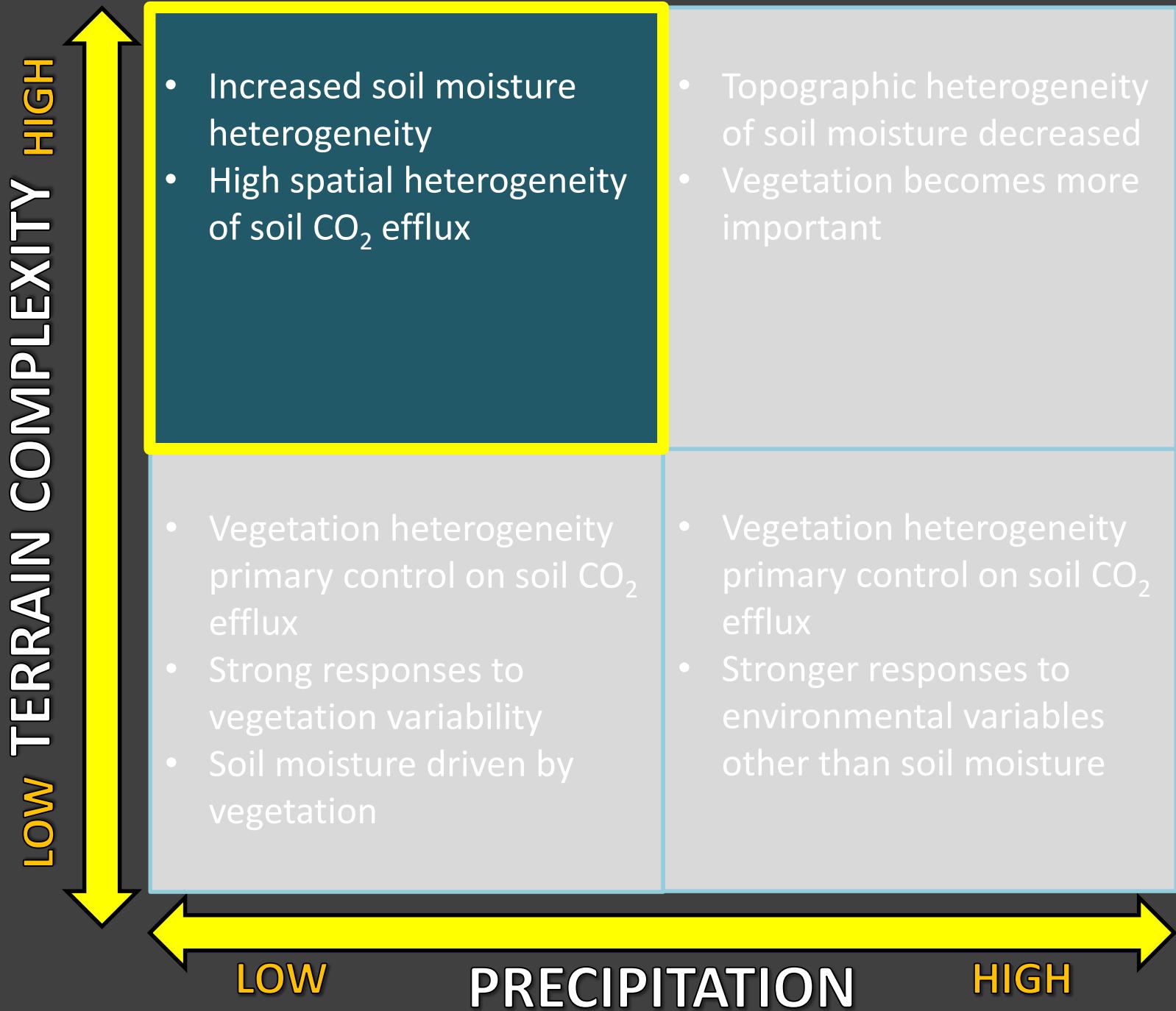


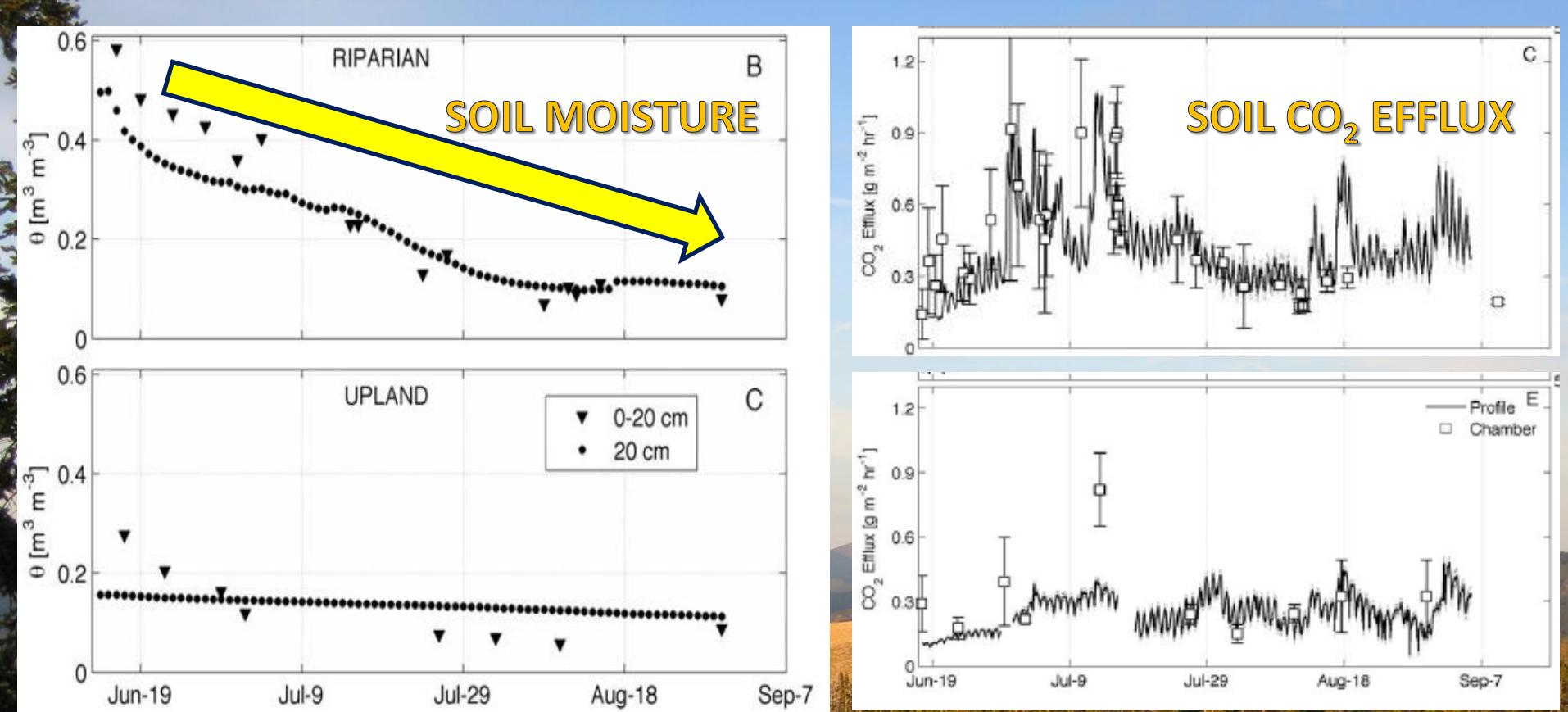
Impacts of Vegetation Heterogeneity and Landscape Position on Carbon and Water Cycling in a Complex, Humid Watershed in West Virginia



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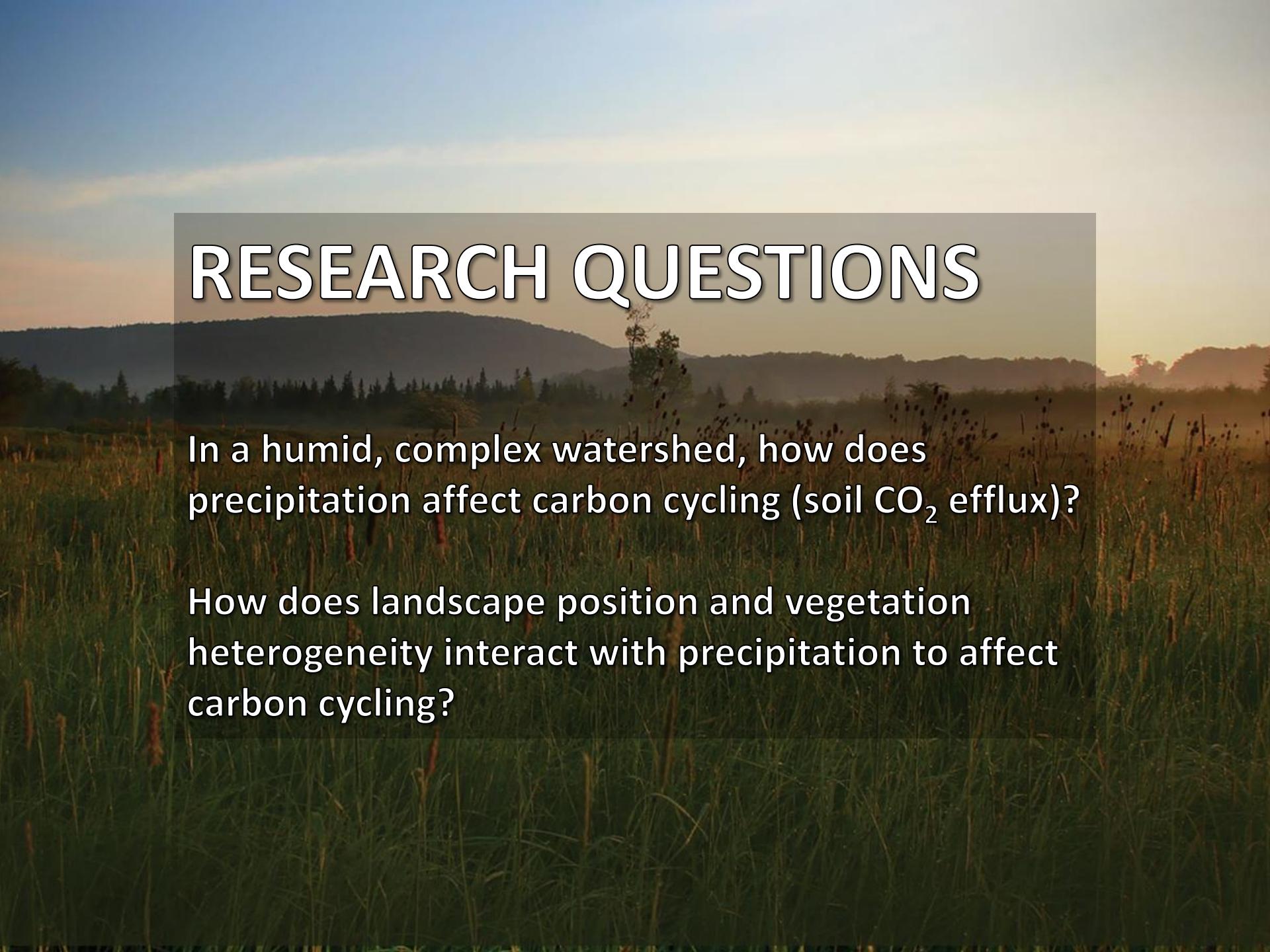


From Riveros-Iregui et al.(2008) Journal of Geophysical Research

- Strong effects of topography with low precipitation

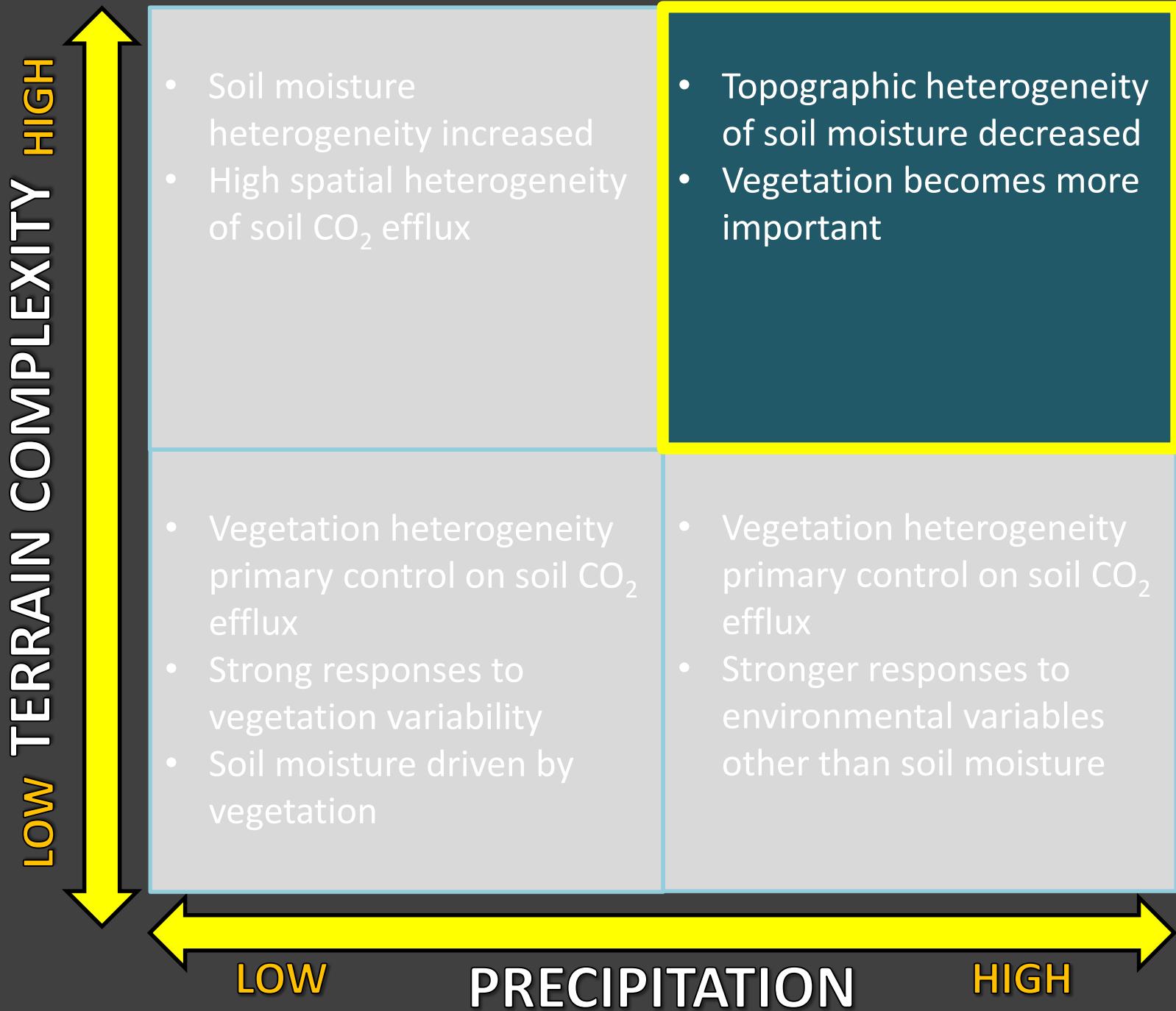
Stringer Creek Watershed
Tender Creek Exp. Forest, Montana

RESEARCH QUESTIONS



In a humid, complex watershed, how does precipitation affect carbon cycling (soil CO₂ efflux)?

How does landscape position and vegetation heterogeneity interact with precipitation to affect carbon cycling?



Weimer Run Watershed

MAT = 8° C

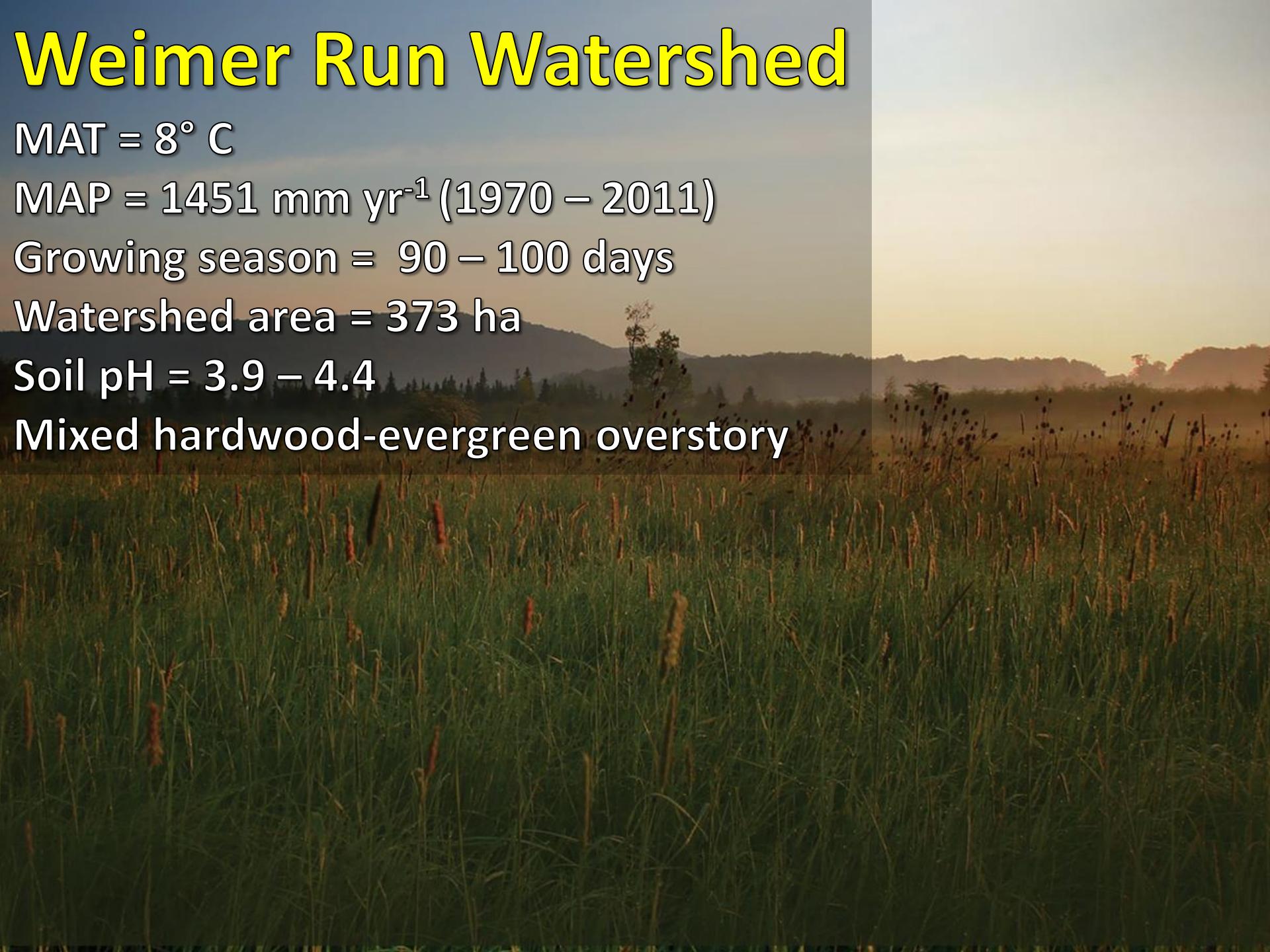
MAP = 1451 mm yr⁻¹ (1970 – 2011)

Growing season = 90 – 100 days

Watershed area = 373 ha

Soil pH = 3.9 – 4.4

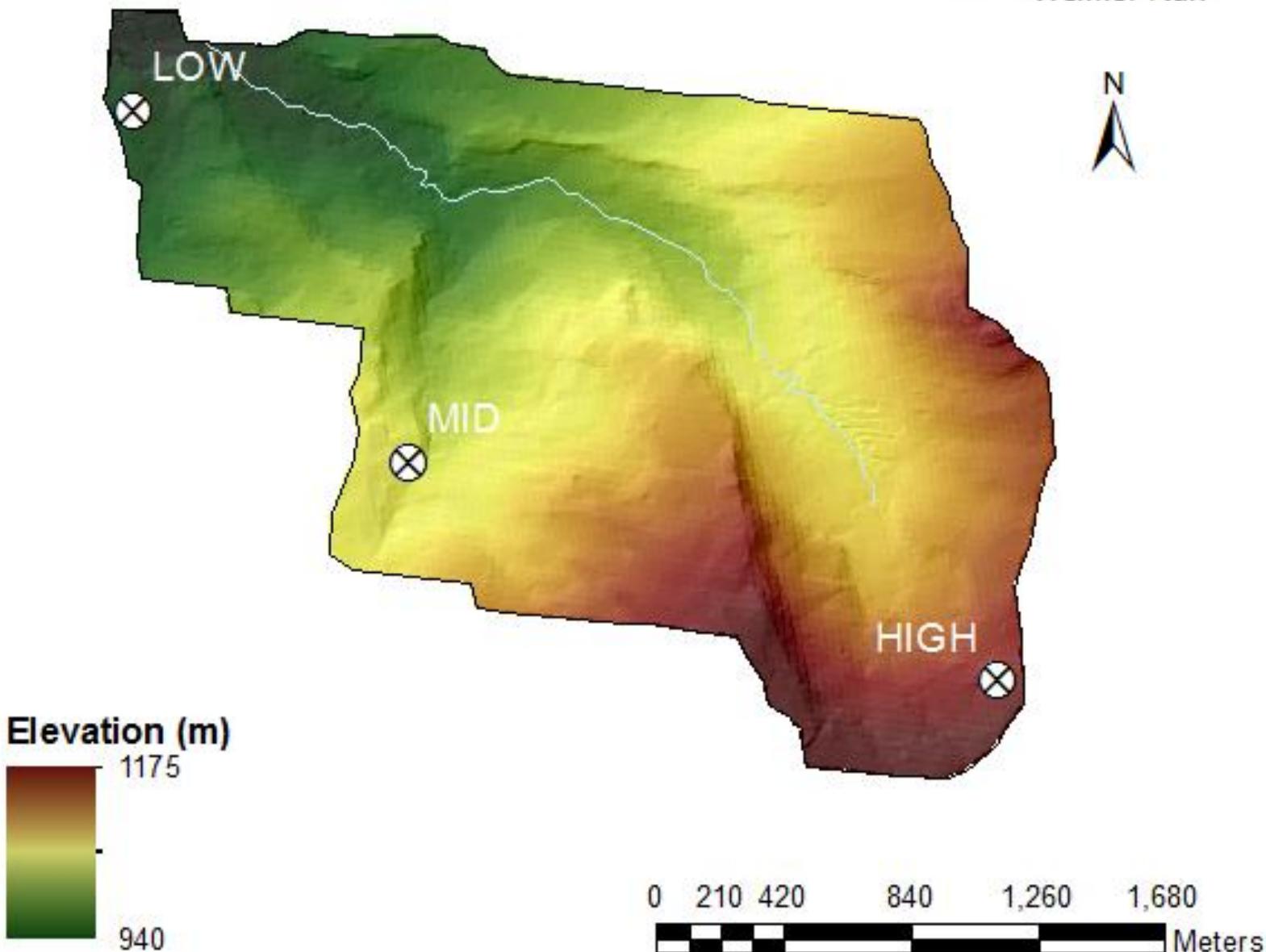
Mixed hardwood-evergreen overstory





Weimer Run Watershed

⊗ Elevation Levels
— Weimer Run





OPEN



SHRUB

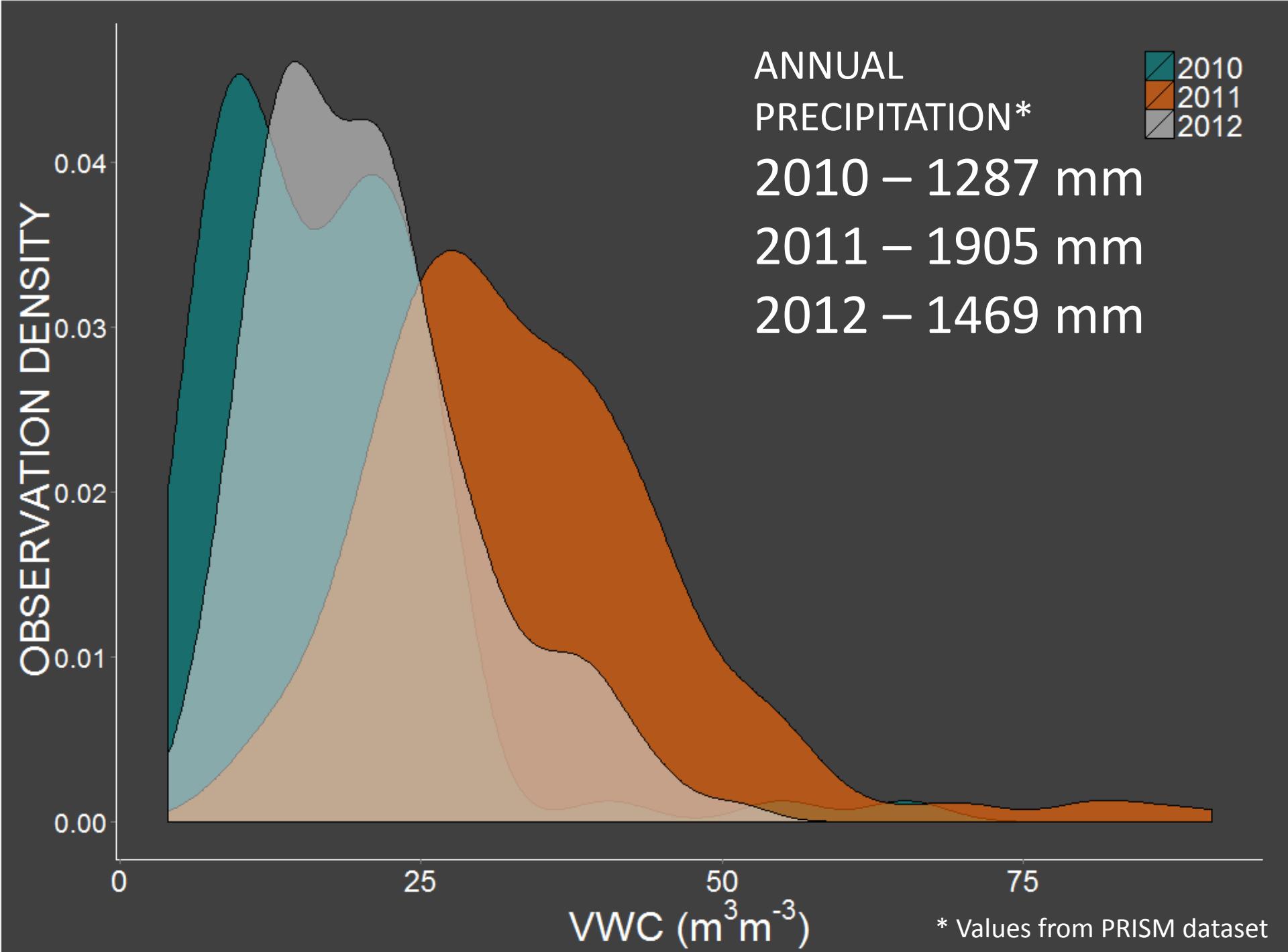


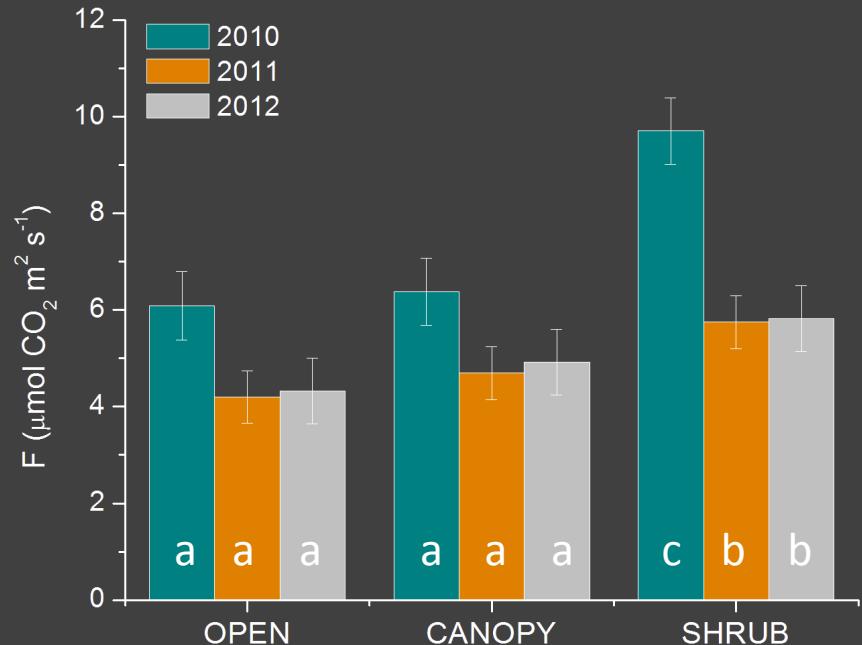
CANOPY

**3 VEGETATION TYPES * 3 ELEVATIONS * 3 REPS =
27 PLOTS**

Three years of measurements (2010-2012)
Weekly measurements during the growing season
(June-September), periodic measurements
remainder of year

- Soil CO₂ efflux (IRGA; SRC-1 & EGM-4; PP Systems)
- Soil temperature at 12 cm
- Volumetric soil moisture 0 – 12 cm
(TDR; Campbell Hydrosense)

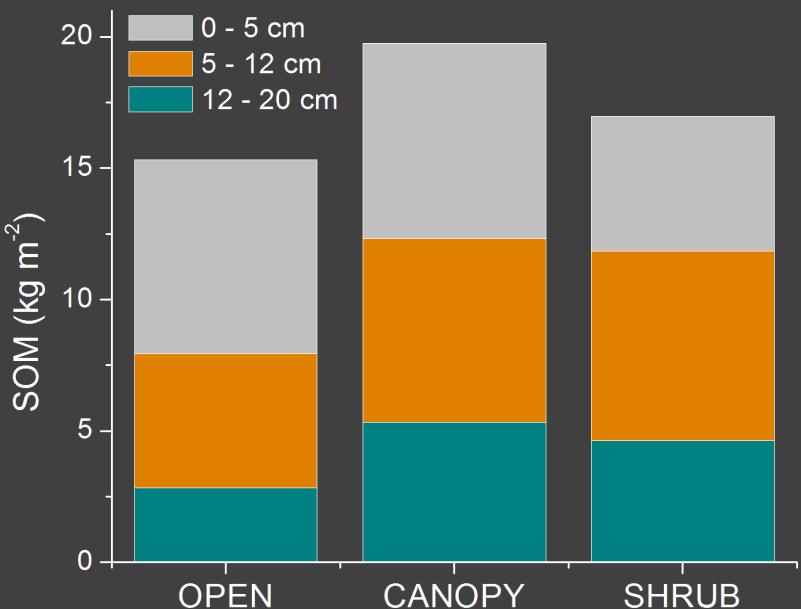
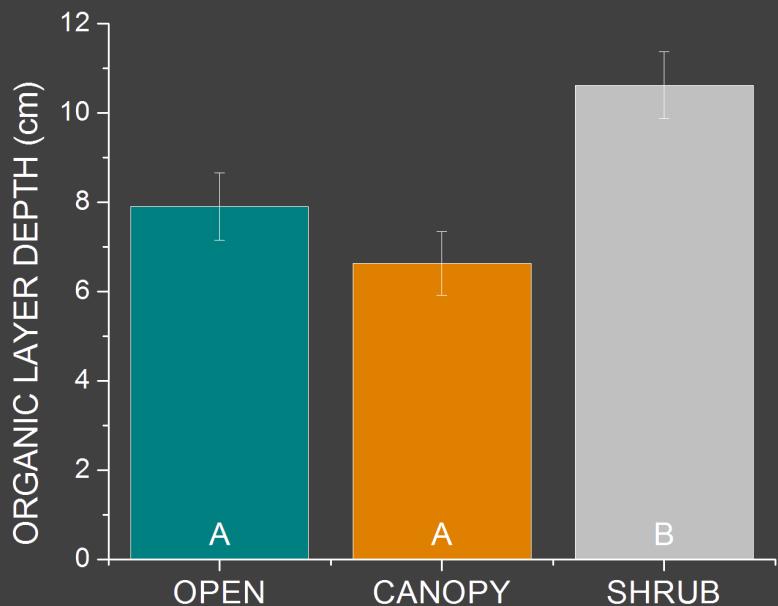


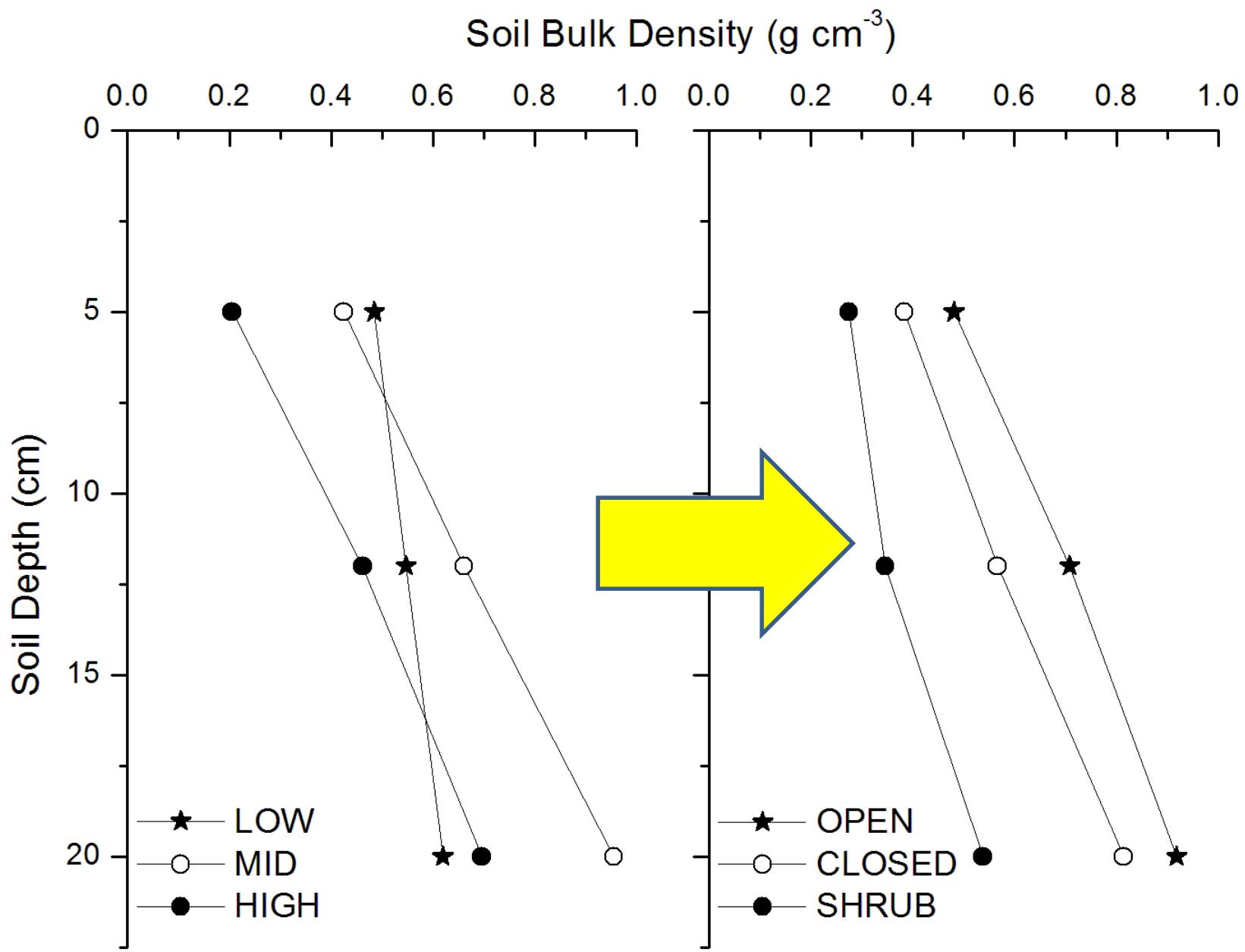


- Dry years increase fluxes
- Minimal effect of elevation
- Strong vegetation effect (shrub effect)
- Vegetation effect stronger in dry year

POSSIBLE MECHANISMS

- Lower soil moisture
- Deeper organic layer
- Soil organic matter
- Lower bulk density







DISCUSSION

DIFFERENCES

- Precipitation
- Wet vs. dry years
- Vegetation effects on carbon cycling

SHRUB EFFECT

- Highest efflux rates
- Lowest soil bulk density
- Deepest organic layer depth

TAKE HOME

- The relationship between complex topography and carbon cycling is a story of precipitation and vegetation heterogeneity.
- The understory shrub layer has a profound impact on soil CO₂ efflux, soil moisture, and soil chemistry and physics within this system