

Flux – PhenoCam Data Fusion to Understand Surface Energy Balance

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Slides Credit: Adam Young

Phenology

“the study of the timing of recurrent biological events, the causes their timing with regard to biotic and abiotic forces, ...”

Lieth 1974



****Phenology has a strong control over ecosystem structure and function***

January



May



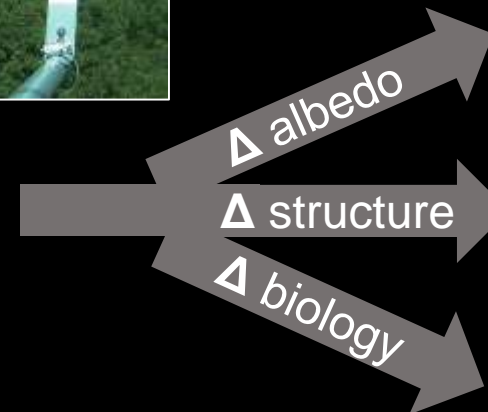
July



**No
Leaves**



Leaves



Δ Carbon

Δ ET

Δ Surf. Temp

The PhenoCam Network:

Near-surface remote sensing of vegetation phenology

- PhenoCam uses imagery from networked digital cameras for continuous monitoring of plant canopies
- Images recorded every 30 minutes, sunrise to sunset, 365 days a year



- **Scale of observations is comparable to that of tower-based flux measurements**



Methods – data synthesis using ...

PhenoCam Data

- Continuous/daily measurement of phenology and canopy development
- Provides estimates for phenological transition dates (e.g., green-up and green-down)



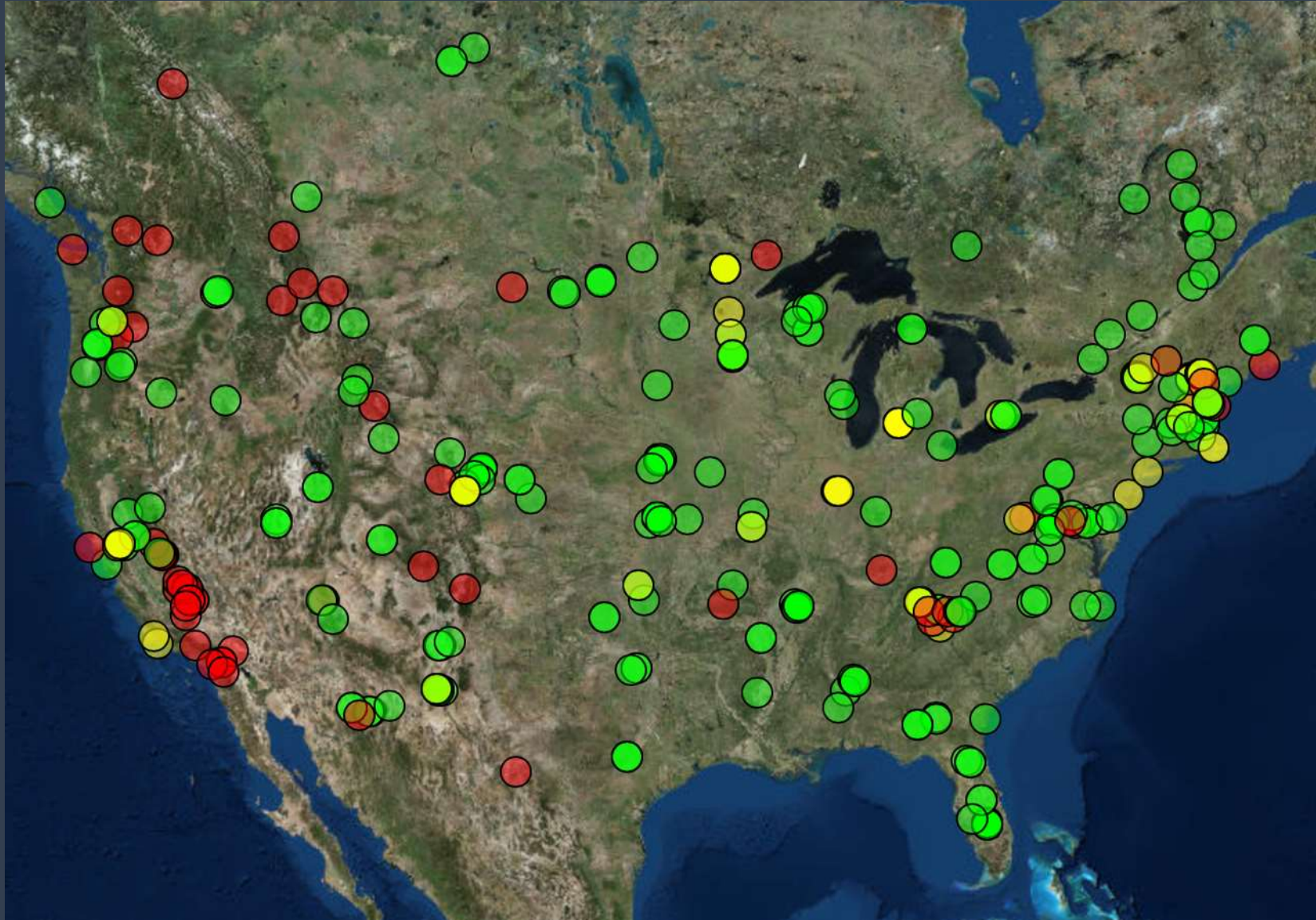
Flux-Tower Data

- Continuous measurements (30 min) of land-atmosphere energy exchanges and meteorological variables (e.g. wind speed, temperature, RH)



(Photo credits: Richard Wehr)

2018: A network of over 500 cameras



Imagery and data available at:
<http://phenocam.sr.unh.edu/>



neon
National Ecological Observation Network

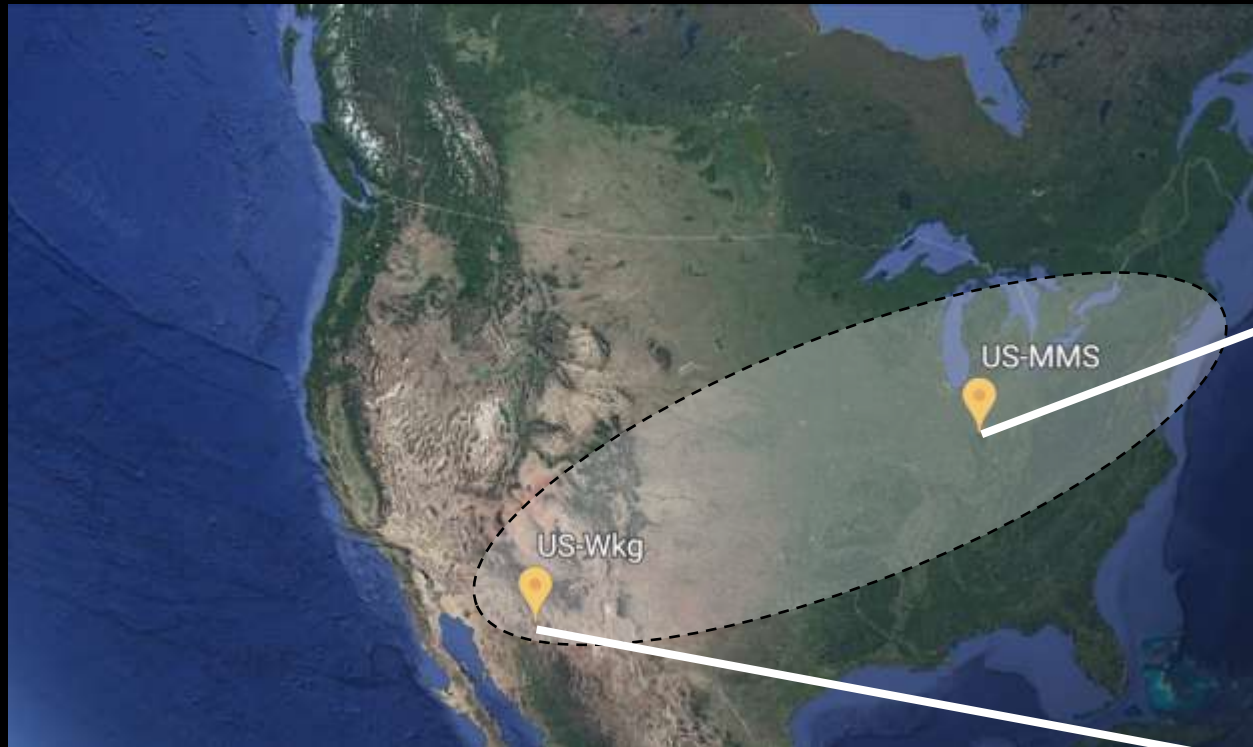
FIELD SITES MAP

● NEON Aquatic ■ NEON Core ▲ NEON Relocatable

NEON is sponsored by the National Science Foundation and operated under cooperative agreement by Battelle

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Test sites



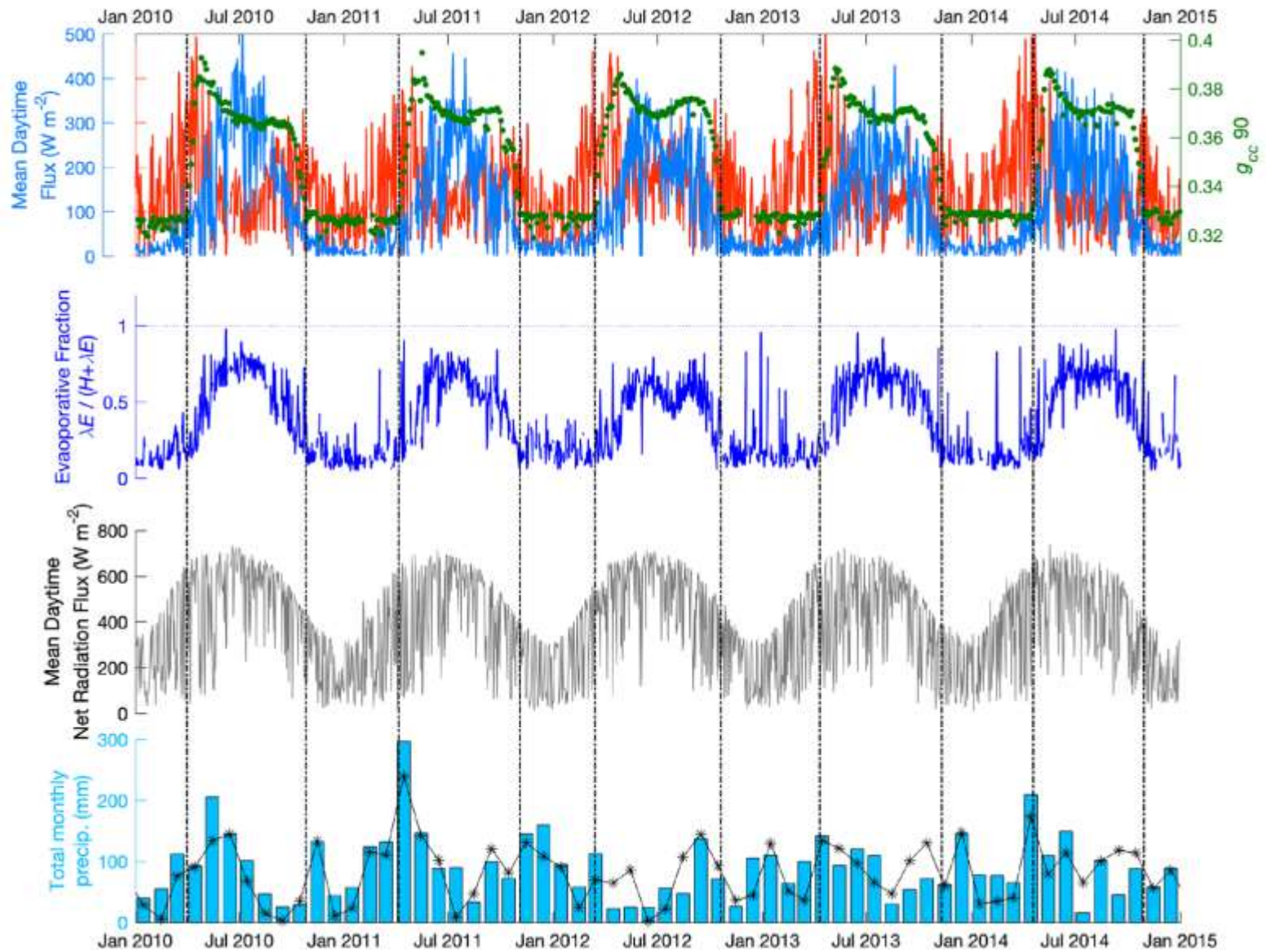
Morgan Monroe State Forest



Walnut Gulch Kendall
Grasslands



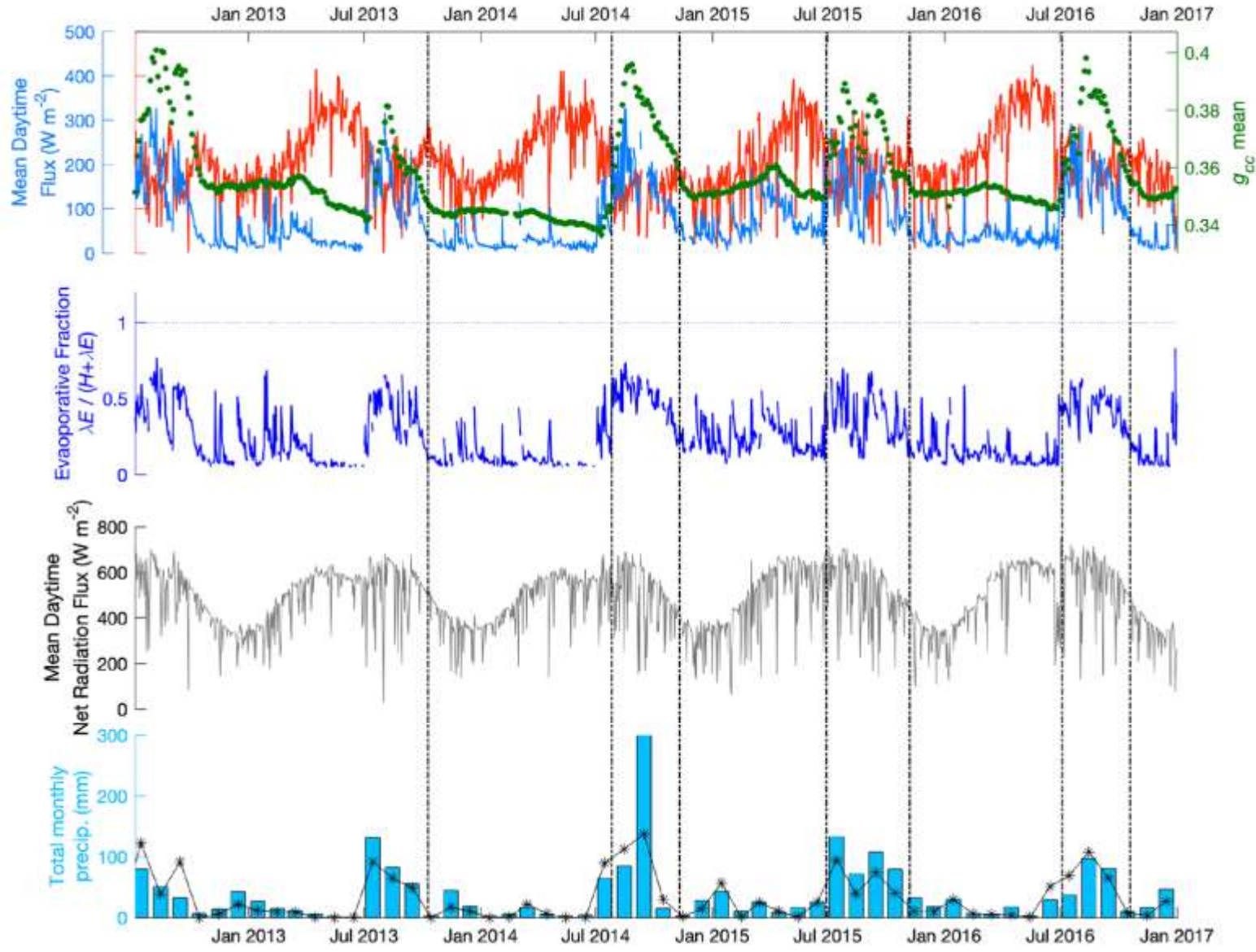
Flux Site	PhenoCam	Veg Type
US-MMS	morganmonroe	Deciduous Broadleaf
US-Wkg	kendall	Arid grassland



Morgan Monroe State Forest

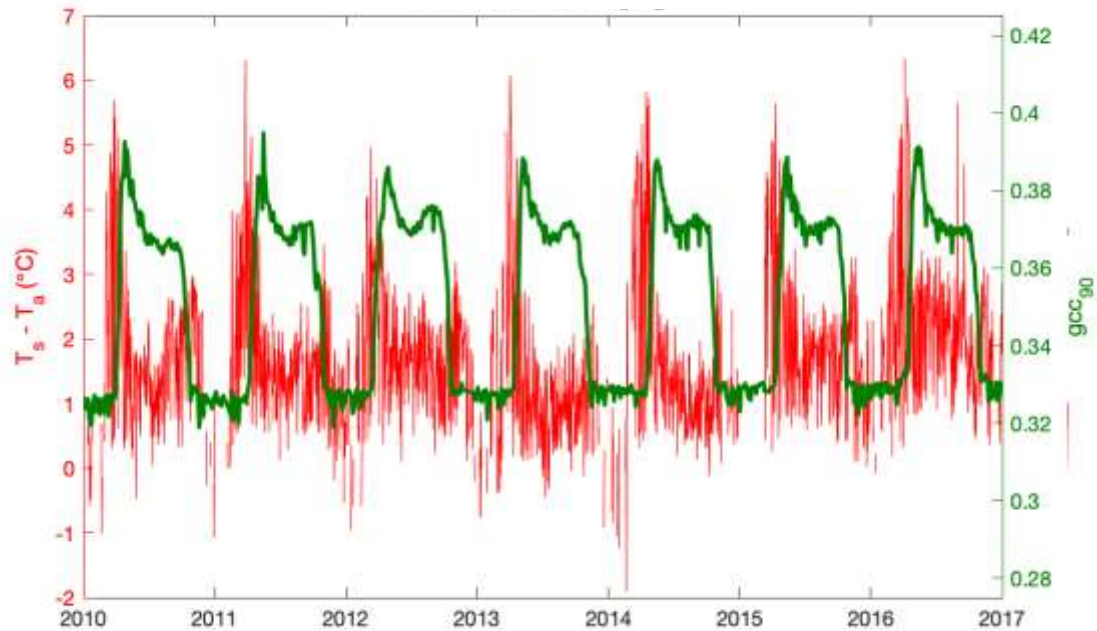


Walnut Gulch Kendall Grasslands

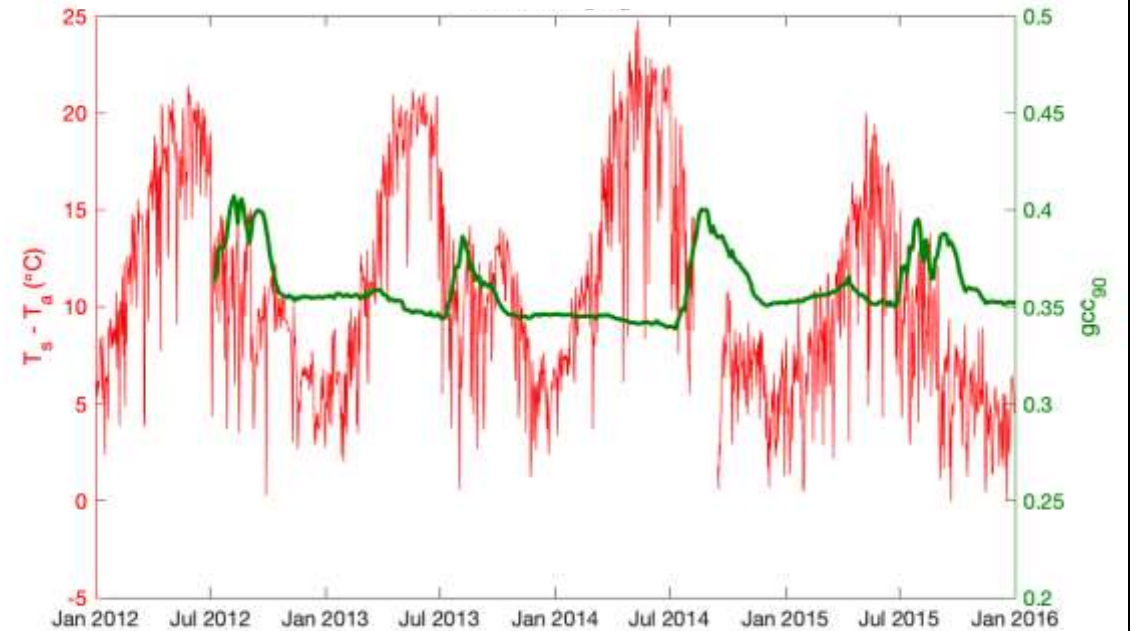


Differences between surface (T_s) and air temperature (T_a)

Moran Monroe State Forest



Kendall Grasslands



Wrapping up

The **PhenoCam** network uses **networked digital cameras** to track vegetation phenology across North America

NEON sites have PhenoCam

Same temporal resolution as the flux data

Answering key questions on understanding surface energy balance with phenology