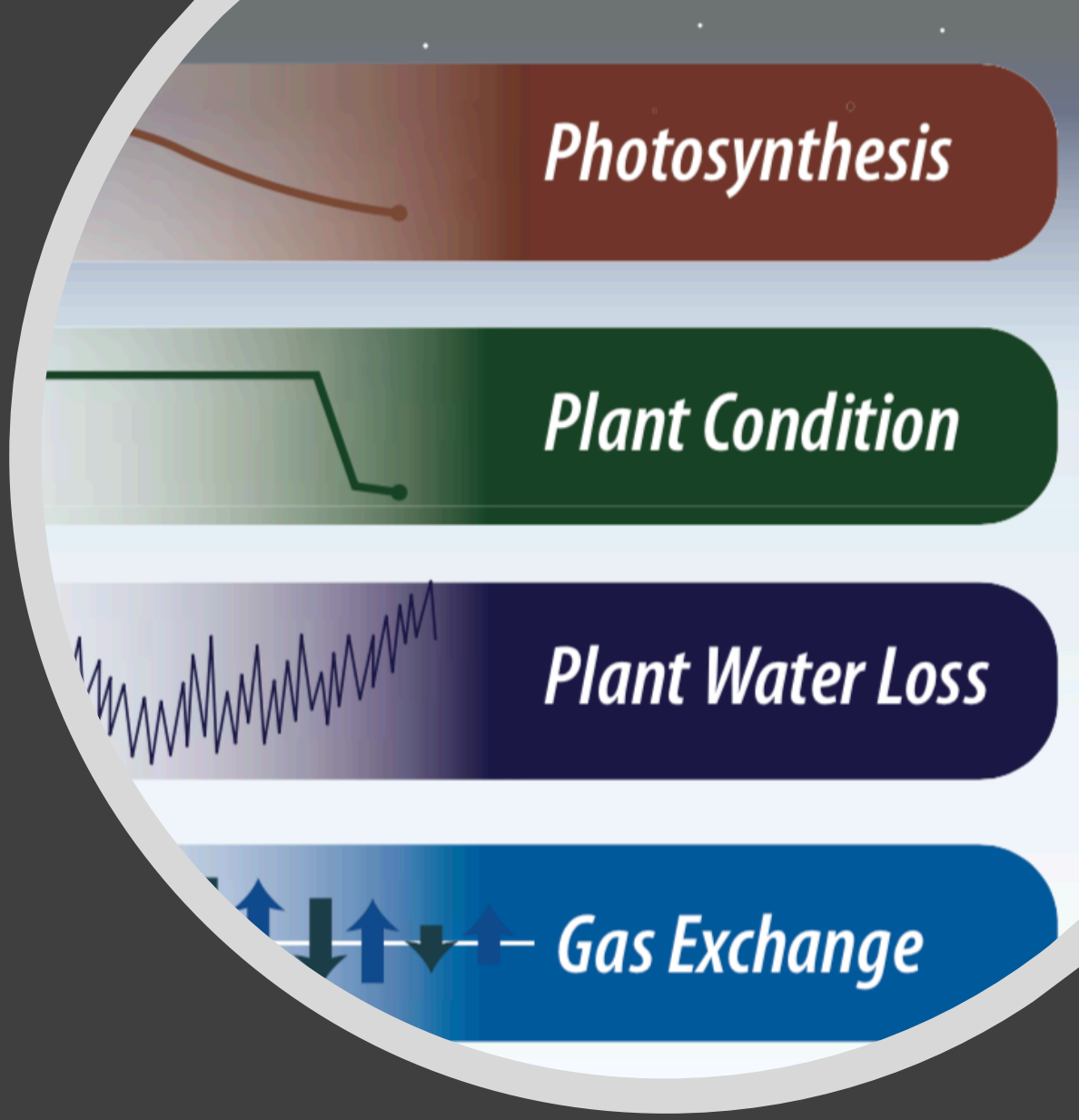
Exploiting Diurnal Cycles to Evaluate Vegetation Responses to Heat and Drought Stress



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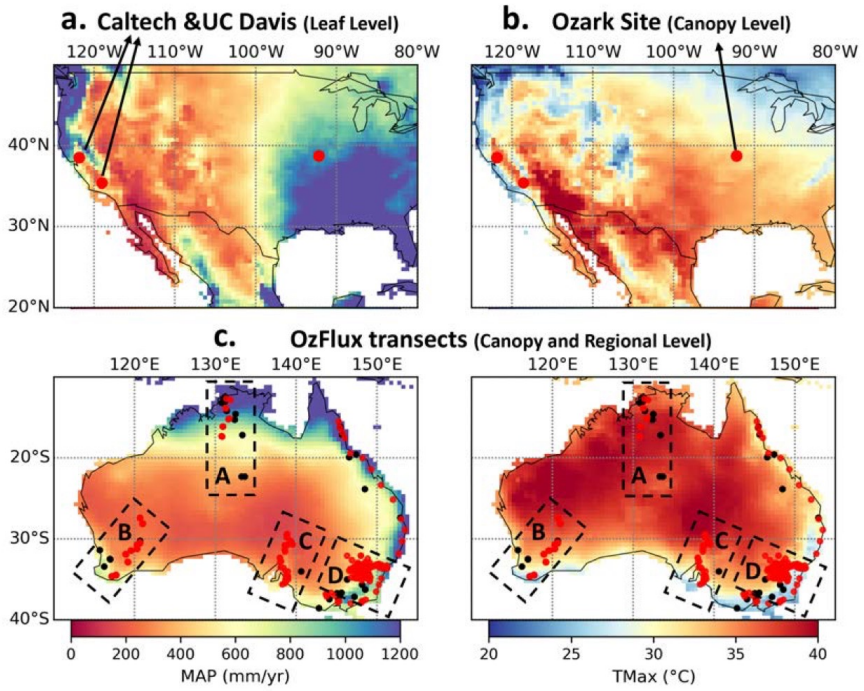
[1] California Institute of Technology

[2] University of California, Davis

ECOSTRESS Science Team Meeting, Ventura, 2020

Main objectives

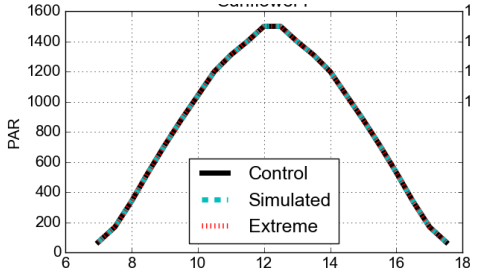
- Leaf Level Experiments
  - How ET, photosynthesis, stomatal conductance, and SIF respond to a range of water and temperature stress?
- Site Level Analysis
  - Synchronization vs. Asynchronization?
- Regional Level Synthesis
  - Variations of energy, water, and carbon cycles for different land cover types in the climate sensitive Central Great Plains and the OzFlux Australia transits.



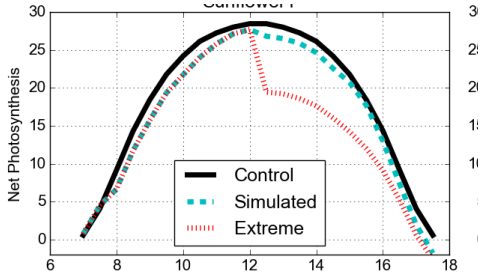
- Parallel efforts in ecosystem modeling - CliMA
  - test theories of stomatal optimization and their impacts on carbon and water fluxes
  - interpolate regional ECOSTRESS observations captured at different local times.

Leaf Level Experiments – REVY preliminary results

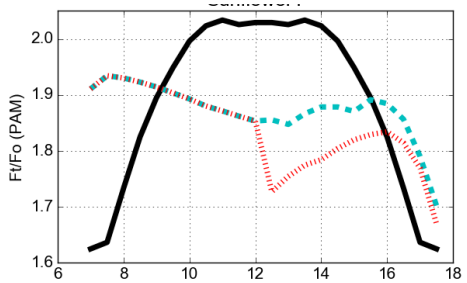
PAR



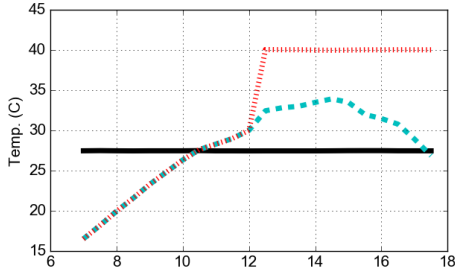
Net Photosynthesis



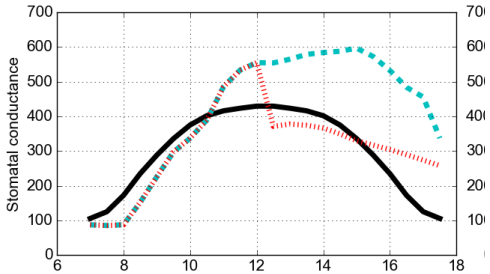
Ft/Fo



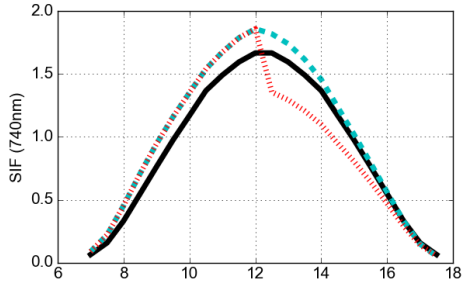
T



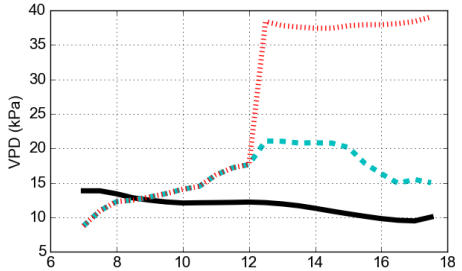
Stomata Conductance



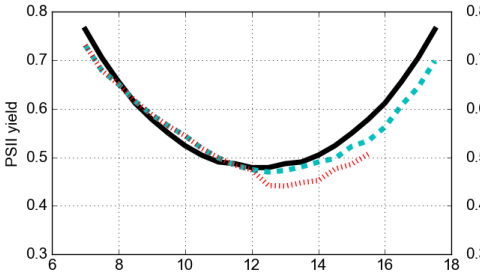
SIF



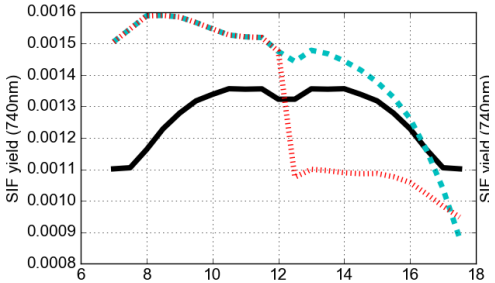
VPD



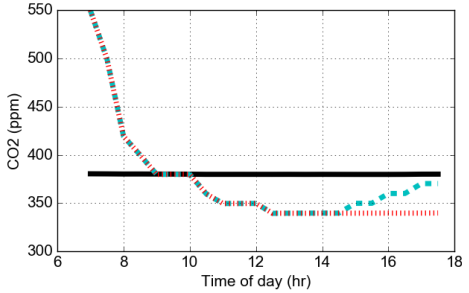
PSII yield



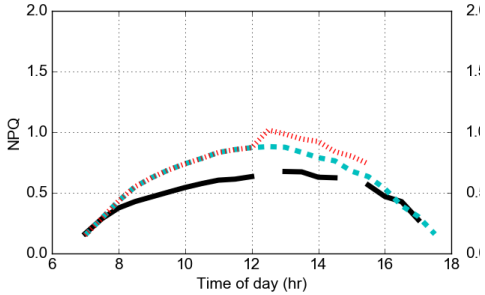
SIF yield



CO_2

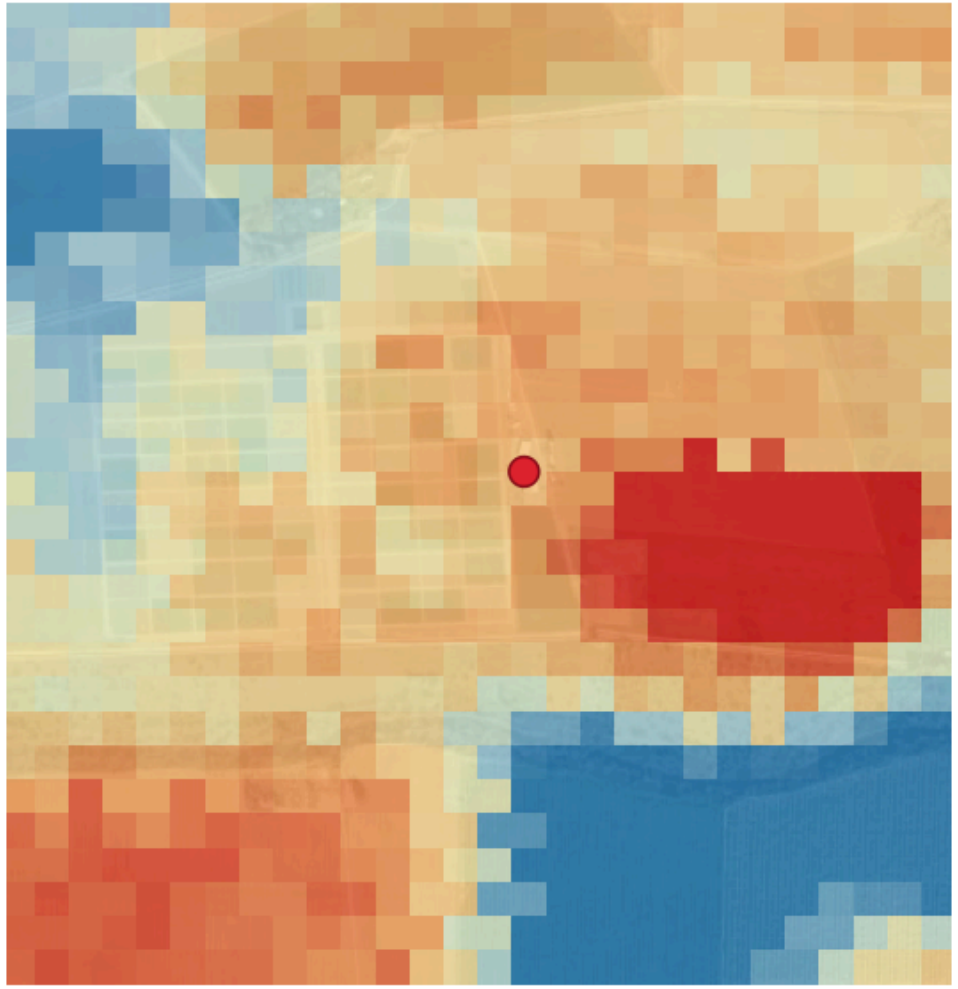


NPQ

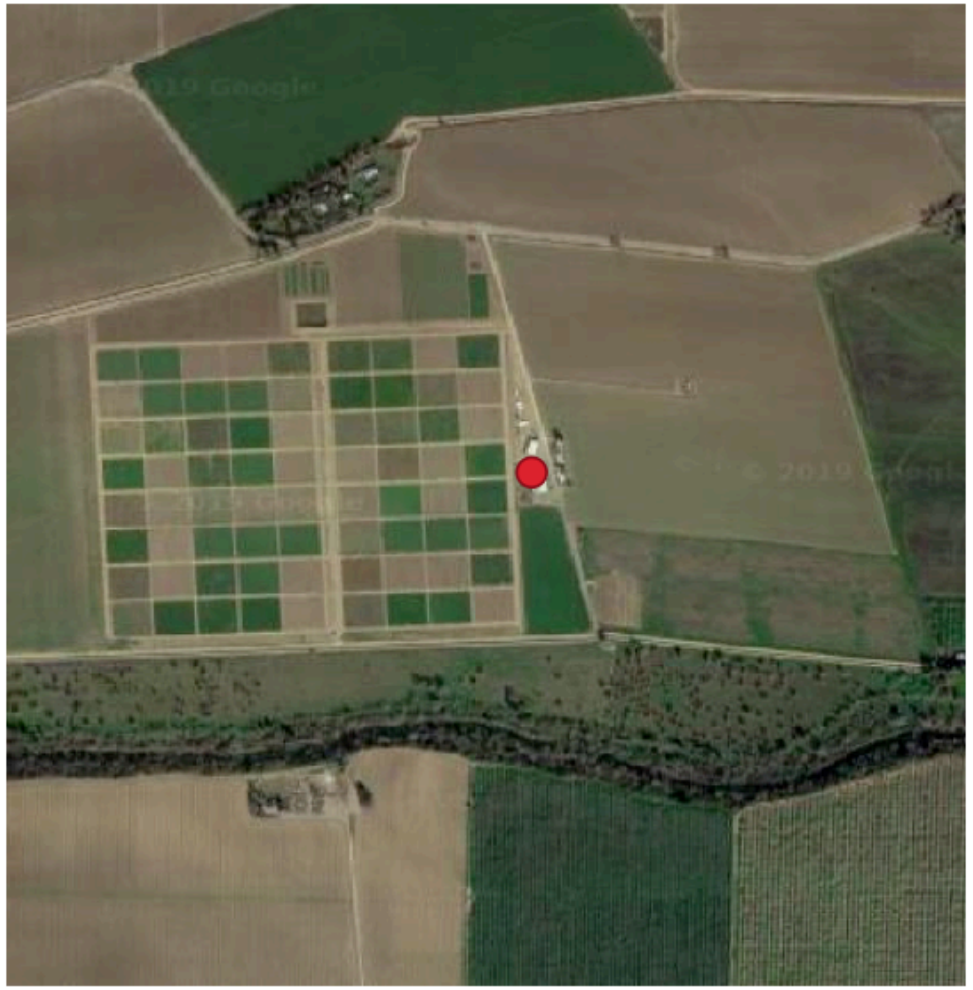


Leaf-to-Canopy Level Experiment – Russel Ranch, UC Davis

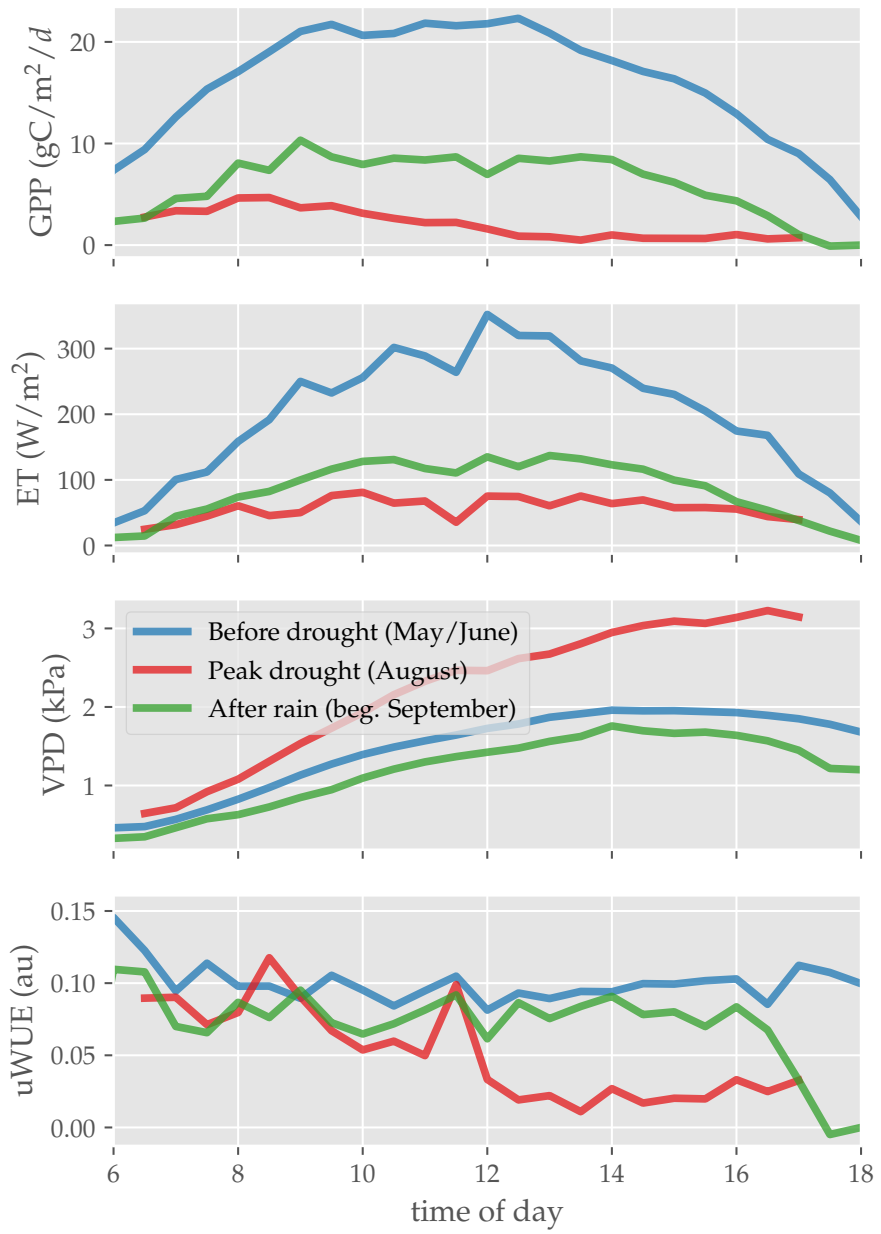
ECOSTRESS LST



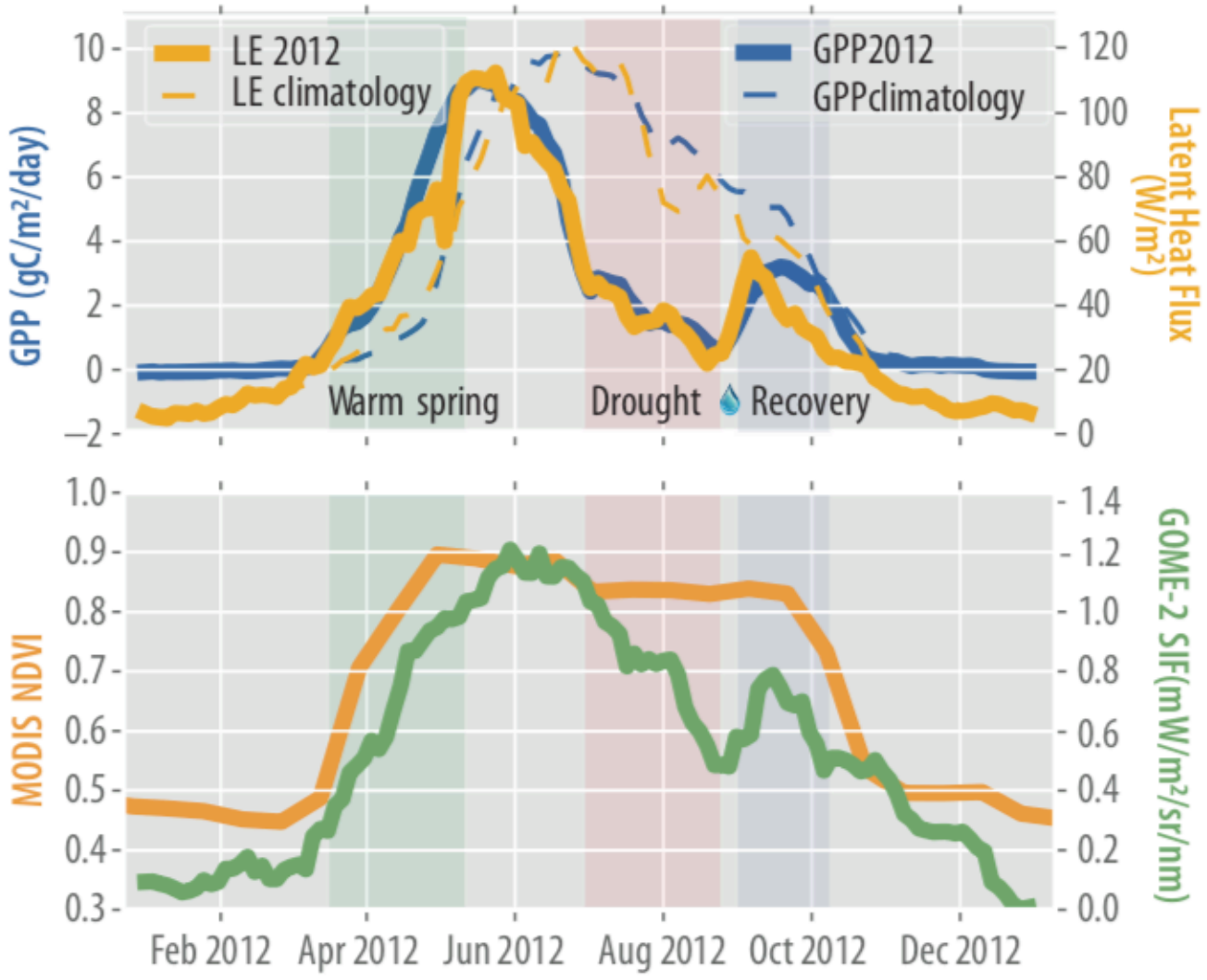
Google Earth Image



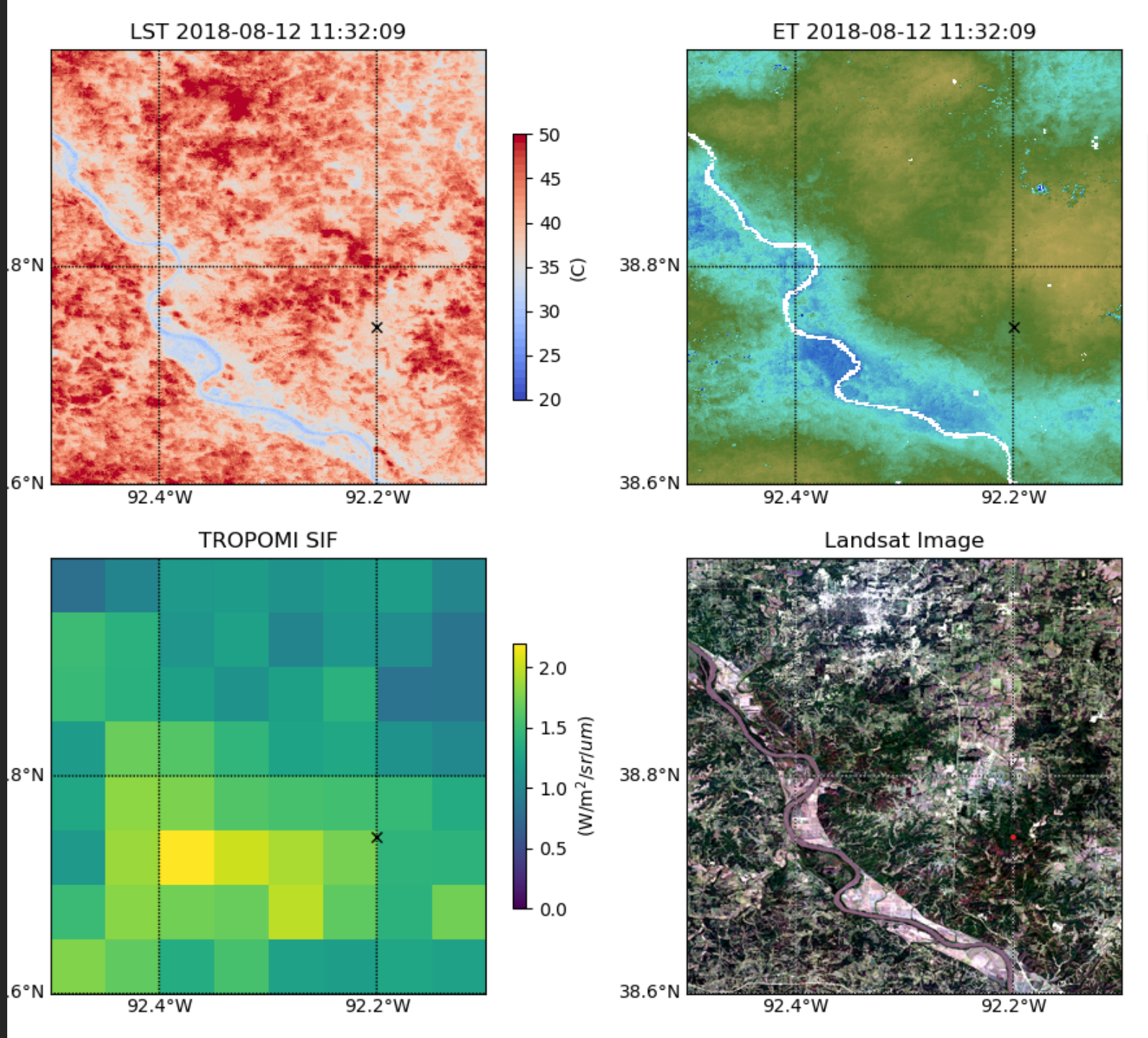
Site Level



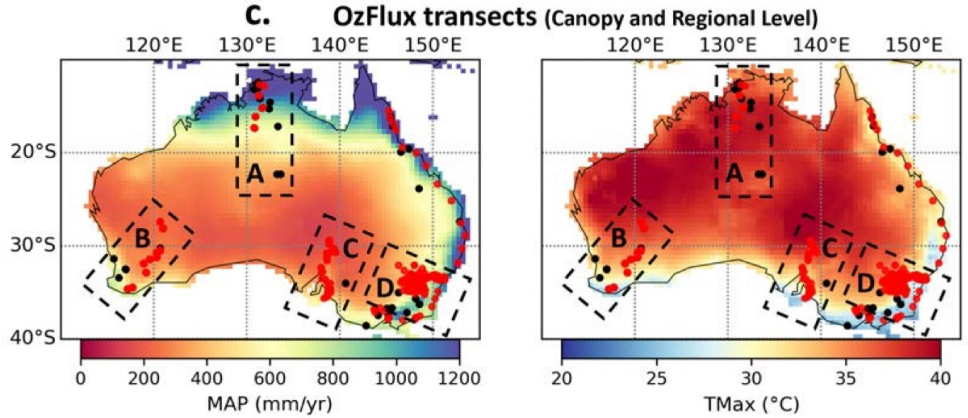
Ozark, Missouri

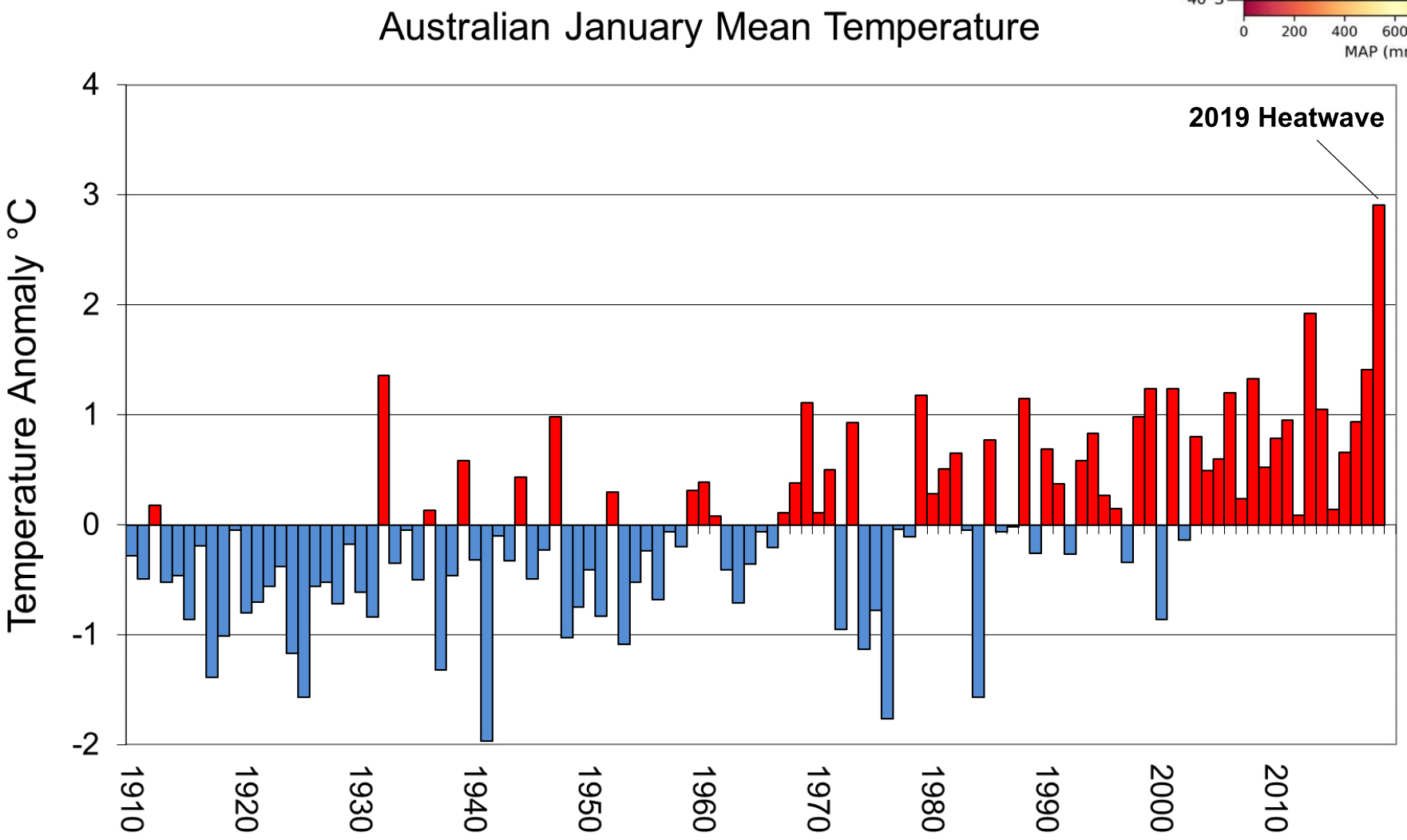


Flux site & satellite obs



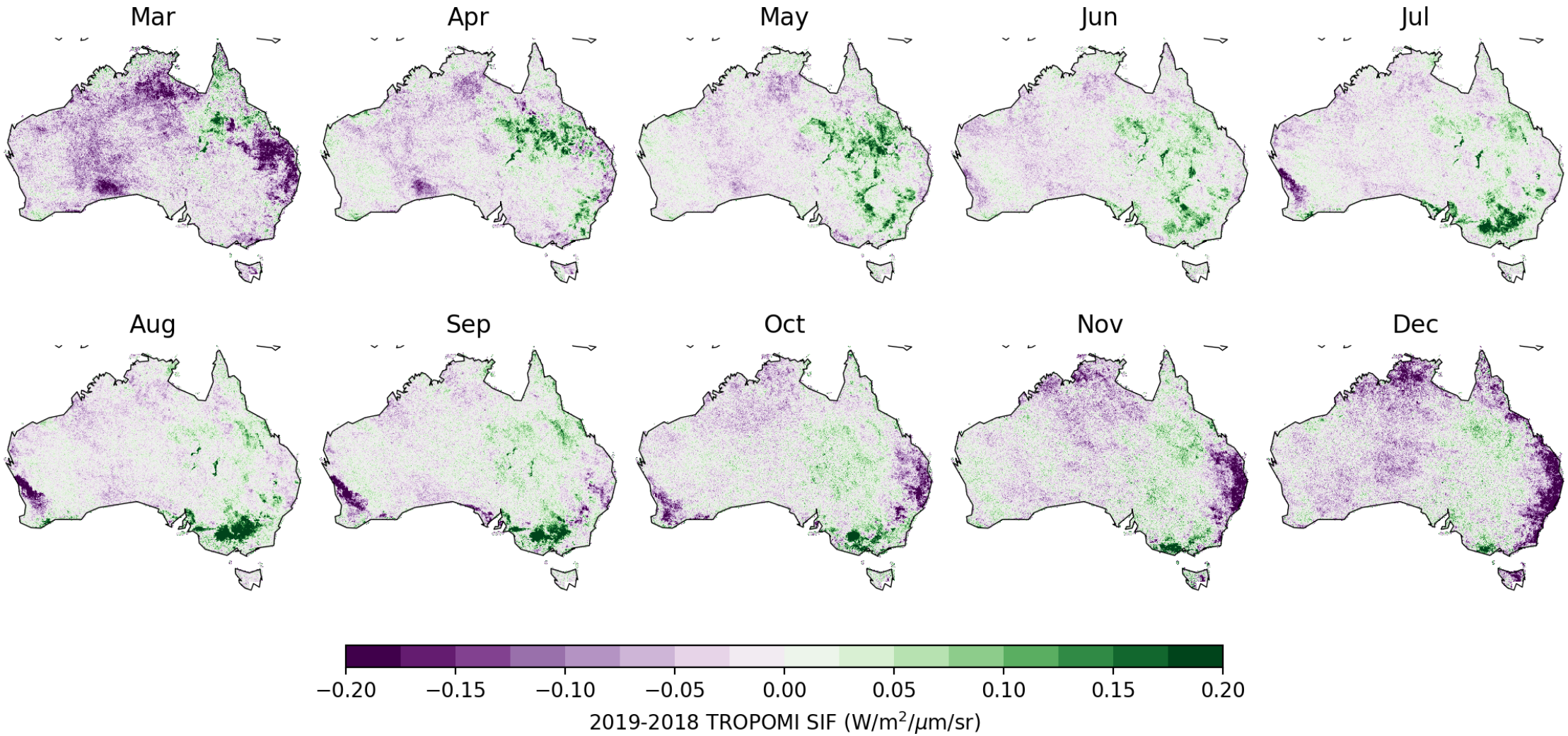
Regional Scale



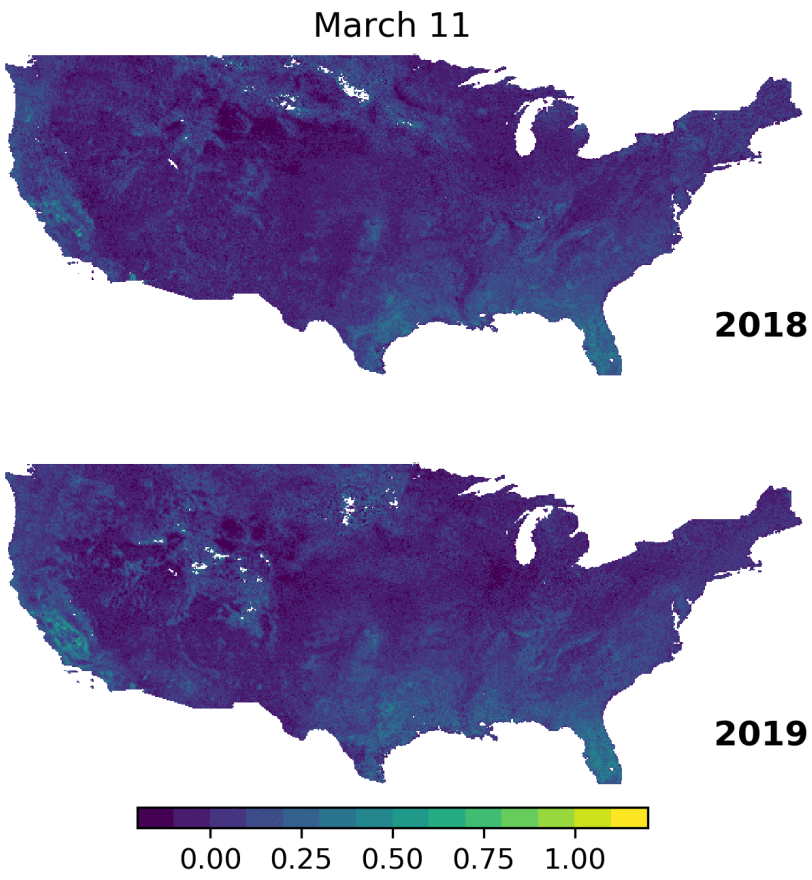


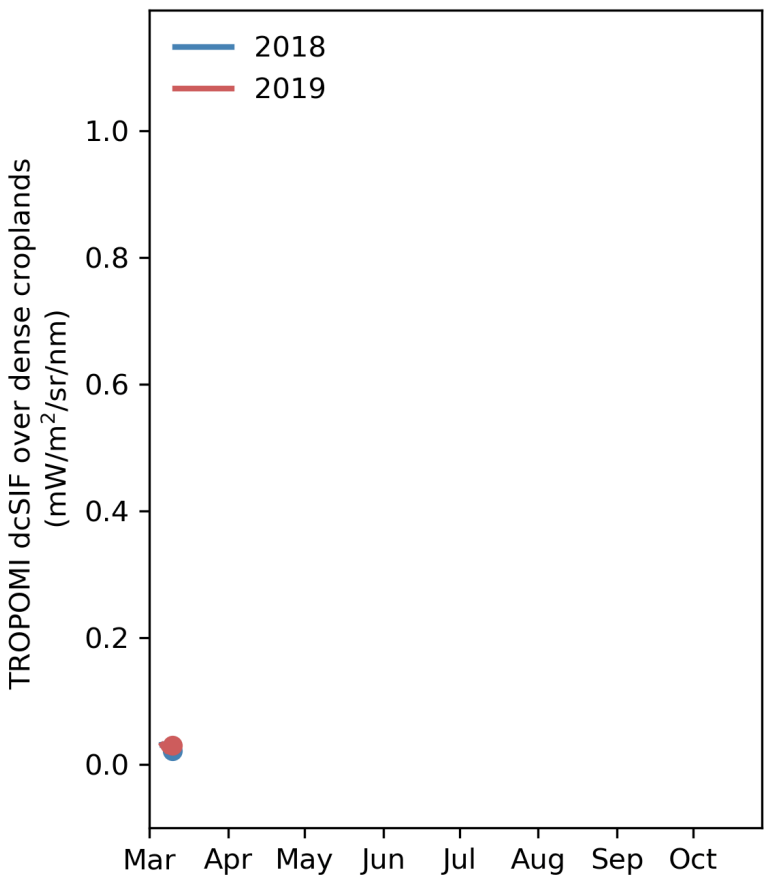
"New" Australia T record at the time of the ECOSTRESS proposal 2019

SIF differences 2019 vs. 2018



2019 Midwest floods



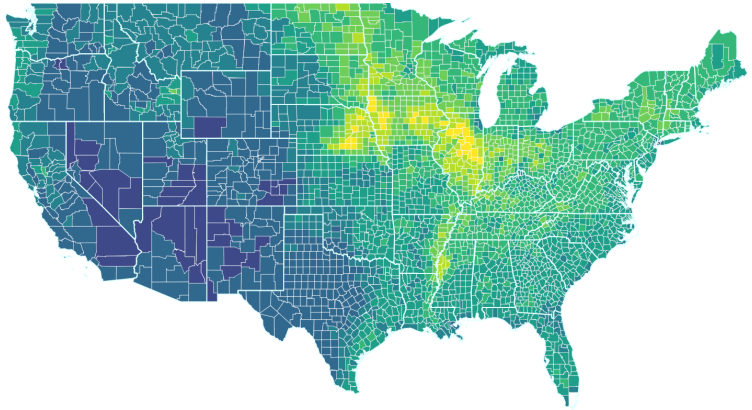


2019 Midwest floods

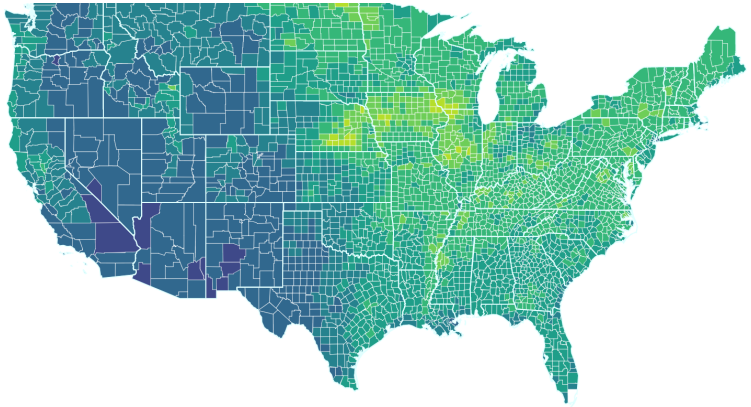
How about ET?

ECOSTRESS & OCO-3 can help us looking into high-resolution regional patterns & diurnal variations!

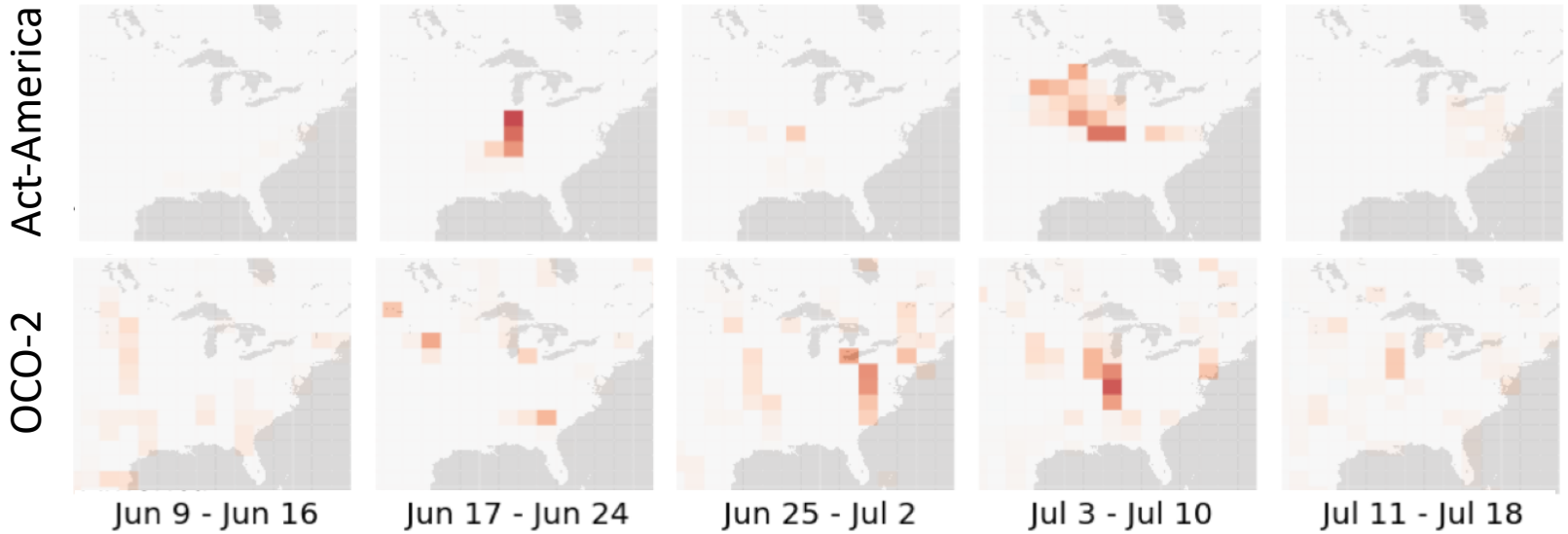
2018 SIF (July)

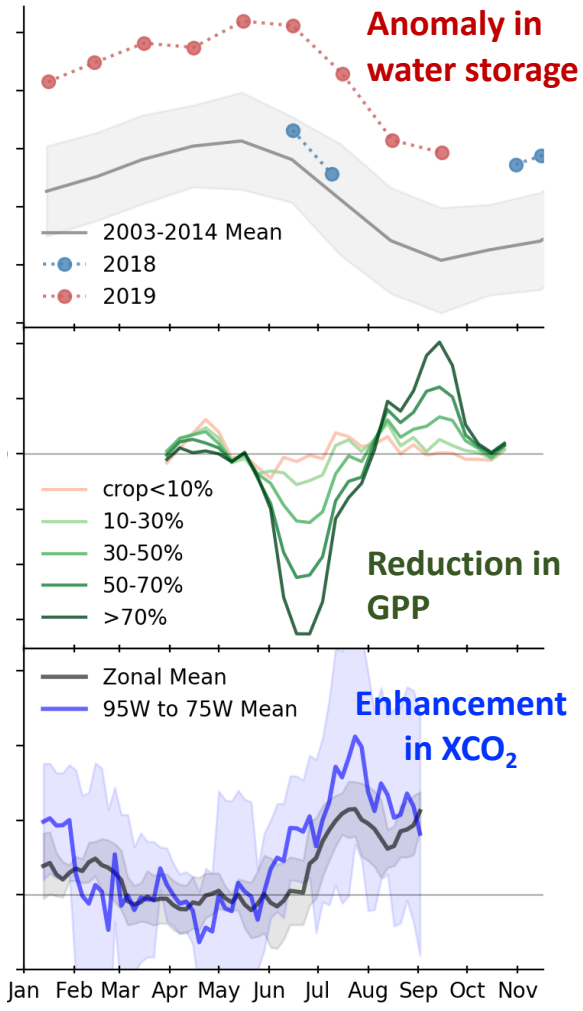


2019 SIF (July)



CO_2 enhancement relative to 2018





Yin et al, AGU Advances, *in press*

Thank you!

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