

# Giga-LES Land Behavior: A Brief Overview



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Land Breakout

# Last Summer Don gave an introduction to Giga-LES

- SiB3 in SAM 6.10.4
- 1.6km Grid Resolution (128x128)
- 22 April-07 June 2011
- ARM-CART region

# The GigaLES-2 experiment

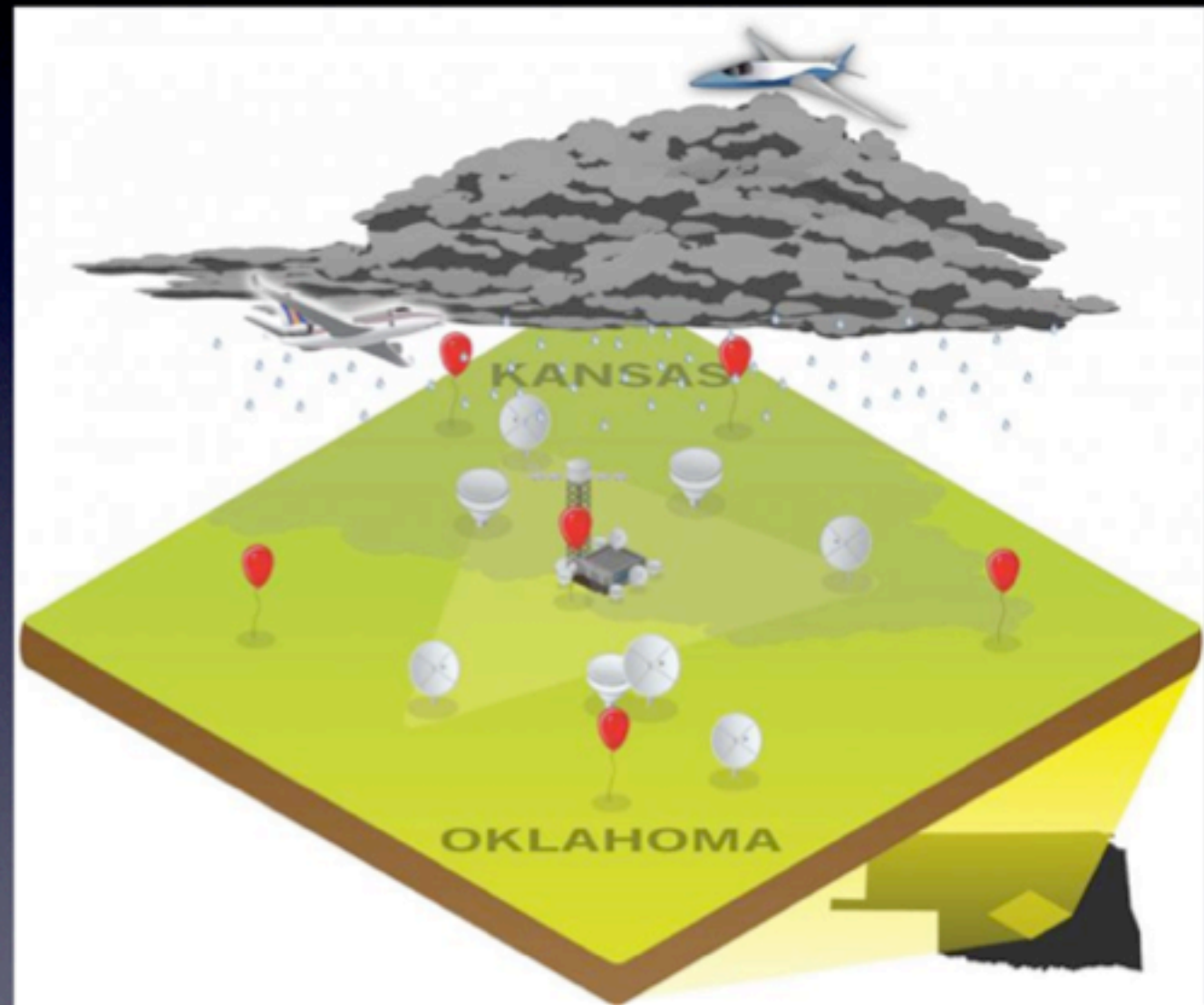
- Midlatitude Continental Convective Clouds Experiment (MC3E)

Location – 97.5W, 36.5N

Period – 22 Apr 2011 – 7 Jun 2011;  
23 May – 26 May for 100m grid spacing.

The CRM is forced with advective tendencies of temperature and water vapor derived from the field campaign observations.

- So far I have worked with 1.6km resolution, 205kmx205km, 64 layer domain.



(Don's slide)

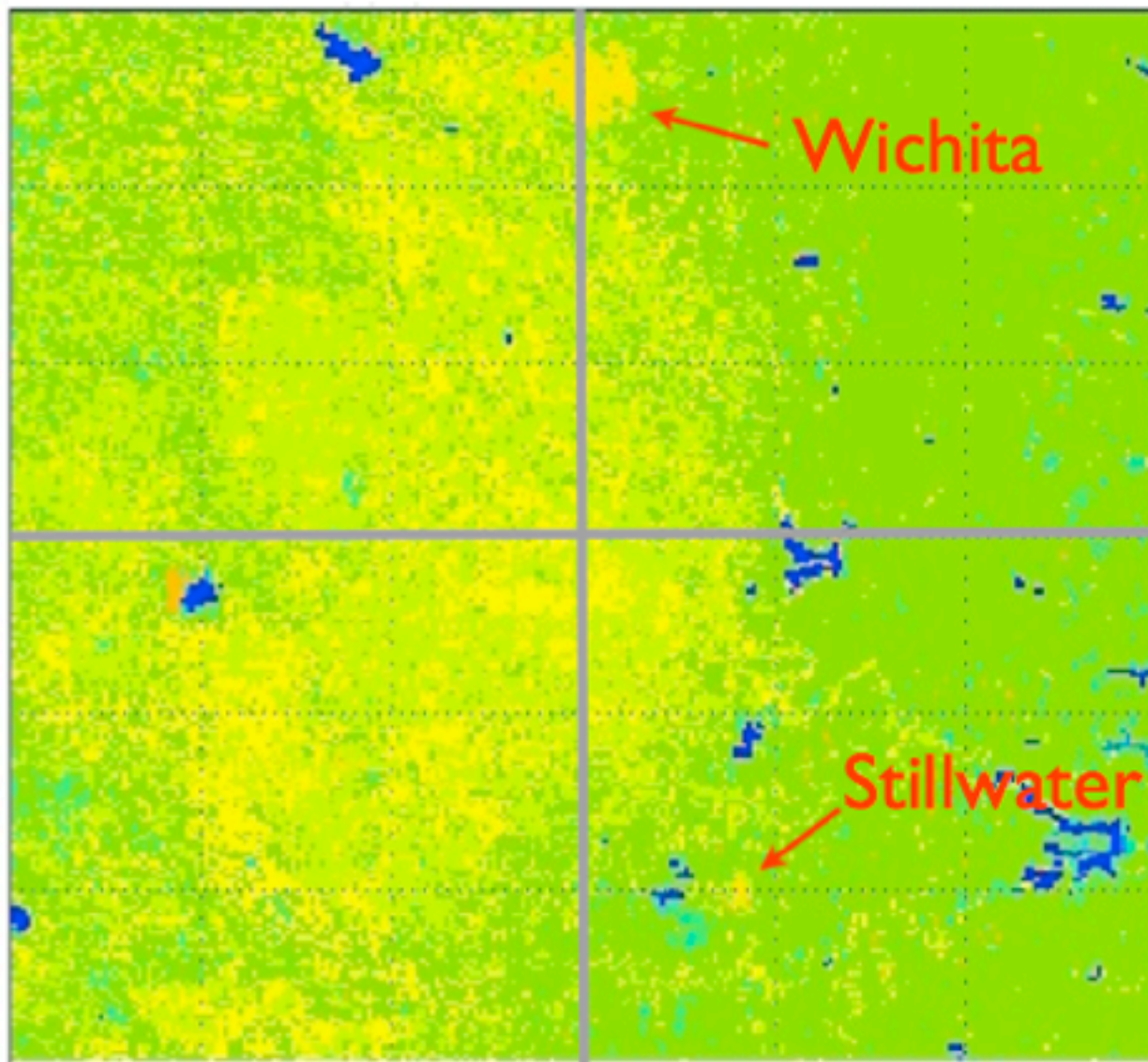


# The Domain

## Going from the real world to an idealized one

Mar 25, 2013

MODIS 1-km vegetation type  
ARMICART region



(Don's slide)

Ian identified 4 biomes occurring for at least 1% of the domain:

Deciduous forest (SiB biome 2)

Grassland (SiB biomes 6 and 7) - green

Agriculture (SiB biome 12) - yellow

The domain is roughly  $2^\circ$  longitude  $\times$   $2^\circ$  latitude. We broke it up according to the  $1^\circ$  degree NCEP and GPCP forcing used to spin up offline SiB with prognostic phenology for 28 years to set SiB prognostic variables for the start of the MC3E IOP.

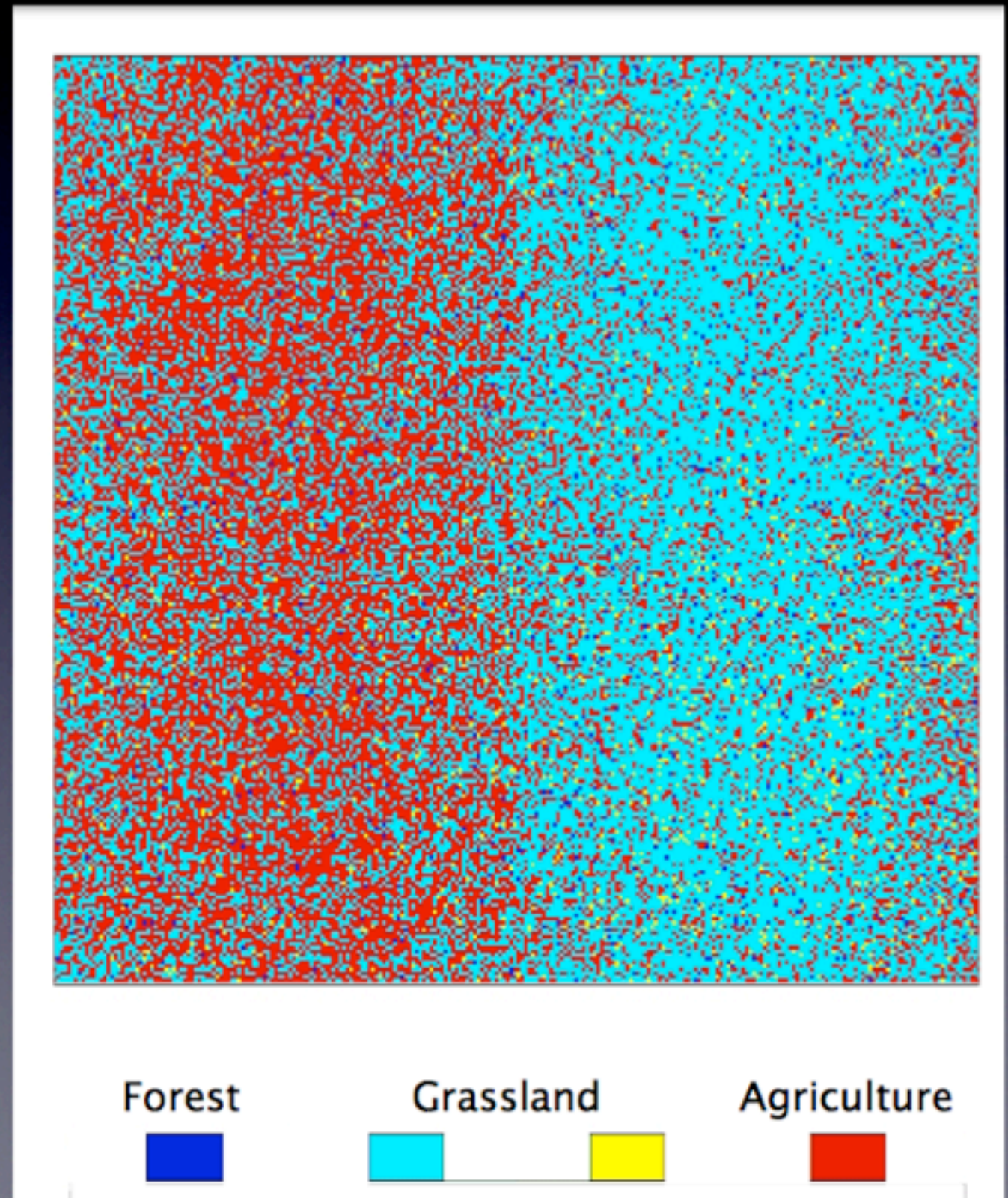
4 biomes times 4 forcing regions (different parameters and prognostic field values) gives 16 different surface types.



# Simulating a real domain with a cyclic-boundary condition model

- Avoiding discontinuities at boundaries
- Avoiding discontinuities at other imposed scales - in this case the  $1^\circ$  spinup forcing
- We used 'fuzzy'  $1^\circ$  squares and random biome distribution with at the 800m scale.

(Don's slide)

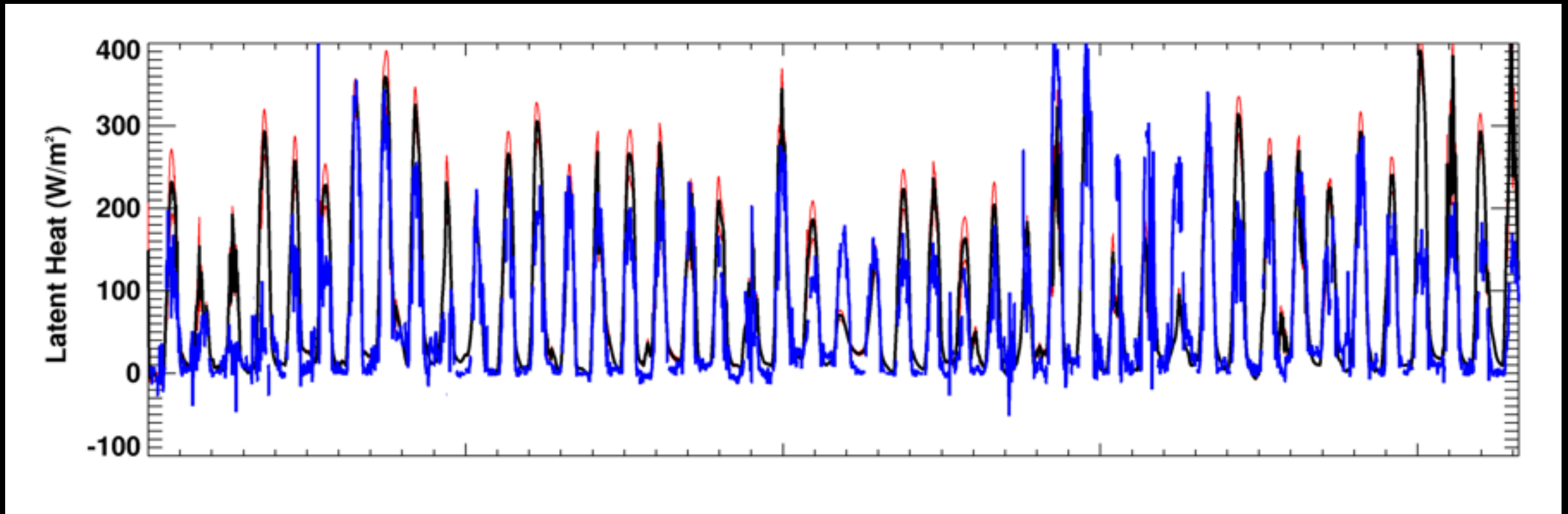




# Today: A brief look at land behavior

- Compare to observations when available
- How does domain evolve
  - spun up?
  - spatial variability

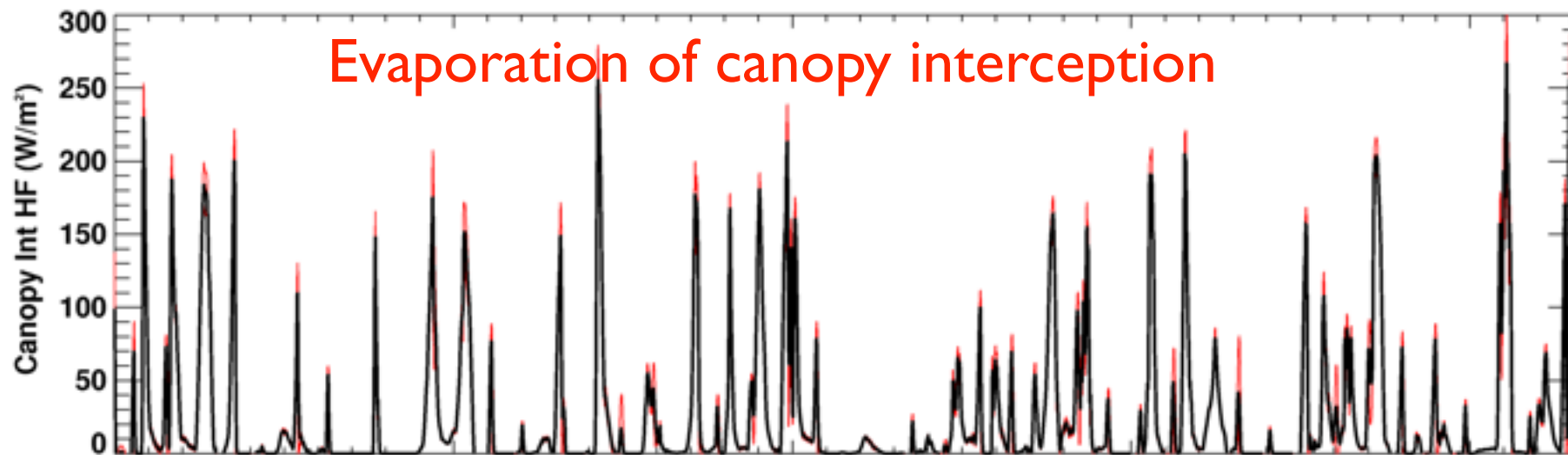
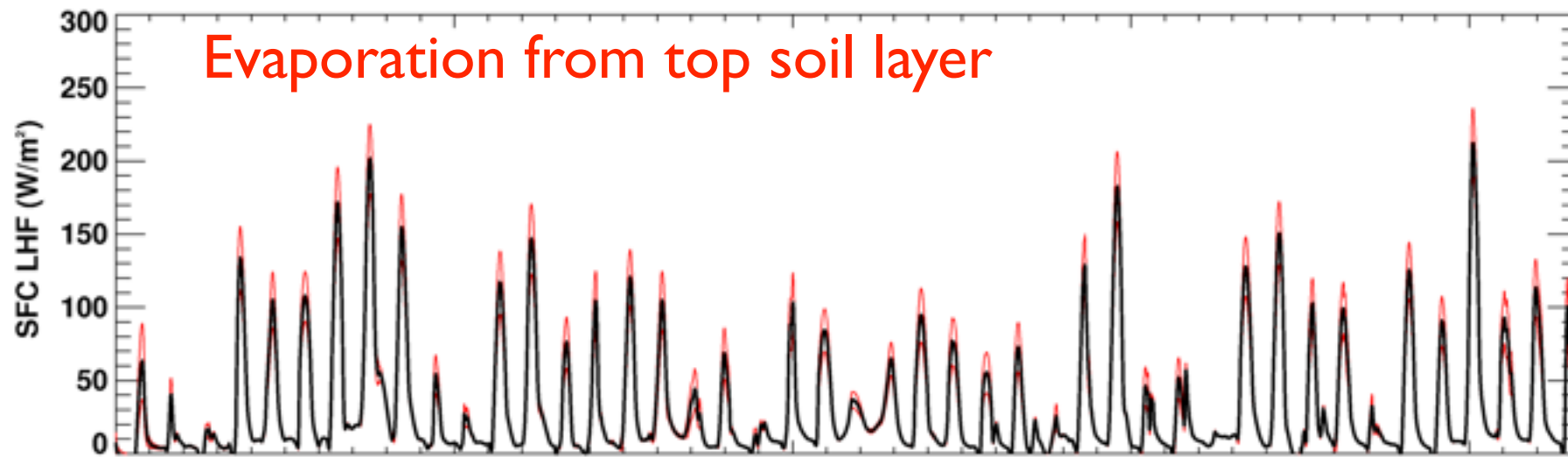
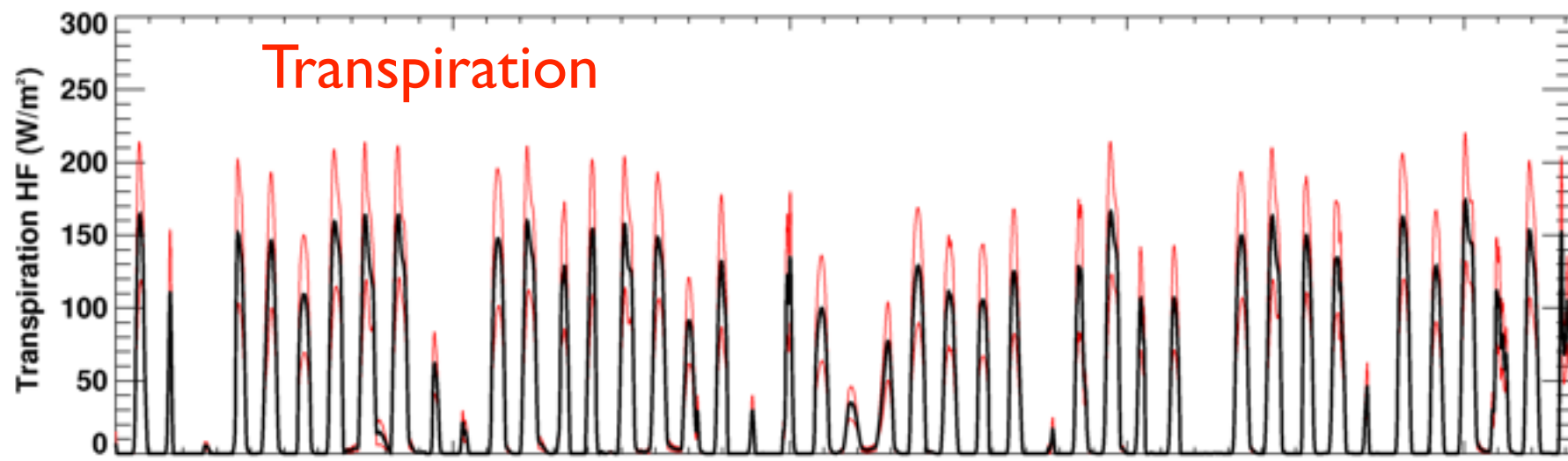
# Total Evapotranspiration



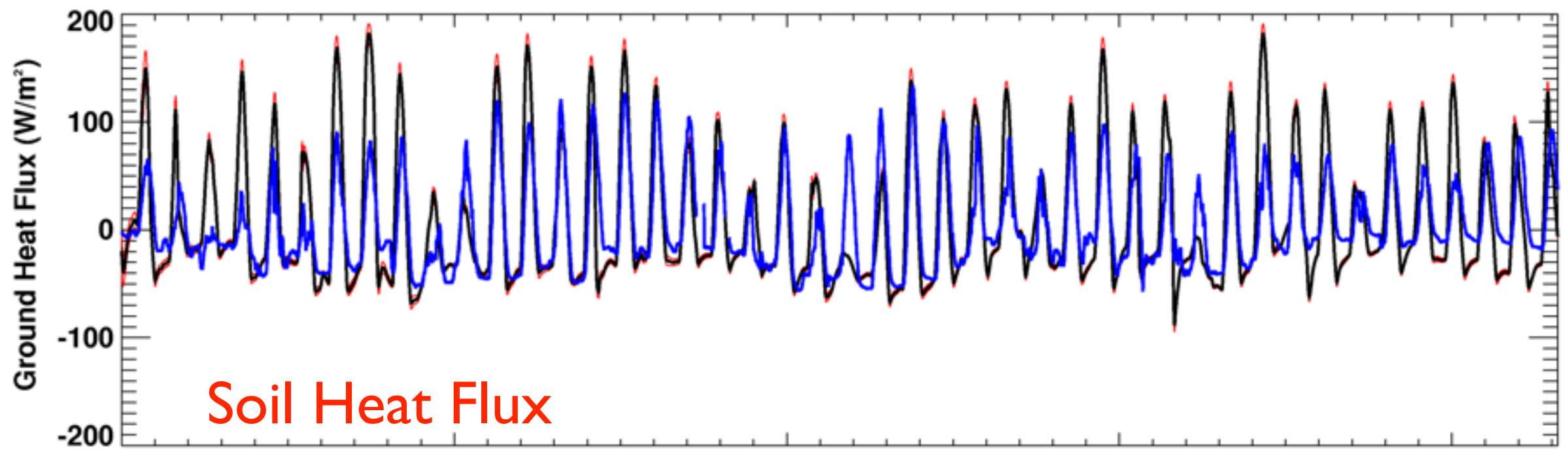
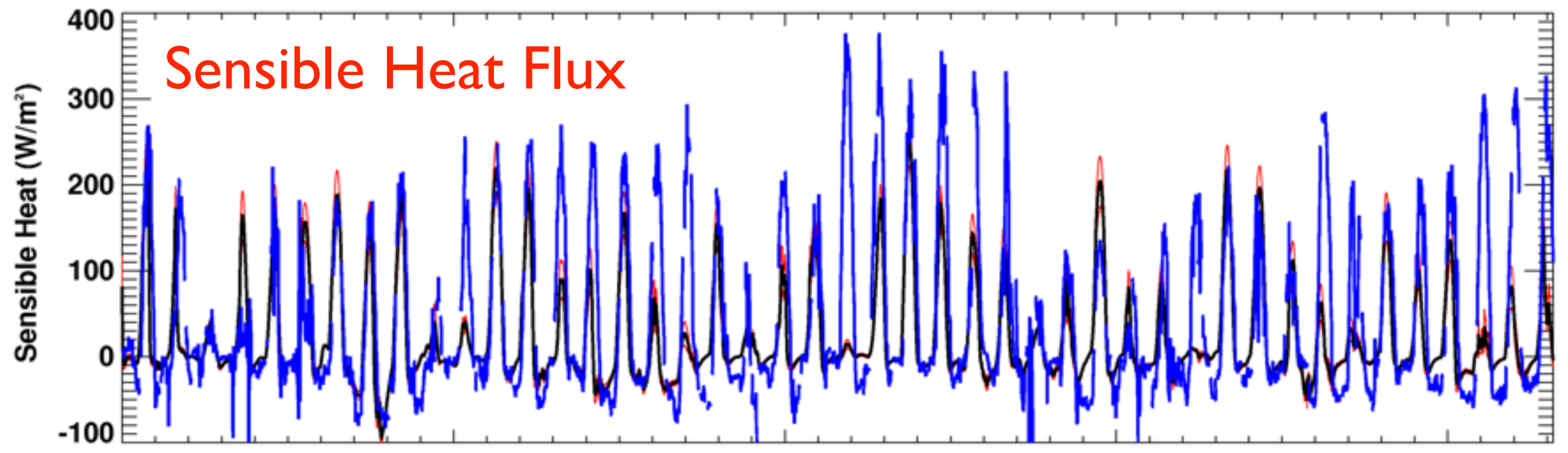
## All Plots:

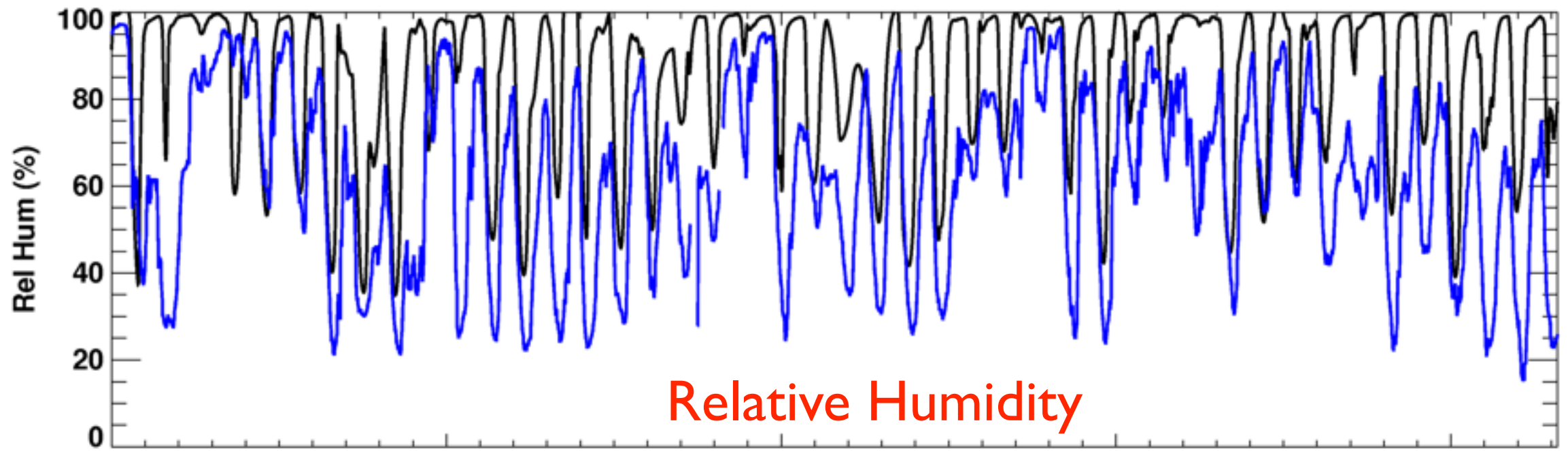
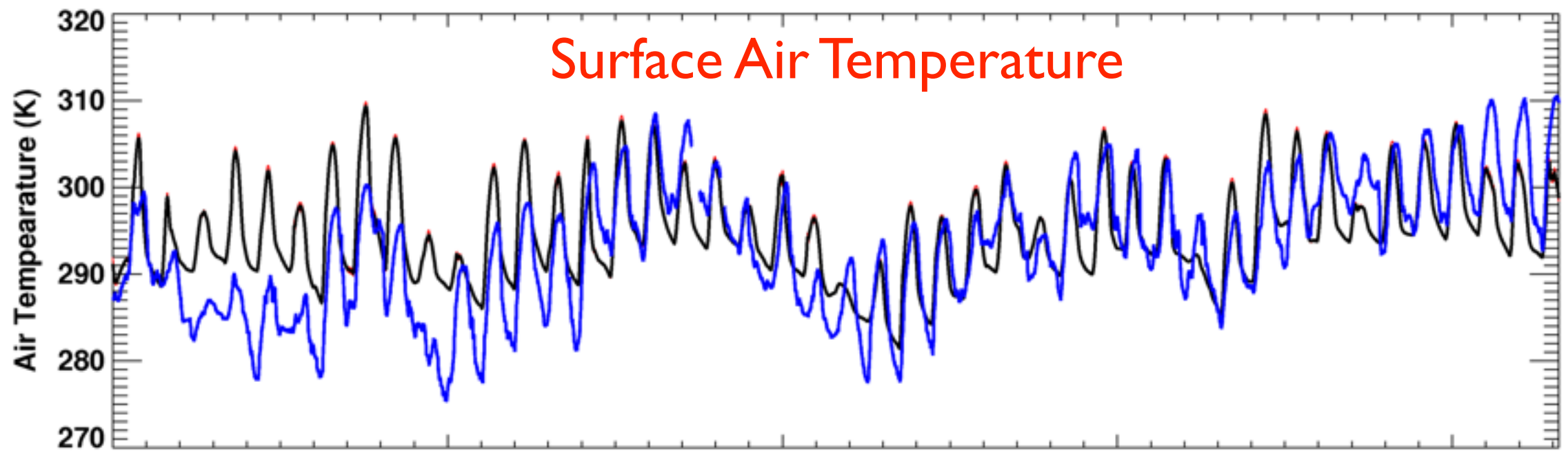
- 22 April - 06 June
- Black: model
- Blue: Available obs from ARM-SGP
- Red (where shown): +/- 1 model standard deviation

# ET Components

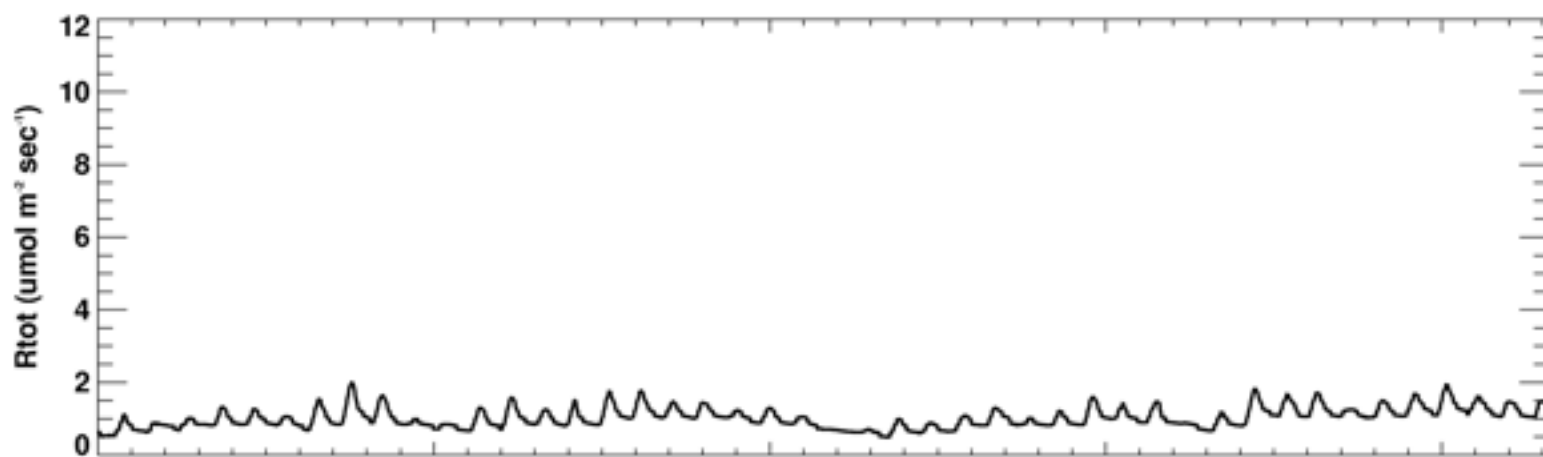
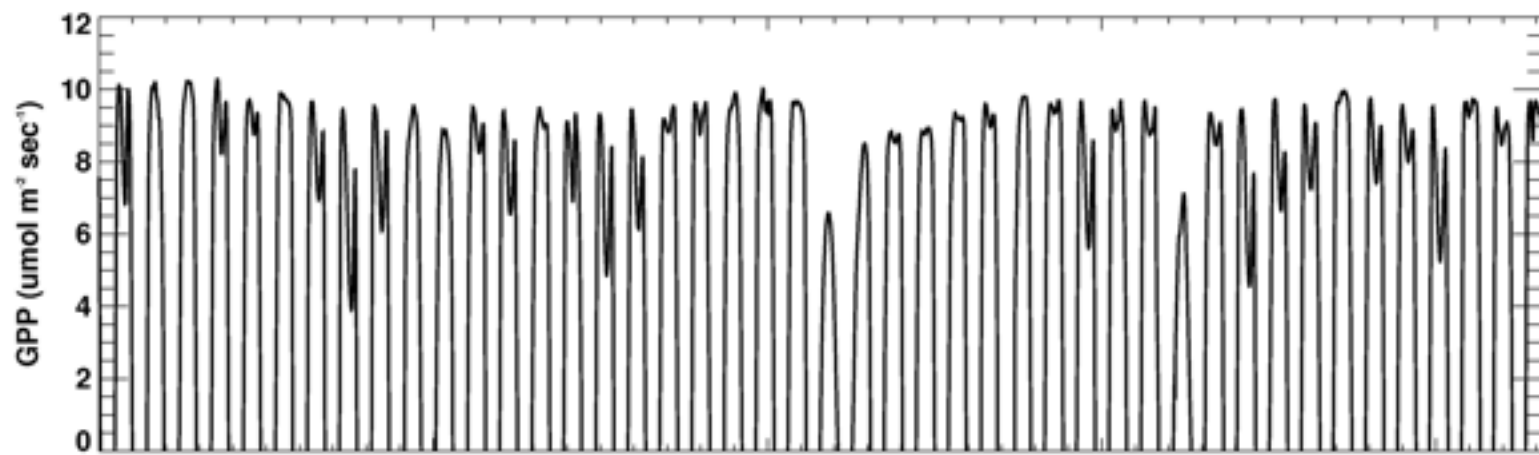
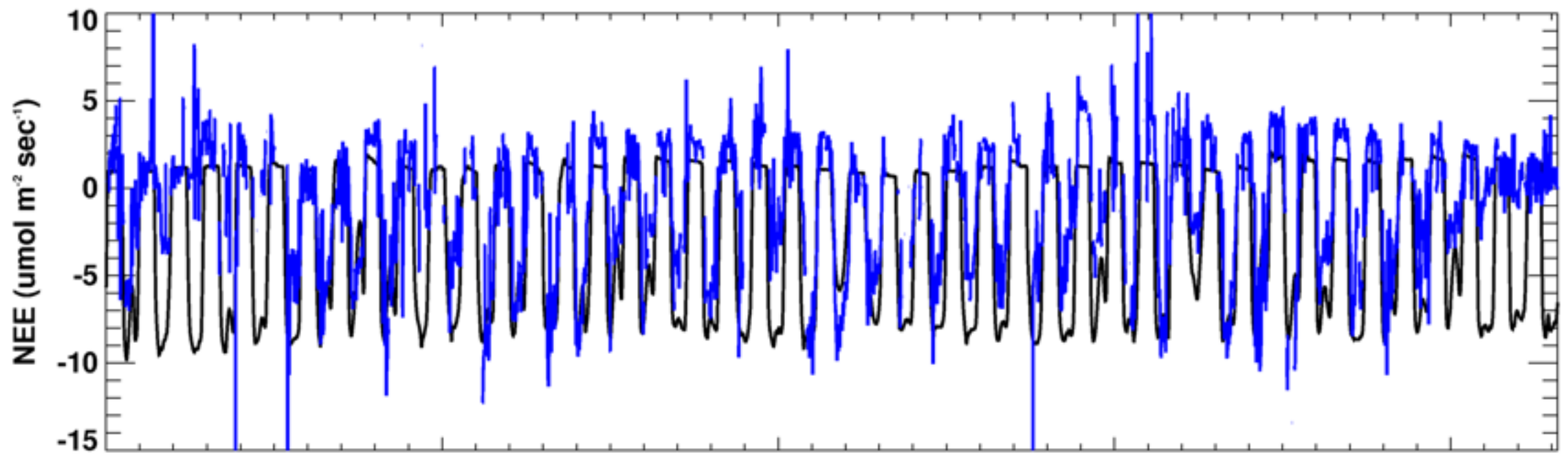


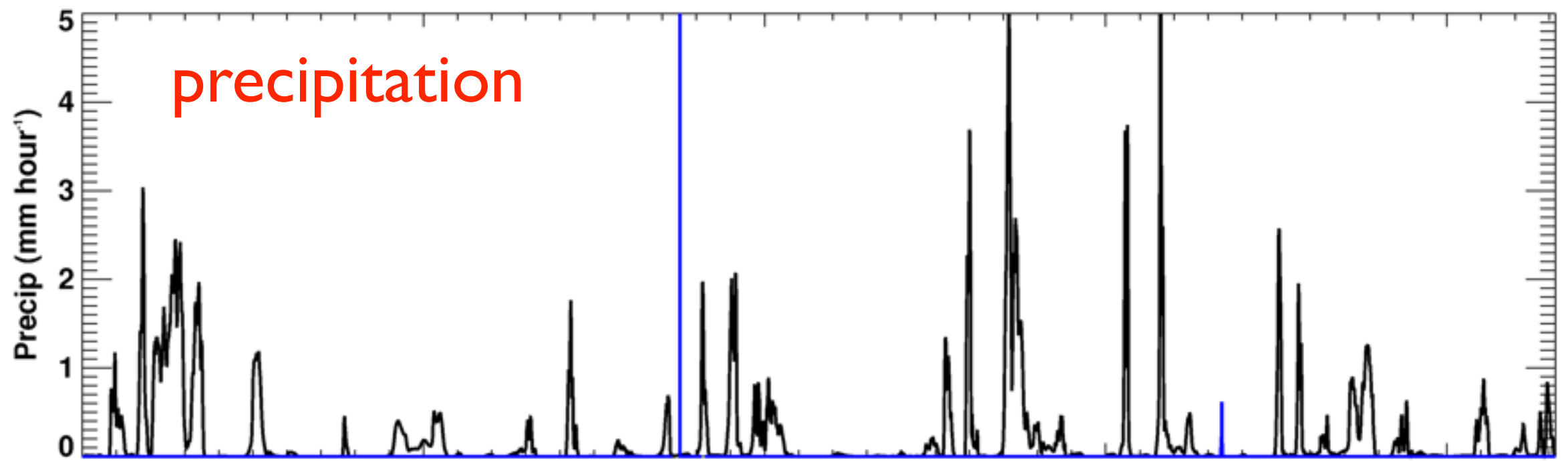
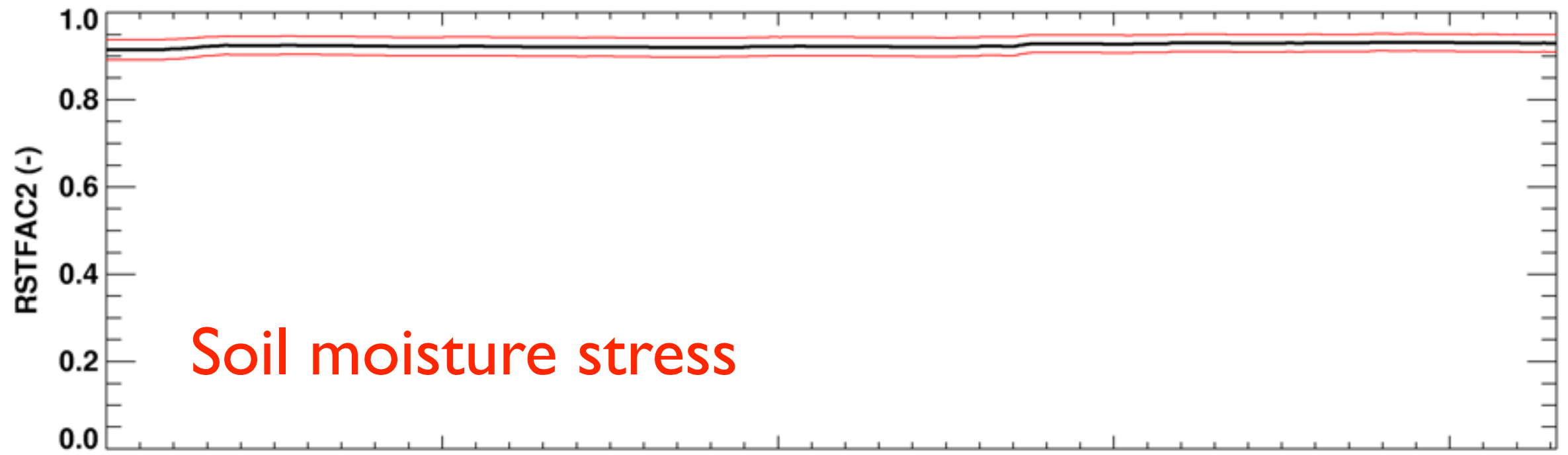














# What can we say about land behavior in the Giga-LES?

- It doesn't suck; reasonably similar to observations at ARM-SGP
- Model is wetter (higher Bowen ratio); more precip, little or no soilmoisture stress on GPP
- No long-term trend seen after the first few days (seen best in Air Temperature)
- What other questions can we ask these data?

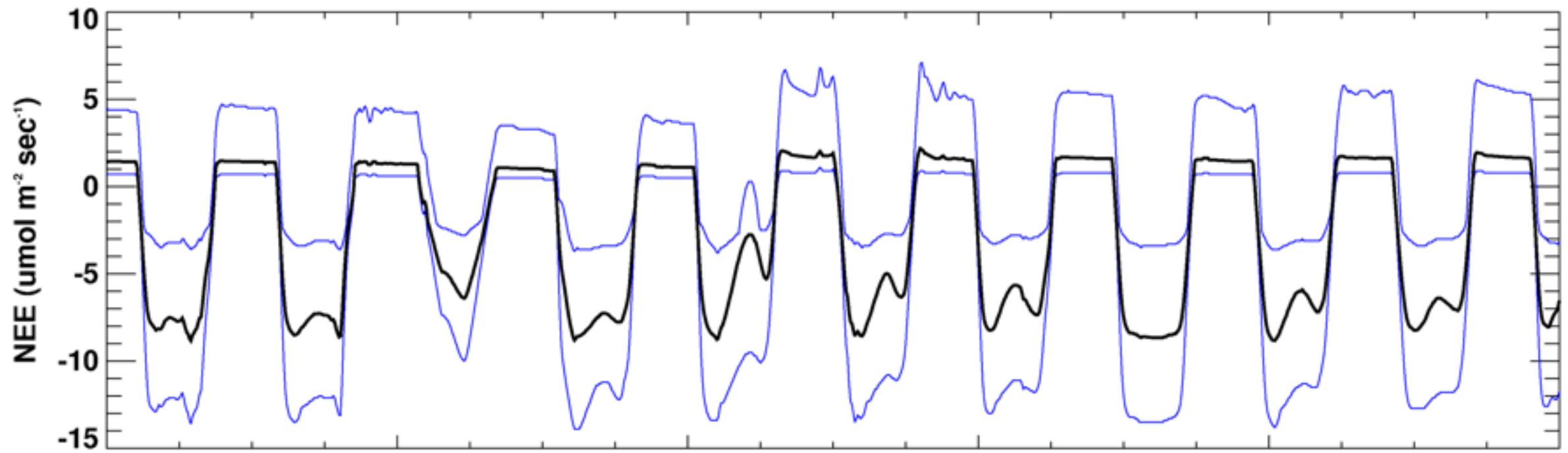
# Prime-Prime Bar

- Dave Randall's talk yesterday: are there relationships we can investigate?
- Some of these relationships are obvious ( $\langle \text{GPP}' \text{ RST2}' \rangle$ ); are there others we should explore?
- Frequently comes back to  $f(\langle x \rangle) \neq \langle f(x) \rangle$



# More Detail, Shorter Period

- timesteps 3000-4000 (approx 23 May to 02 June)
- No longer plotting observations; BLUE line is min/max simulation value



- Some interesting stress features (days 3, 5, 8)
- Midday stress almost every day



