

Diffuse Radiation and Physiological Response in a Tropical Forest

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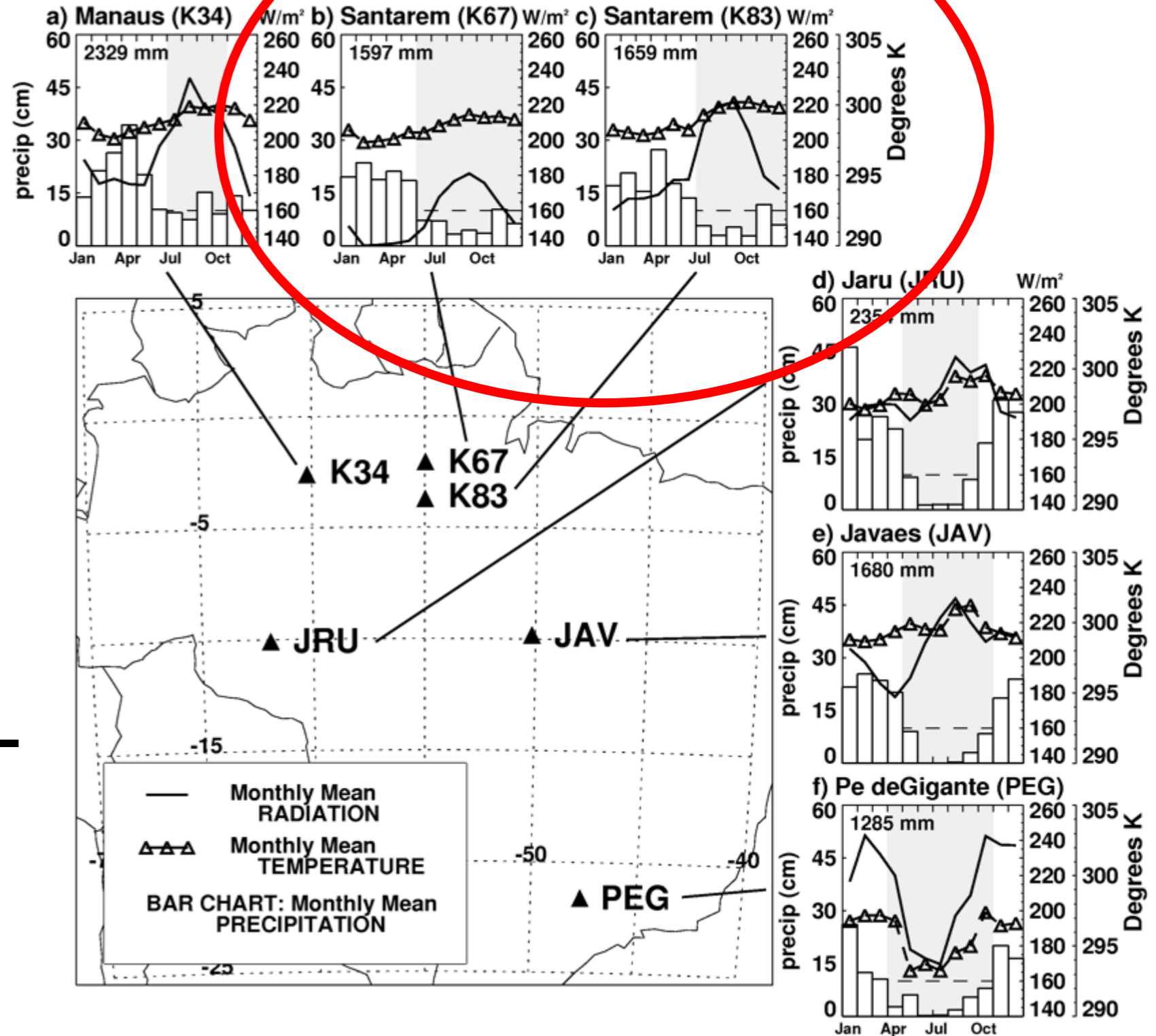
Colorado State University

Fort Collins CO, USA



Site Comparison

- Tapajos River National Forest, Brazil (KM67/KM83)
- Sites are near each other
- Virtually identical- but look at radiation!



Diurnal Composites

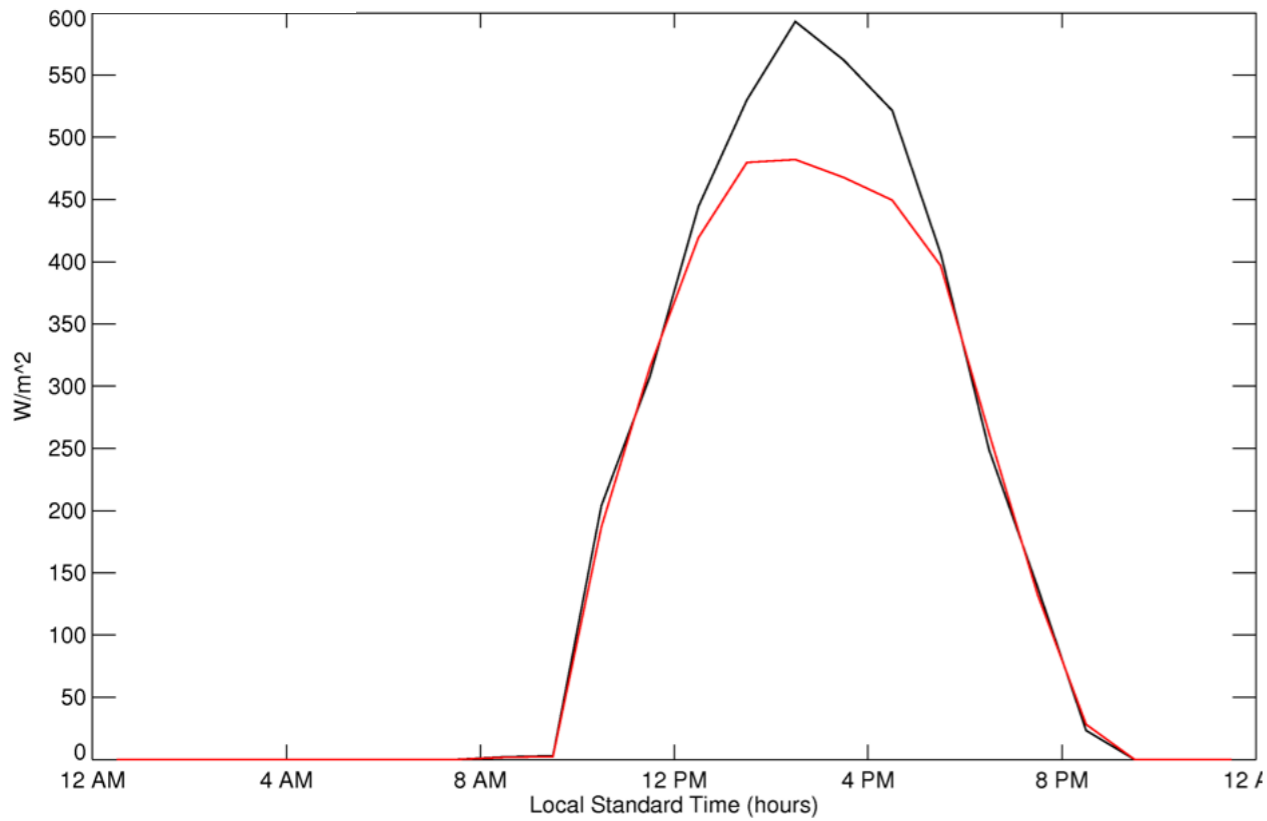
4, 2011

Apr 14, 2011

SHORTWAVE SOLAR (MMDC)

Lat: -3.02, Lon: -0.00

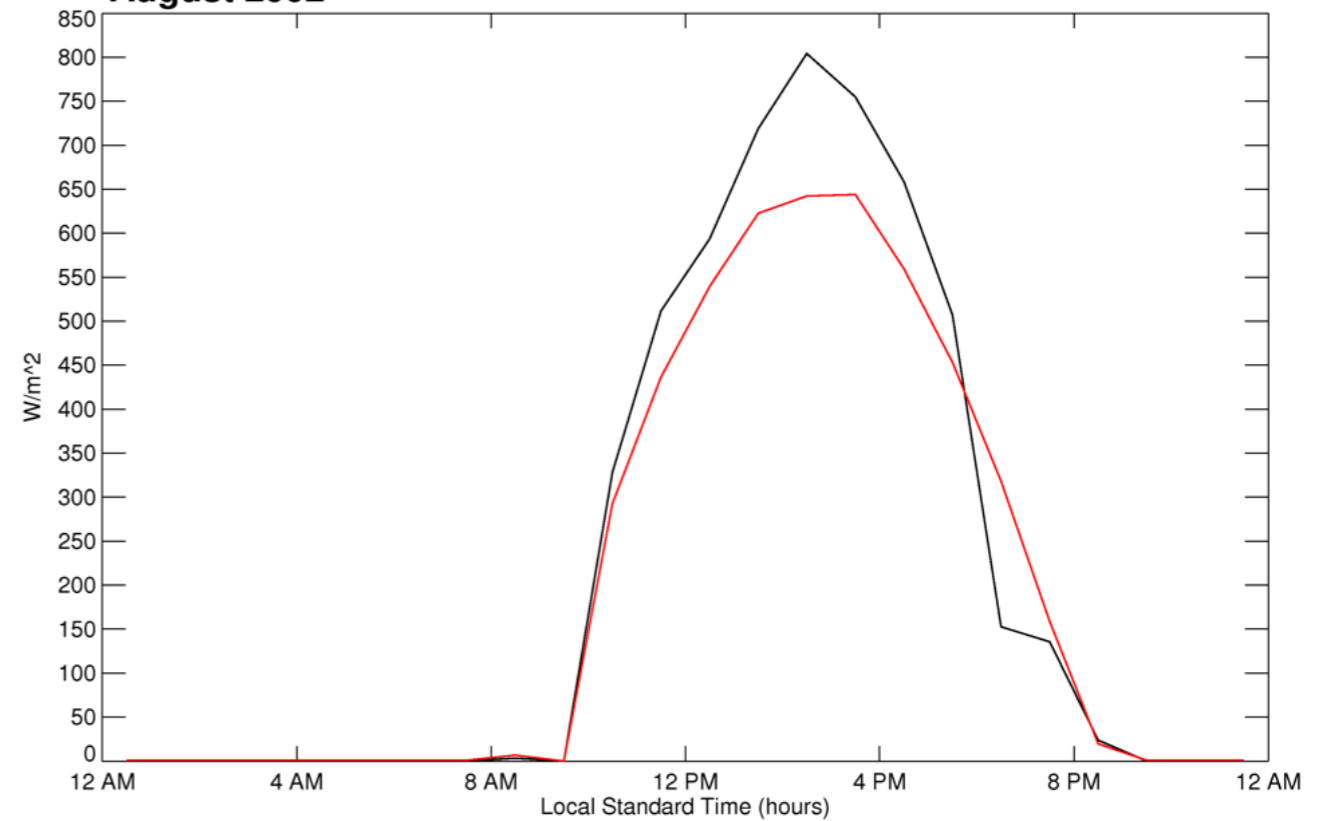
March 2002



DRIVER MET: SOLAR RADIATION

Lat: -3.02, Lon: -0.00

August 2002



— k83

— k67

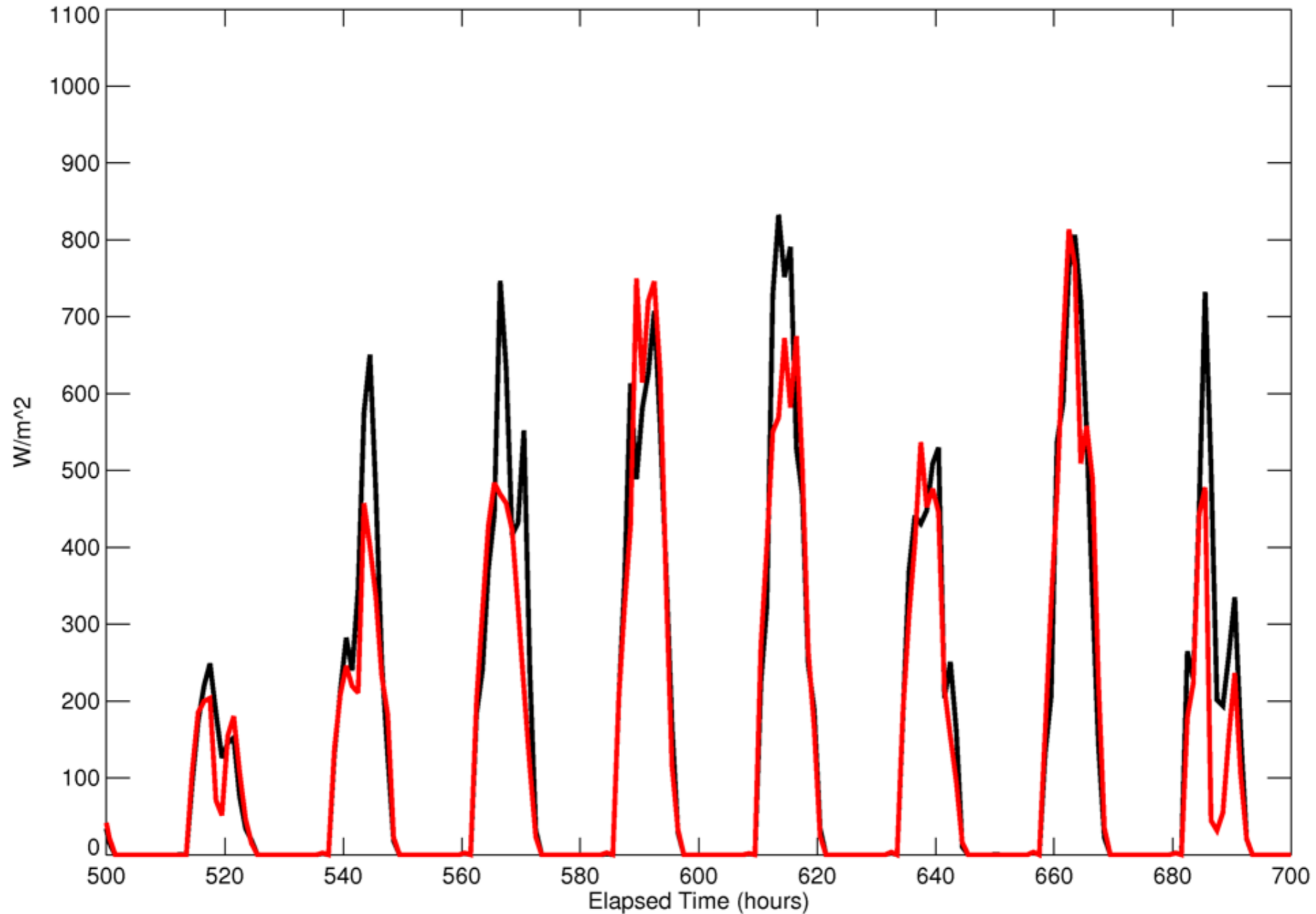
— K83

— K67

SHORTWAVE SOLAR

Lat: -3.02, Lon: -0.00

March 2002

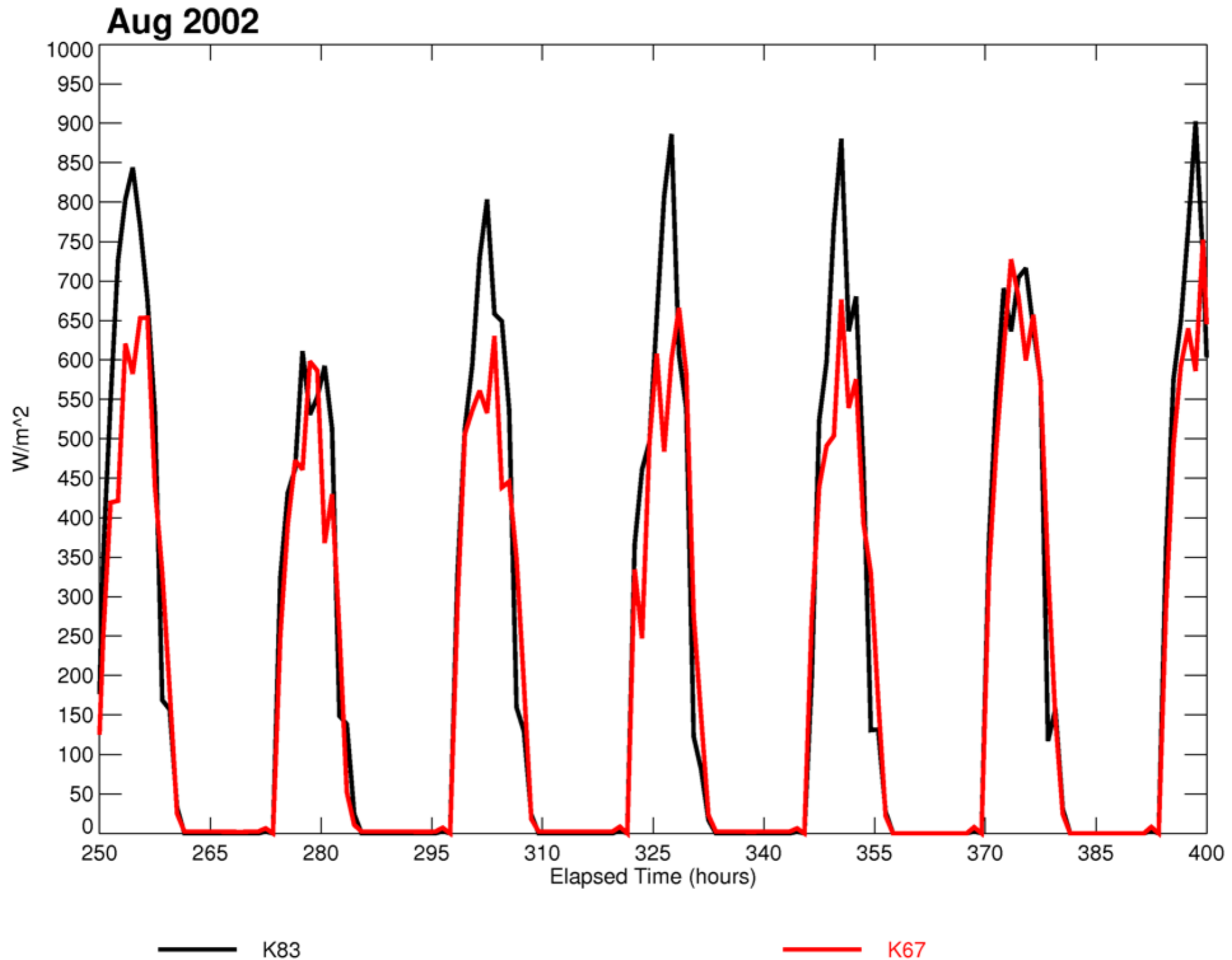


— K83

— K67

DRIVER MET: SOLAR RADIATION

Lat: -3.02, Lon: -0.00



So What's Going On?

- River Breeze
(Silva Dias et al. 2004)
- Convergence line (Lu et al. 2005)
- K67 is 'shaded' by this quasi-persistent cloud more frequently than K83!

Figure from Lu et al (2005)

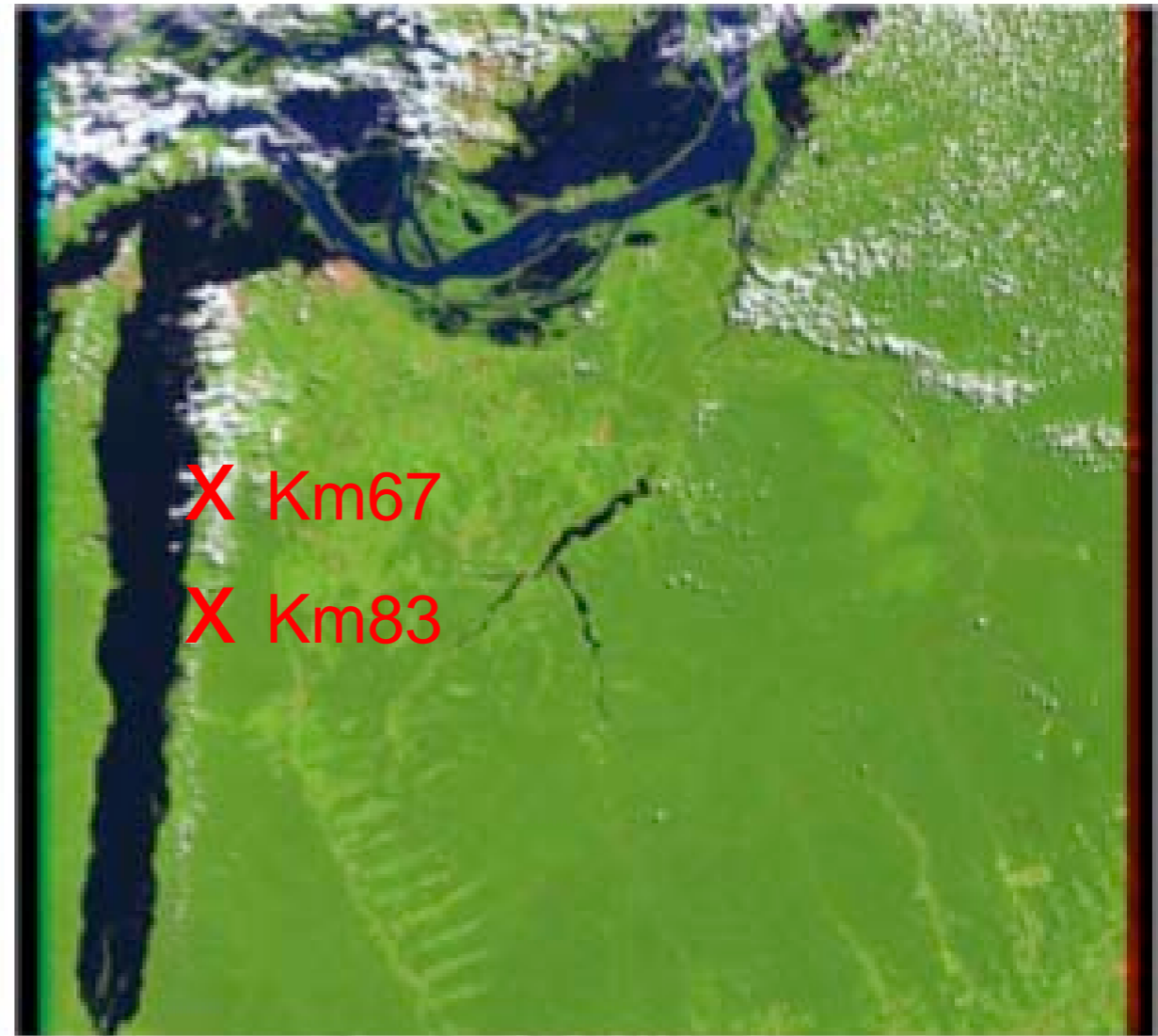
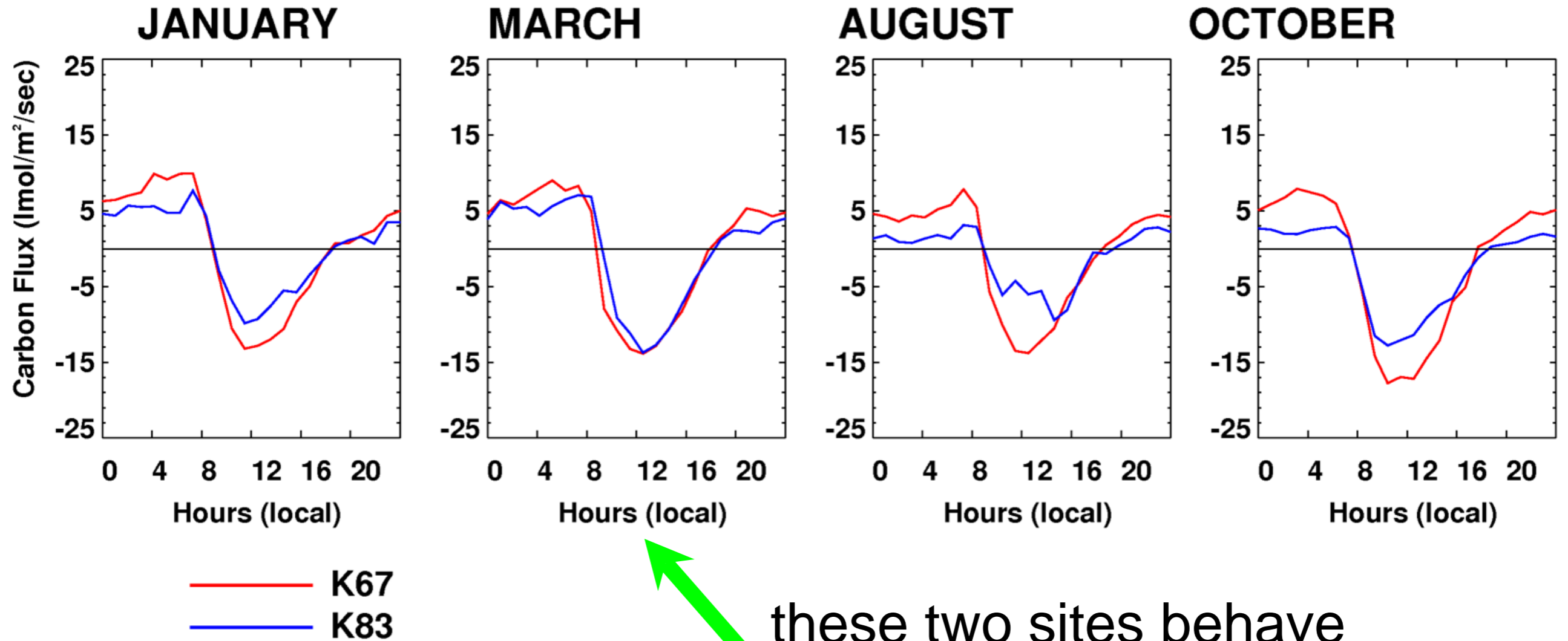


Figure 9. Satellite image obtained from Landsat 7 ETM+ scene for path 227 and row 62, on 31 July 2001. It shows that during a clear day, the low-level cumulus clouds favor the east bank of Tapajós River. The image is located at the Web site of Tropical Rain Forest Information Center (TRFIC), which is jointly hosted by LBA-ECO and Michigan State University.

Observed Carbon Flux

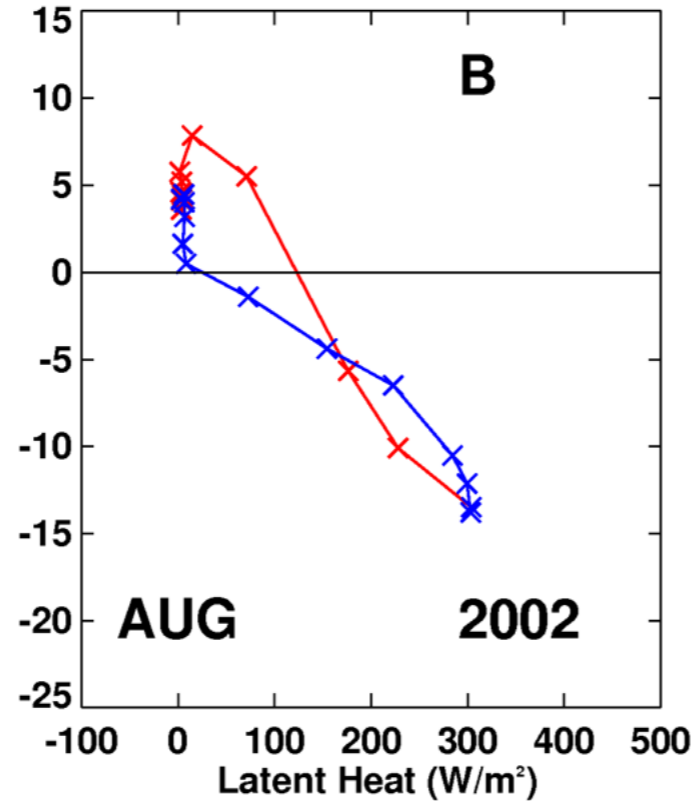
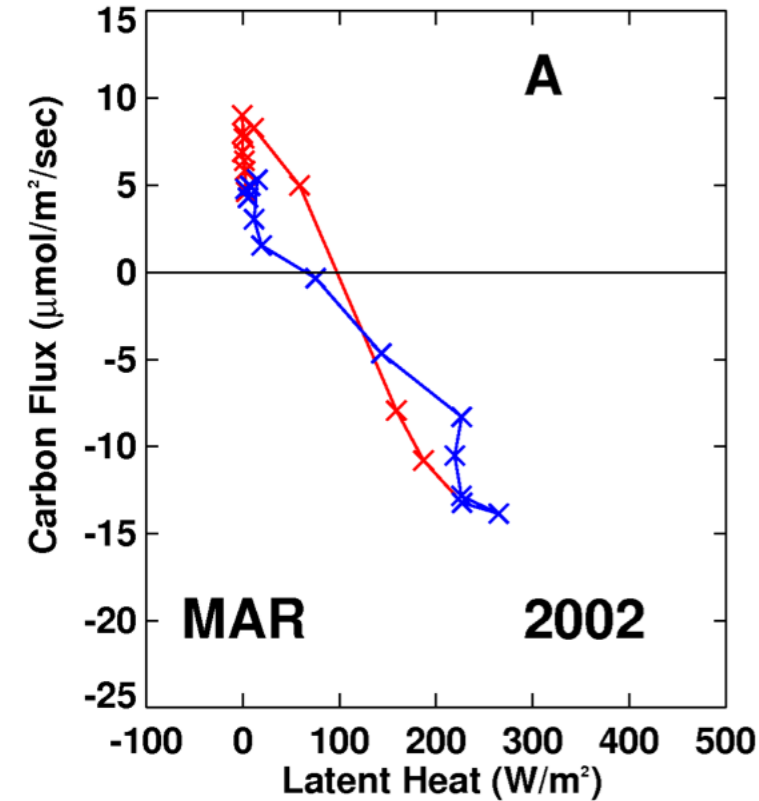
All 2002



these two sites behave identically in March, right?

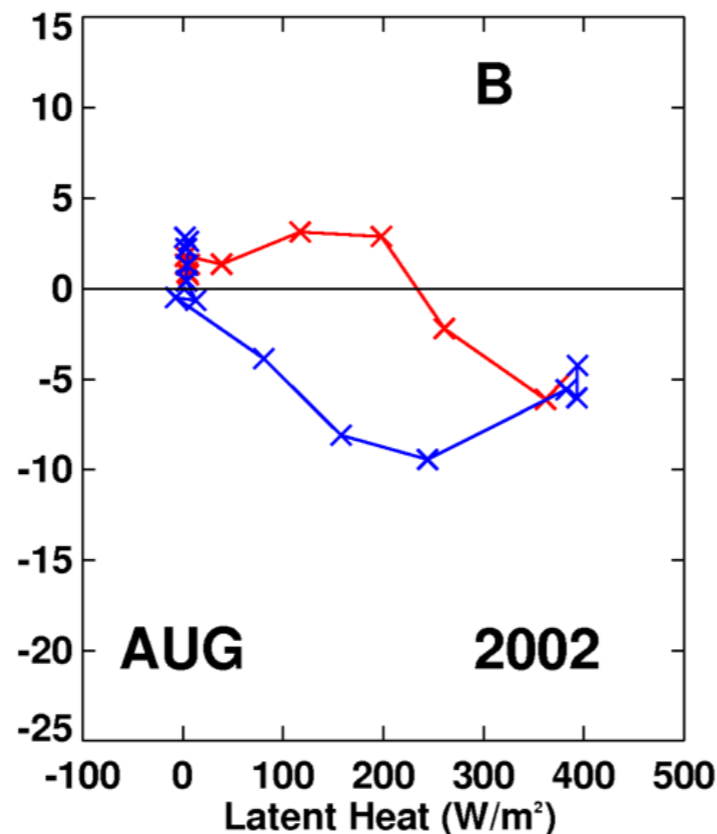
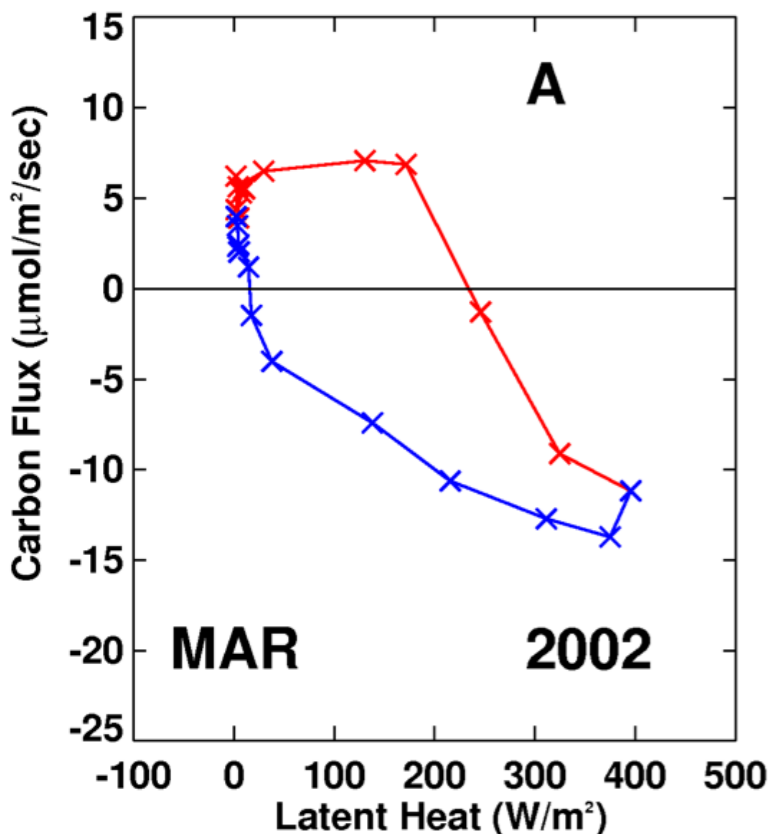
Station: K67

— MORNING
— AFTERNOON



Station: K83

— MORNING
— AFTERNOON



- K67: looks more like a 'light response' curve
- Quasi-linear response, C-flux and LE
- K83: More hysteresis (hysterical?)
- Morning: K83, greater increase in LE
- Afternoon: similar between two stns

What Should We Look At?

- Do sites behave similarly on with similar forcing?
- Are differences due to biophysics or topography and/or canopy (storage)?
- How can we partition a single radiation value into beam/diffuse/vis/nir components?
- This situation may provide a unique testbed for model simulation of variations in beam/diffuse radiative forcing