

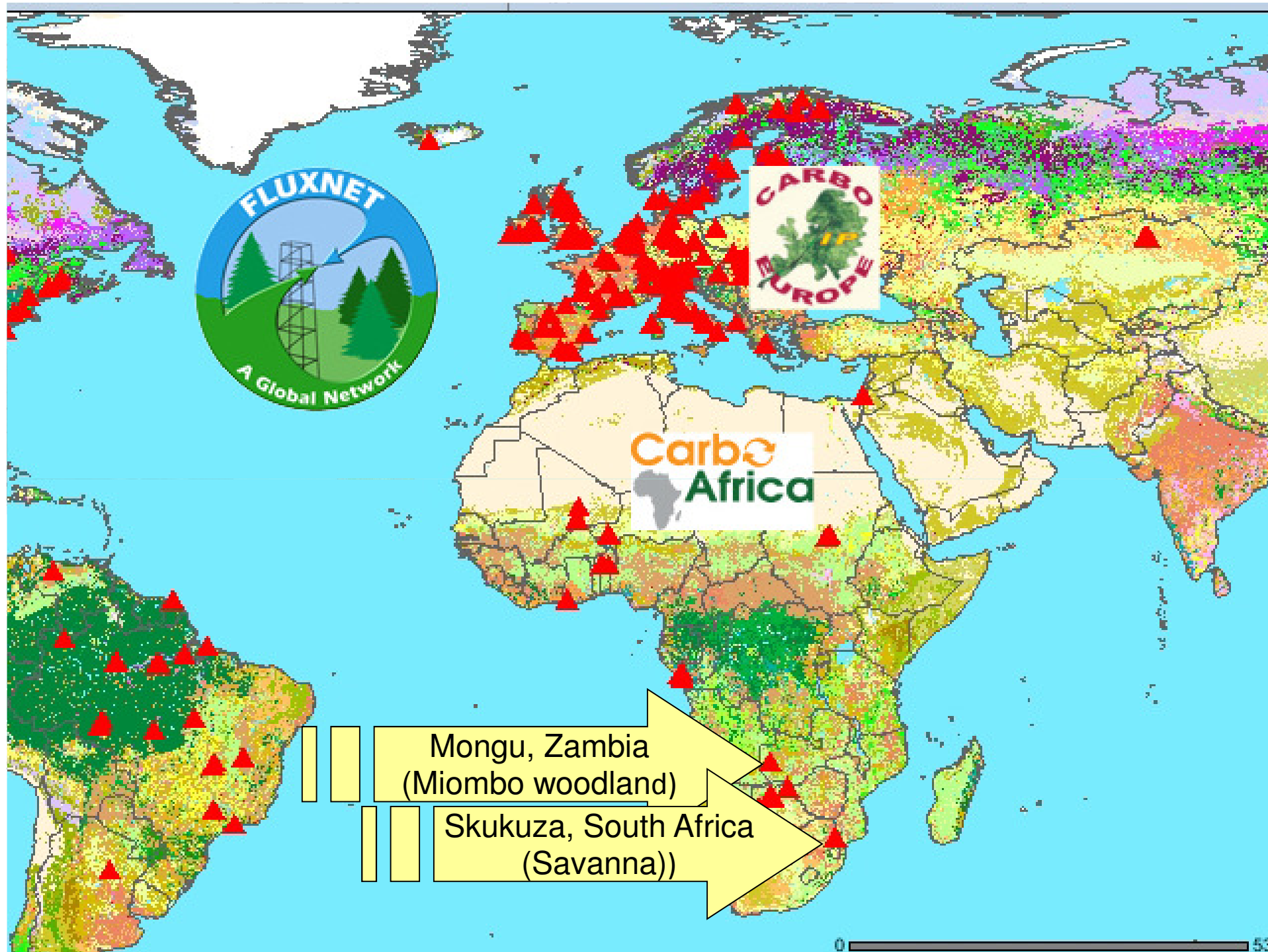


Seasonal changes of water carbon relations in savanna ecosystems

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Mongu, Zambia
(Miombo woodland)

Skukuza, South Africa
(Savanna)



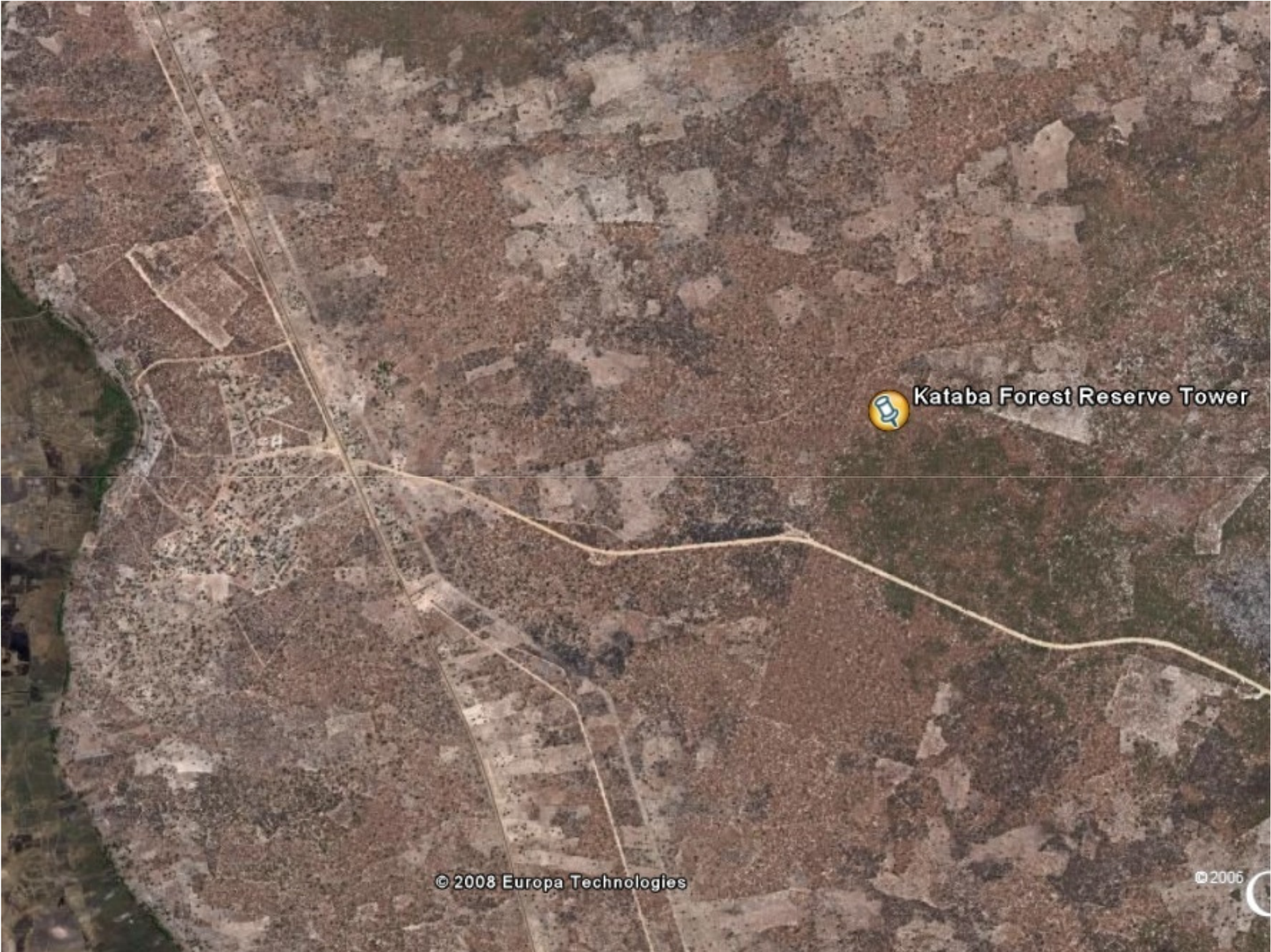
Skukuza Tower, Kruger National Park, South Africa






Kataba Forest Reserve,
Mongu, Western Zambia



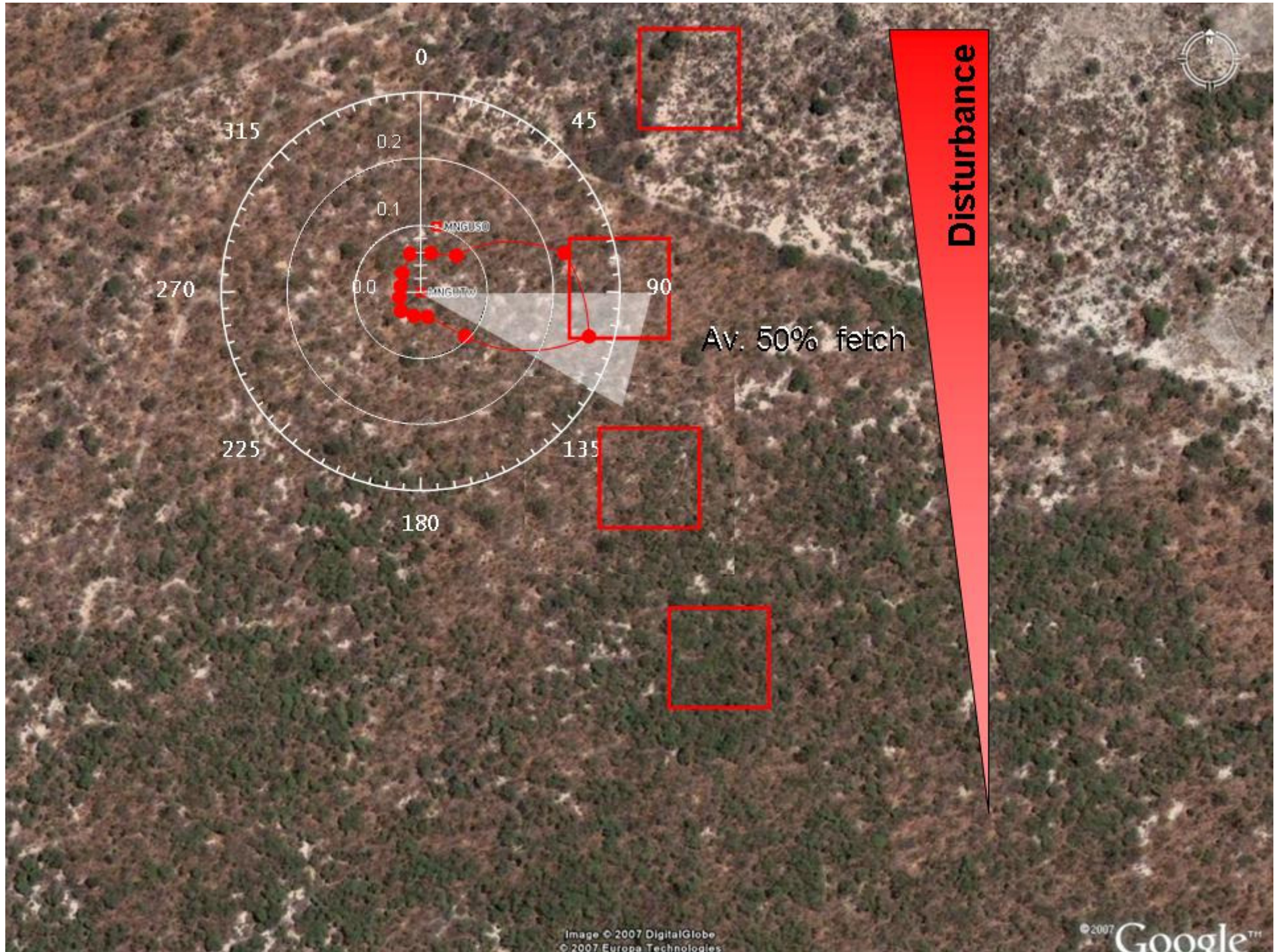


A satellite map showing a rugged, brownish landscape with a network of roads and paths. A yellow pushpin icon is placed on the map, pointing to a specific location. The text 'Kataba Forest Reserve Tower' is displayed next to the pushpin. The terrain appears to be a mix of rocky and vegetated areas, with some linear features like roads or paths cutting through the landscape.

 Kataba Forest Reserve Tower

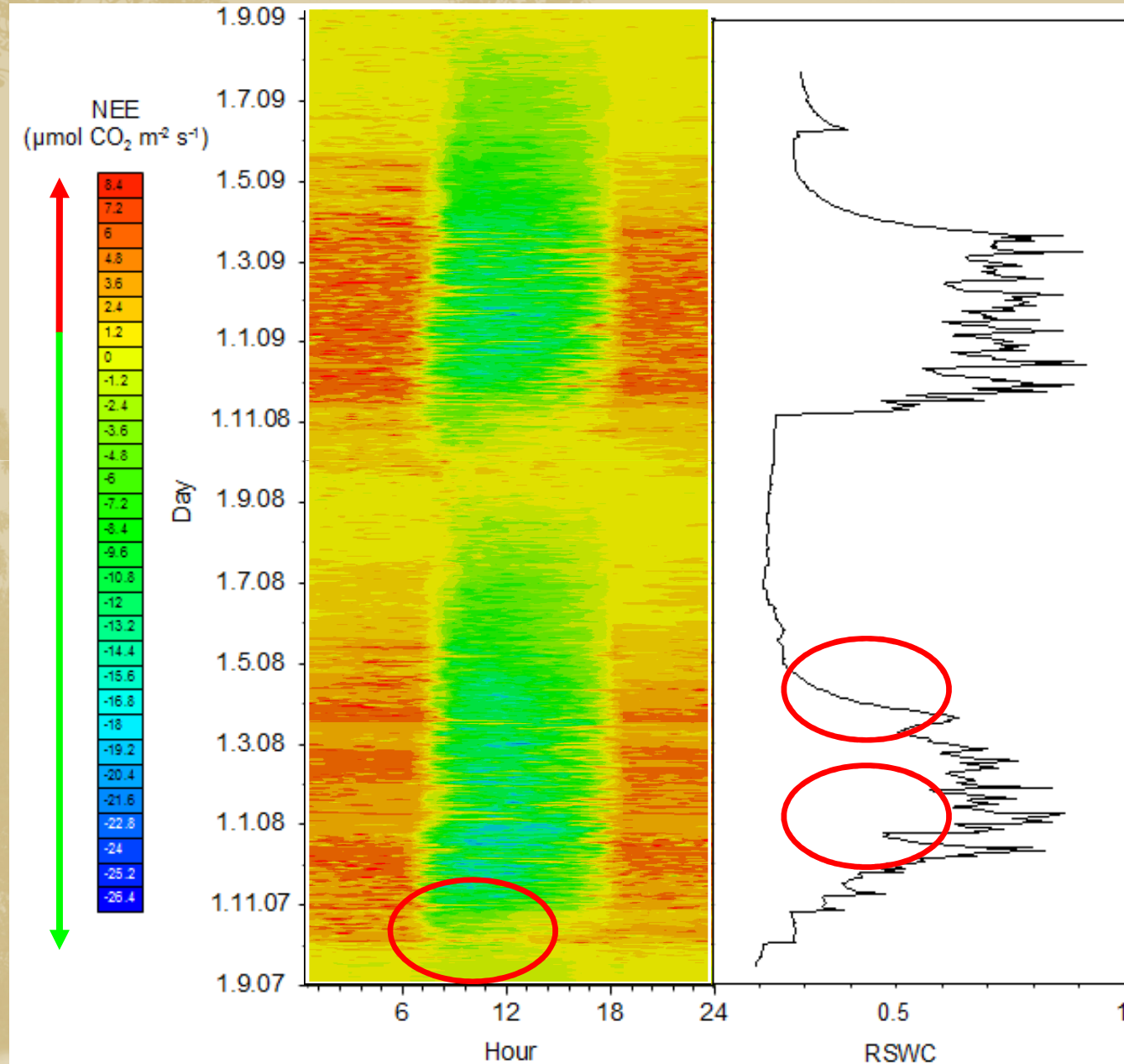
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Disturbance

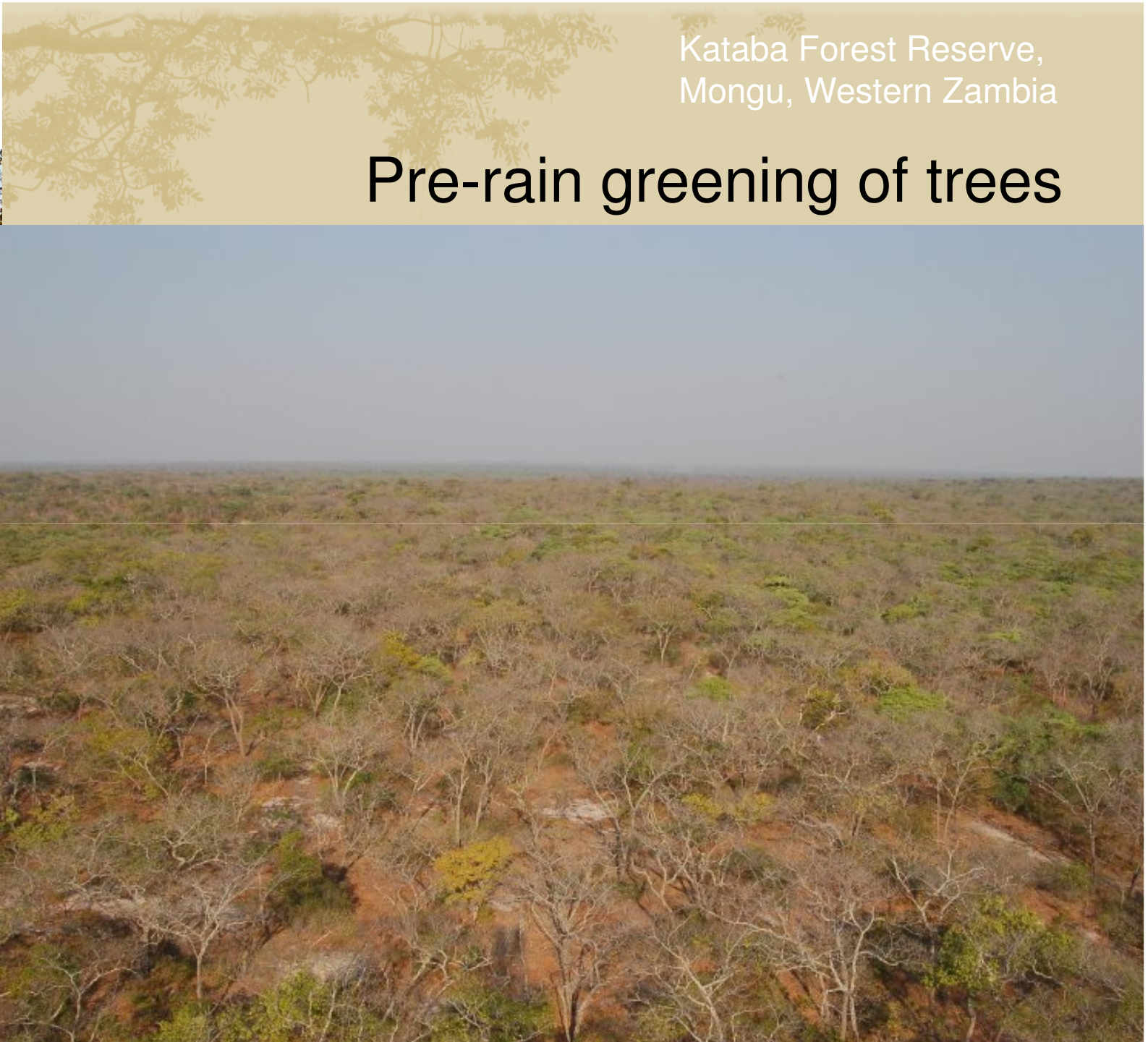
Av. 50% fetch

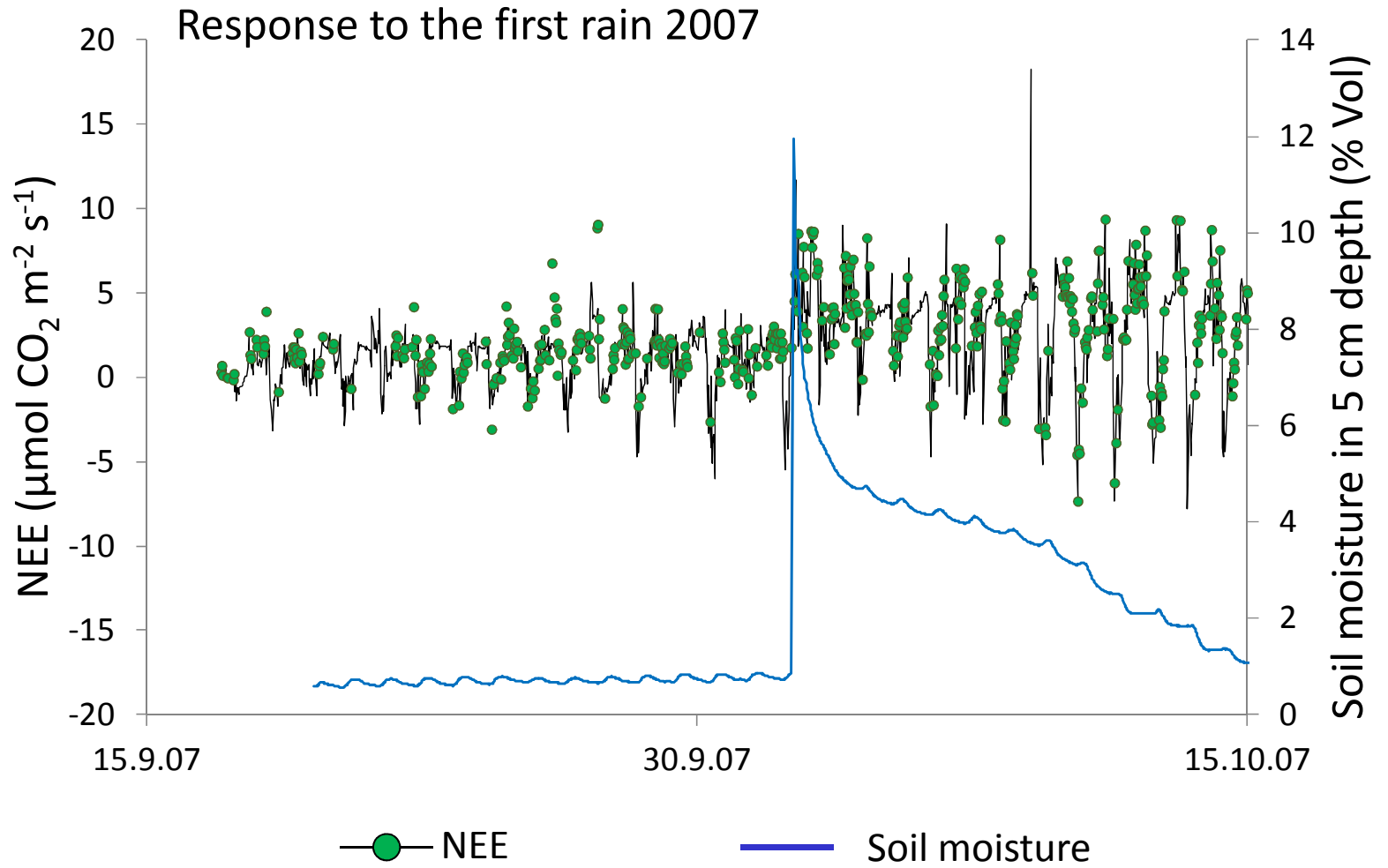




Kataba Forest Reserve,
Mongu, Western Zambia

Pre-rain greening of trees



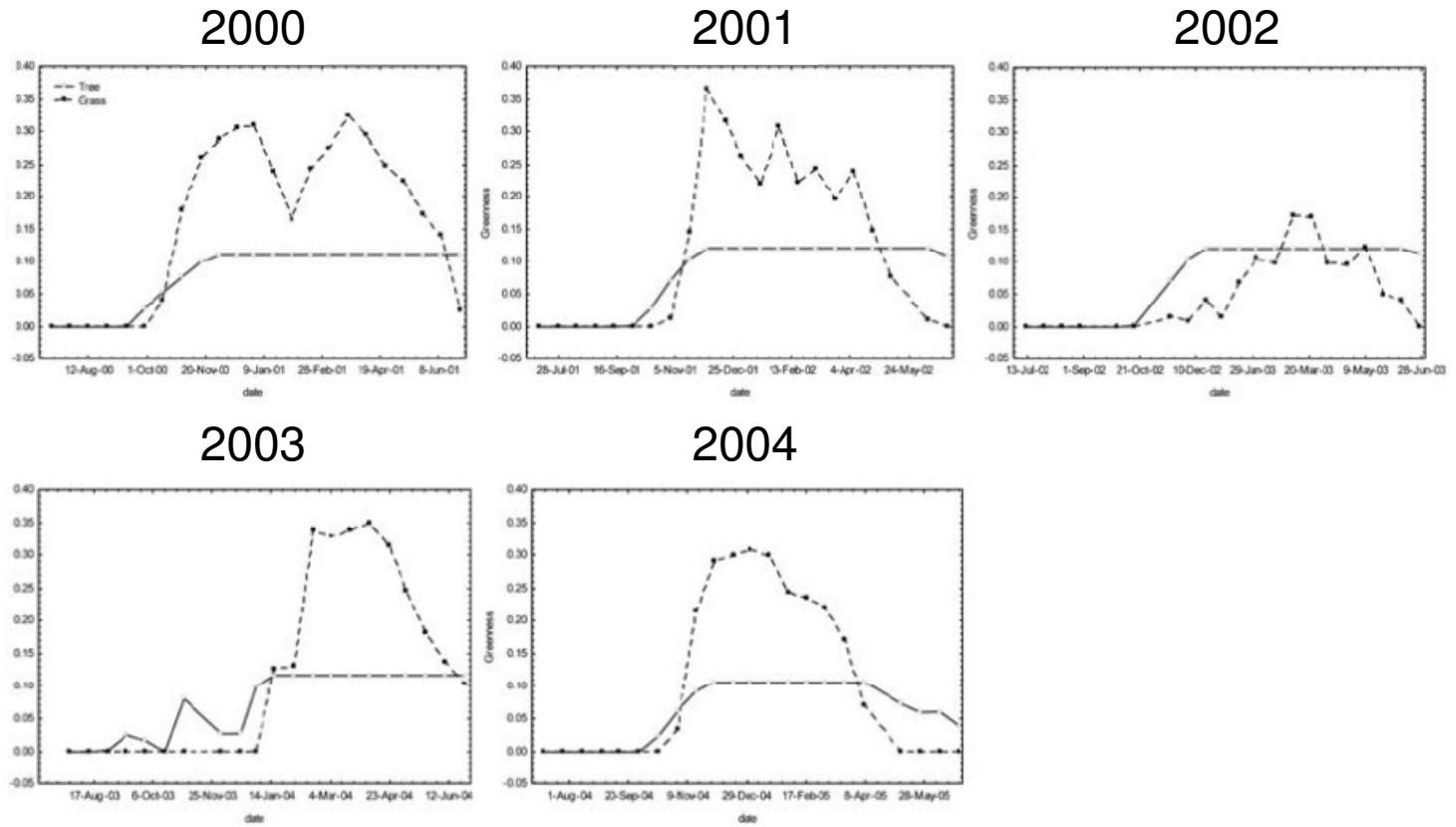


Skukuza Tower, Kruger National Park, South Africa

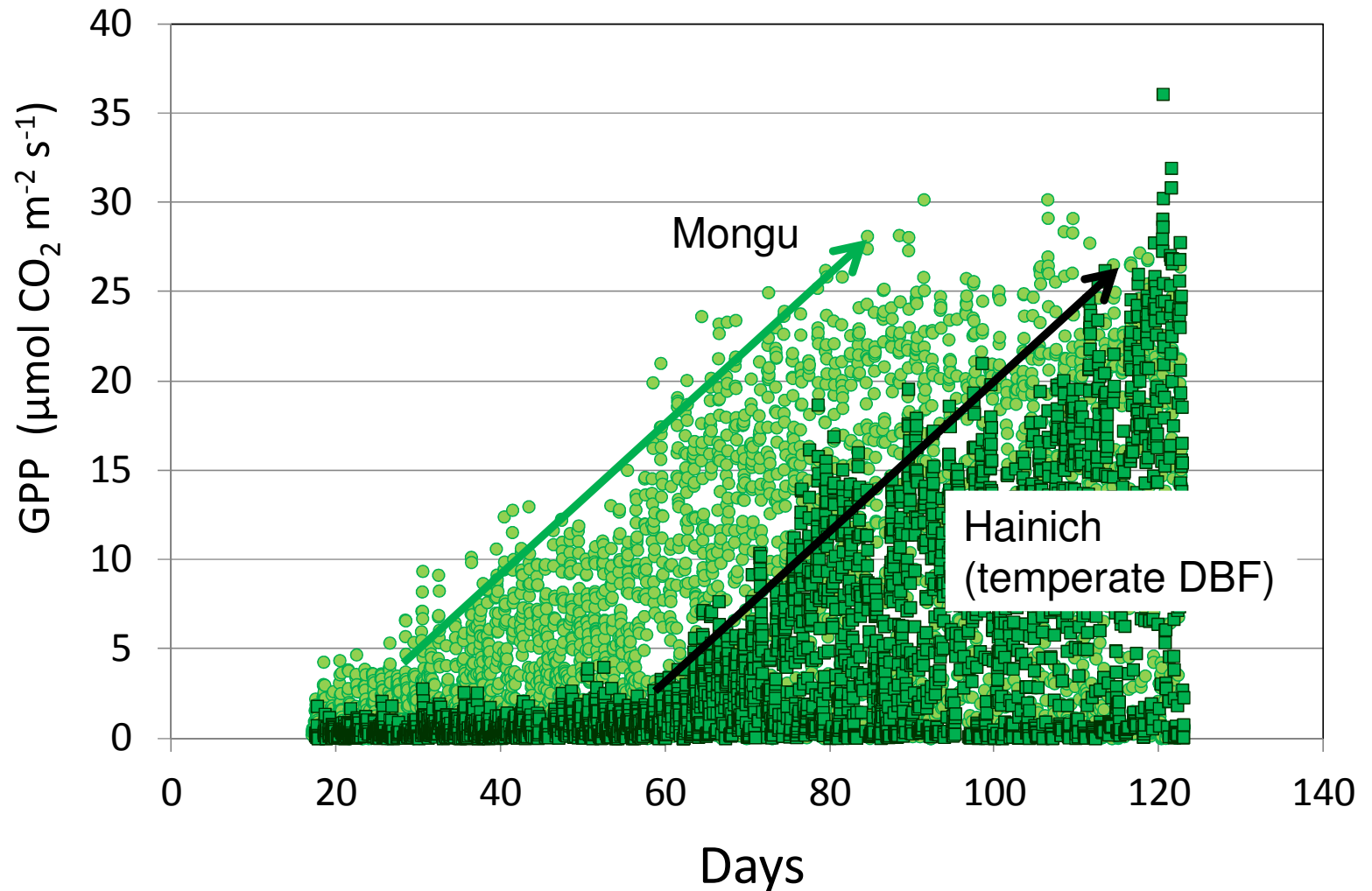
Grass and tree phenology

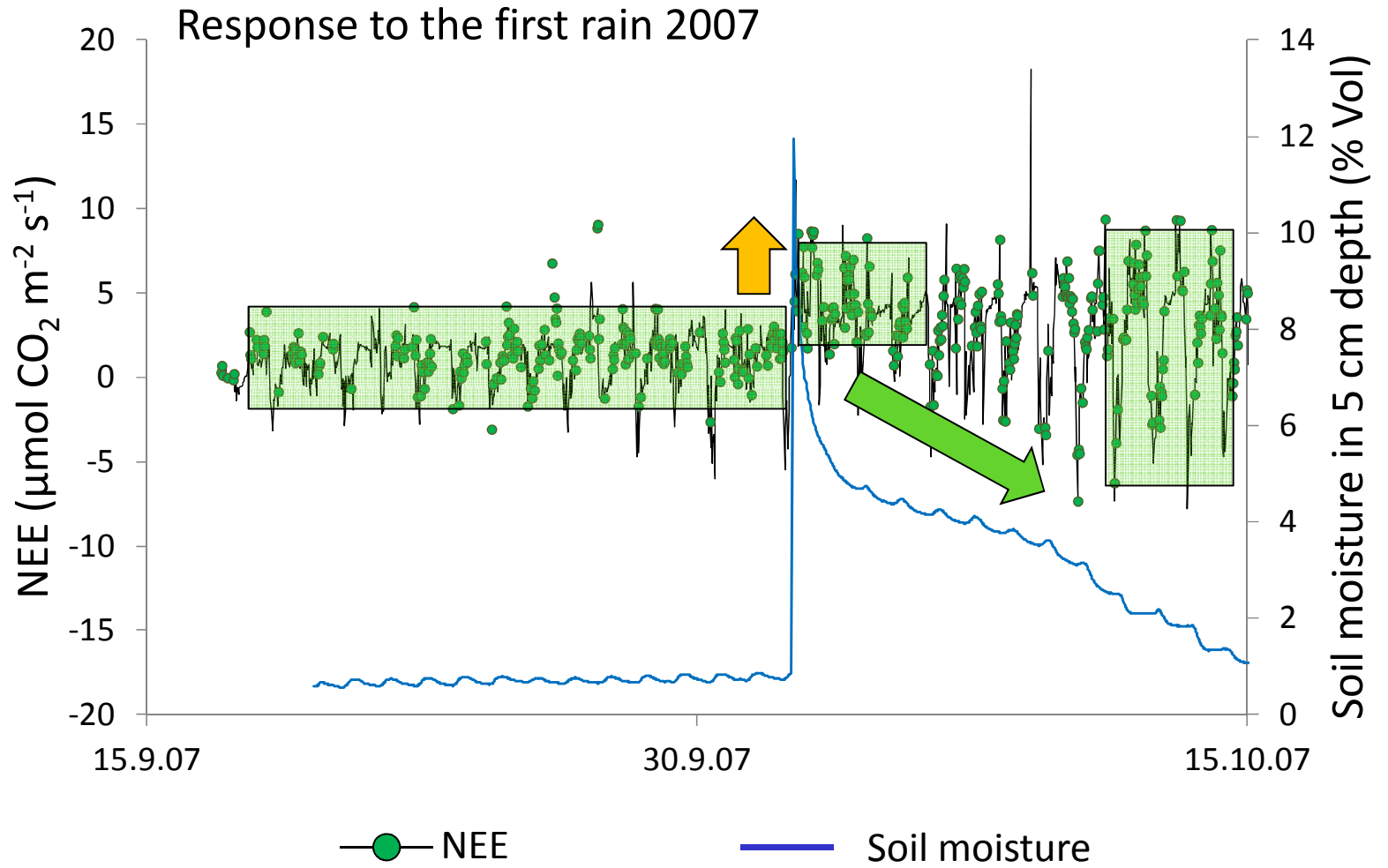


MODIS NDVI Greenness



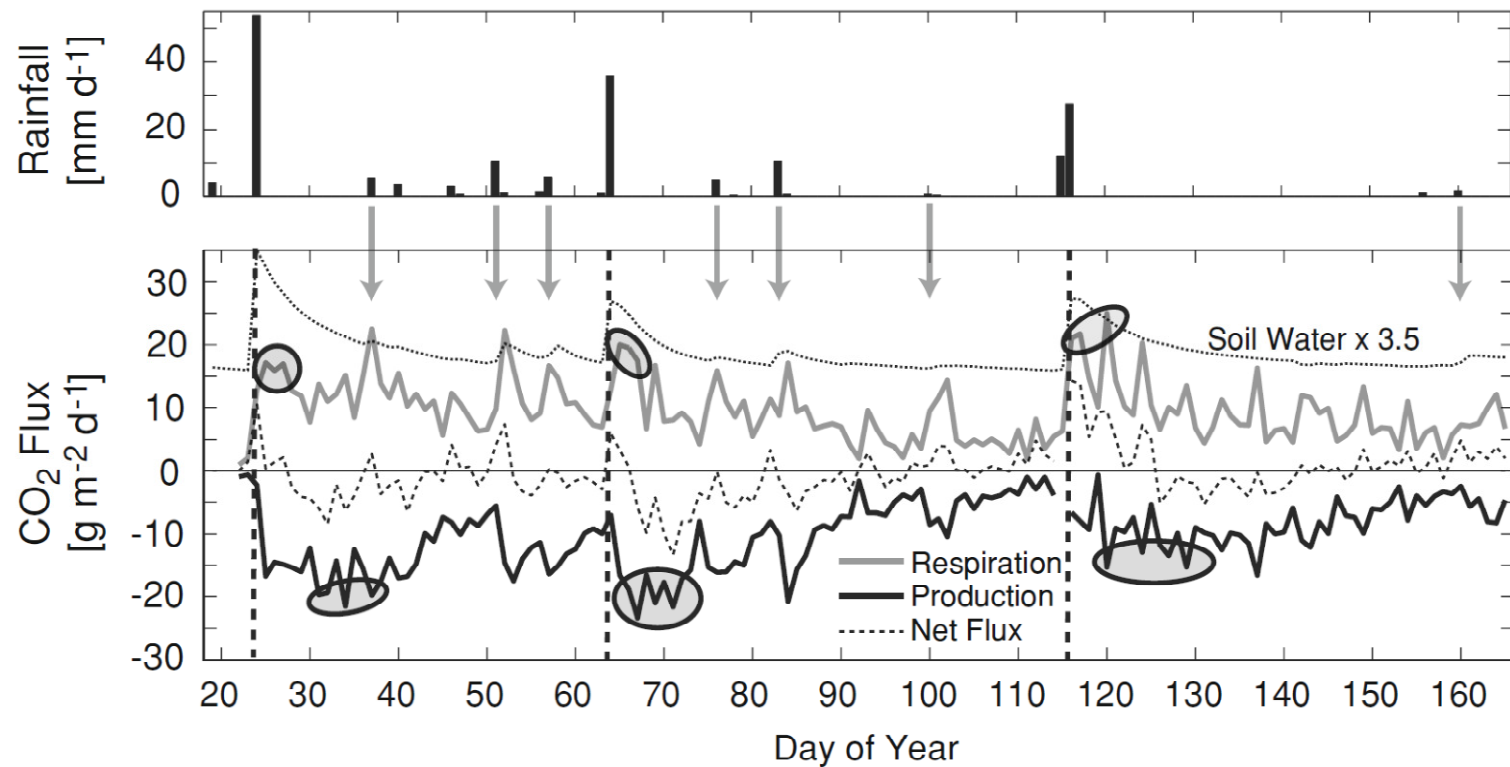
Faster development of photosynthetic capacity (GPP_{max})?







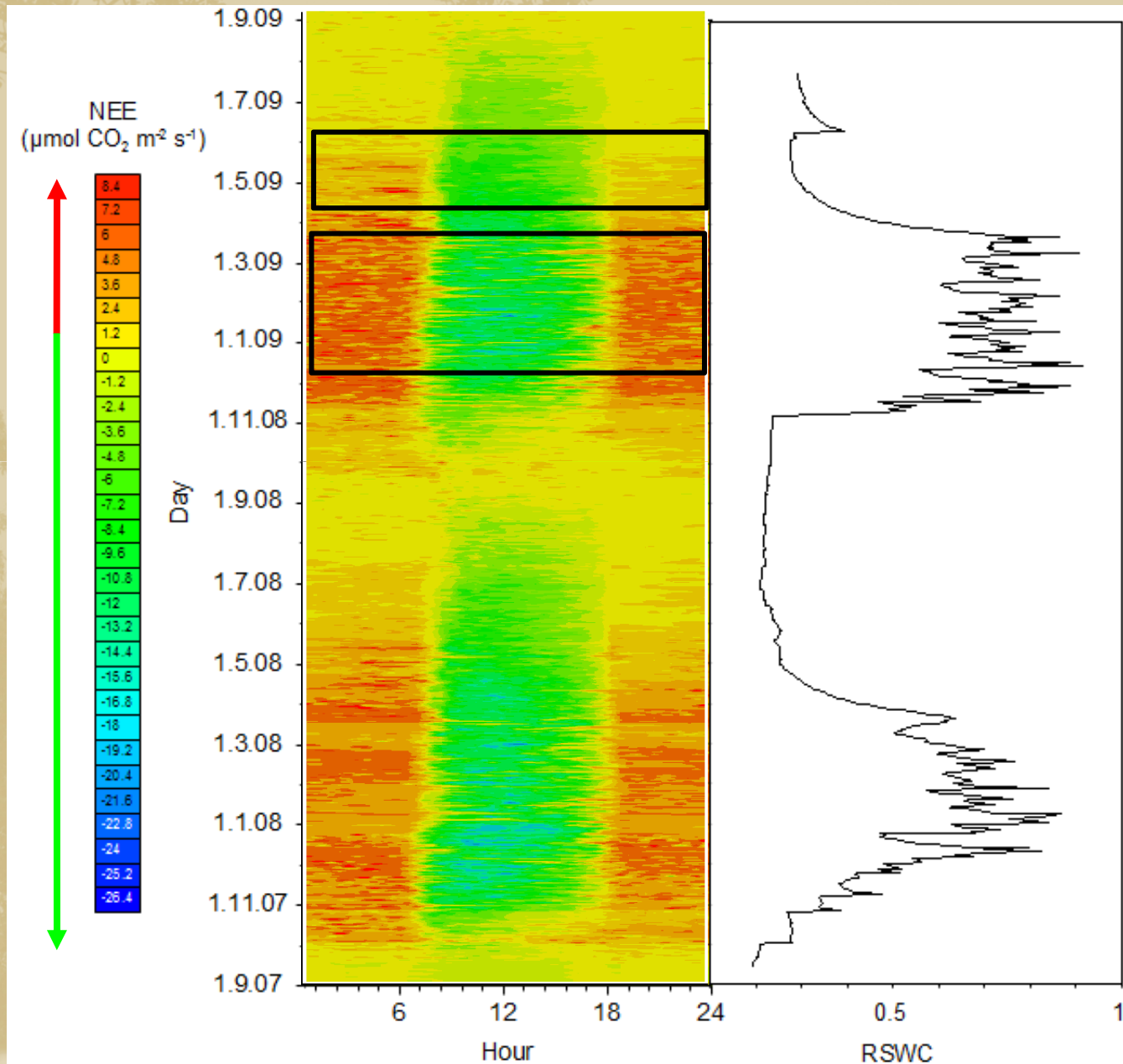
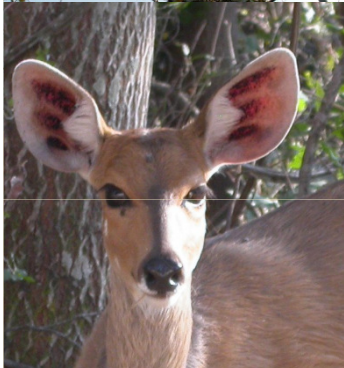
Response to rain pulses



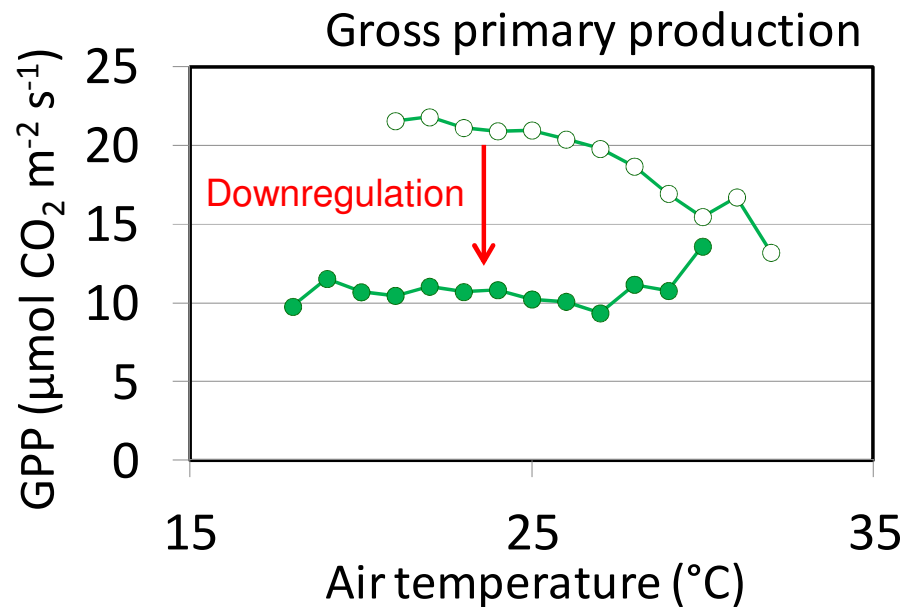
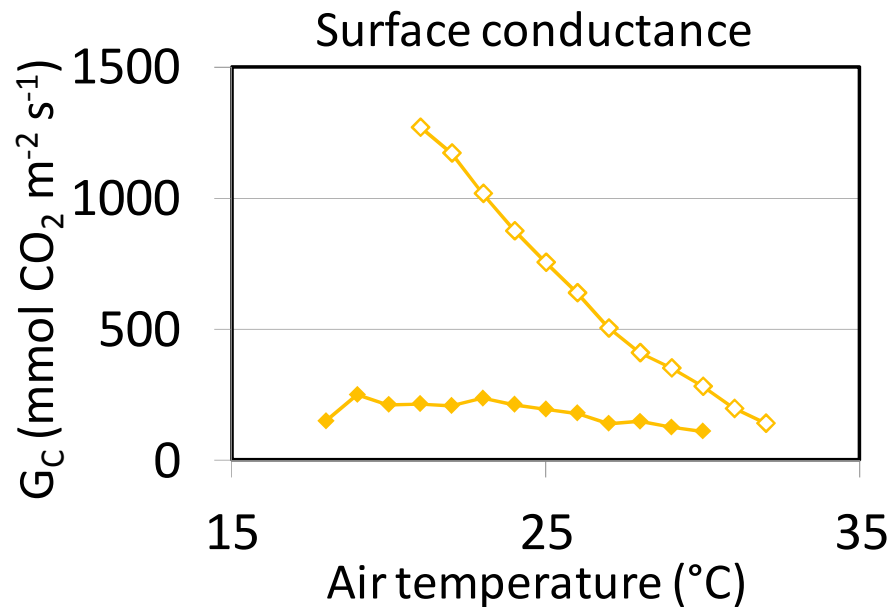
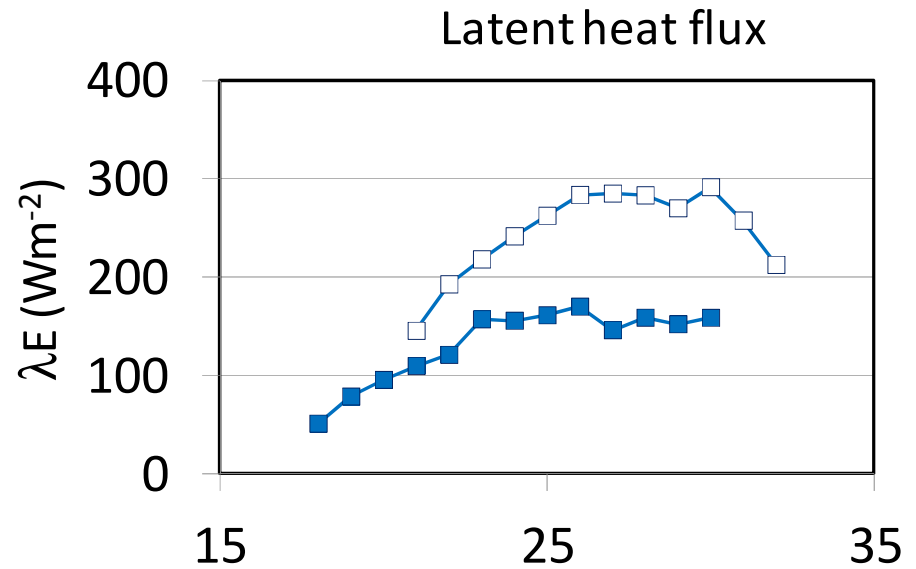
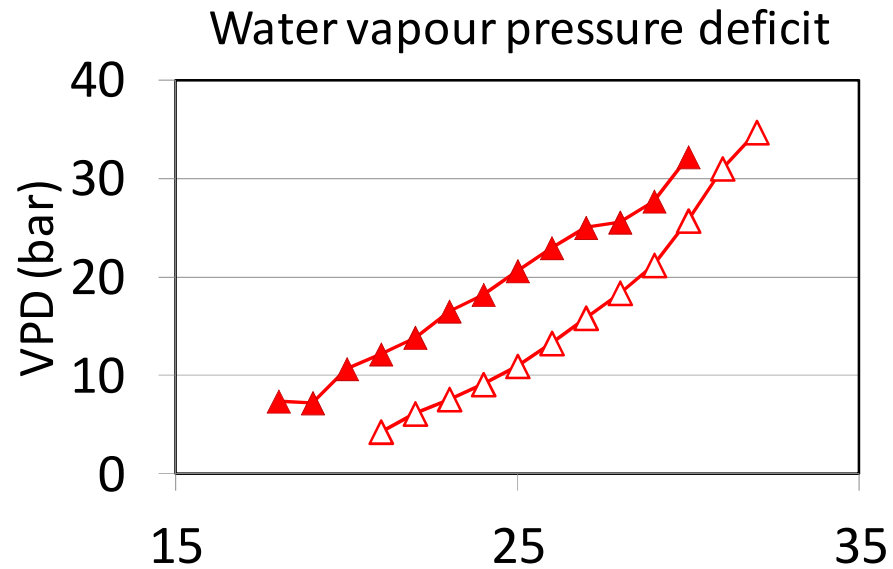


Response to drought:

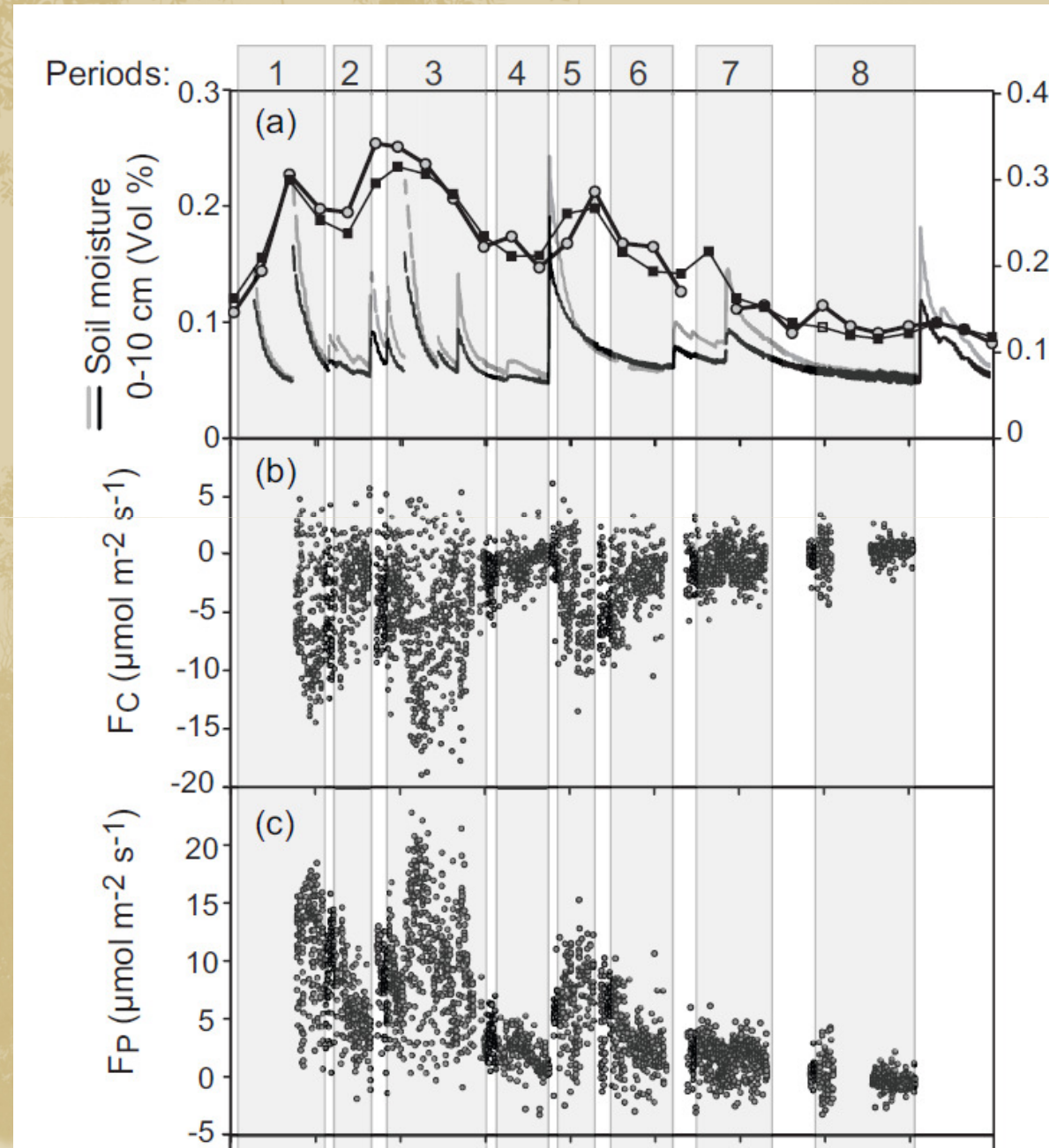
Transition to dry season
or
Intermediate dry periods

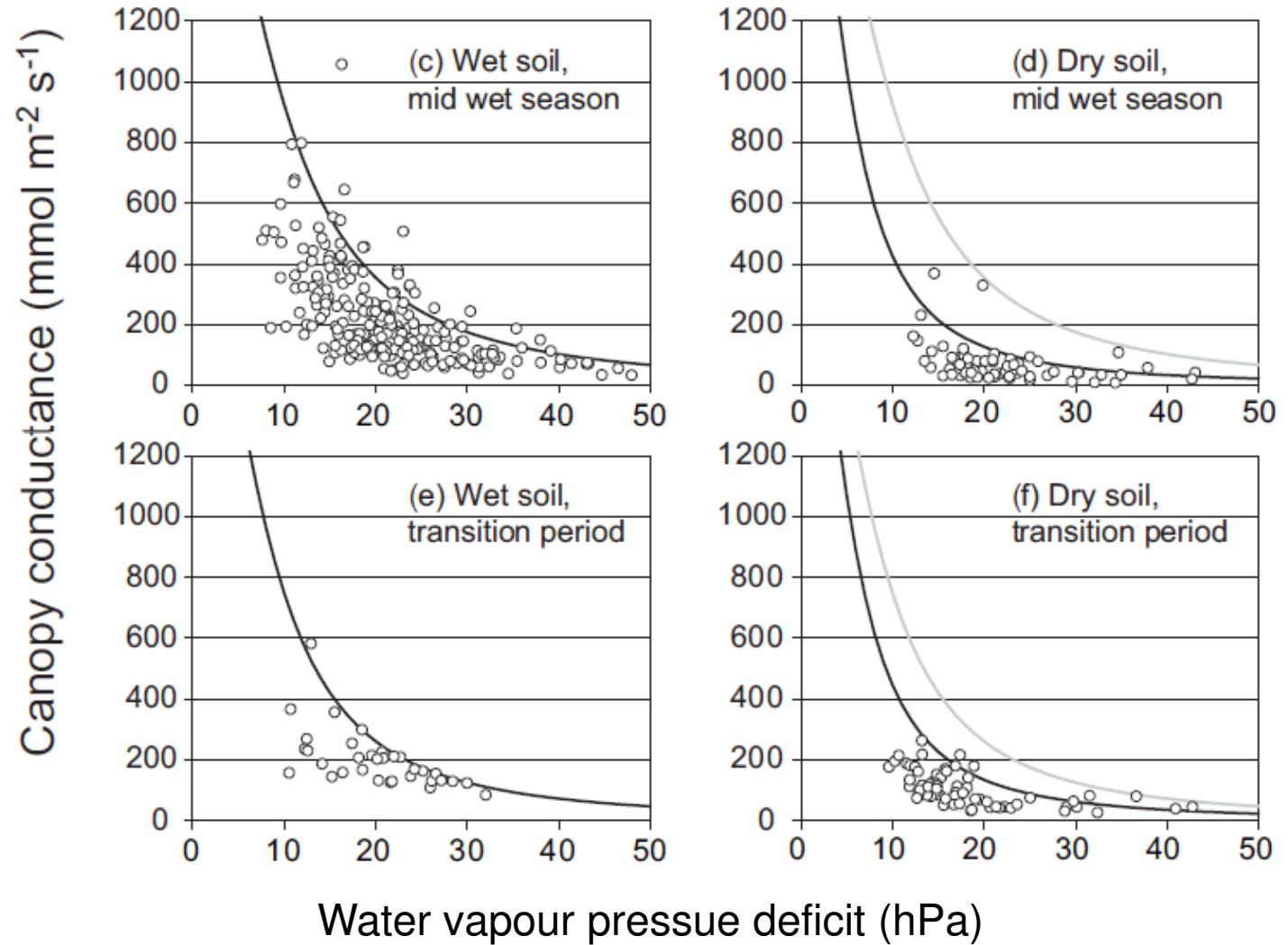


Transition from growing season (open) to dry season (filled)



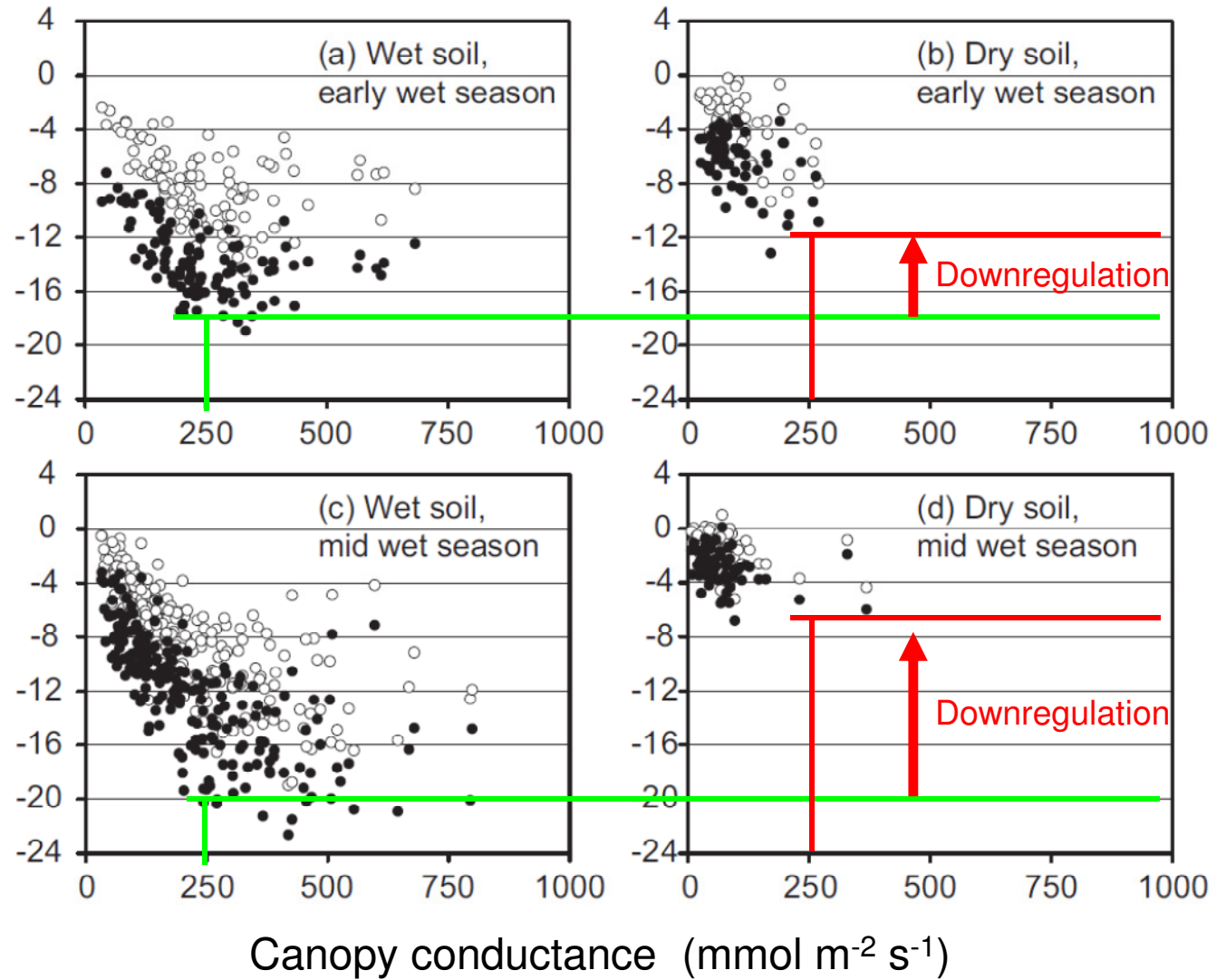
Skukuza Tower, Kruger National Park, South Africa







● Canopy photosynthesis ($\mu\text{mol m}^{-2} \text{s}^{-1}$)
○ Net ecosystem exchange

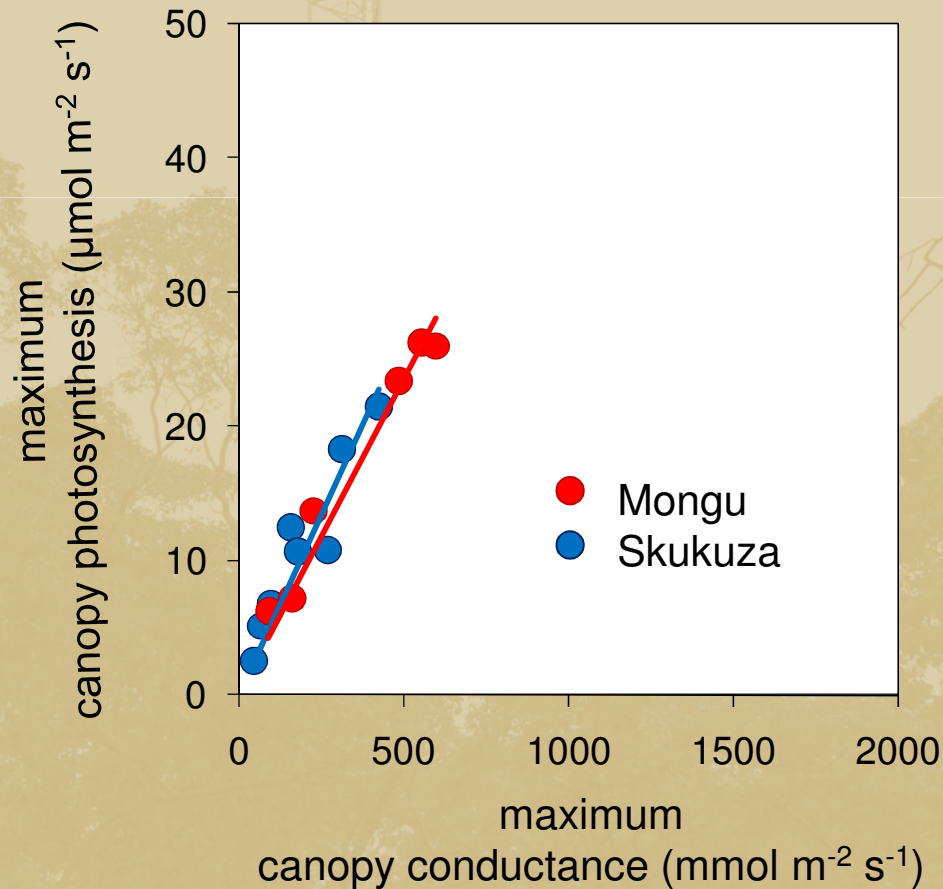


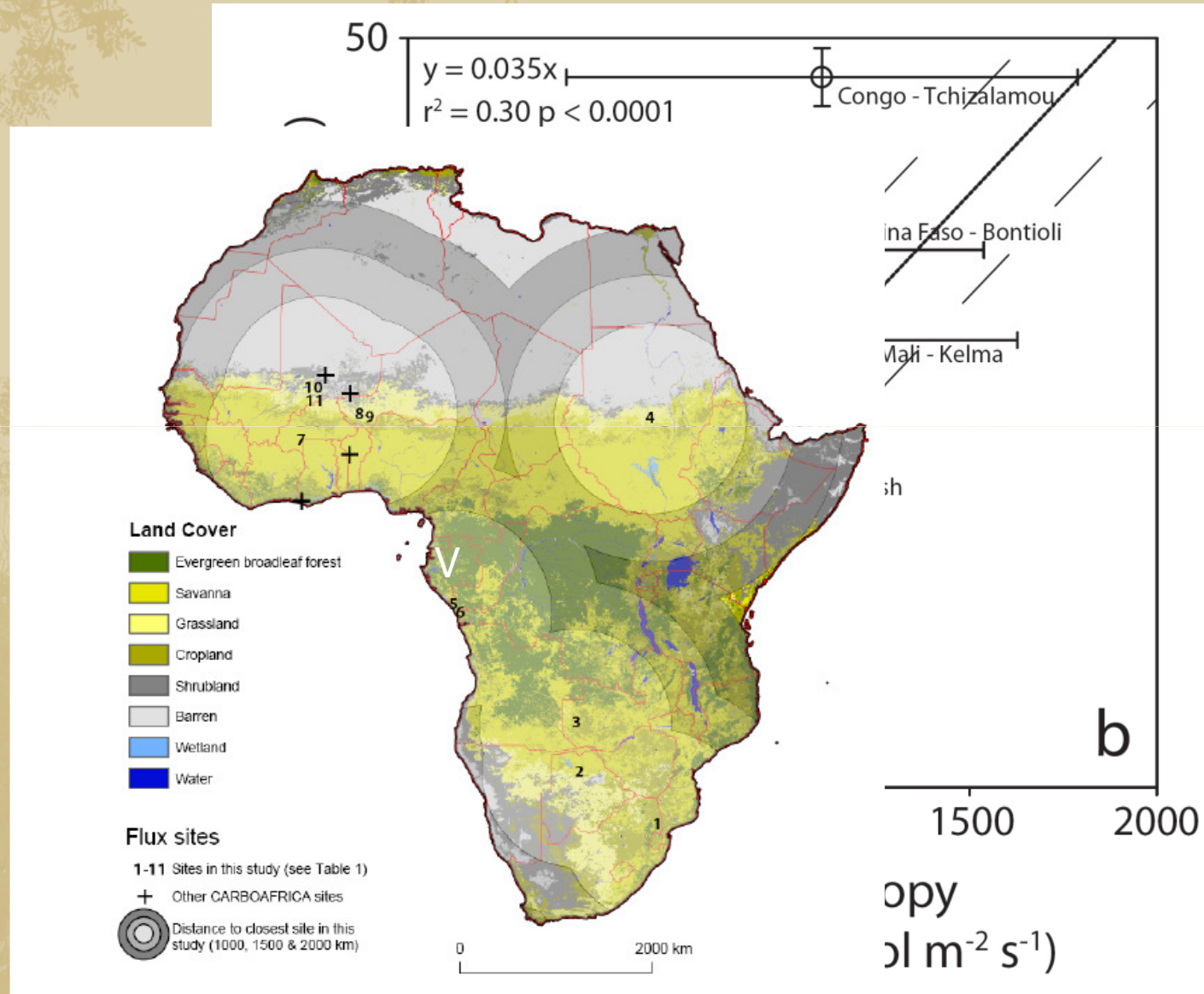


Temporal variation

During the course of the season the photosynthetic capacity and the conductance for water vapour are closely correlated.

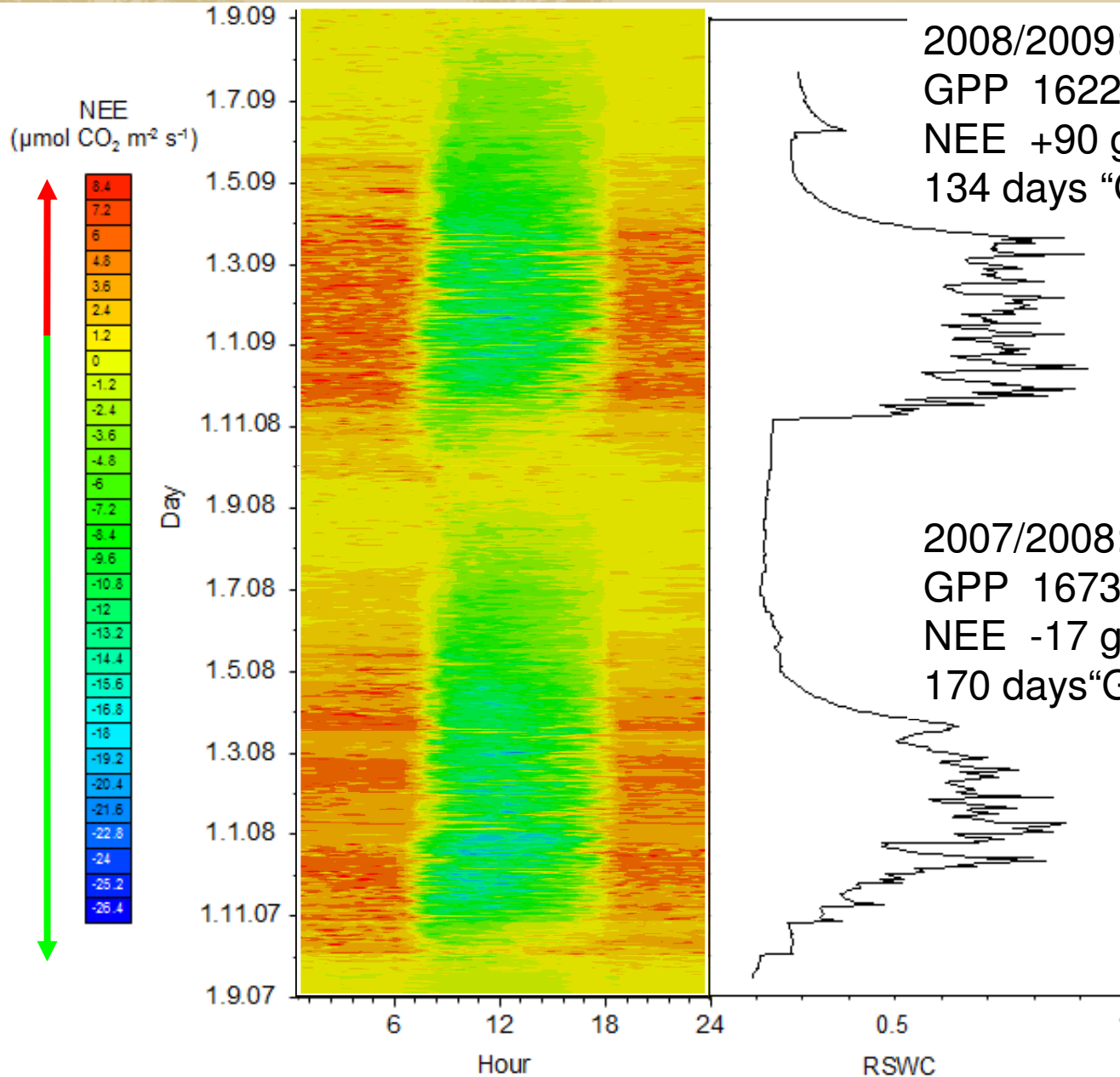
Physiological response: down-regulation of photosynthesis.
Canopy response: changes in LAI





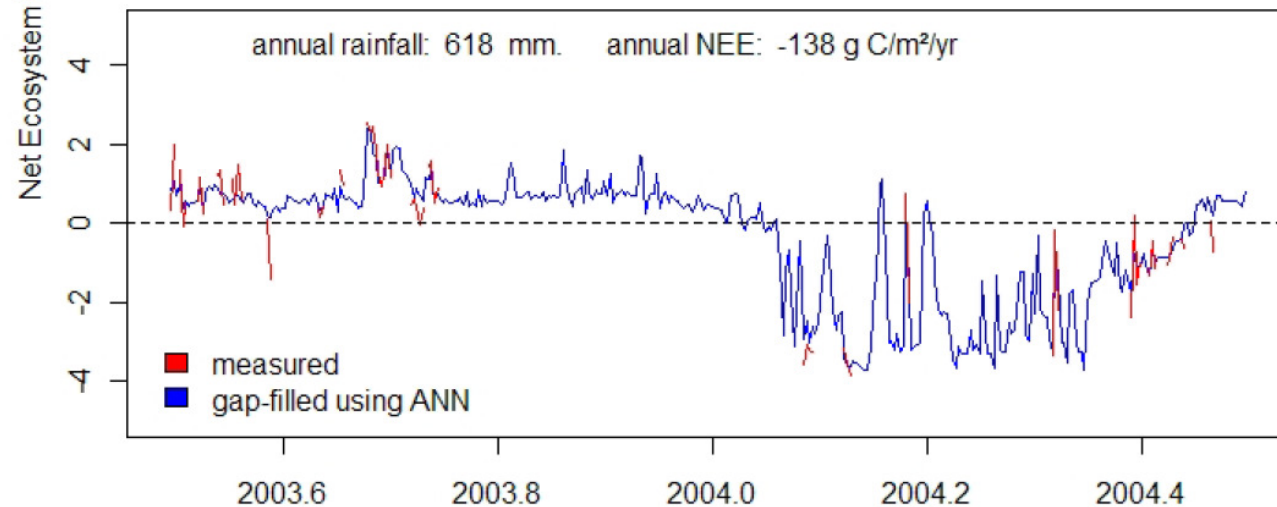
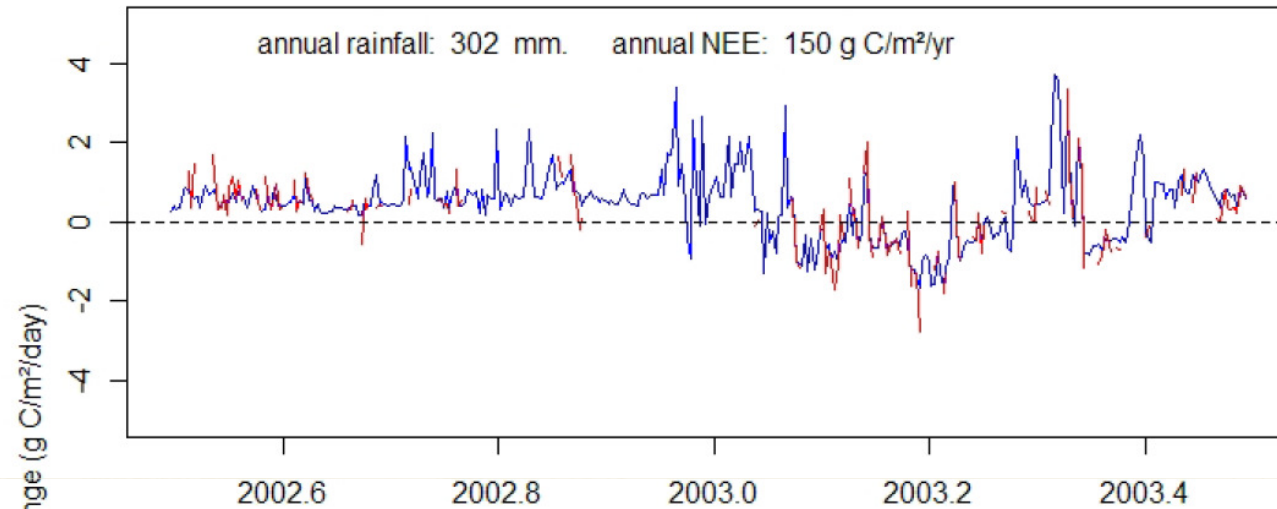


From seasonality to interannual variations



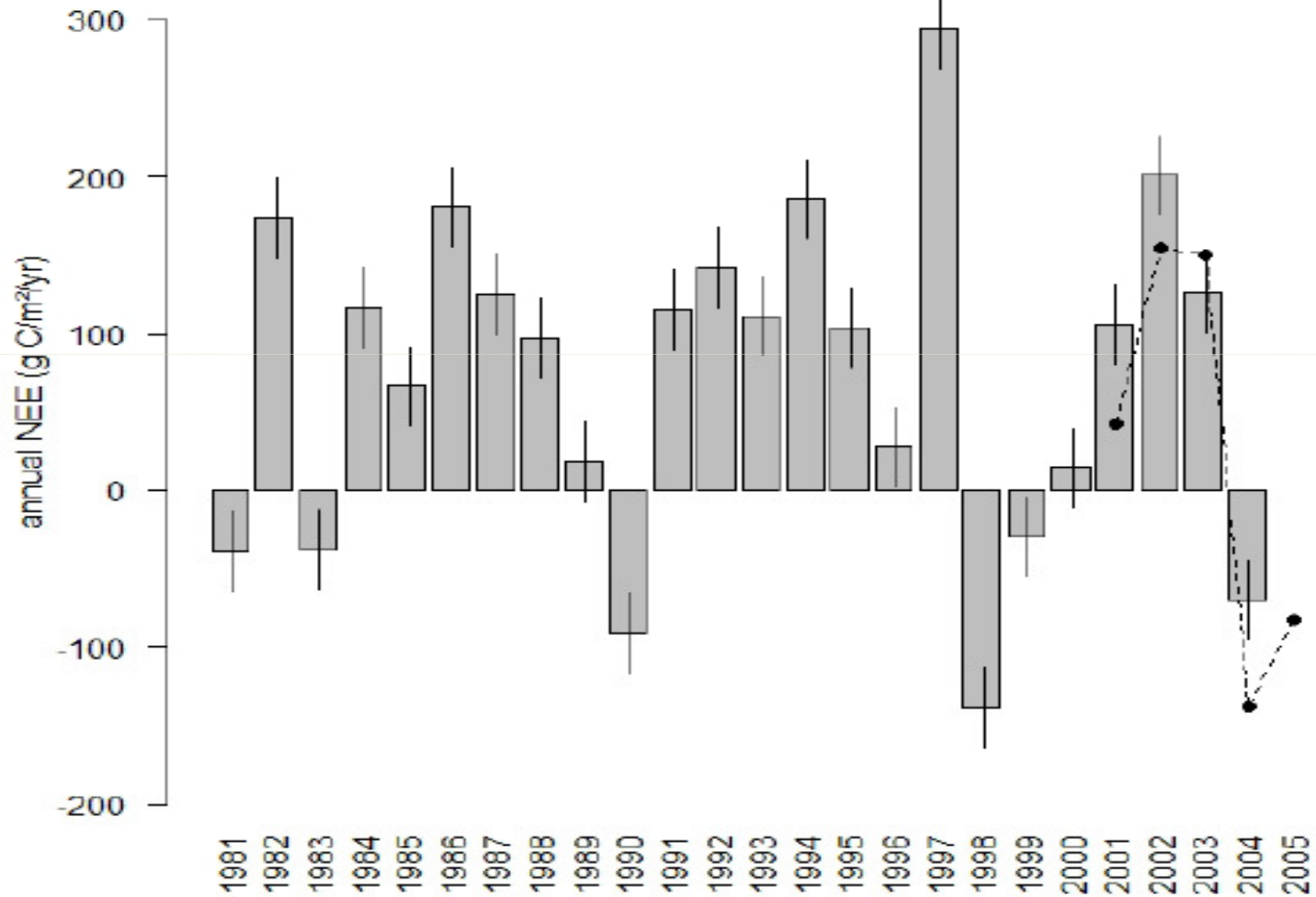
2008/2009:
GPP $1622 \text{ g C m}^{-2} \text{ y}^{-1}$
NEE $+90 \text{ g C m}^{-2} \text{ y}^{-1}$
134 days "GS"

2007/2008:
GPP $1673 \text{ g C m}^{-2} \text{ y}^{-1}$
NEE $-17 \text{ g C m}^{-2} \text{ y}^{-1}$
170 days "GS"





Kruger National Park Skukuza, South Africa





Summary: Seasonality of savannas

Seasonality of savannas is driven by precipitation.

Savanna trees show a pre-rainfall greening.

Functional ecosystem properties such as canopy conductance or photosynthetic capacity respond to rainfall patterns within the season.

Production in dryer savannas is depending on amount of rainfall, while there are some indications that in wet savannas it depends on length of the wet season.



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