Seasonal variability of energy and micrometeorological CO2 fluxes across Cerrado and Forest sites

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- Amazonian tropical forest
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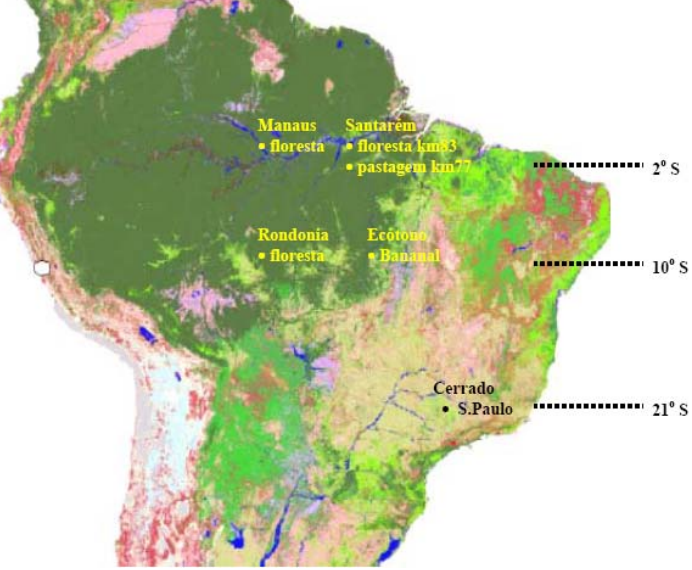
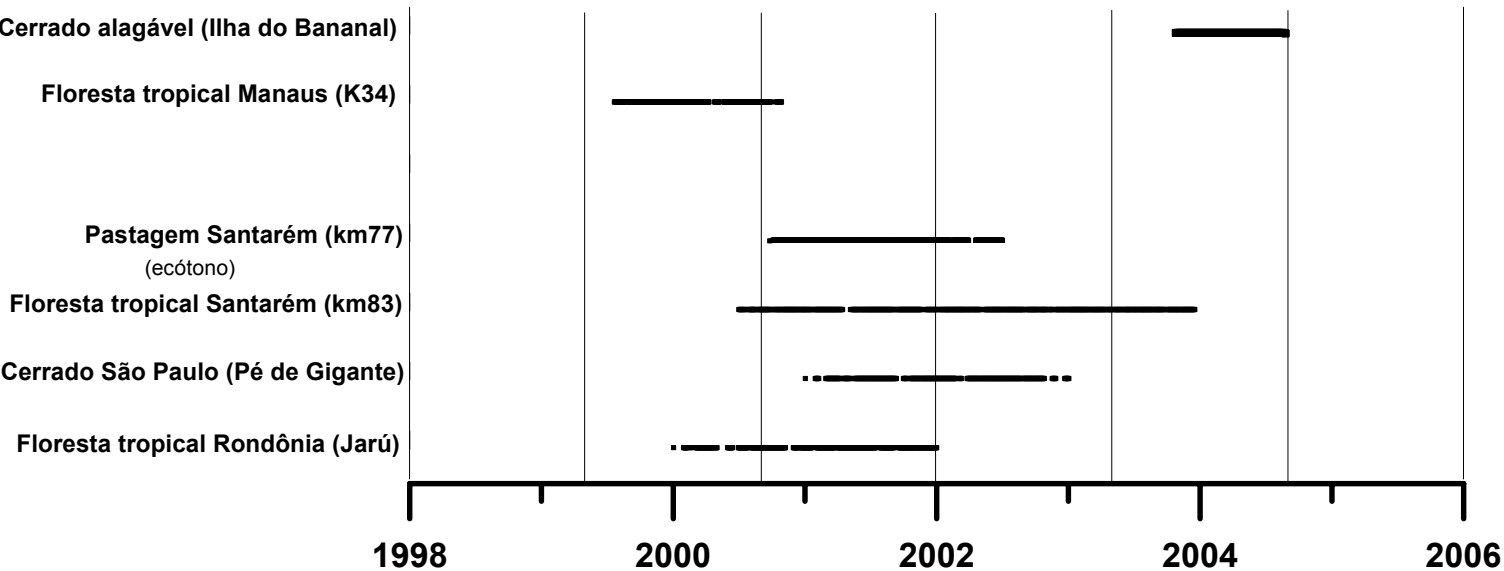


6 experimental sites



Dados de fluxos turbulentos (calor, água, CO_2) disponíveis no sítio experimental

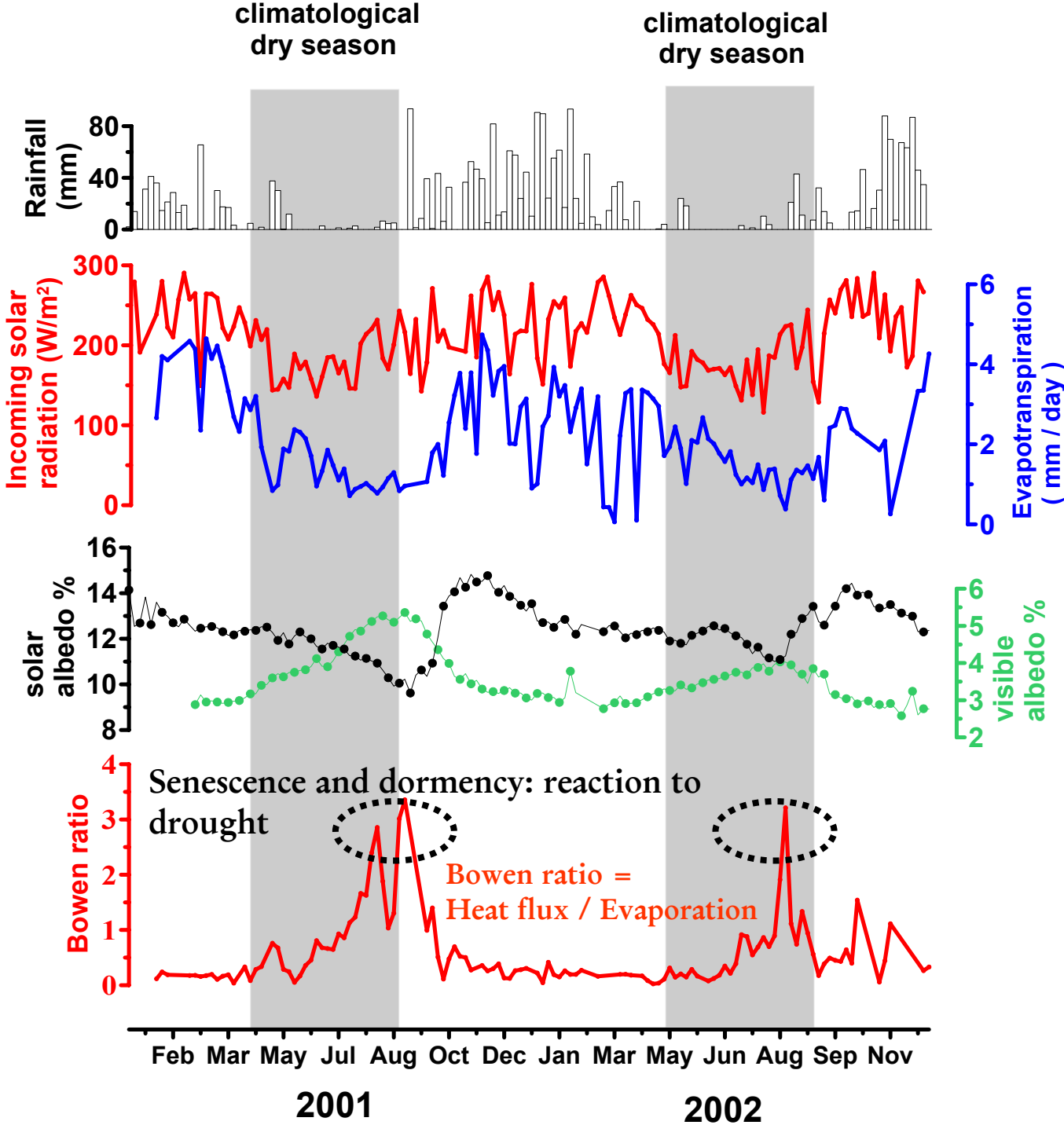
Selected data set each site

Cerrado senso strictu

- Seasonality of energy fluxes and albedo

Rocha et al (2002)

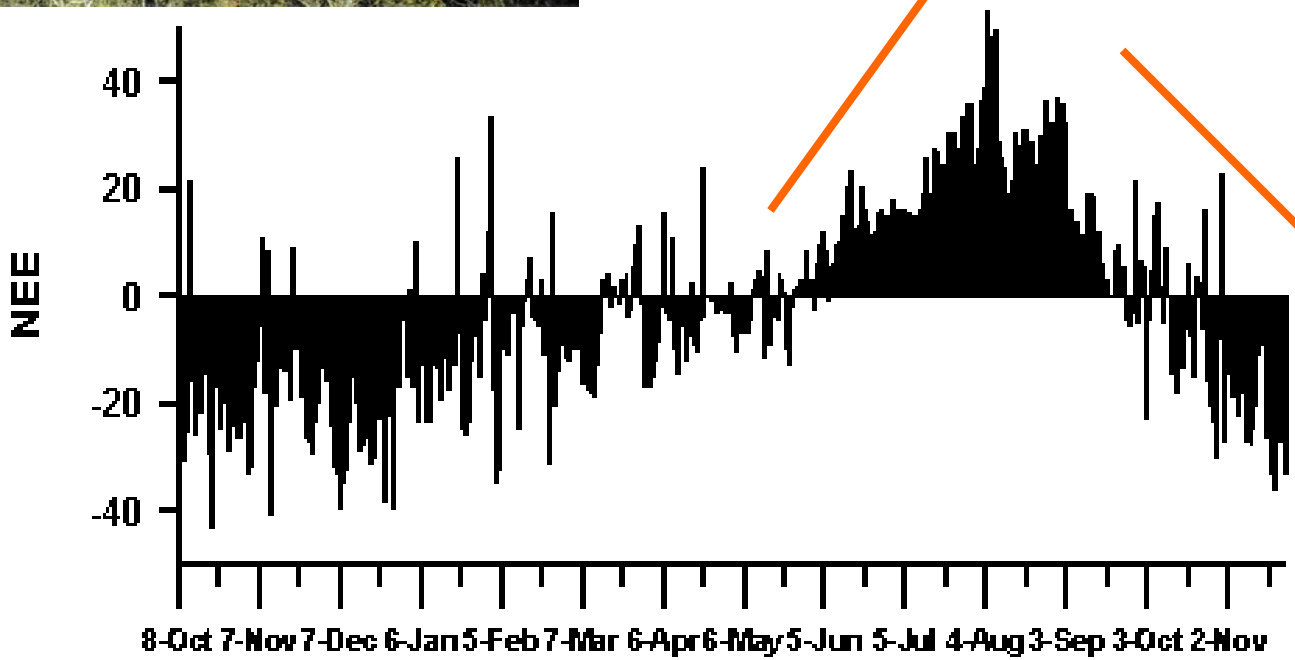
Tannus (2004)



Cerrados sensu stricto: strong sesonality of total CO_2 flux

Looses C in dry season

Sinks C in wet season

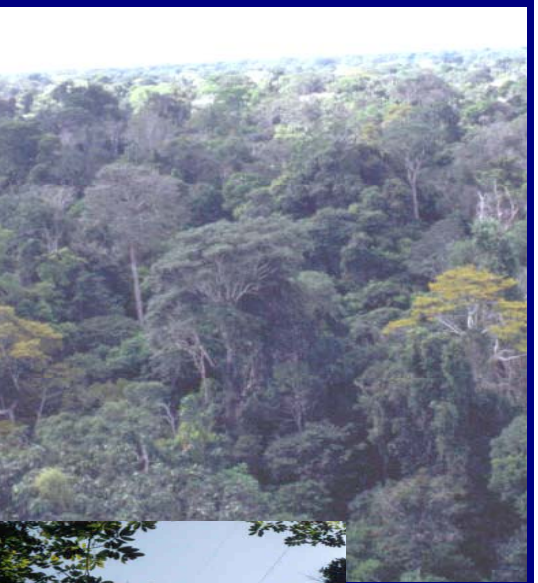


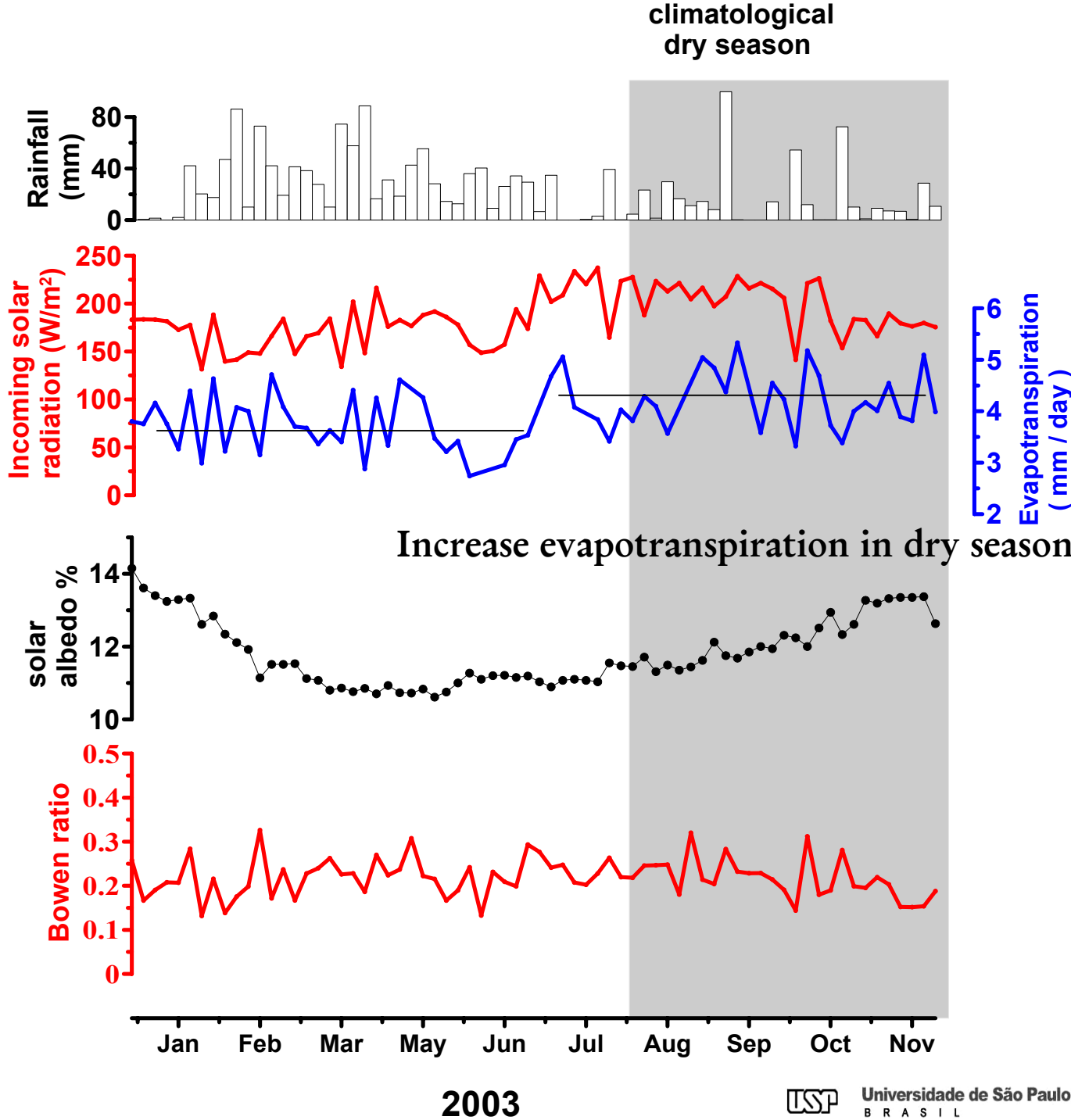
CO2 flux (NEE) daily mean (kg C ha^{-1} day^{-1}), over Cerrado s.s (Gleba Pé de Gigante, from October 2000 to November 2001. Source: Rocha et al. (2002).

Tropical forest

Rocha et al (2004)
Goulden et al (2004)
Saleska et al (2003)

Santarem flux tower (67 m)





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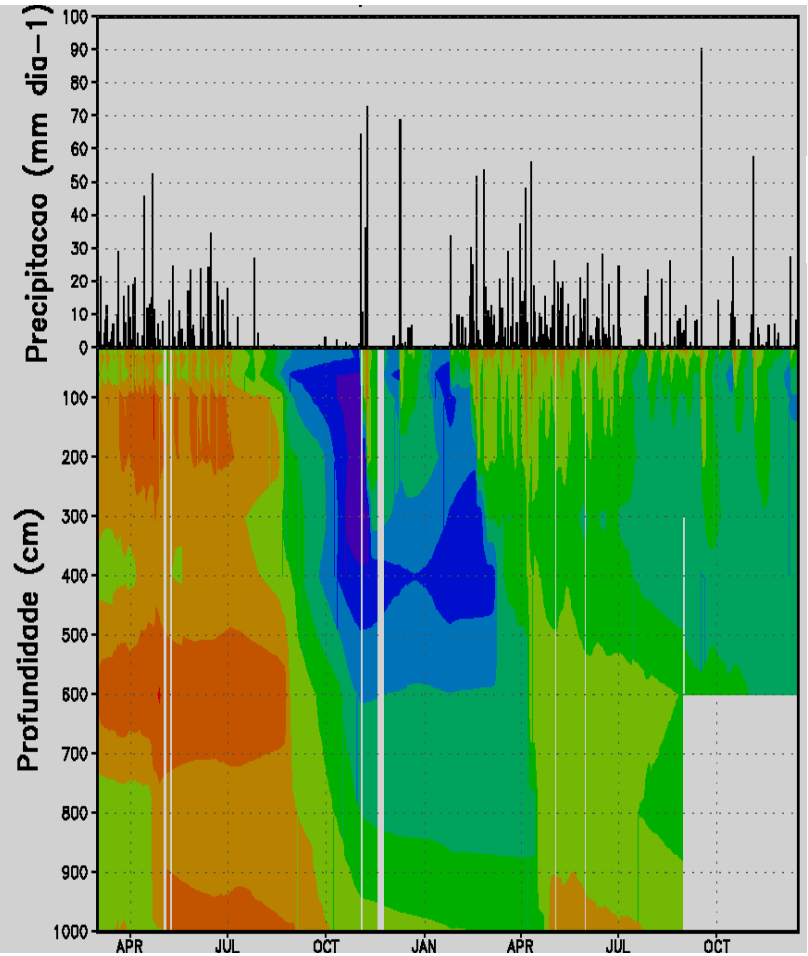
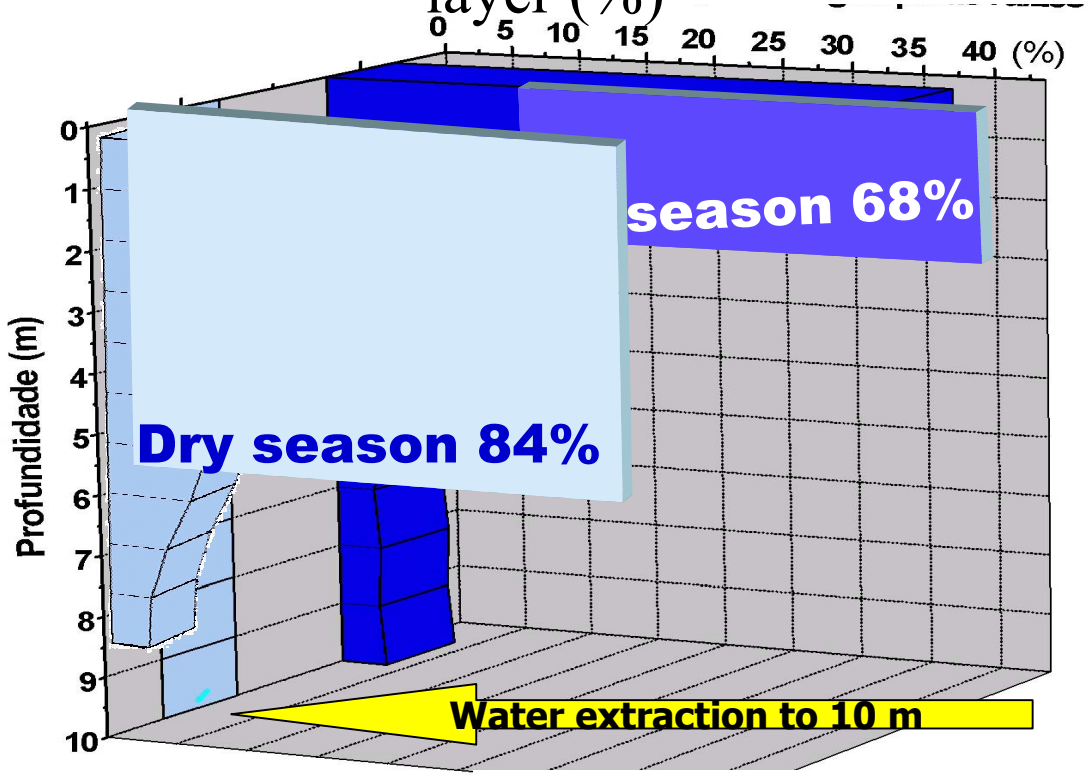
Soil moisture profile (10 m depth)

Tropical forest Santarem km83

Source: Bruno et al (2005)



Fraction of soil moisture extraction each layer (%)



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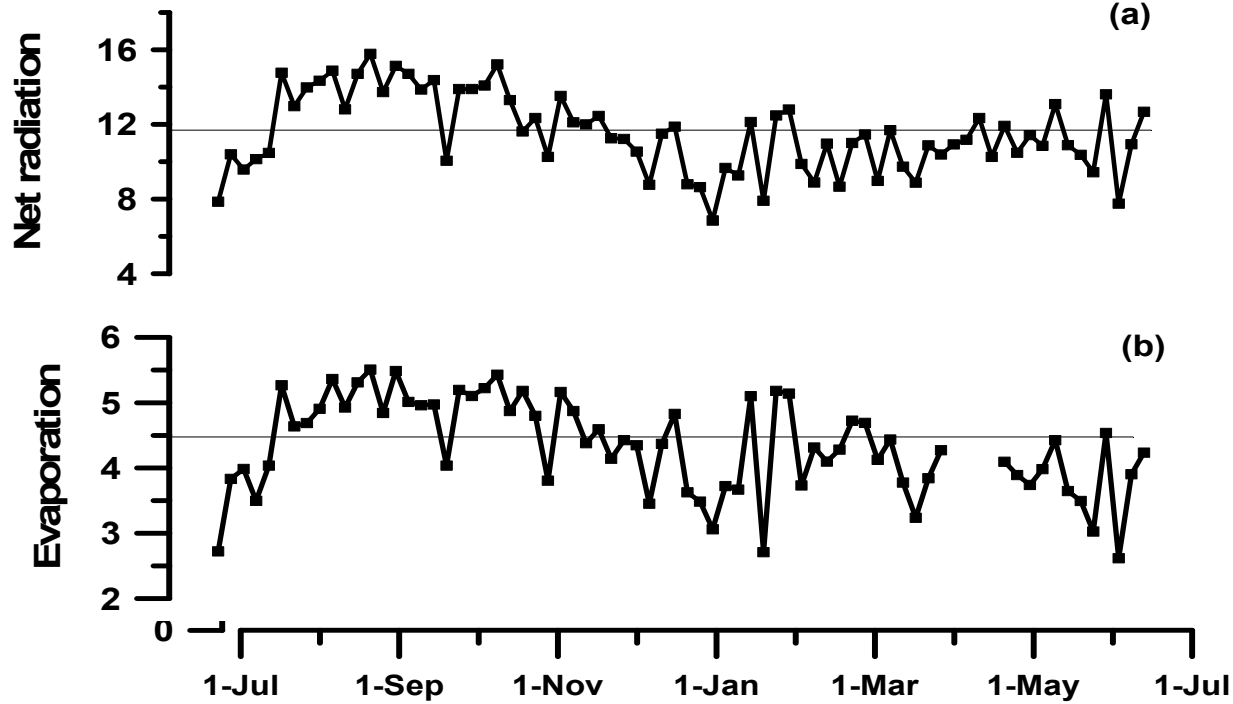
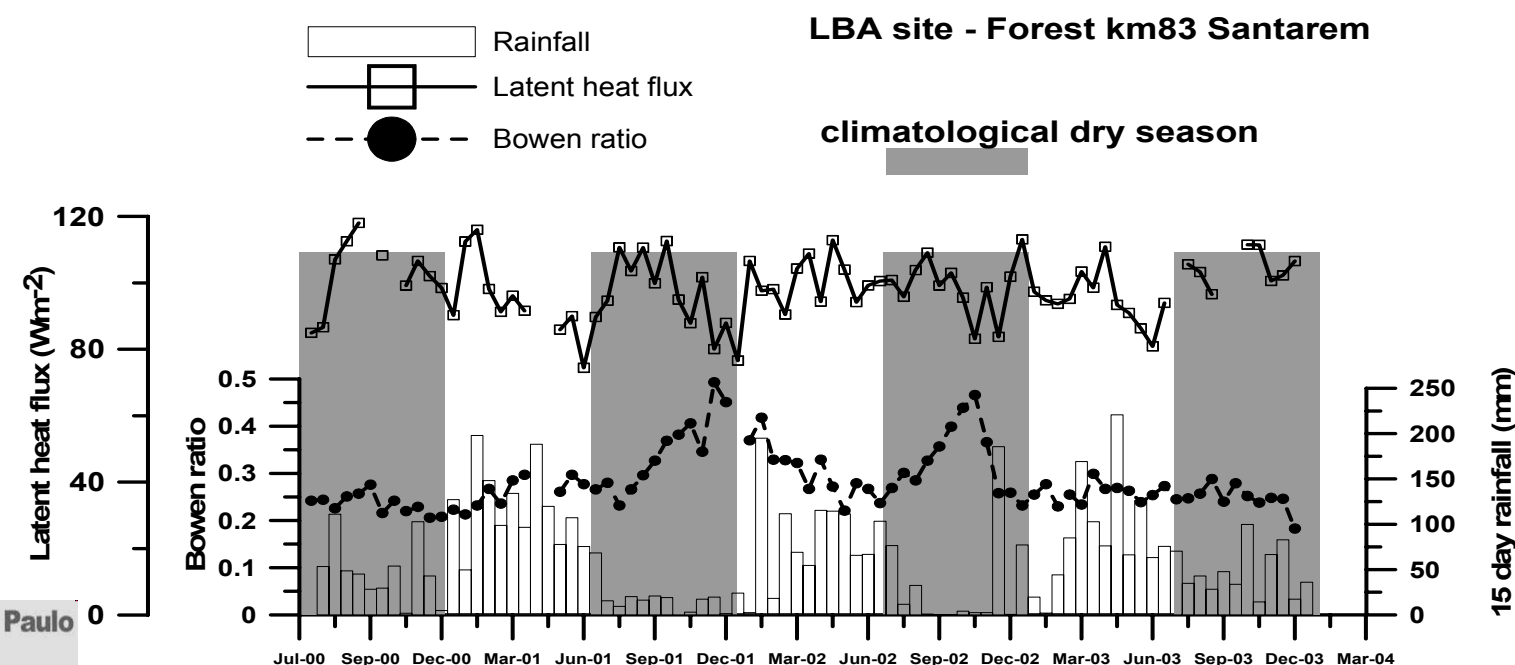
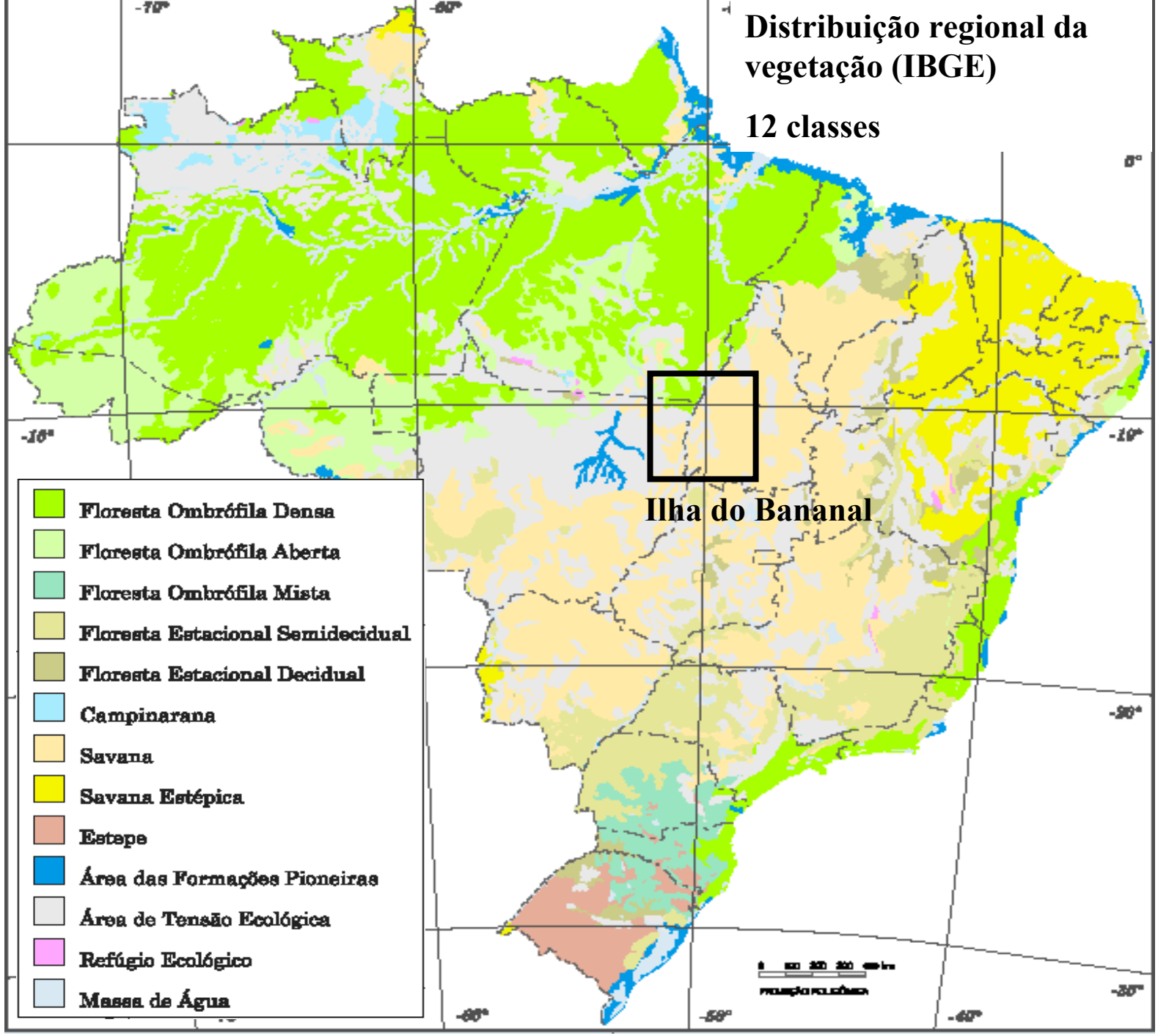
Rocha
(Eco App 2004)
LBA-site: Forest
Santarém - km83
(Jul 2000 – Jun 2001)

Evapotranspiration dominated by radiation: increases in dry season



In intense dry season Bowen ratio increases




Distribuição regional da vegetação (IBGE)
12 classes
Ilha do Bananal
Floresta Ombrófila Densa
Floresta Ombrófila Aberta
Floresta Ombrófila Mista
Floresta Estacional Semidecidual
Floresta Estacional Decidual
Campinarana
Savana
Savana Estépica
Estepe
Área das Formações Pioneiras
Área de Tensão Ecológica
Refúgio Ecológico
Massa de Água

FLORESTA OMBRÓFILA DENSA - D
(Floresta Tropical Pluvial)

Da — Aluvial

Db — Terras Baixas

D — Vegetação Secundária e Atividades Agrárias

SAVANA - S
(Cerrado)

Sd — Florestada (Cerradão)

Sa — Arborizada (Campo Cerrado, Cerrado "propriamente dito")

Sp — Parque (Campo-sujo-de-cerrado e Cerrado de Pantanal)

Sg — Gramineo-Lenhosa (Campo-limpo-de-Cerrado)

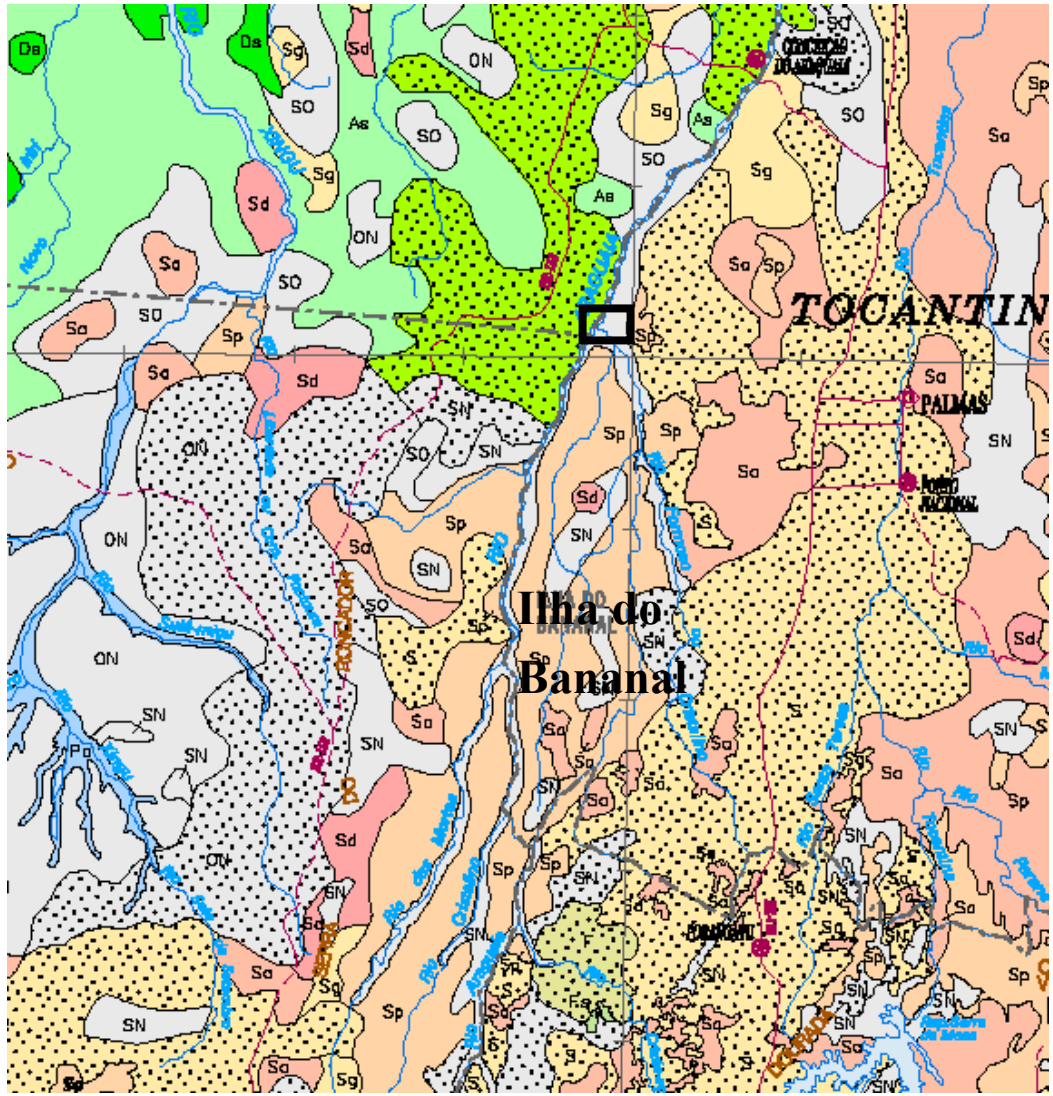
S — Atividades Agrárias

ÁREAS DE TENSÃO ECOLÓGICA
(Contatos entre Tipos de Vegetação)

Contatos

Atividades Agrárias

SO - Savana/Floresta Ombrófila; ON - Floresta Ombrófila/Floresta Estacional; LO - Campinarana/Floresta Ombrófila; OM - Floresta Ombrófila Densa/Floresta Ombrófila Mista; SM - Savana/Floresta Ombrófila Mista; NM - Floresta Estacional/Floresta Ombrófila Mista; SN - Savana/ Floresta Estacional; NP - Floresta Estacional/ Formações Pioneiras (Restinga); SP - Savana/Formações Pioneiras (Restinga); TN - Savana Estépica/Floresta Estacional; EN - Estepe/Floresta Estacional; ST - Savana/Savana Estépica; STN - Savana/Savana Estépica/Floresta Estacional; EM - Estepe/Floresta Ombrófila Mista.



~ 500 km

Ilha do Bananal – ecotone (seasonally flooded)

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Ilha do Bananal site

an ecotone

and

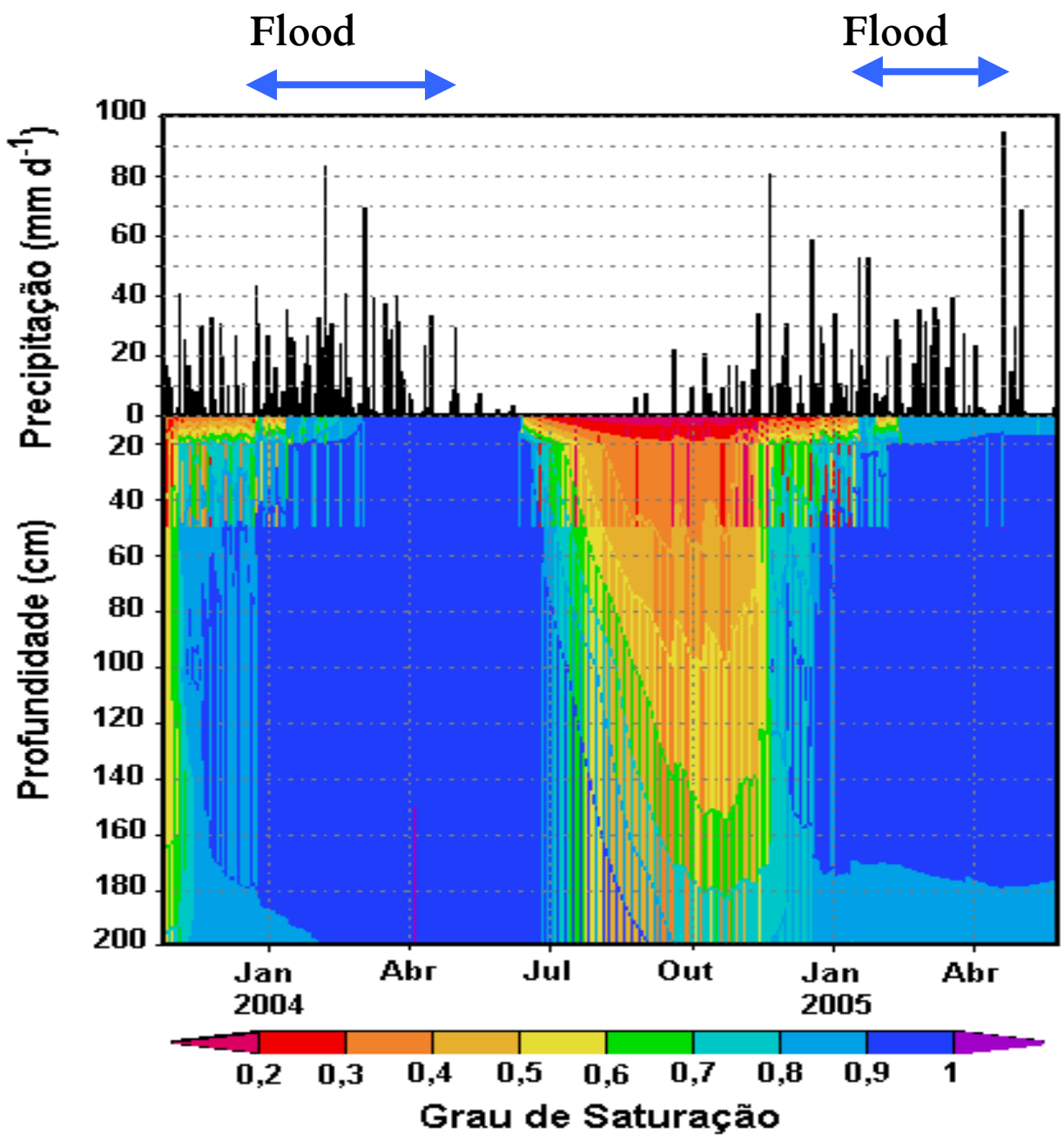
a floodplain

O ecótono da Ilha do Bananal

(inunda sazonalmente, de 2 a 5 meses / ano)

Floresta terra firme: crescimento troncos ocorre na est. chuvosa
Várzeas na Amazônia: o oposto inundação induz estresse por anóxia (Dezzeo et al. 2003)

Rainfall and flood in the Ilha do Bananal ecotone site



Soil wetness

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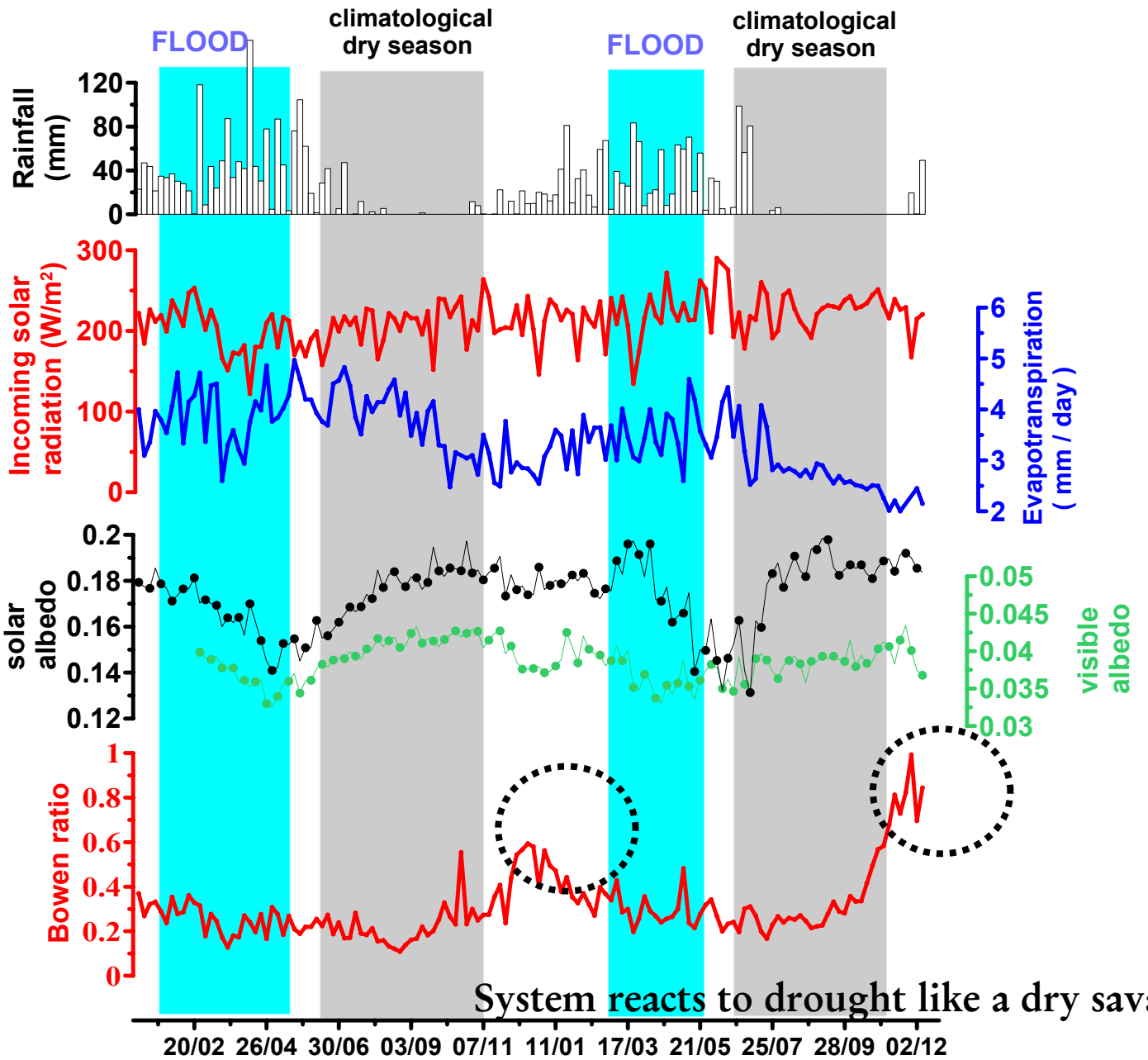
Climate and energy fluxes

Ecotone Ilha do Bananal

Oliveira (2005)

Tannus (2004)



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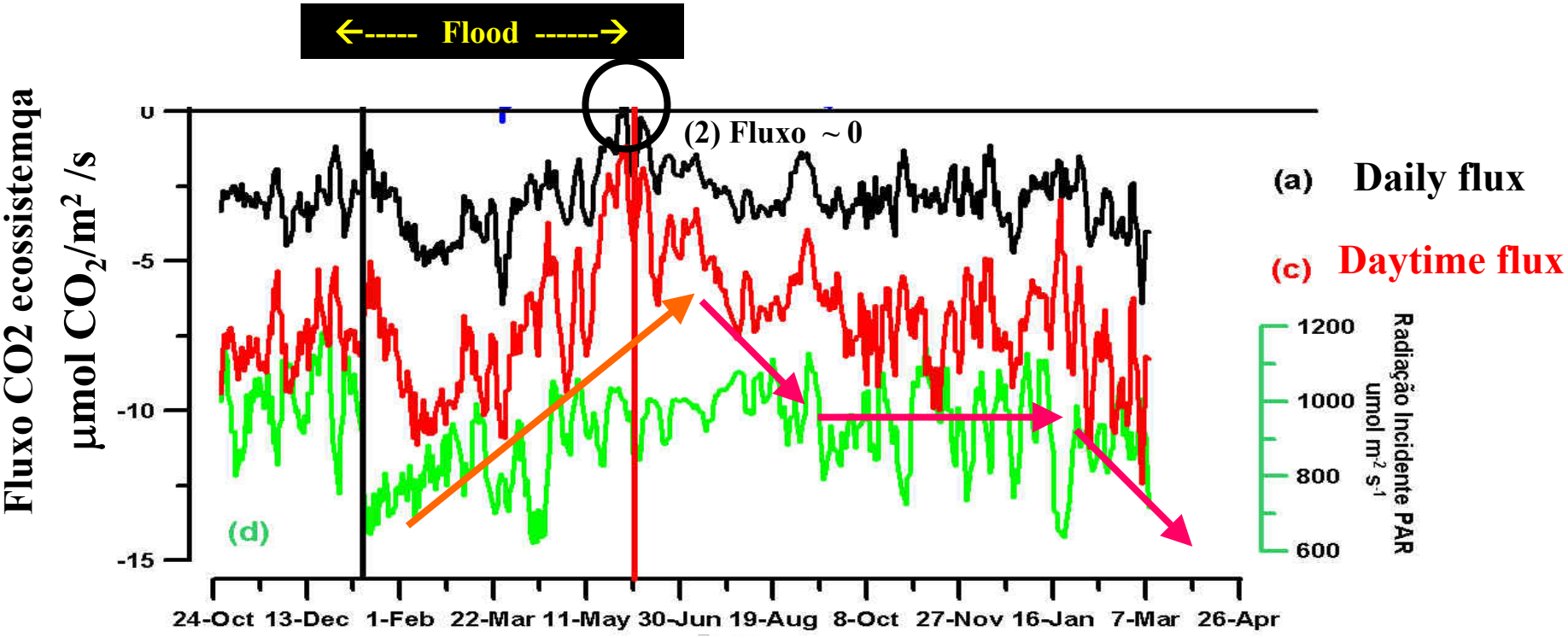
The control of flood pulse in the CO2 fluxes

Ecotone Ilha do Bananal



(1) anóxia stress

Productivity ⇓

(3) Dry season -> early wet season

Productivity ⇑, levels off , ⇑

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Seasonal variation across sites: Temperature, radiative and energy fluxes

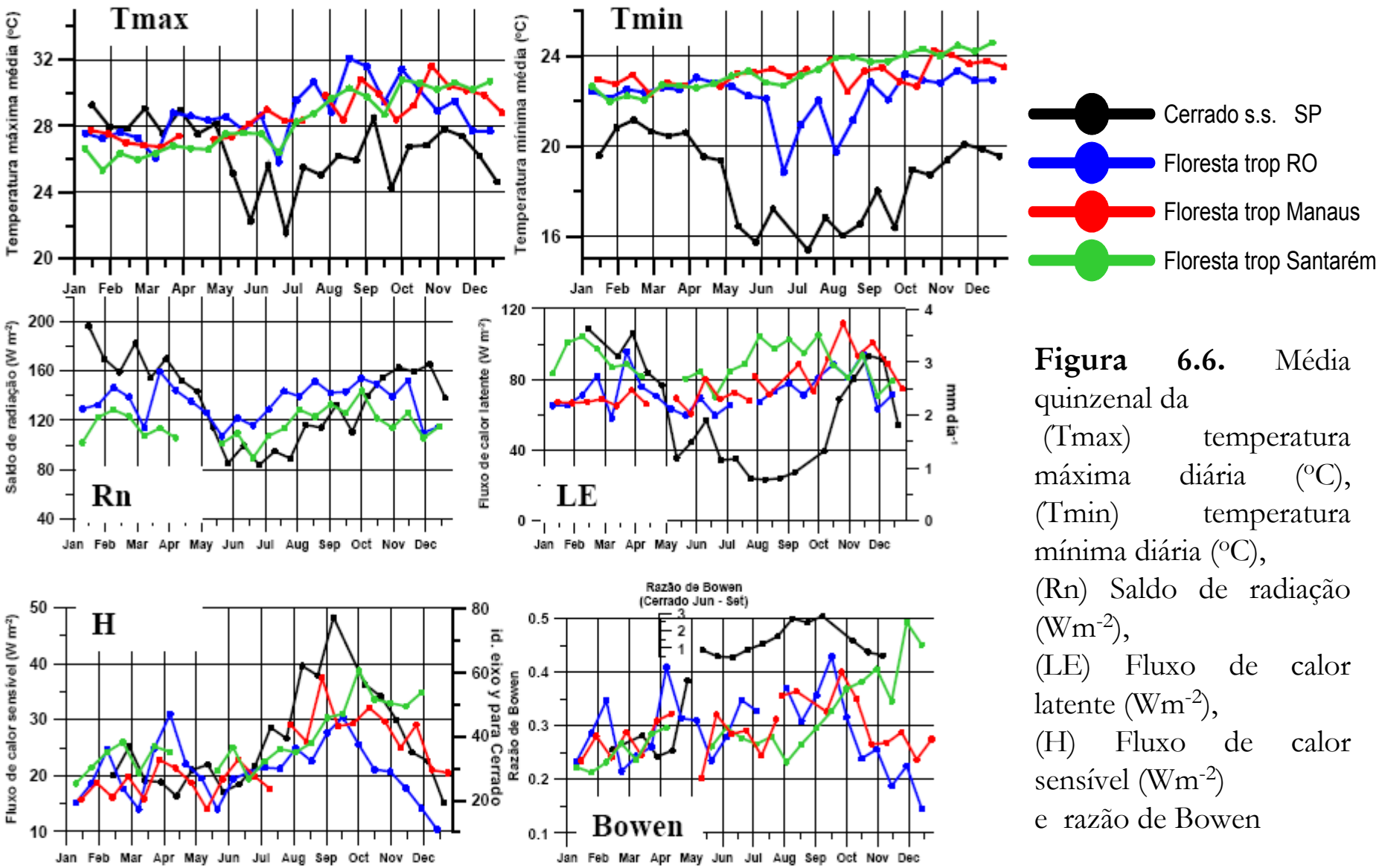
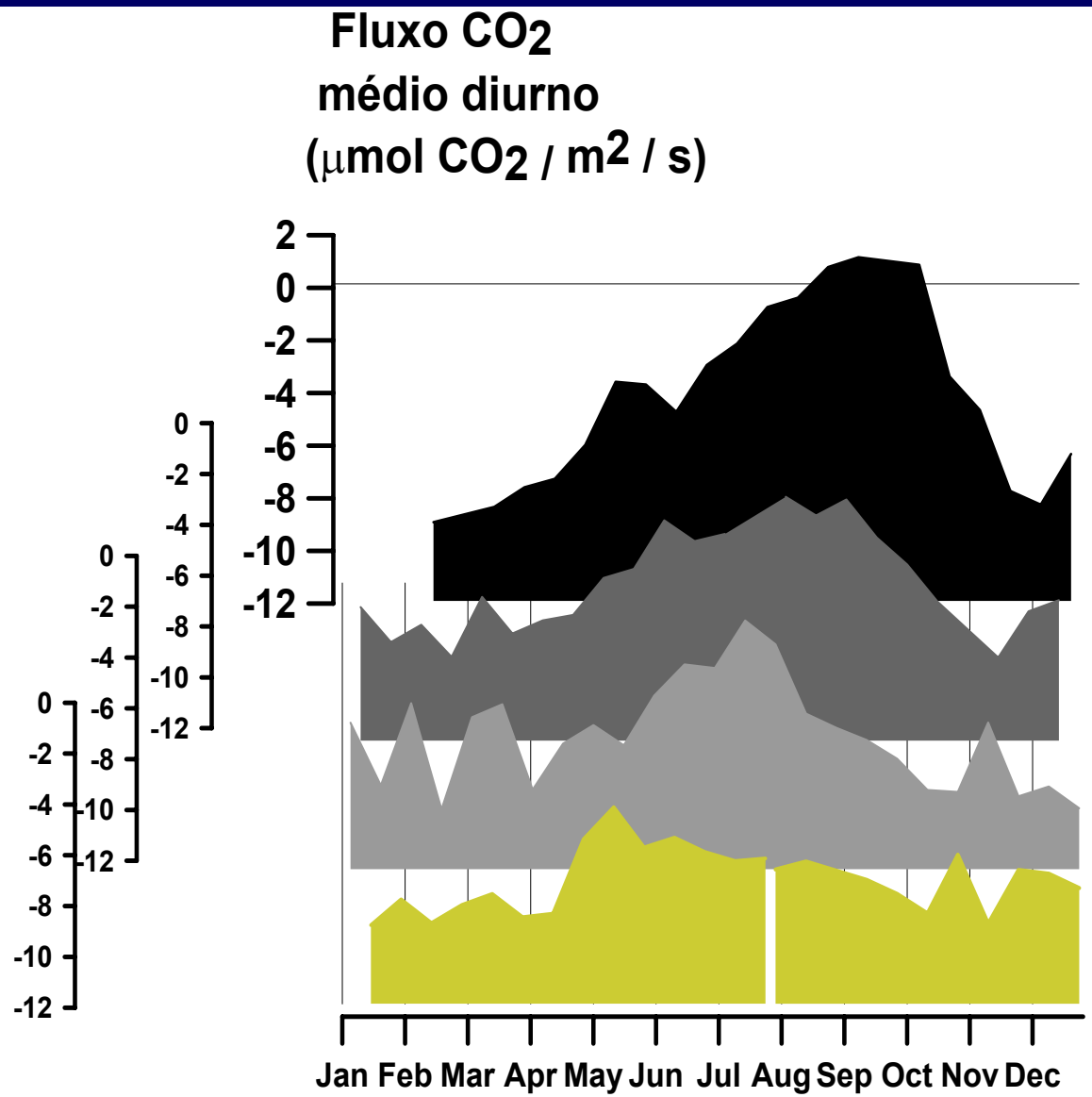


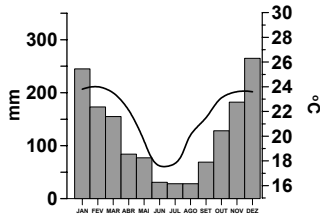
Figura 6.6. Média quinzenal da (Tmax) temperatura máxima diária (°C), (Tmin) temperatura mínima diária (°C), (Rn) Saldo de radiação (Wm^{-2}), (LE) Fluxo de calor latente (Wm^{-2}), (H) Fluxo de calor sensível (Wm^{-2}) e razão de Bowen

O padrão da estação seca (duração, intensidade)

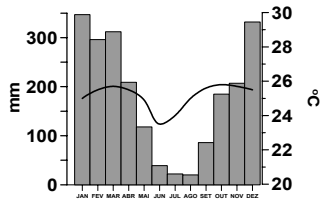
controla a produtividade do ecossistema florestal (Rocha 2004)



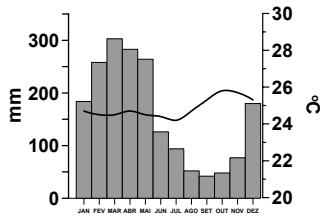
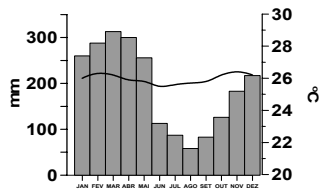
Cerrado São Paulo



Floresta Rondonia



Floresta Santarém



Floresta Manaus