

# Aquecimento Global, Mecanismo de Desenvolvimento Limpo e a Biodiversidade

ENCONTRO

ÁGUA & FLORESTA

Rio Paraíba do Sul

Taubaté

Warwick Manfrinato



Plant Planejamento e Ambiente Ltda

ESALQ

Universidade de São Paulo



# Conteúdo

- Considerações sobre Florestas e Água
- Elementos do Mercado de Carbono

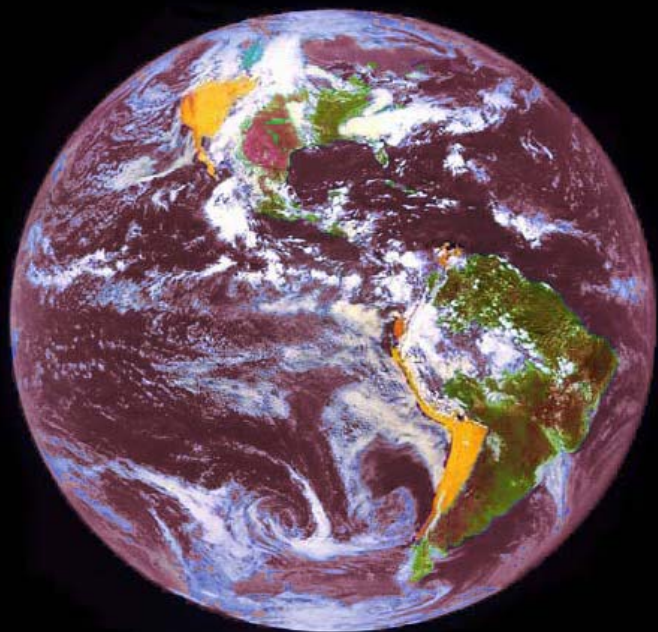
# Atmosfera... incrível sutileza



Envelope gasoso completamente improvável ...



Terra Estufa  
95% CO<sub>2</sub>





Terra Hoje  
0.037% CO<sub>2</sub>





Água Líquida na Superfície

# Propriedades Termodinâmicas da VIDA

Manipula fluxos de matéria e energia

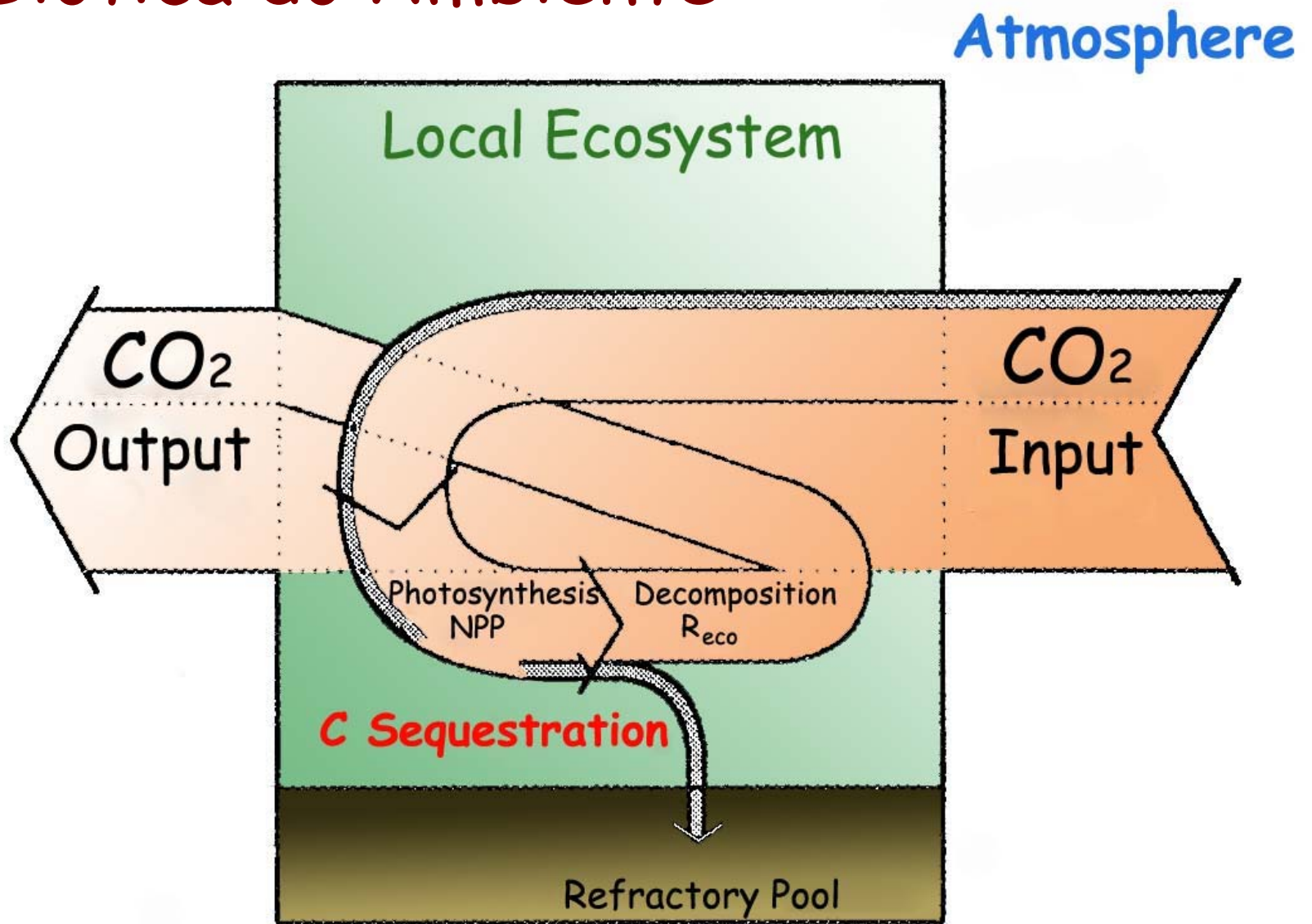
Sempre busca equilíbrio

Acumula informação

Contra desordem

É auto regulada

# Fundamento da Regulação Biótica do Ambiente



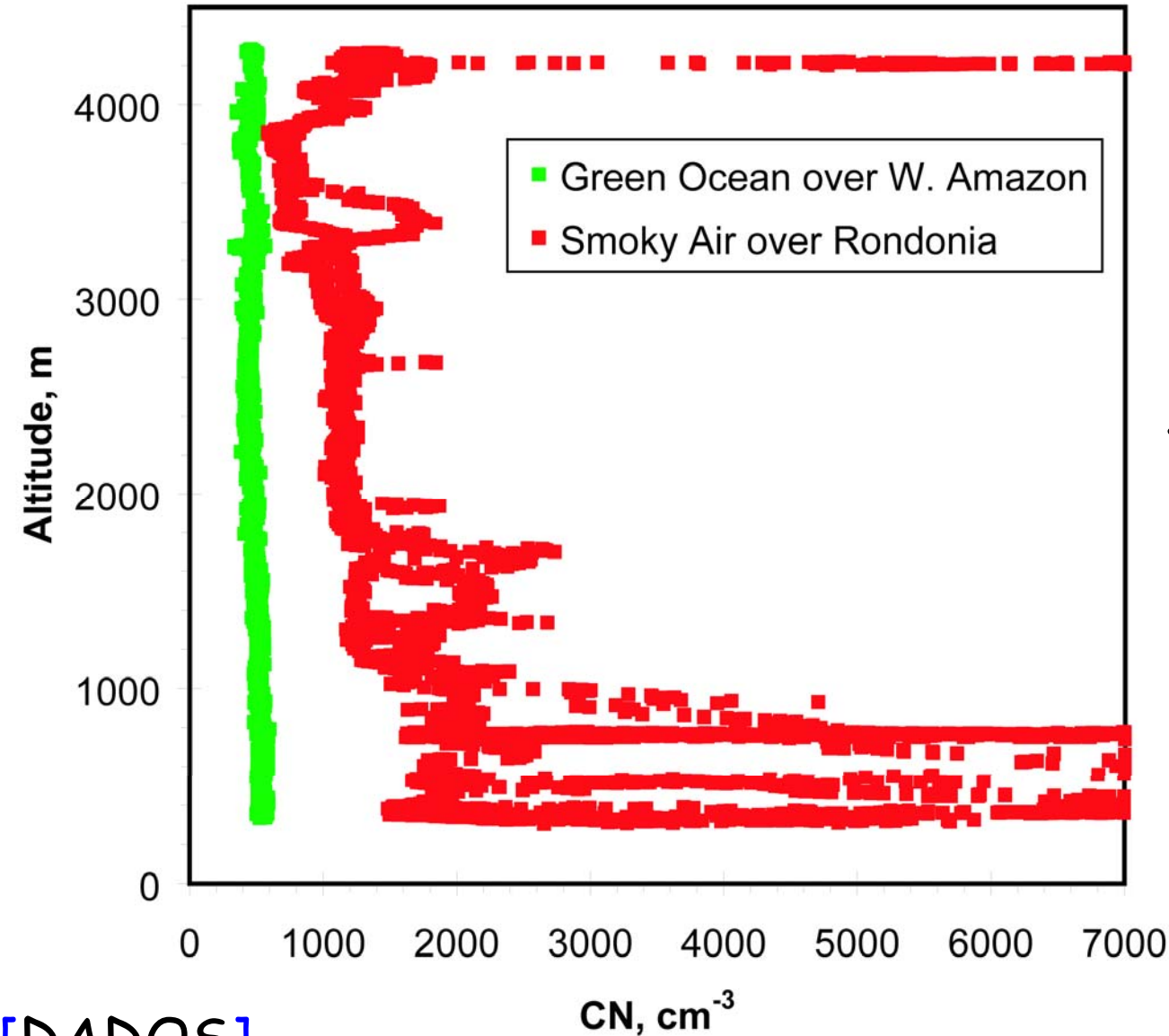
(from Gorshkov et al, *Biotic Regulation of the Environment*, 2000, Springer-Praxis)



# Saudável Oceano Verde



# Porque a Amazônia é Comparada ao Oceano?



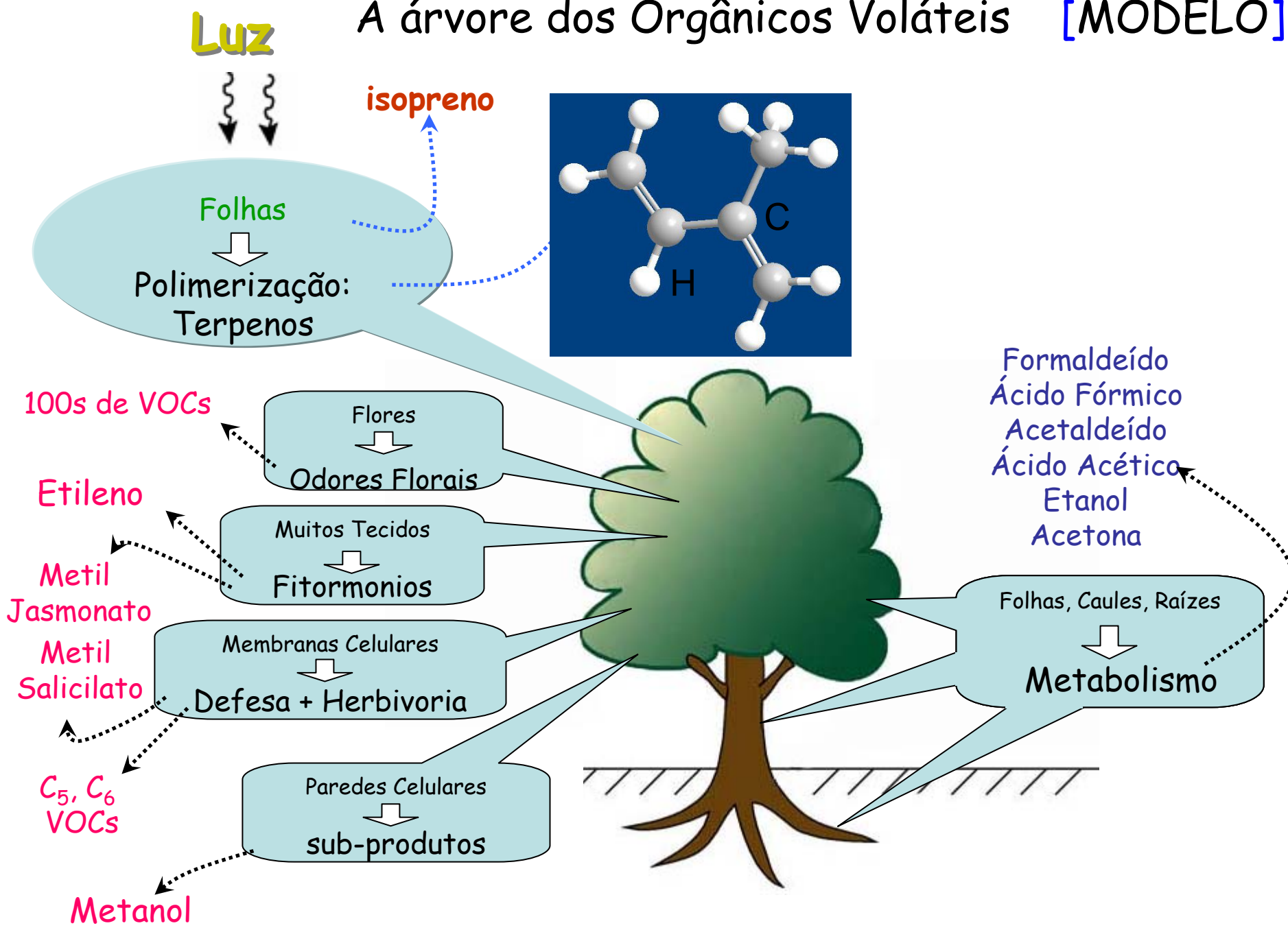
Distribuição vertical de poeira sobre a floresta Amazônica

[DADOS]



As Emissões  
de Compostos Orgânicos Voláteis  
está Associada com a Biodiversidade

# A árvore dos Orgânicos Voláteis [MODELO]



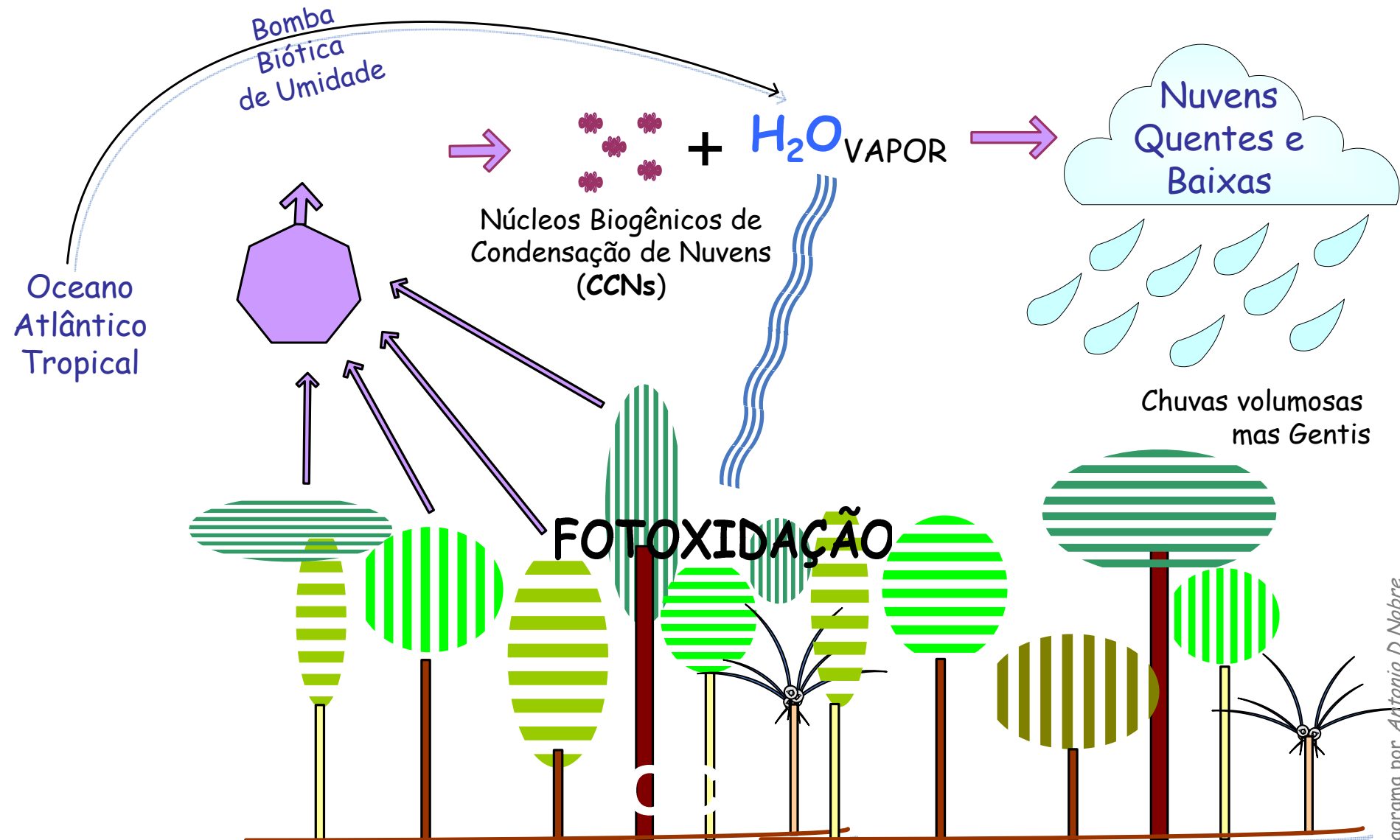


# Formação de Gotas



# MECANISMO DE CHUVA EM UMA FLORESTA NÃO PERTURBADA

ATMOSFERA LIMPA



[MODELO]

baseado em resultados do LBA: Claeys et al and Andrea et al. *Science* 2004; Marengo et al 2004, 2005; e outros

# MECANISMO DE CHUVA EM UMA FLORESTA NÃO PERTURBADA

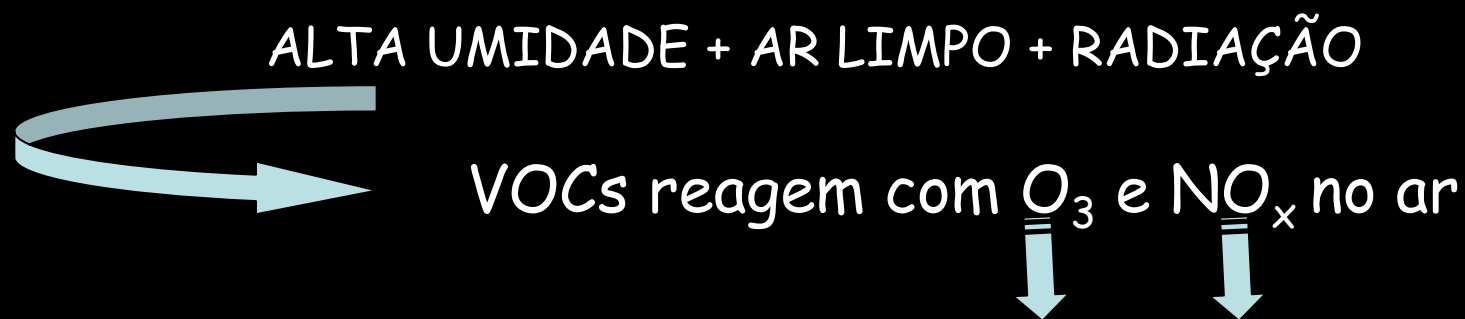
*Regador*

*"Jardim do Éden"*





Promoção de chuvas não é o única regulação promovida pela floresta



A floresta funciona também como um *Fígado Aberto da Atmosfera* ...ativamente removendo poluentes naturais e antropogênicos

# Em sumario, a floresta Amazônica pode:

Manter a atmosfera limpa do excesso de poeira que poderia afetar deletariamente a dinâmica da chuva;

Retornar água precipitada para a atmosfera através da transpiração das plantas e interceptação da chuva;

Criar sua própria chuva através de maneiras engenhosas de estimulação da produção de sementes de condensação de nuvens com gases orgânicos;

Limpar ativamente o ar de poluentes perigosos como ozônio e óxidos de nitrogênio, aumentando sua própria produtividade como resultado

Bombear para dentro do continente água doce evaporada do oceano circundante...

# Rios de Vapor

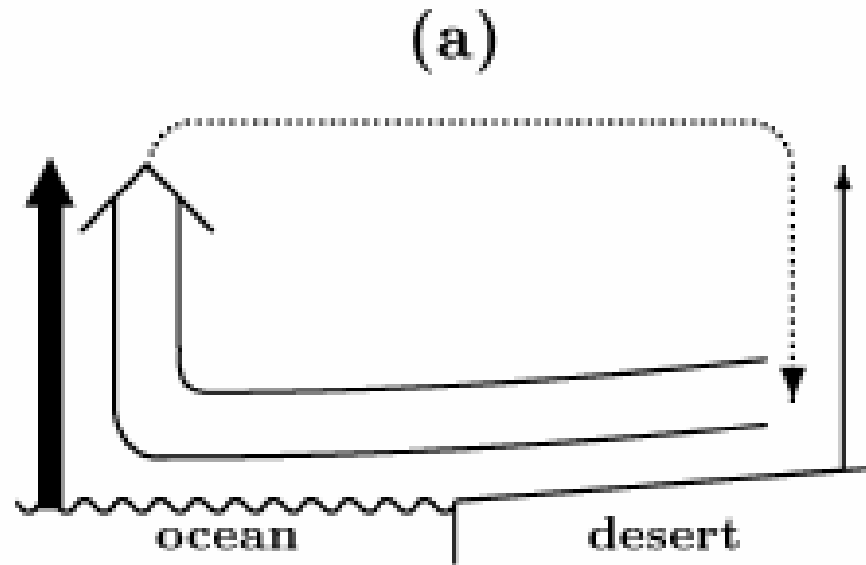




Poderoso evaporador

# Rios de Vapor

- Cada árvore grande na Amazônia chega a evaporar 300 l de água por dia
- para toda a região de floresta (5,5 milhões de km<sup>2</sup>) 20 bilhões de toneladas de água são evaporadas a cada dia
- A energia do sol consumida para a evaporação de apenas um dia é equivalente à produção total de eletricidade de Itaipu ao longo de 135 anos!
- 1 ano na Amazônia => 50 mil anos de Itaipu

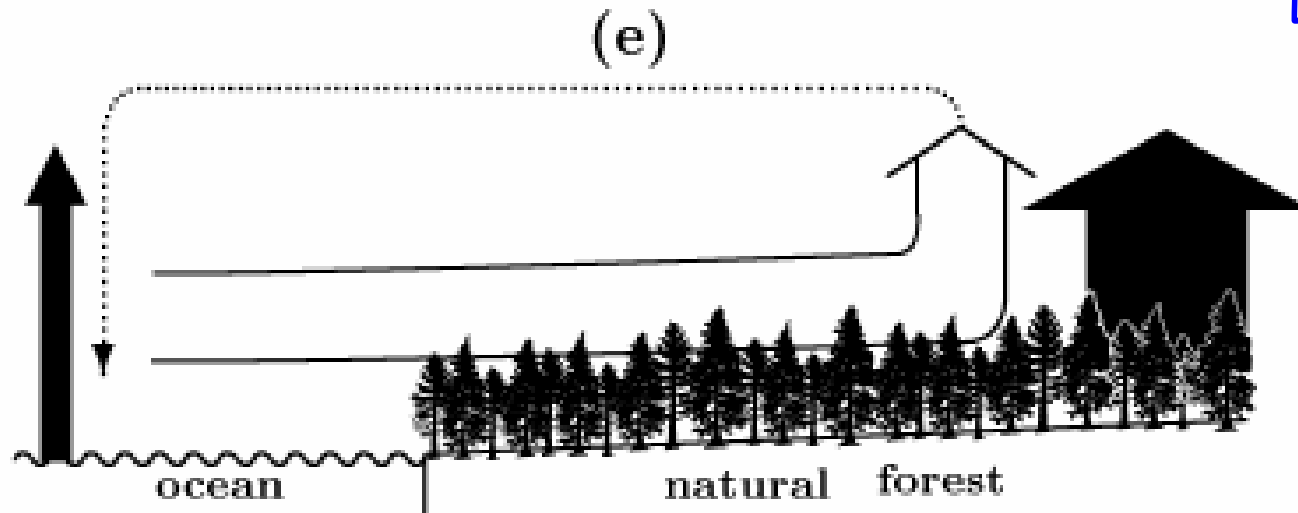


*desert locked for moisture*

(a) Deserts: evaporation on land is close to zero, so the low level air moves from land to the ocean year round, thus "locking" the desert for moisture.

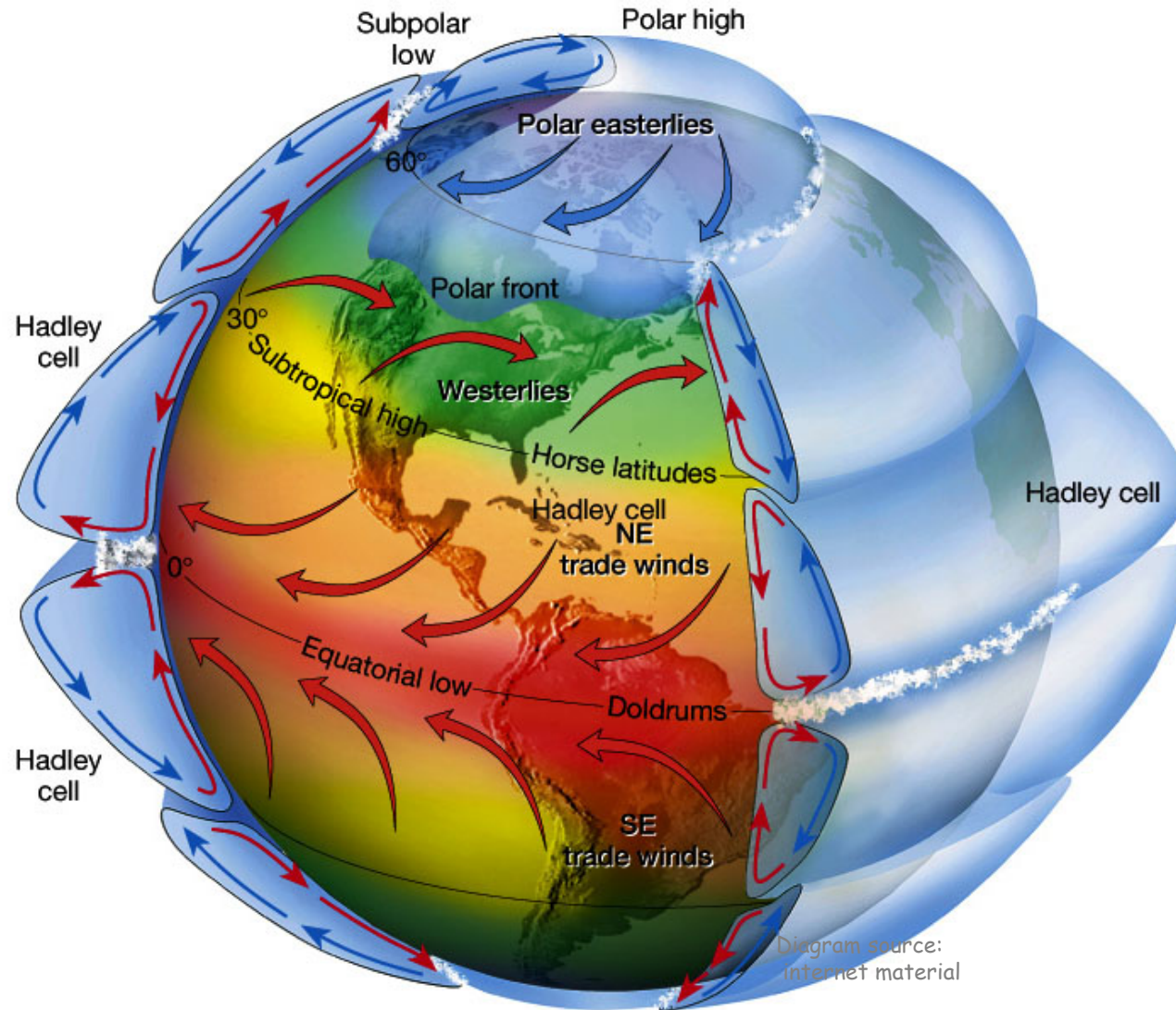
# CIRCULAÇÃO SOBRE ÁREAS FLORESTADAS

[MODELO]



*biotic pump of atmospheric moisture*

(e) Biotic pump of atmospheric moisture: transpiration fluxes regulated by natural forests exceed oceanic evaporation fluxes to the degree when the arising ocean-to-land fluxes of moist air become large enough to compensate losses of water to runoff in the entire river basin.







ECÇÃO

# A Explicação: *Os Monções da América do Sul*

2262

JOURNAL OF CLIMATE

VOLUME 17

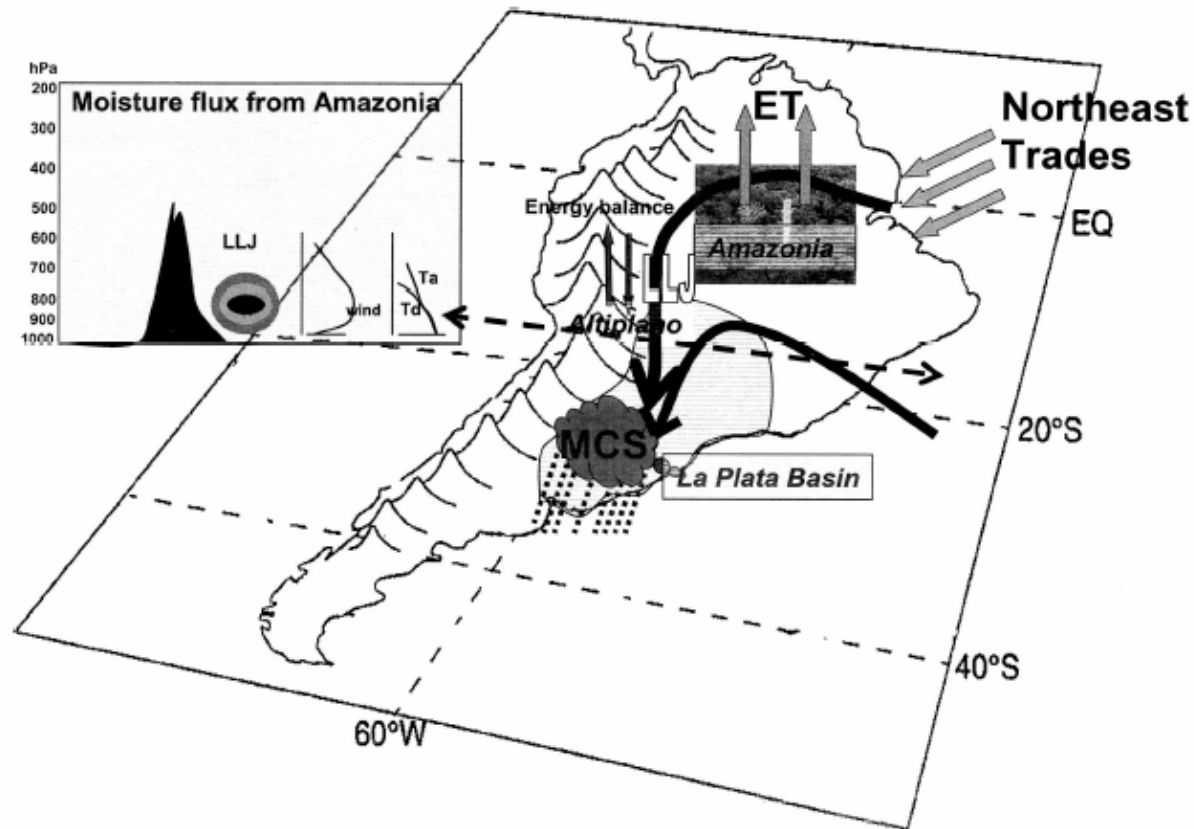


FIG. 1. Conceptual model of the SALLJ east of the Andes.

Marengo et al, 2005

[MODELO]



# MECANISMO DE CHUVA EM UMA ÁREA PERTURBADA

[MODELO]

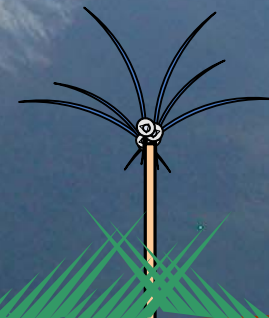
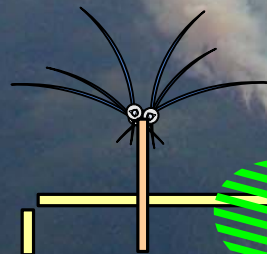
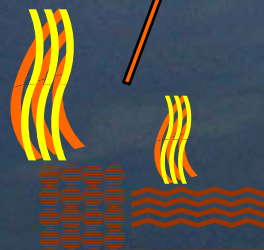
ATMOSFERA SUJA

VOCS  
~~X~~

Fuligem  
Poeira

H<sub>2</sub>O

Foto Crédito *Andrea, Artaxo et al.*  
LBA Experimento Smocc

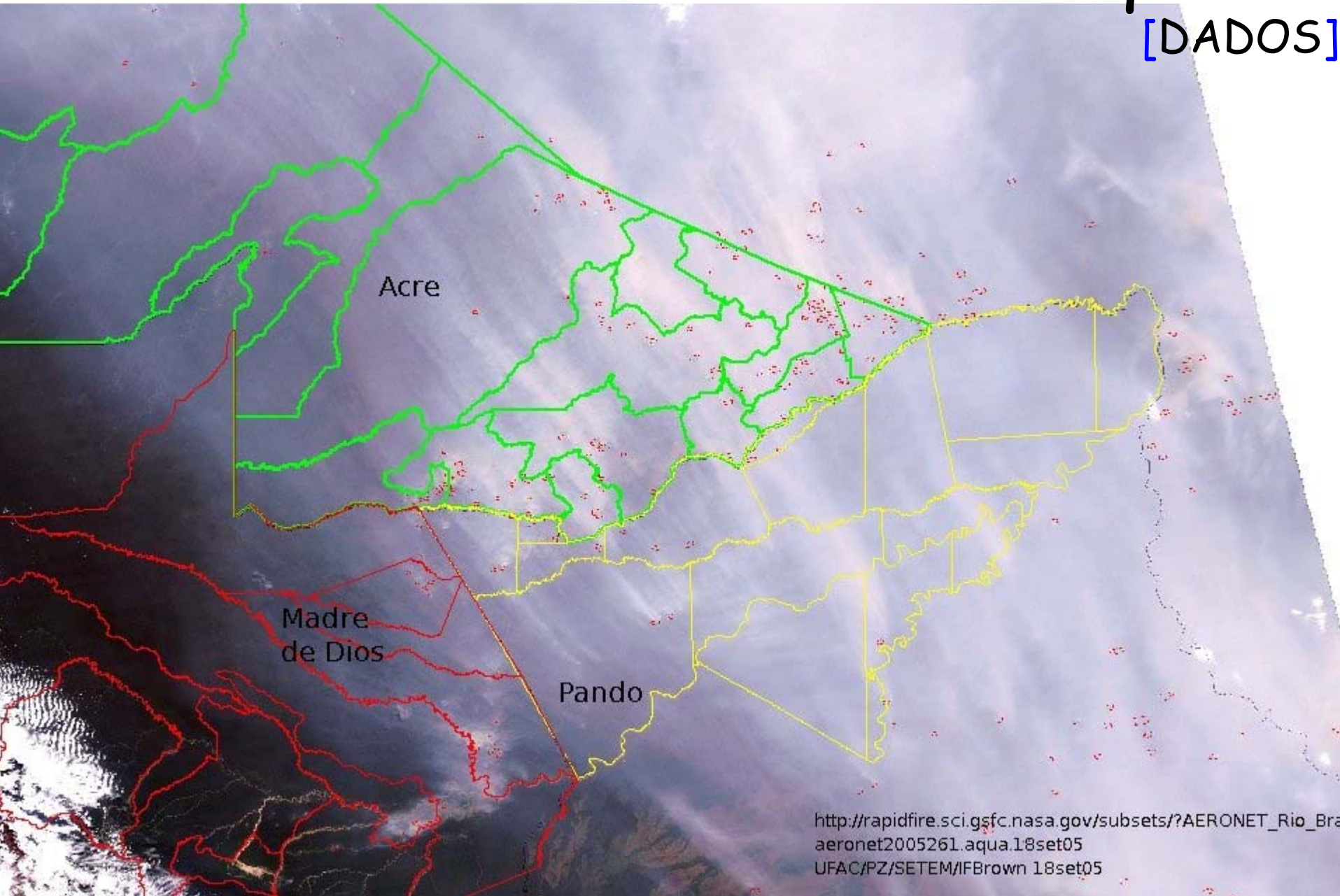


Baseado nos resultados dos projetos *ABRACOS 2000* e *LBA*: *Andrea et al. Science*,; e outros

Diagrama por *Antonio D Nobre*

# 18/Setembro/05 Modis Aqua

[DADOS]



Acre

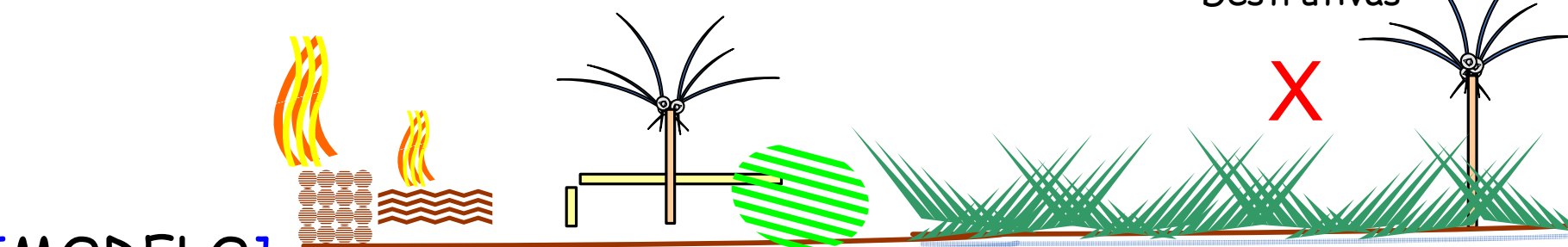
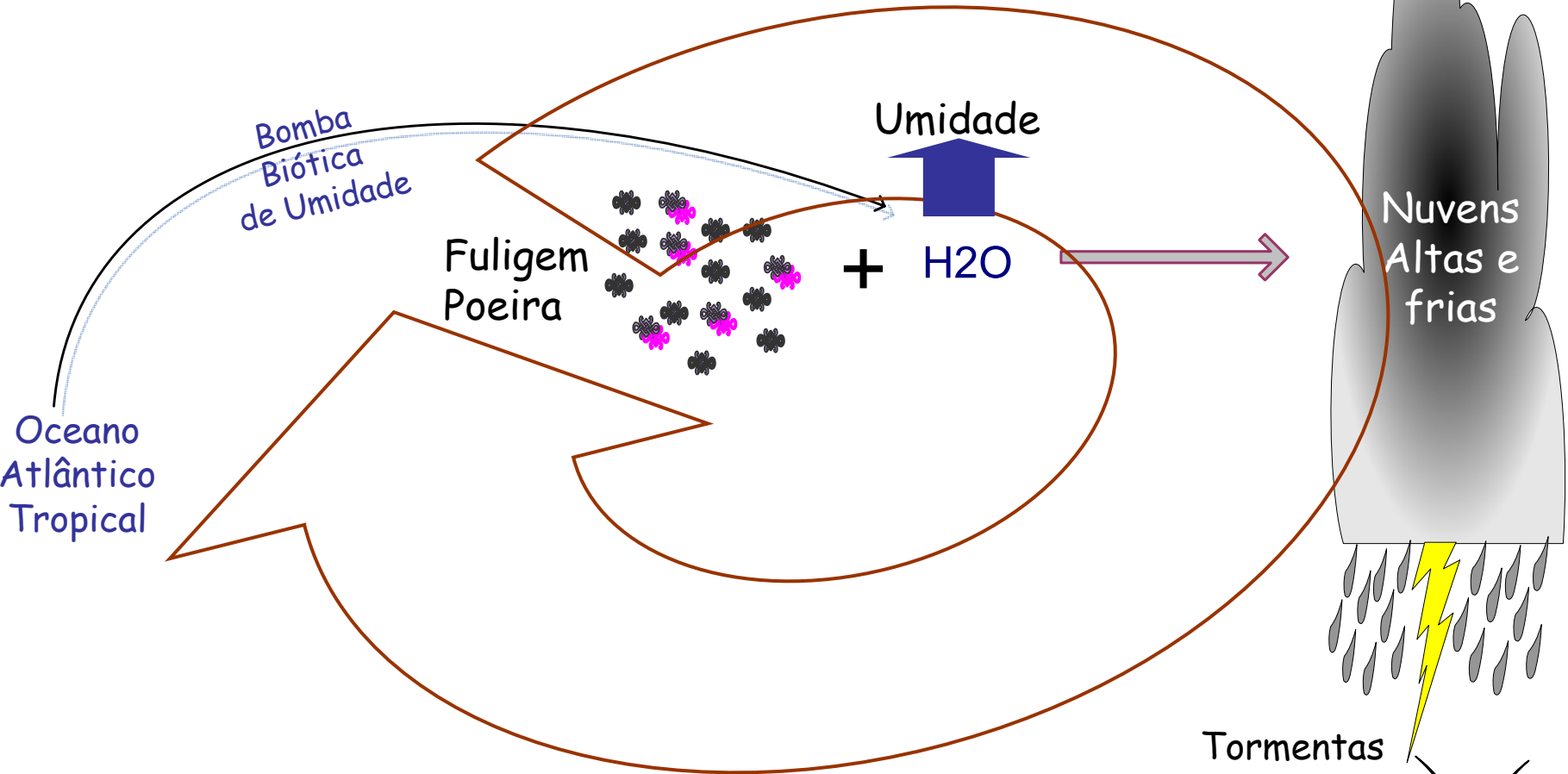
Madre de Dios

Pando

[http://rapidfire.sci.gsfc.nasa.gov/subsets/?AERONET\\_Rio\\_Bra\\_aeronet2005261\\_aqua.18set05](http://rapidfire.sci.gsfc.nasa.gov/subsets/?AERONET_Rio_Bra_aeronet2005261_aqua.18set05)  
UFAC/PZ/SETEM/IFBrown 18set05

# MECANISMO DE CHUVA EM UMA ÁREA PERTURBADA

ATMOSFERA SUJA



[MODELO]

Baseado nos resultados dos projetos ABRACOS 2000 e LBA: Andrea et al. *Science*; e outros

Diagrama por Antonio D Nobre

# INTERROMPENDO O TRANSPORTE DE UMIDADE PARA DENTRO DO CONTINENTE



[MODELO]









  
AMBULÂNCIA  
FLUVIAL

SENADOR ARTUR VIRGILIO





# Rio Amazonas, 2005



# MERCADO DE CARBONO: uma experiência econômica inovadora



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# SIMULAÇÃO:

O relacionamento entre  
interessados

Exemplo:

## Western Oil & Gas Co

This sheet provides a one-page overview of your virtual company and relates this data to the web page used in the CO2e.com Trading Simulation

<b>Company Description</b>	This company has particular expertise in the oil exploration and production in harsh conditions in Western Canada.
<b>Starting Cash</b>	\$120,000

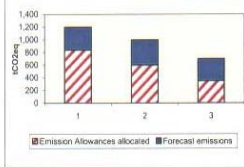
### Virtual Company Position

This section provides an overview of your virtual company position - forecast emissions, emission allowances allocated and instrument shortfall, in a tabular and graphical format.

Year	1	2	3
Forecast emissions	1200	1000	700
Emission Allowances allocated	840	600	350
Shortfall	360	400	350

(expressed in metric tonnes carbon dioxide equivalent (tCO2eq))

This is the key information page for participants and defines their compliance and cash position. Participants should refer back to this page to observe how origination and trading activities impact their position and adjust their strategy, and execution of strategy, accordingly.



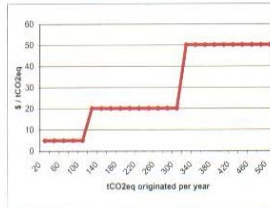
### Marginal Abatement Cost (MAC) Curve

#### Marginal abatement cost curve

The marginal abatement cost (MAC) curve shows the cost of originating one tCO2eq in a particular year, given that a known volume of internal reductions have already been originated in that particular year.

#### Origination page

The Origination page provides the facility to originate internal reductions for the year selected. For convenience, the volume originated in each year is also included. To originate further internal reductions, select the origination year, select the desired volume and then click accept to execute.



## Oil & Gas Co

This sheet provides a one-page overview of your virtual company and relates this data to the web page used in the CO2e.com Trading Simulation

<b>Company Description</b>	This company is a major force in the oil exploration and production industry in Canada.
<b>Starting Cash</b>	\$120,000

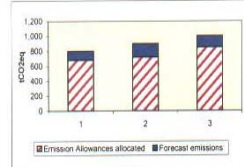
### Virtual Company Position

This section provides an overview of your virtual company position - forecast emissions, emission allowances allocated and instrument shortfall, in a tabular and graphical format.

Year	1	2	3
Forecast emissions	800	900	1000
Emission Allowances allocated	660	720	850
Shortfall	120	180	150

(expressed in metric tonnes carbon dioxide equivalent (tCO2eq))

This is the key information page for participants and defines their compliance and cash position. Participants should refer back to this page to observe how origination and trading activities impact their position and adjust their strategy, and execution of strategy, accordingly.



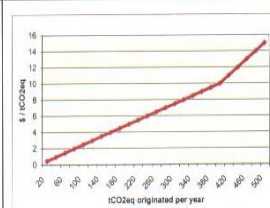
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## Cement Co

This sheet provides a one-page overview of your virtual company and relates this data to the web page used in the CO2e.com Trading Simulation

<b>Company Description</b>	This company is the leading producer in the North American cement market and supplies 25% of Canada's cement requirements.
<b>Starting Cash</b>	\$120,000

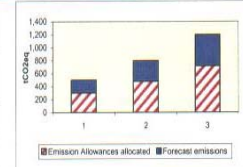
### Virtual Company Position

This section provides an overview of your virtual company position - forecast emissions, emission allowances allocated and instrument shortfall, in a tabular and graphical format.

Year	1	2	3
Forecast emissions	500	800	1200
Emission Allowances allocated	300	480	720
Shortfall	200	320	480

(expressed in metric tonnes carbon dioxide equivalent (tCO2eq))

This is the key information page for participants and defines their compliance and cash position. Participants should refer back to this page to observe how origination and trading activities impact their position and adjust their strategy, and execution of strategy, accordingly.



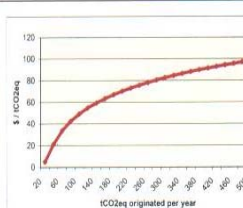
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