Multi-scale analyses of inundaton and wetland vegetation dynamics: Applications to carbon fluxes

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Towards a Functional Characterization of Amazonian Wetlands

Basinwide mapping of Amazonian wetlands using a classification system suitable for multiple applications:

Biogeochemical and hydrologic modeling

Resource management and development planning

Classification approach

Three physical characteristics detectable using satellite remote sensing satisfy the key requirements :

Vegetation structure (non-vegetated, herbaceous, shrub, woodland, forest)

Inundation periodicity (flooded or non-flooded on a sequence of dates)

Water type (blackwater, whitewater, clearwater, mixed)

Remote Sensing Datasets

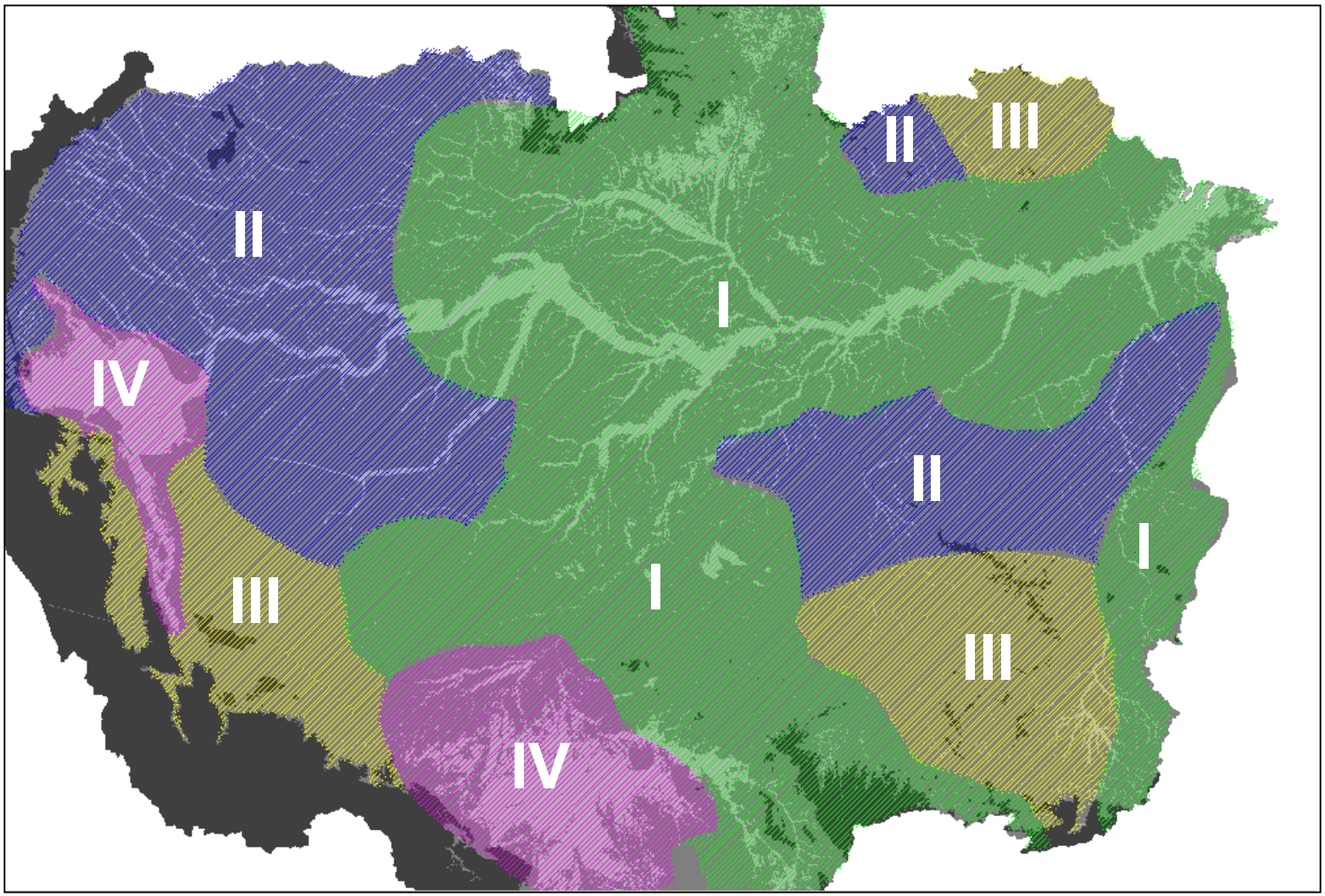
High-resolution basinwide and regional mosaics

- **SAR (JERS-1, Radarsat, Envisat) 100 m**
- **Landsat TM 30 m**
- **Shuttle Radar Topography Mapper 90 m**

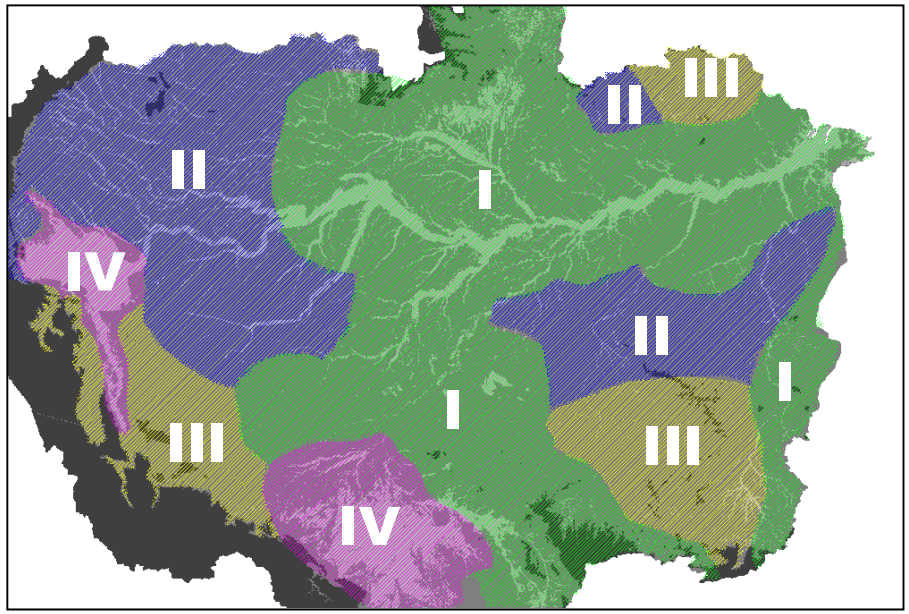
Low-resolution regional mosaics

- **SMMR passive microwave 25 km**
- **MODIS 250 m**

Wetlands Mapping: Thematic Accuracy Zones

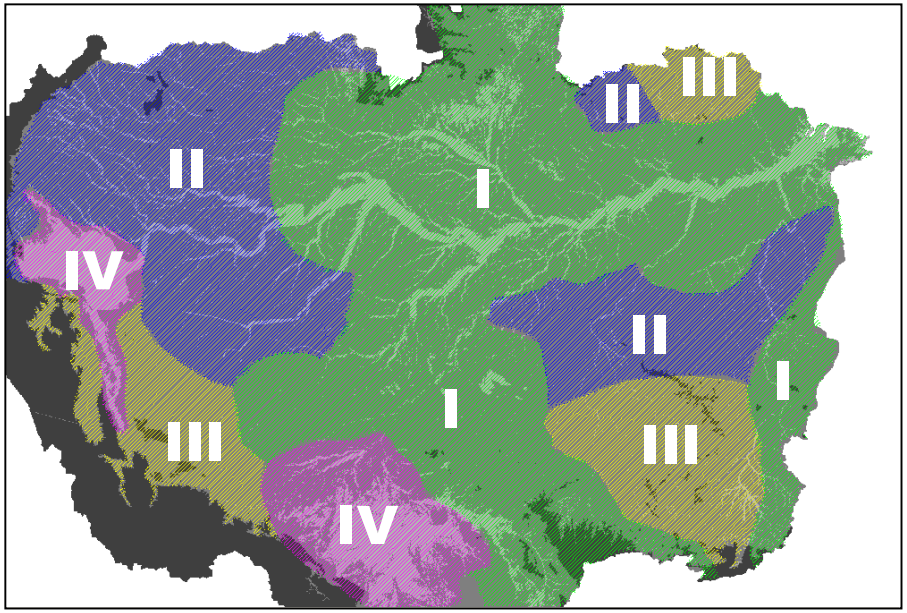


Wetlands Mapping: Thematic Accuracy Zones (2)



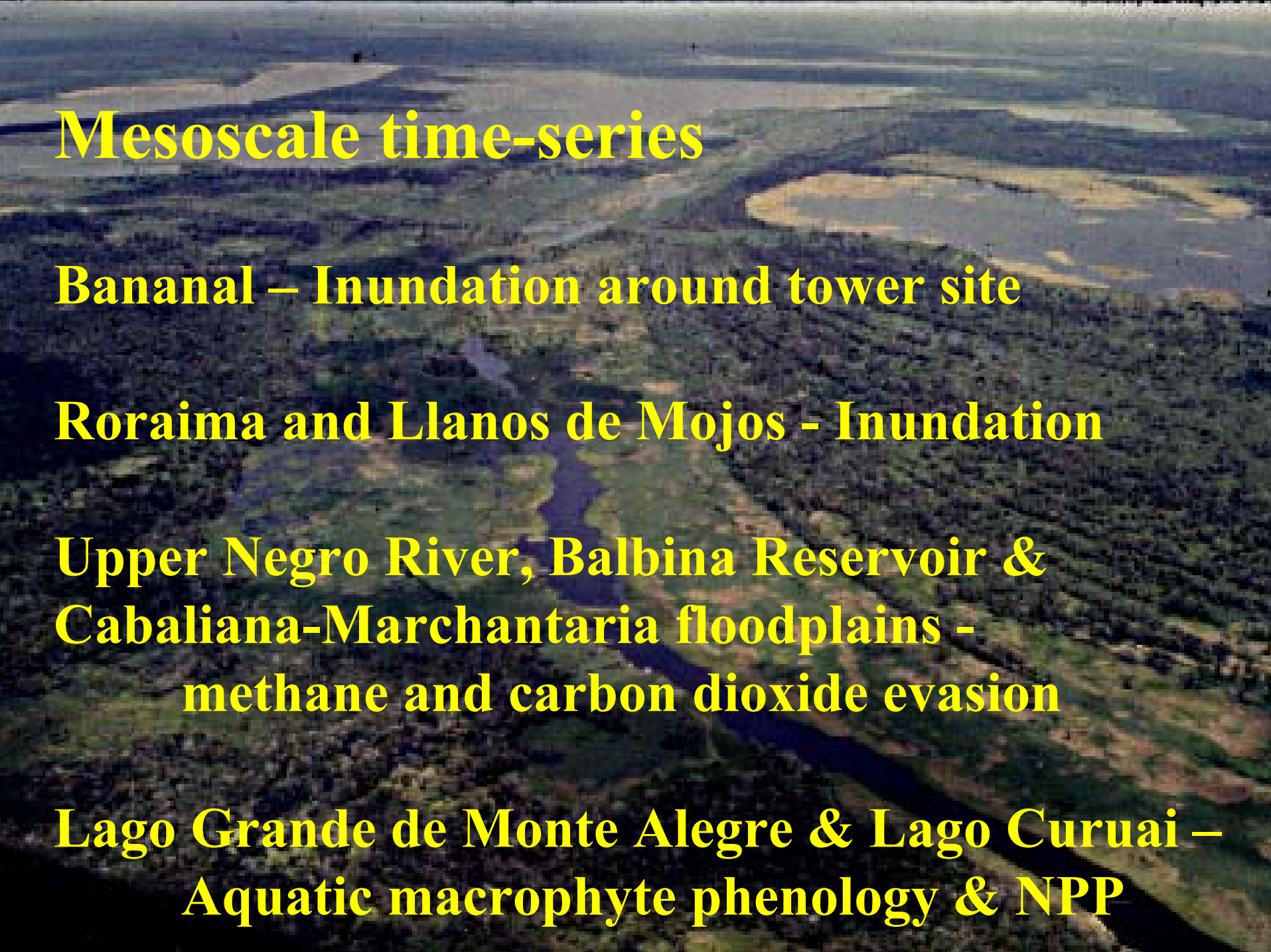
- For wetland vs. non-wetland mapping, primary validation dataset is 1999 videography (timed to high-water stage for central Amazon)
- Zone 1 is a 500 km buffer centered along 1999 video flightlines
- Within Zone 1, we assume video-based accuracy statistics are valid

➢ To what extent can these results be extended beyond Zone 1?



Wetlands Mapping: Thematic Accuracy Zones (3)

- Zone II: vegetation structure and flood timing are represented within video transects
- Zone III: flood timing not well represented within video transects
- Zone IV: neither vegetation nor flood timing well represented within video transects



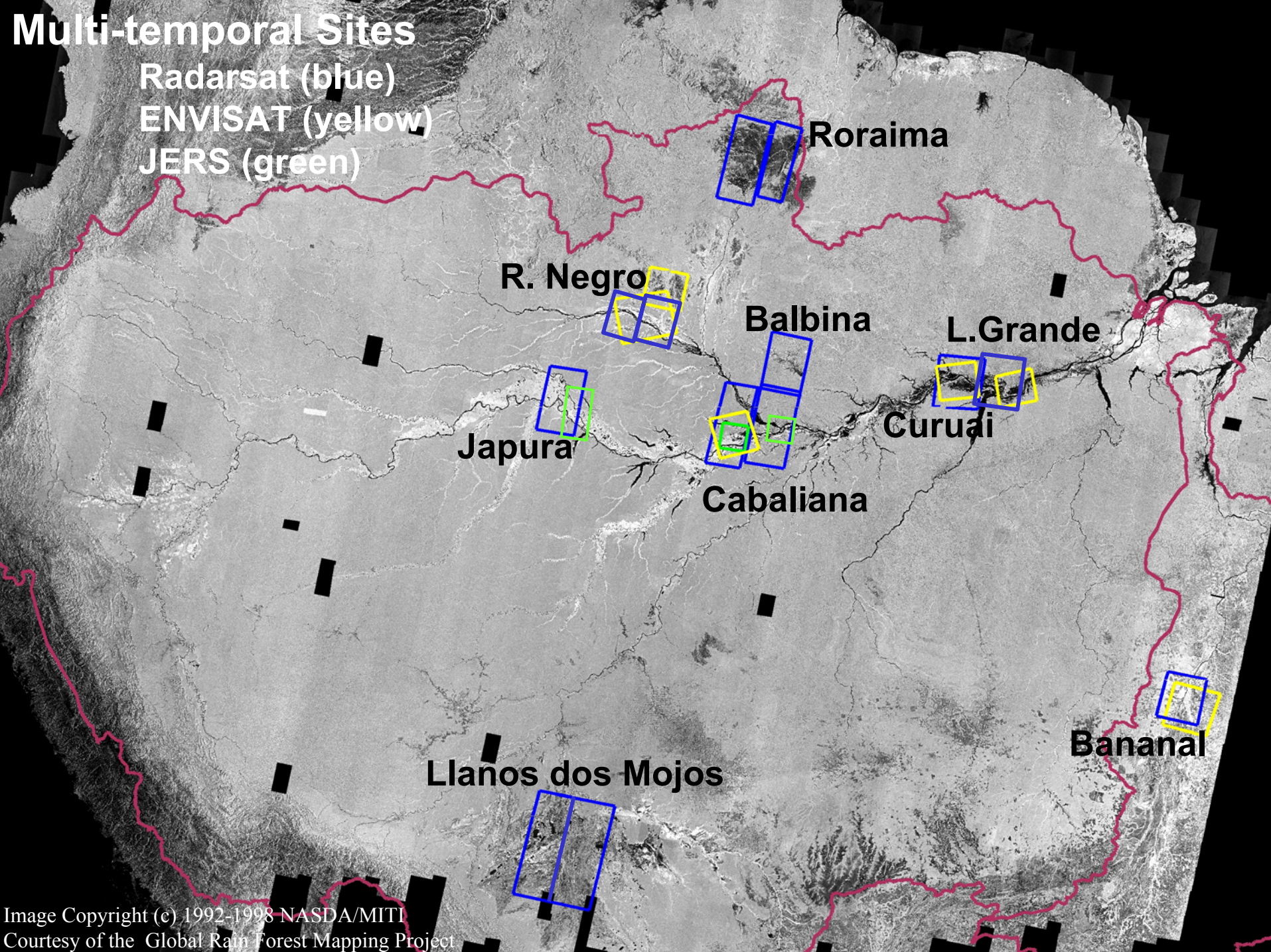
Mesoscale time-series

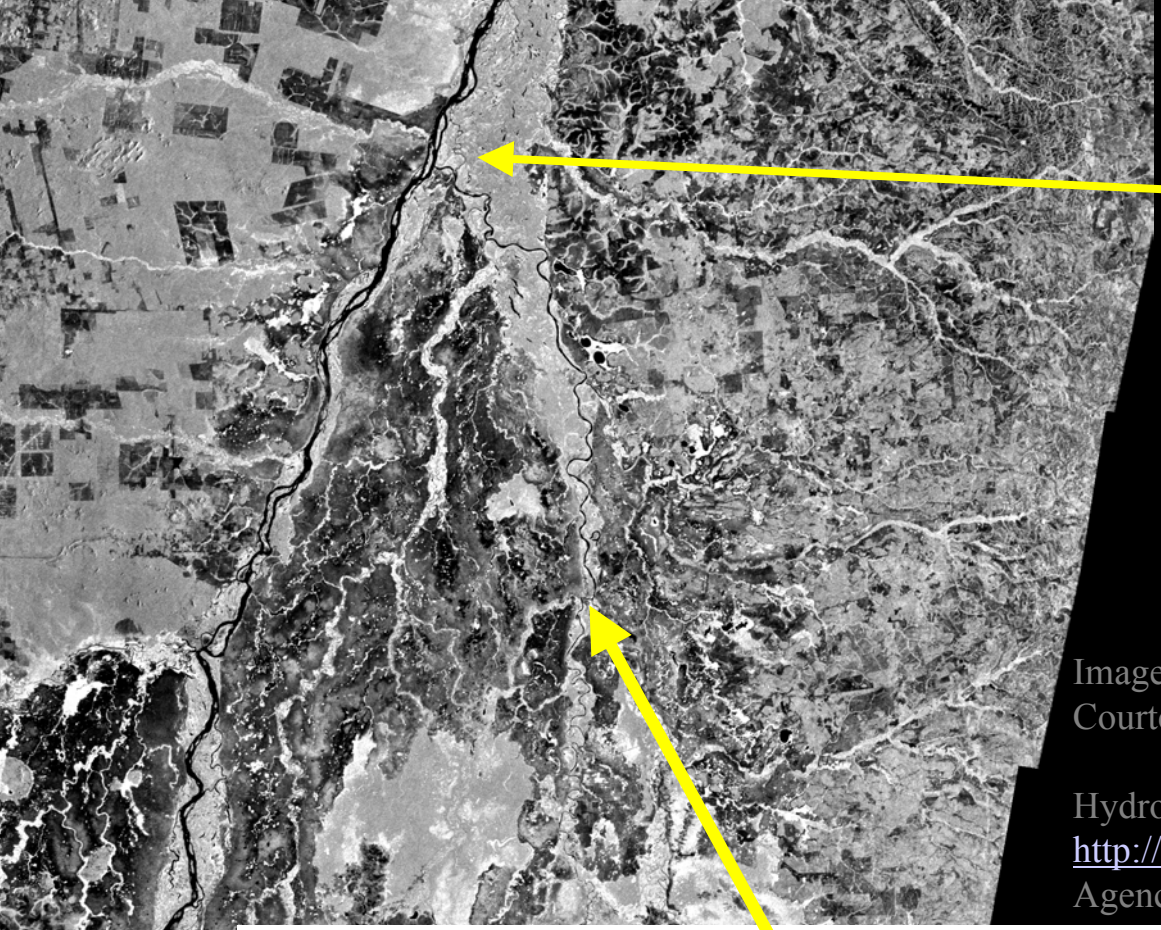
Bananal – Inundation around tower site

Roraima and Llanos de Mojos - Inundation

Upper Negro River, Balbina Reservoir & Cabaliana-Marchantaria floodplains - methane and carbon dioxide evasion

Lago Grande de Monte Alegre & Lago Curuai – Aquatic macrophyte phenology & NPP

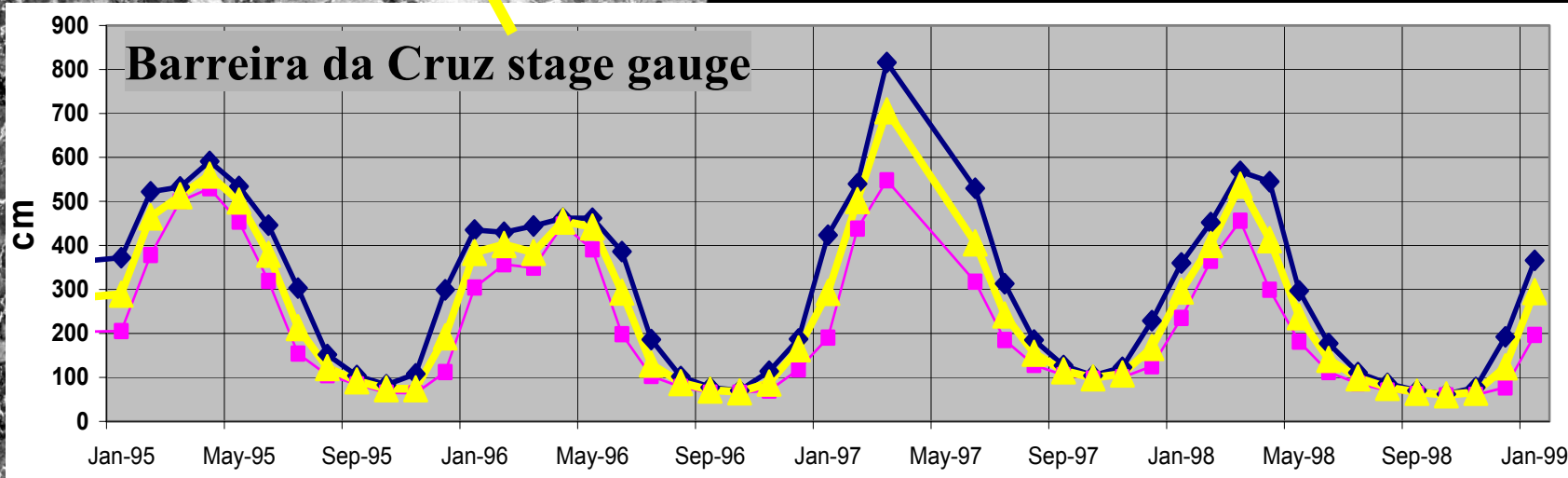




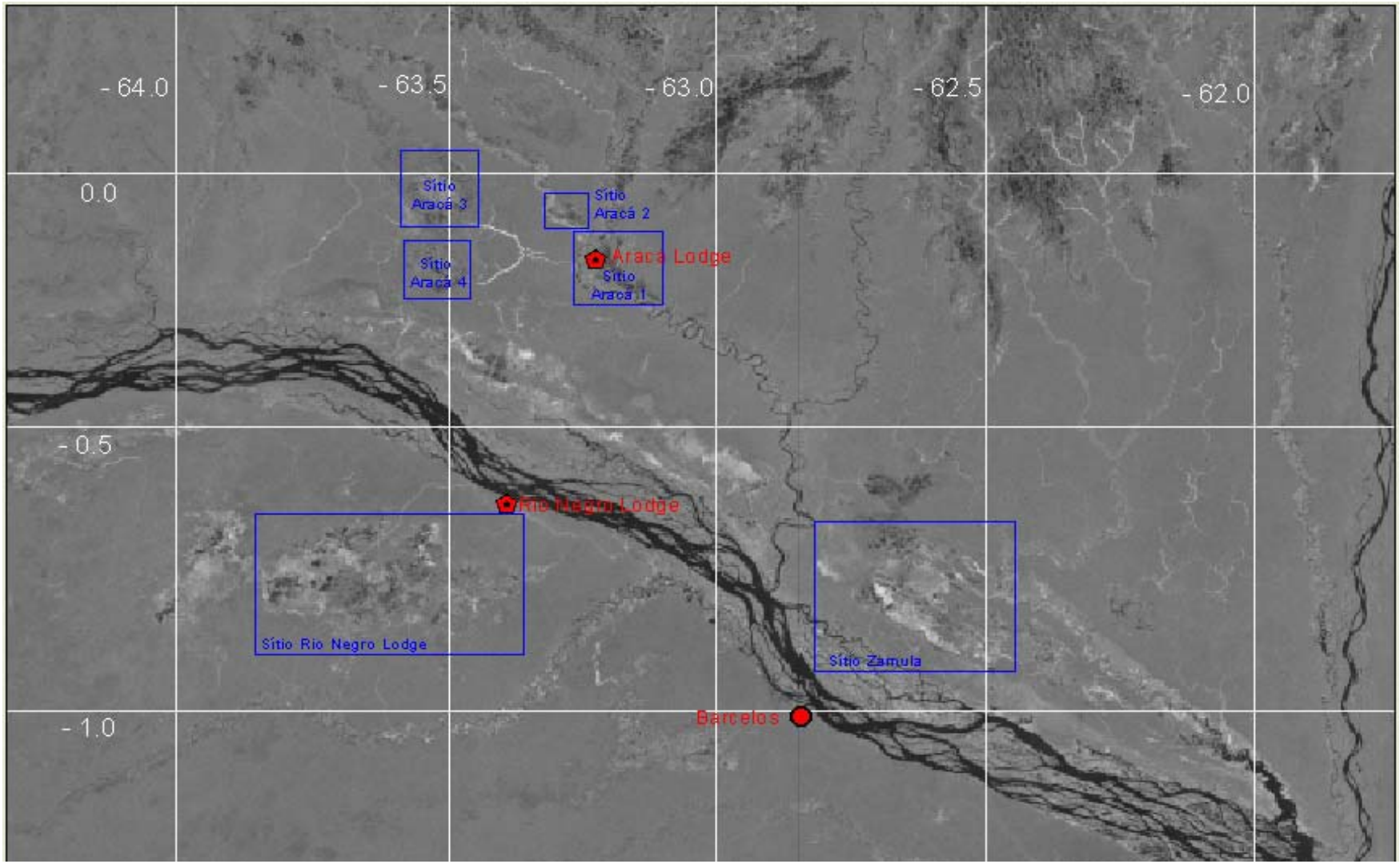
Bananal Tower Site

Radarsat data from
March 2003 to March 2004
and continuing

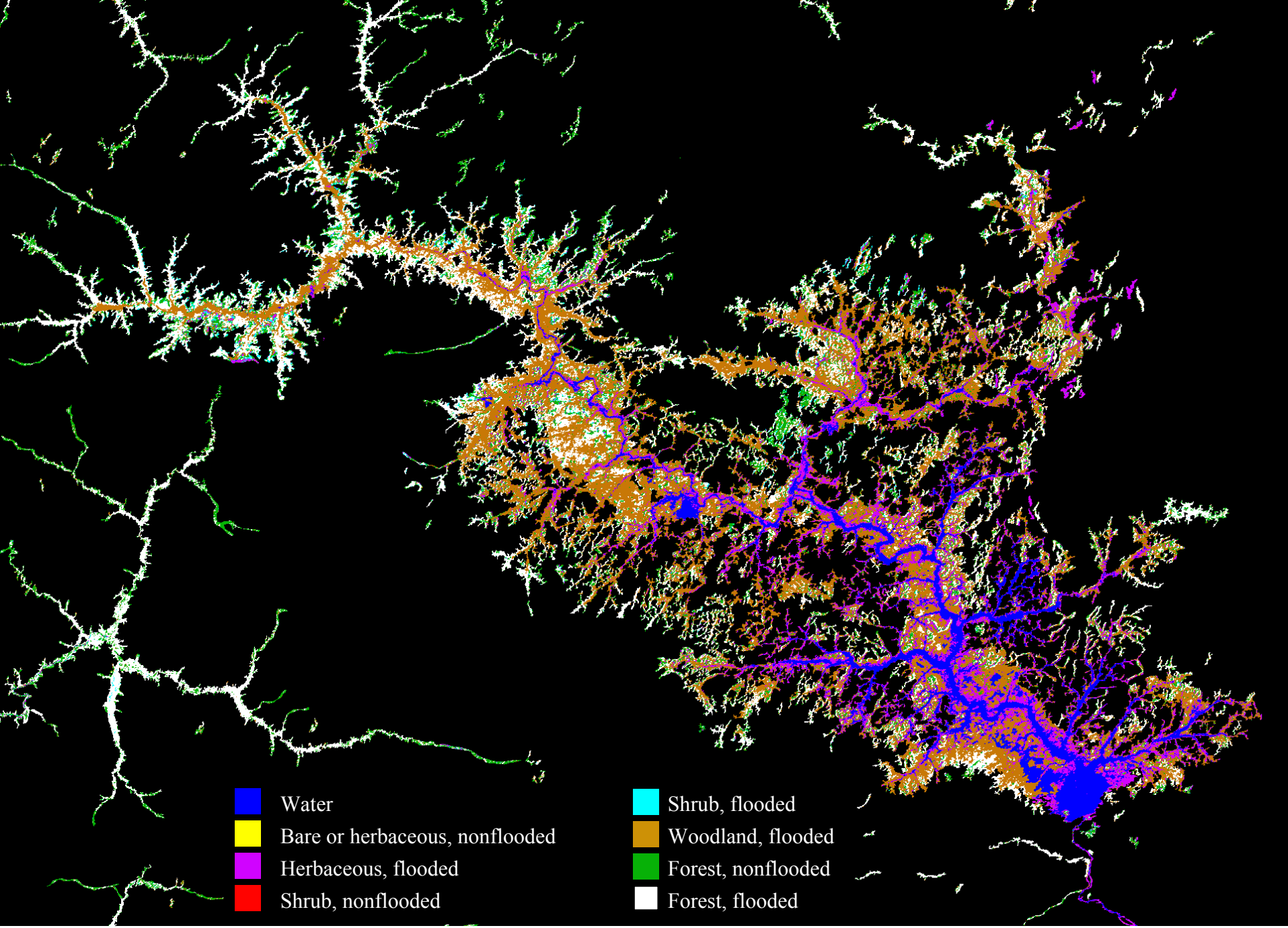
Hydrograph from
http://hidroweb.ana.gov.br/HidroWeb/
Agencia Nacional de Aguas (ANA)



Upper Rio Negro sites
for methane and carbon dioxide evasion studies



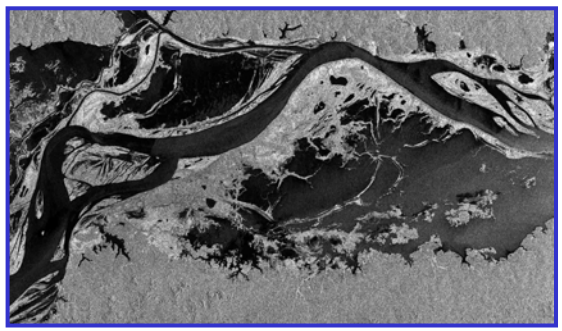
Radarsat coverage from Feb 2004 to Dec 2004



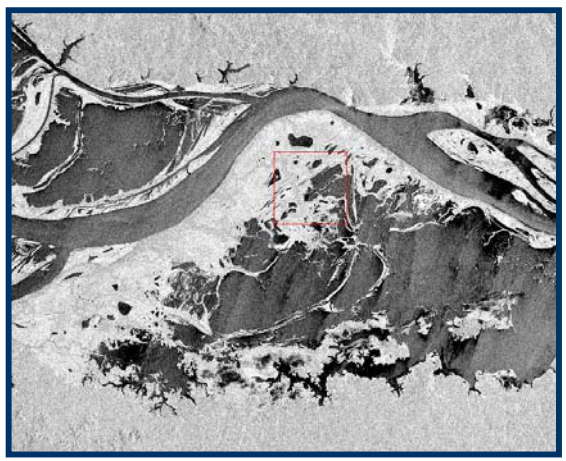
Balbina reservoir at high water

Spatio-temporal dynamics of macrophyte communities with multi-sensor data

Radarsat C-HH, Envisat ASAR C-HH/VV,
MODIS, Landsat TM



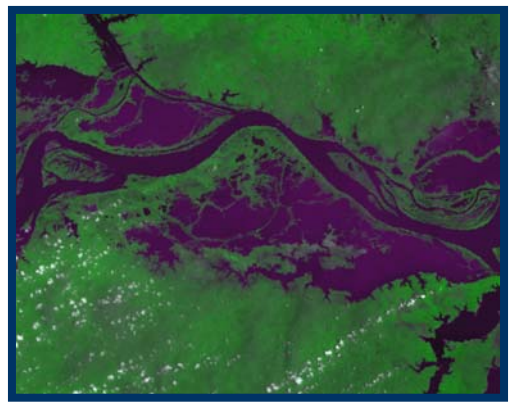
ASAR



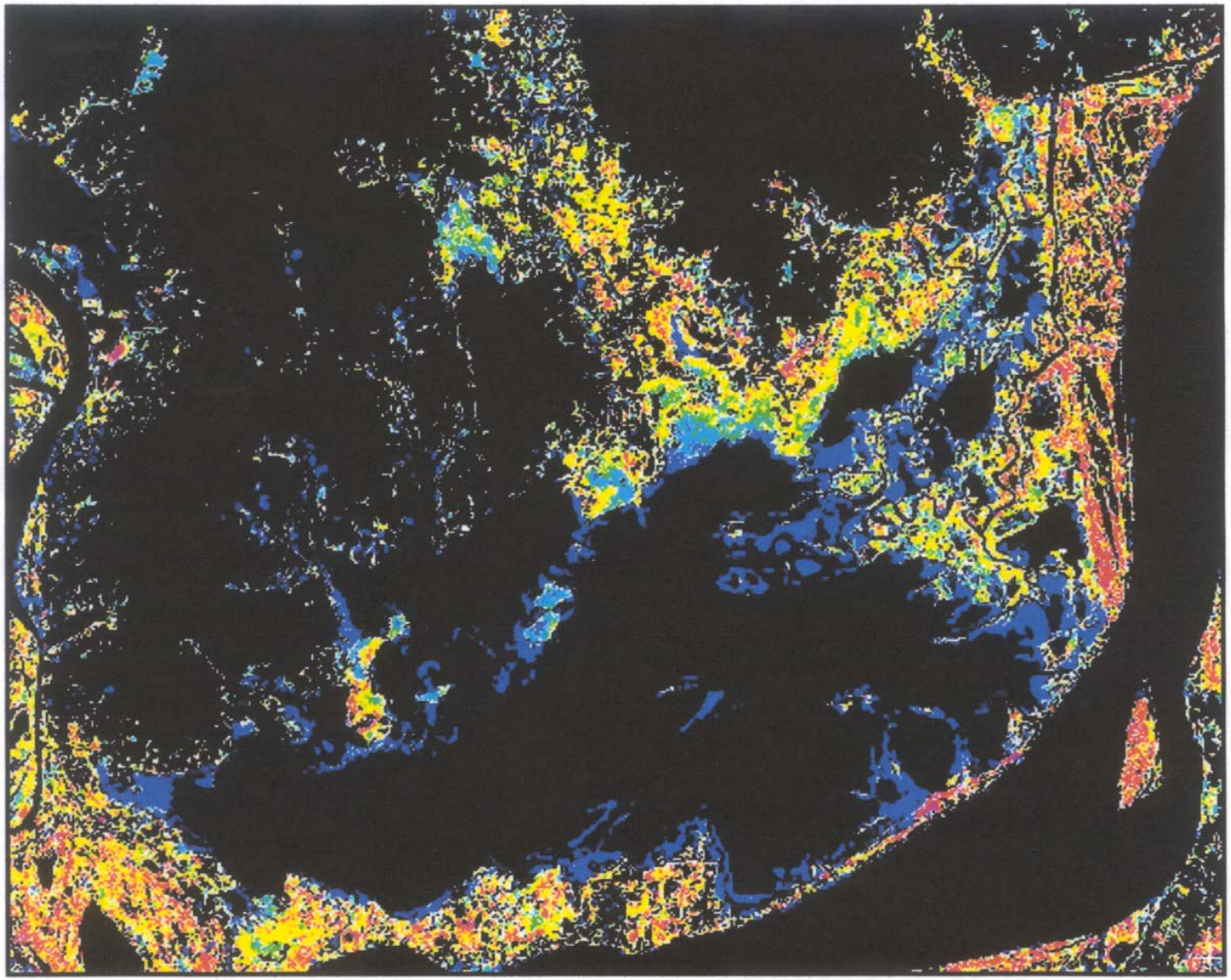
Radarsat

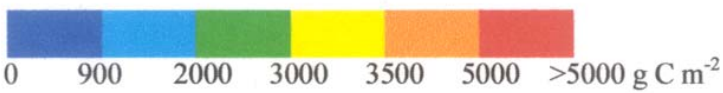
TM

MODIS



Net Primary Productivity of Floating Macrophytes

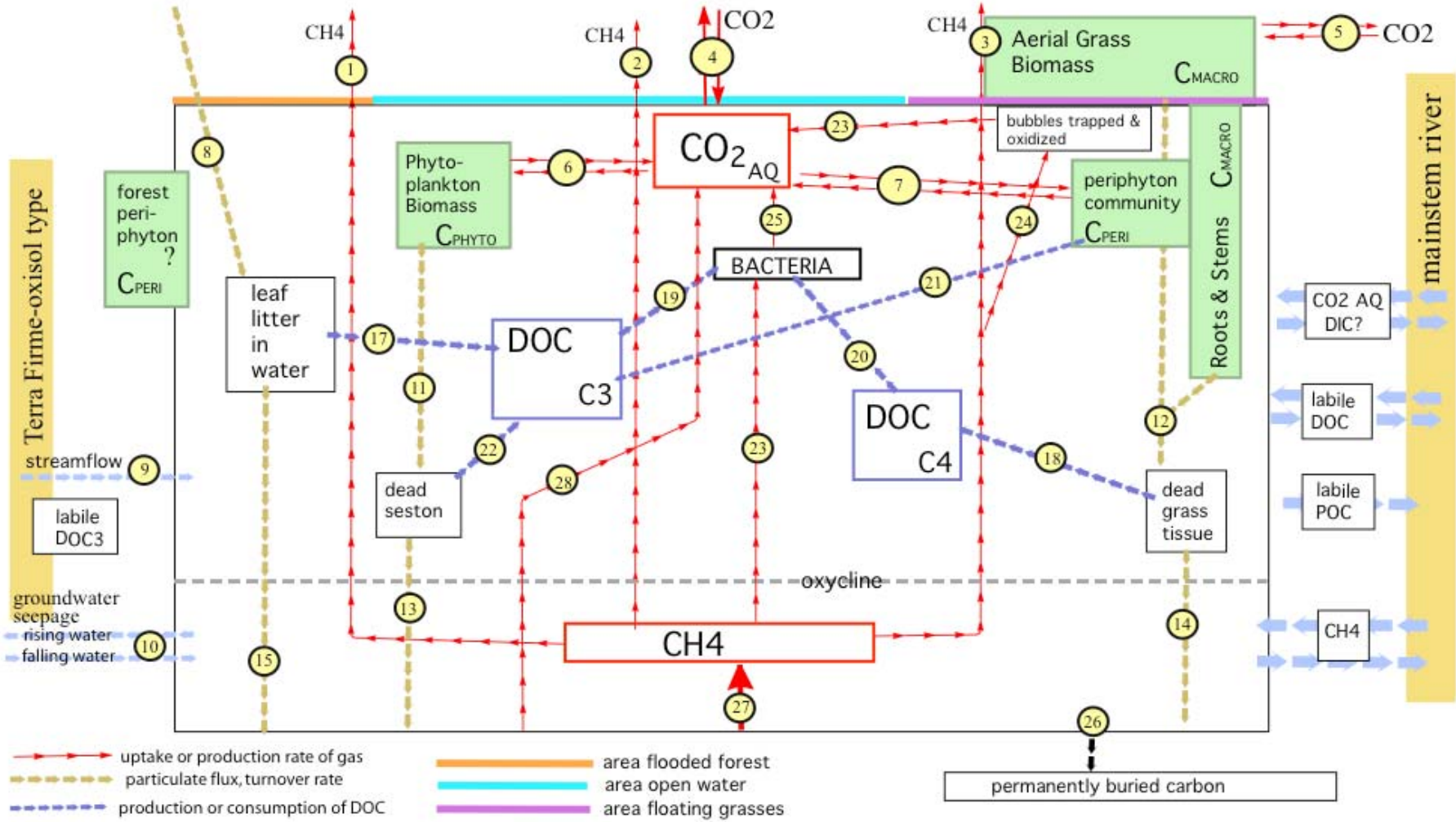




M. Costa 2000


Measurements of carbon dynamics
in a floodplain lake

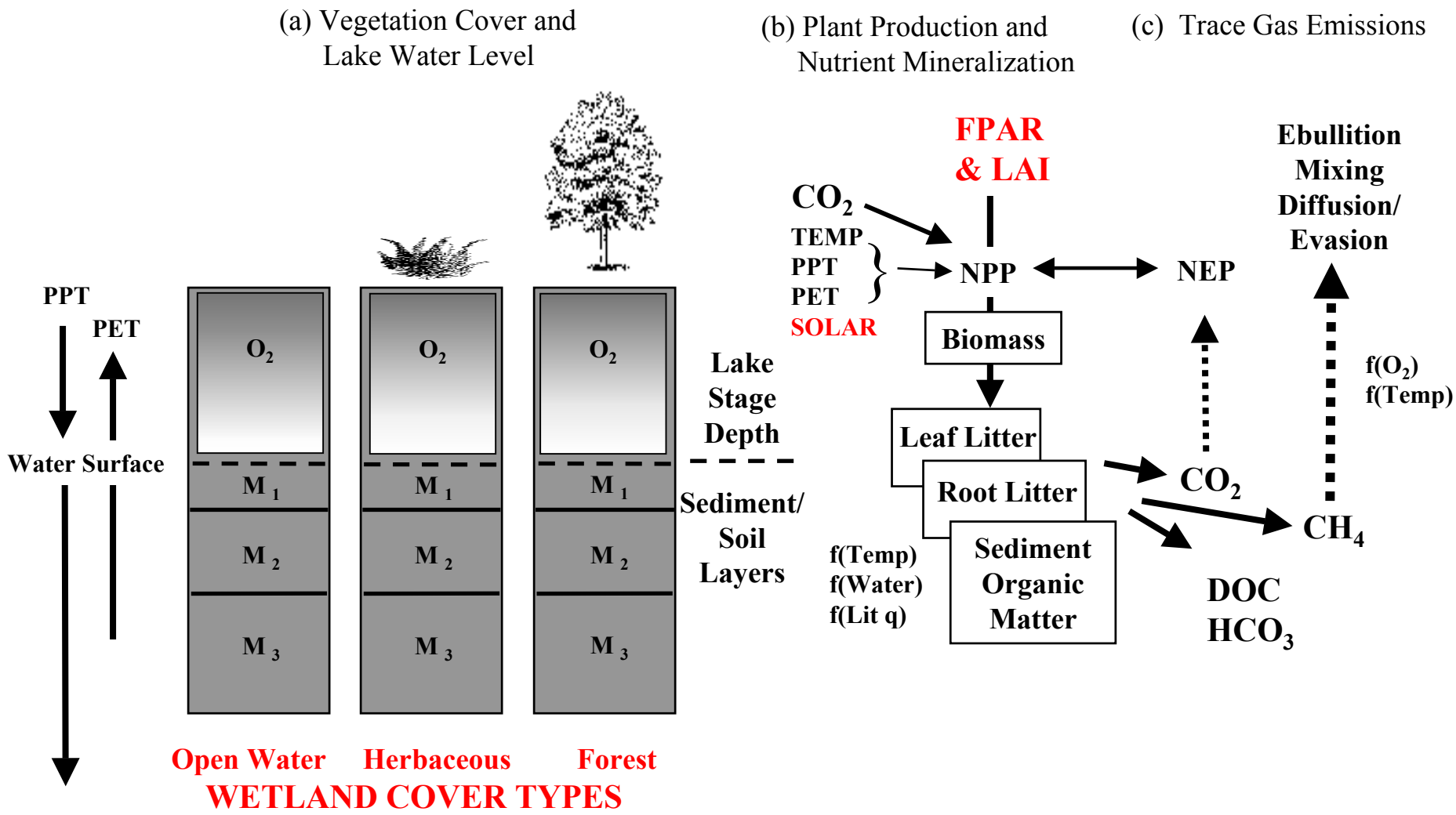
Carbon fluxes in Lago Calado




Modeling carbon dynamics
and methane emission
Collaboration with
C. Potter, NASA Ames

NASA-CASA Amazon Wetlands Model

Satellite Product Inputs



LBA Ecology

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