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LABORATÓRIO DE ANÁLISE E PROCESSAMENTO DE IMAGENS DE SATÉLITES

Sistema de Monitorização da Seca na ALC – Brasil

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Universidade Federal de Alagoas – UFAL

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1ª Reunião EUrocLIMA - Seca e Desertificação
6-7 Abril 2010
Santiago do Chile, Chile

OBJETIVOS

OBJETIVO PRINCIPAL:

- ❖ Monitoreo y prospección de sequía espacial mediante teledetección y datos meteorológicos.

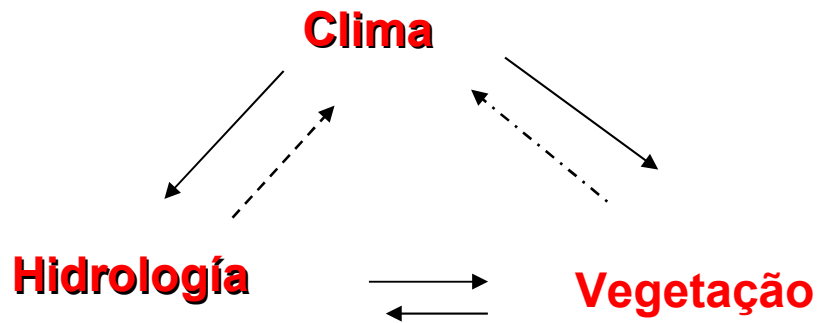
OBJETIVO ESPECIFICO:

- ❖ Hacer uso de datos disponibles de satélites meteorológicos y ambientales mediante GEONETCast/EUMETCast;

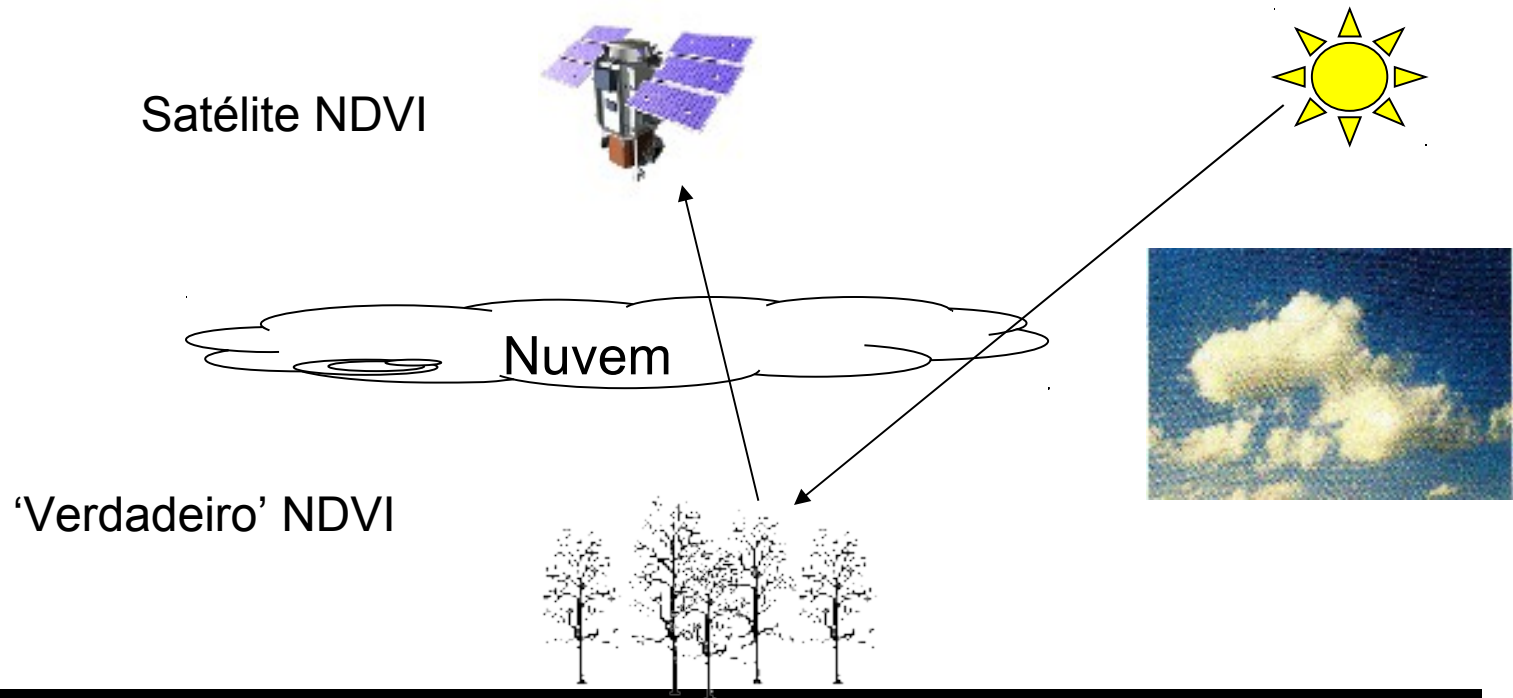
Introducción

- La sequía es un fenómeno complejo con impactos con escalas de tiempo diferentes;
- Índices espectrales de teledetección se han convertido en una de las principales herramientas para vigilar las condiciones de la vegetación (McVicar y Jupp, 1998; Kogan, 1990);
- Vegetación tiene un comportamiento diferente en términos de reflexión de la radiación electromagnética de onda de rojo (R) y infrarroja (NIR). NDVI es calculado sobre una base de píxel a píxel.
 - $NDVI = (NIR - R) / (NIR + R)$

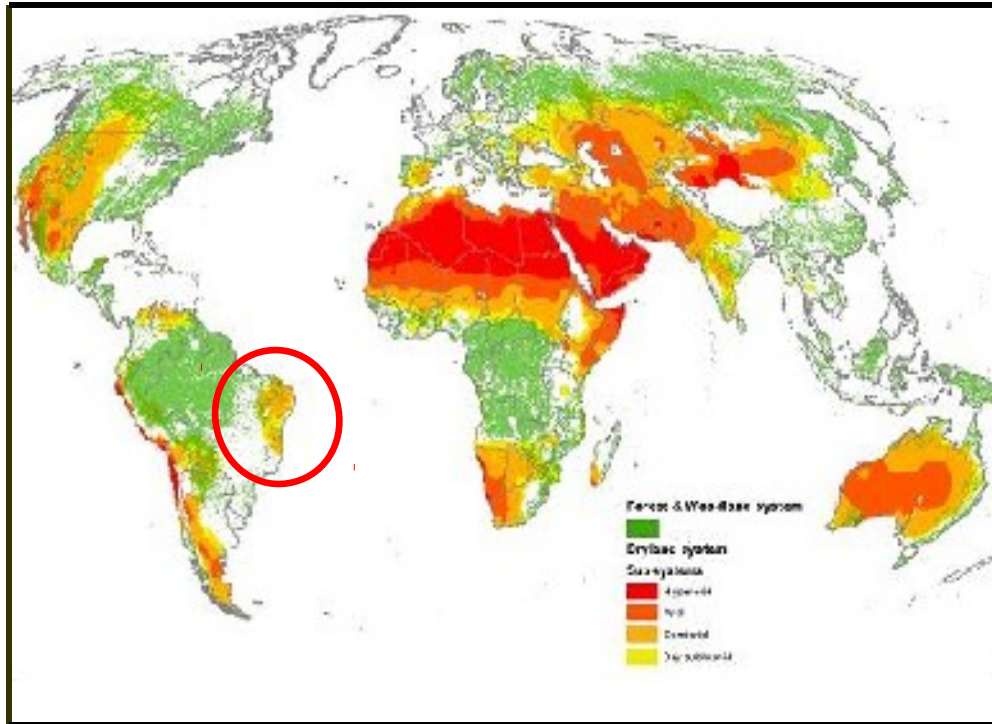
MOTIVAÇÃO



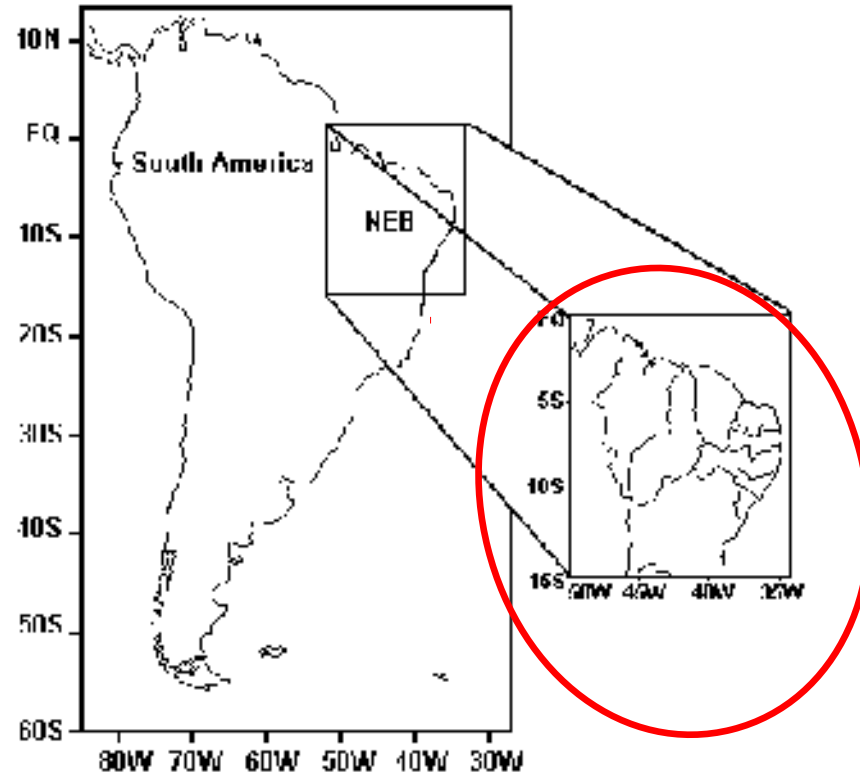
■ A dinâmica dos padrões temporais e espaciais da vegetação, por meio de **IMAGENS ORBITAIS**, são de grande importância para os sistemas de **MODELAGEM** dos processos de interação entre o **CLIMA** e a **BIOSFERA**.



Nordeste do Brasil



Fonte: Millennium Ecosystem Assessment 2004



Fonte: Barbosa et al. (2006)

Fonte: Barbosa et al. (2006)



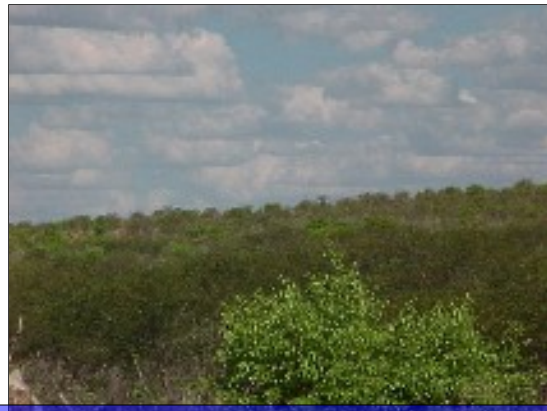


Os efeitos climáticos sobre a vegetação do Nordeste do Brasil

Fonte: Humberto A. Barbosa



Efeito sazonal da precipitação sobre a vegetação



Desmatamento



Degradação ambiental

If there is any significant climate change impact of land use change on the characteristics of Ugandan vegetation dynamics, it would show a low vegetation biomass with low variability as function of time.

Hypothesis

How to disentangle climatic and human factors contributing to vegetation change?

Data

Given the lack of spatially complete, high-resolution climate data in this region to answer this question, I rely on satellite-derived vegetation recorded.

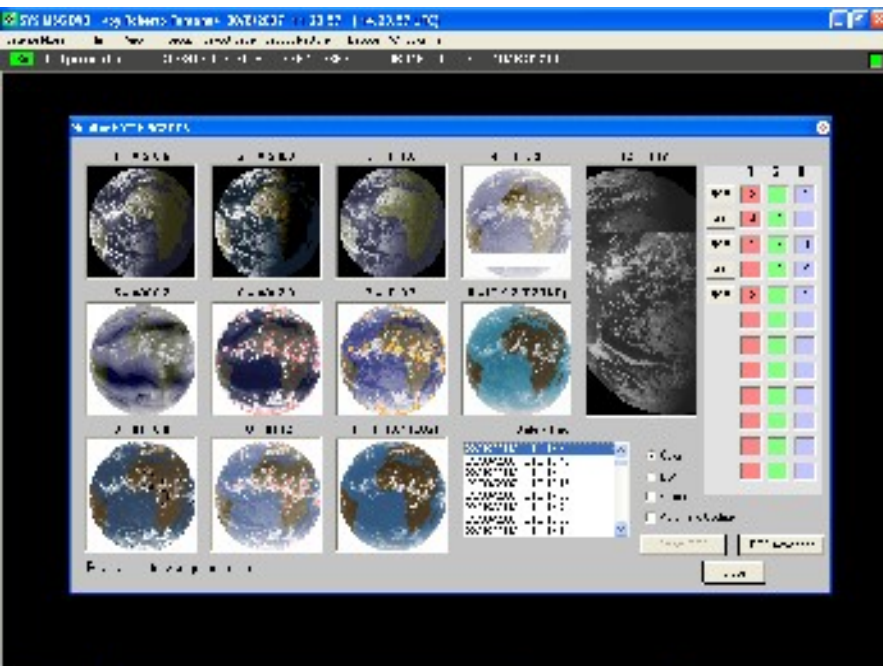
Analysis

To detect that signal (or lack thereof) which is the focus of this research, I used an approach similar to that of Barbosa et al.'s (2006) work.

Challenges: data scarcity and dimensionality (time, space & scale) issues ?

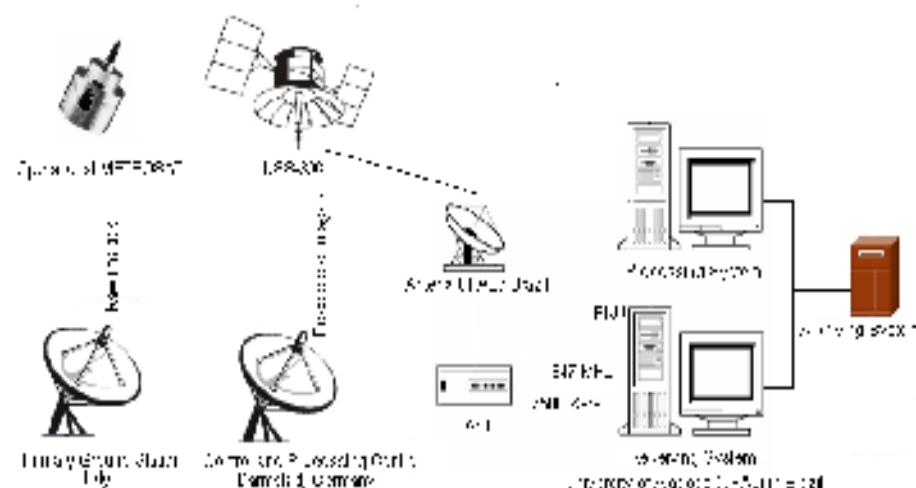
The overall objective of the study

METEOSAT SEGUNDA GERAÇÃO (MSG)



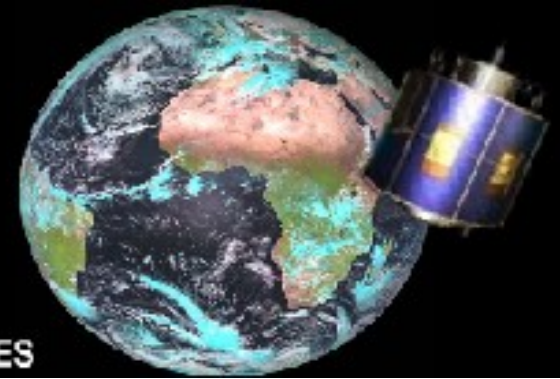
METEOSAT-9					
Canal	λ	Banda	Res. Espacial	Res. Temporal	Aplicações
HRV	0.1 - 1.1	Visível	1 km	15 min	Superfície, Vegetação, Neve, Albedo
VI3 006	0.66 - 0.71	Visível	3 km	15 min	
VI3 008	0.74 - 0.88	Visível	3 km	15 min	
IR 016	1.20 - 1.70	Infravermelho Próximo	3 km	15 min	TSM, Queimadas, Superfície, Nuvens
IR 039	3.48 - 4.36	Window	3 km	15 min	
IR 087	8.30 - 9.1	Window	3 km	15 min	Vapor d'Água na camada limite
IR 108	9.80 - 11.80	Window	3 km	15 min	Nuvens
IR 120	11.00 - 13.00	Window	3 km	15 min	TSM e Superfície
WV 002	5.25 - 7.15	Vapor d'Água	3 km	15 min	Umidade em 300 hPa
WV 073	6.80 - 7.80	Vapor d'Água	3 km	15 min	Umidade em 600 hPa
IR 097	8.36 - 9.94	Ozônio	3 km	15 min	Ventos na estratosfera
IR 134	12.40 - 14.40	Dióxido de Carbono	3 km	15 min	Nuvens e Massa de ar

ESTAÇÃO DE RECEPÇÃO DE IMAGENS METEOSAT-9





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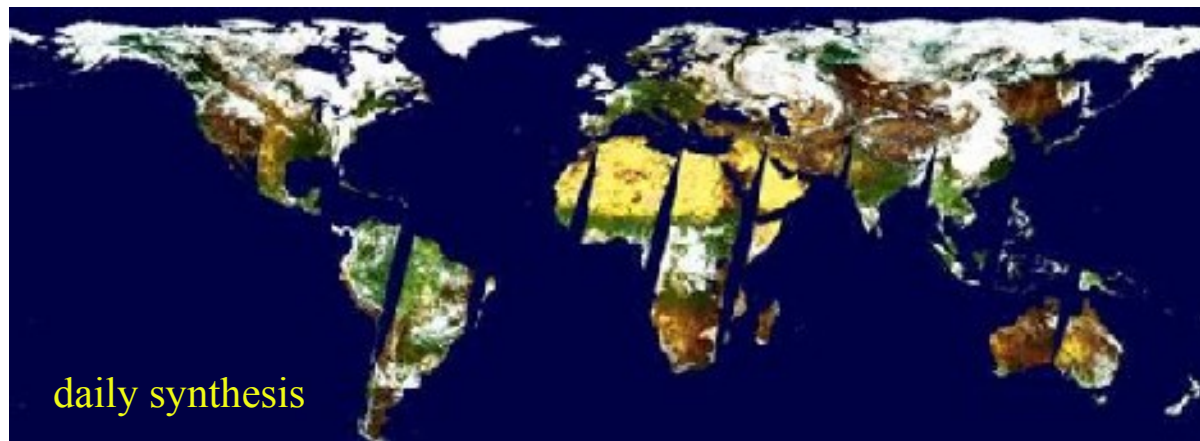


Datos:

SPOT-VEGETATION – 1 km



P-product
(segment)



daily synthesis

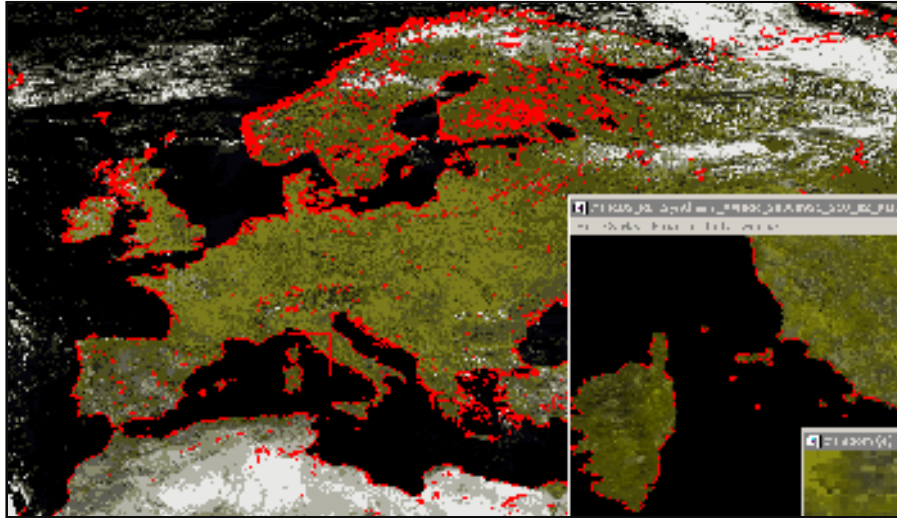


10-daily synthesis

Global archive since Apr 1998

www.spot-vegetation.com

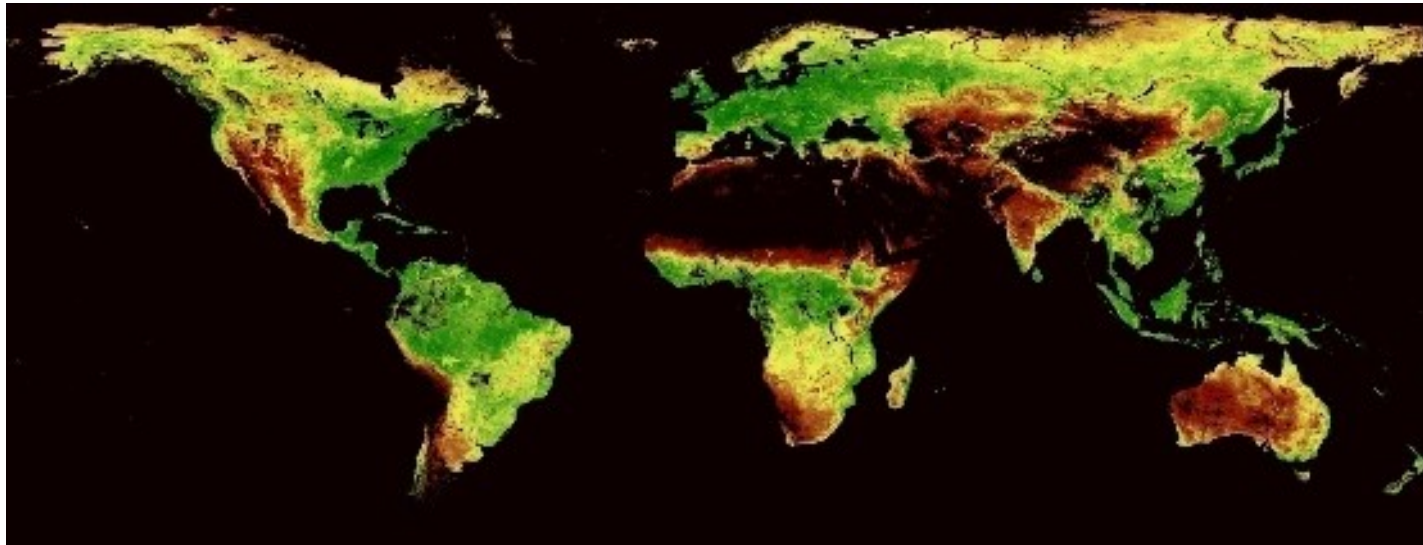
Basic 10-day products - other EO sensors



NOAA-AVHRR

- Since 1982
- Europe 1 km

*Produced for JRC-MARS and
ESA Global Monitoring for Food
Security (GMFS) project*

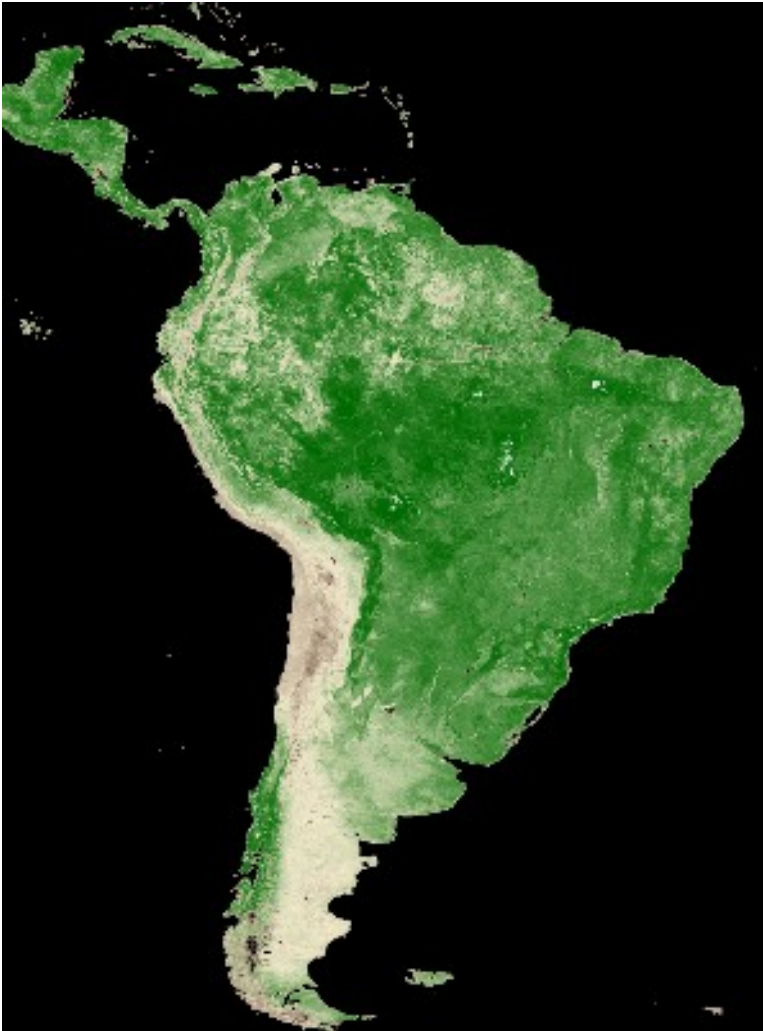


ENVISAT-MERIS

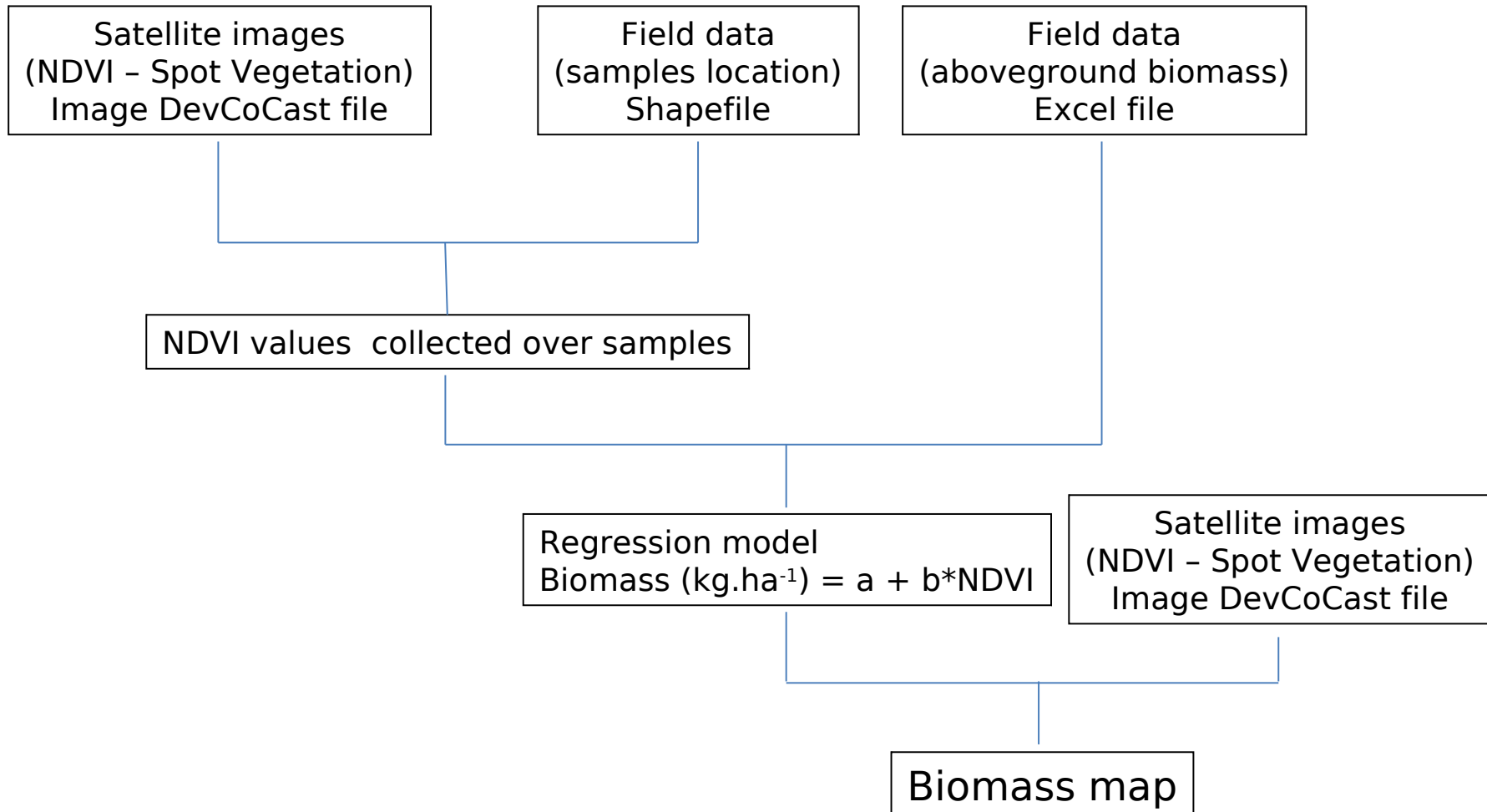
- Since 2002
- Global 1 km
- Africa 250m

SPOT-VGT samples

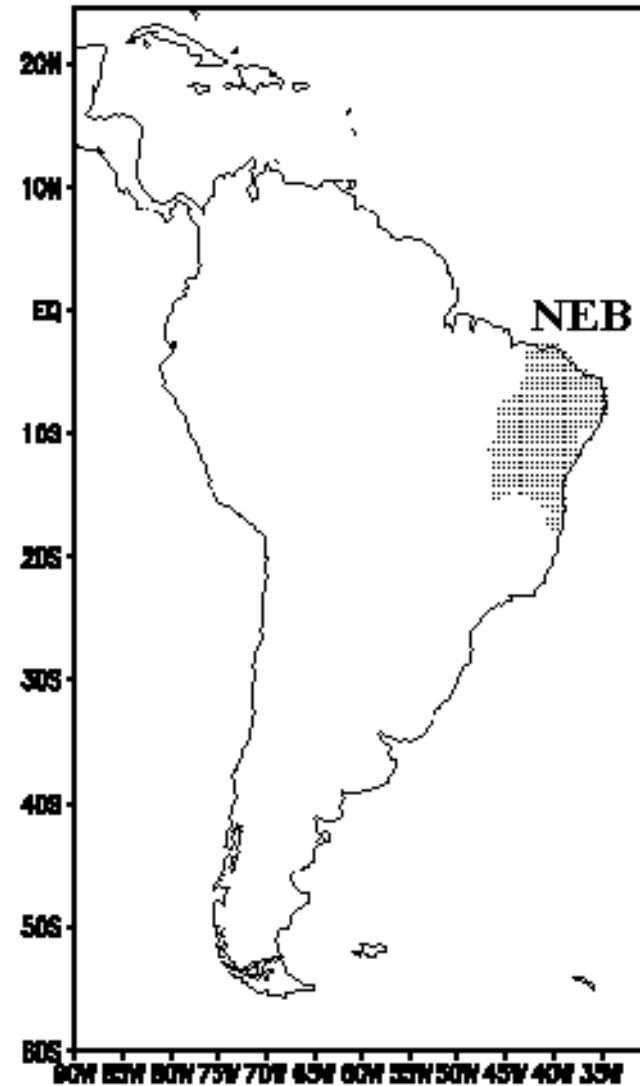
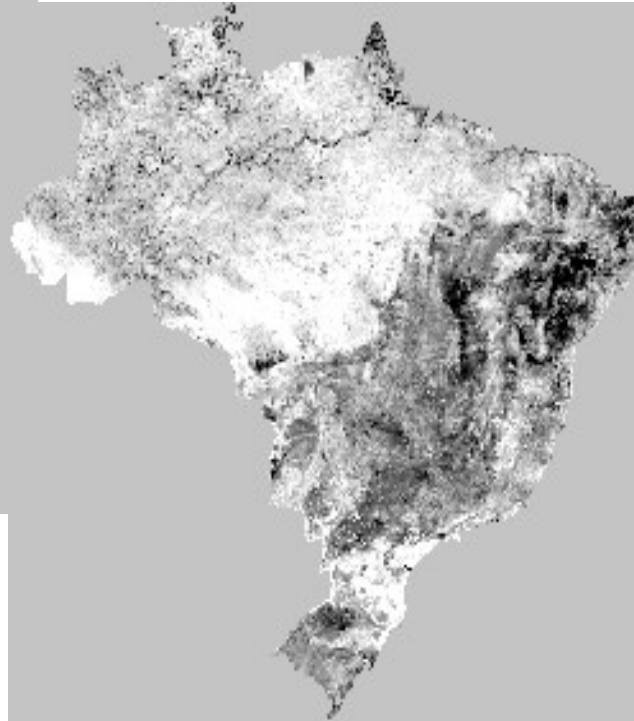
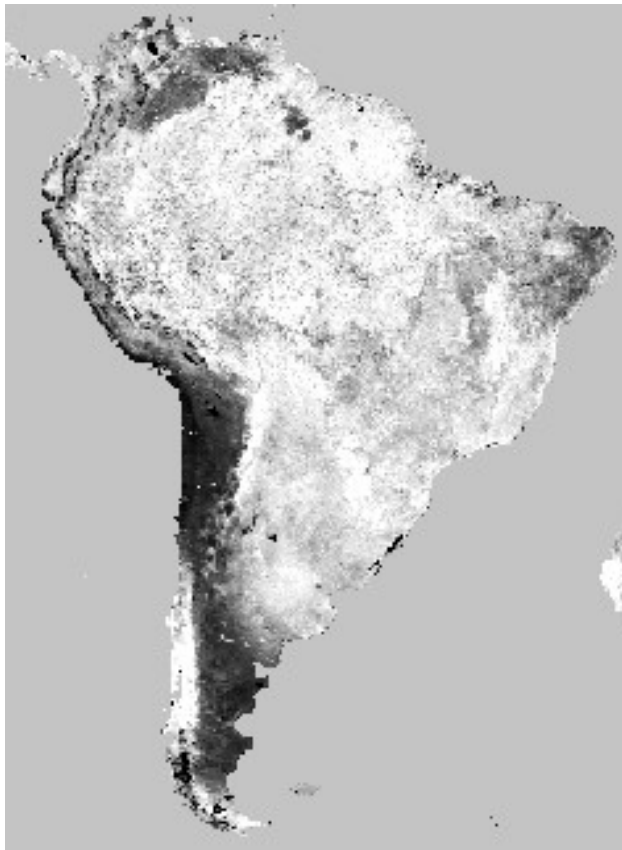
NDVI and NDWI, 1st dekad of May 2010

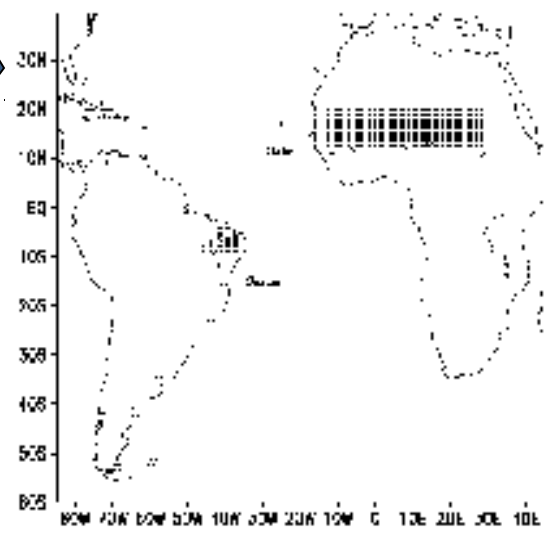
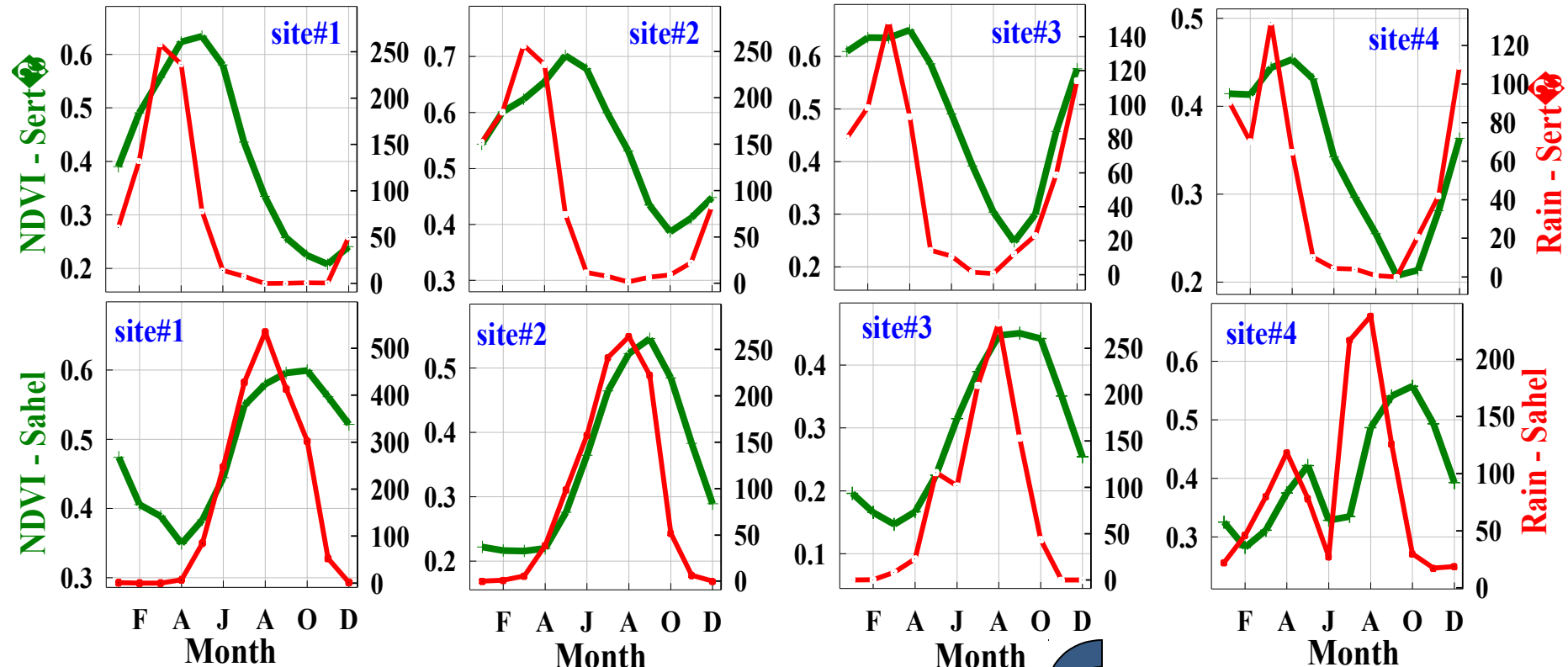


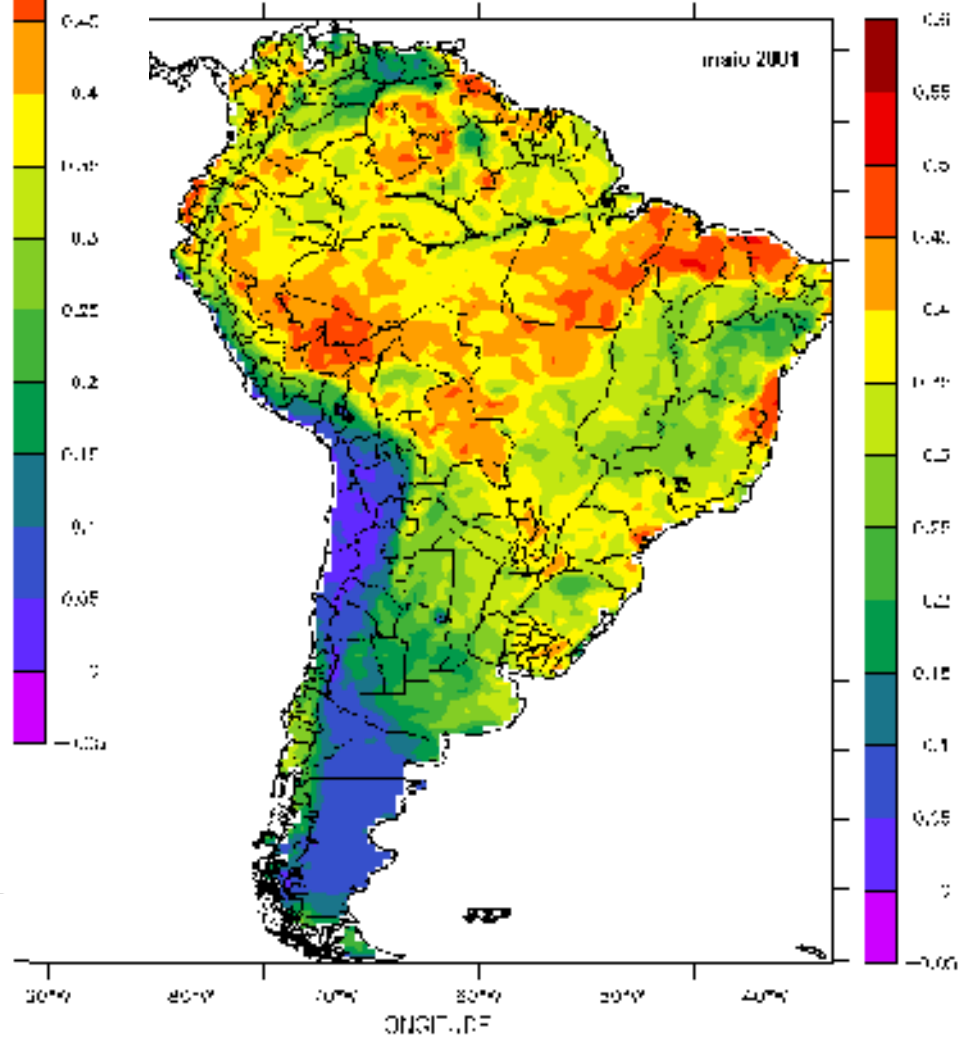
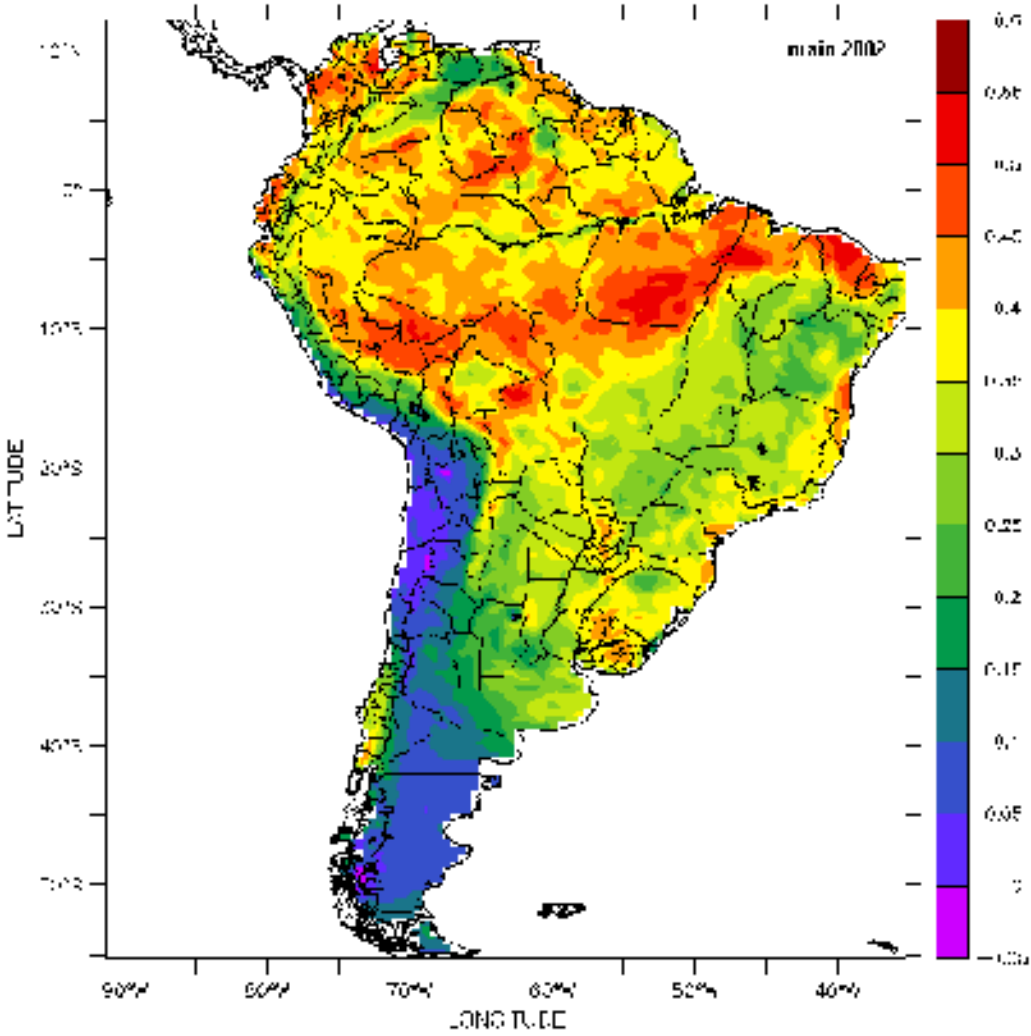
METODOLOGÍA y procesamiento de datos

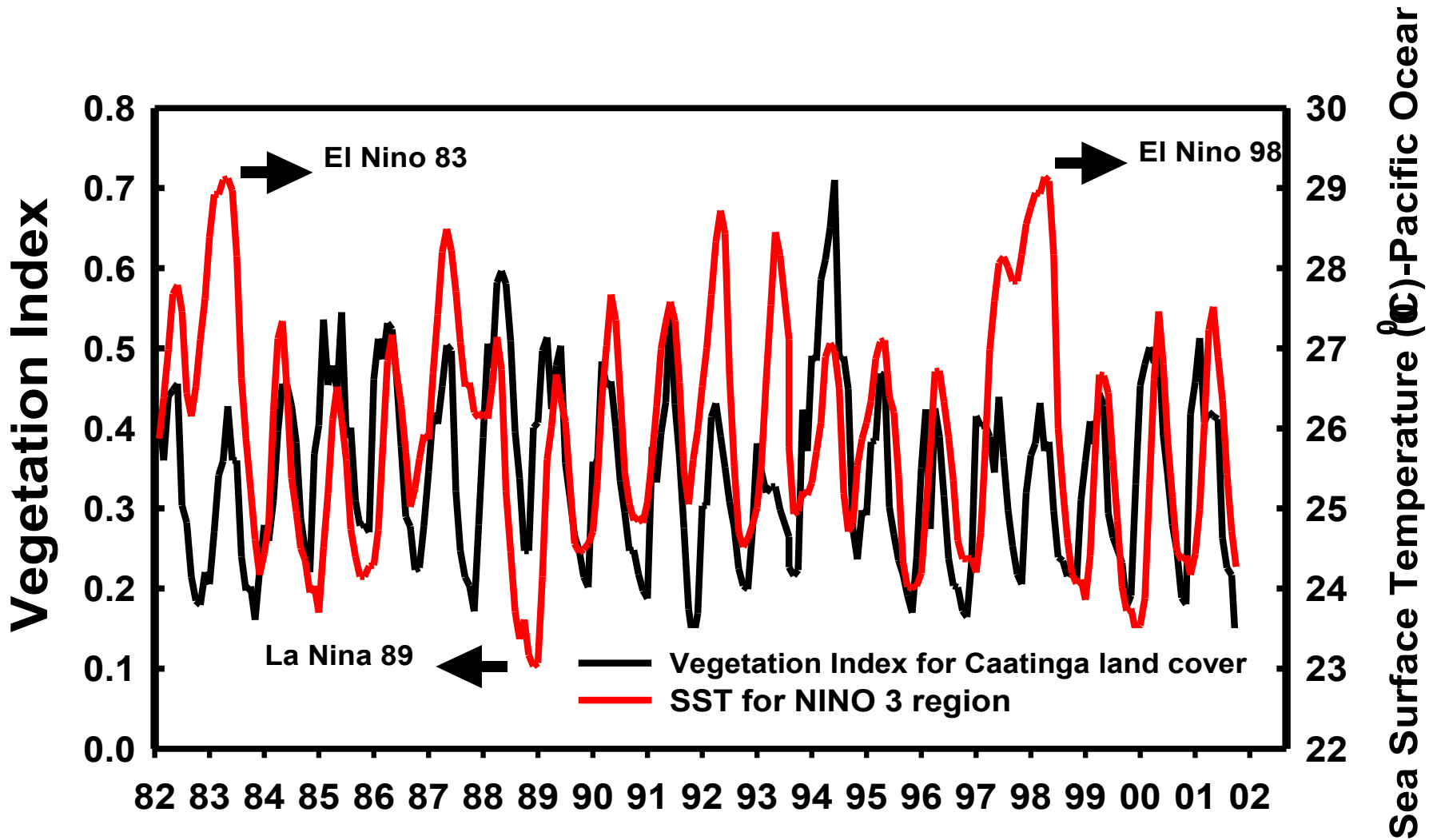


Vegetação derivada de satélite



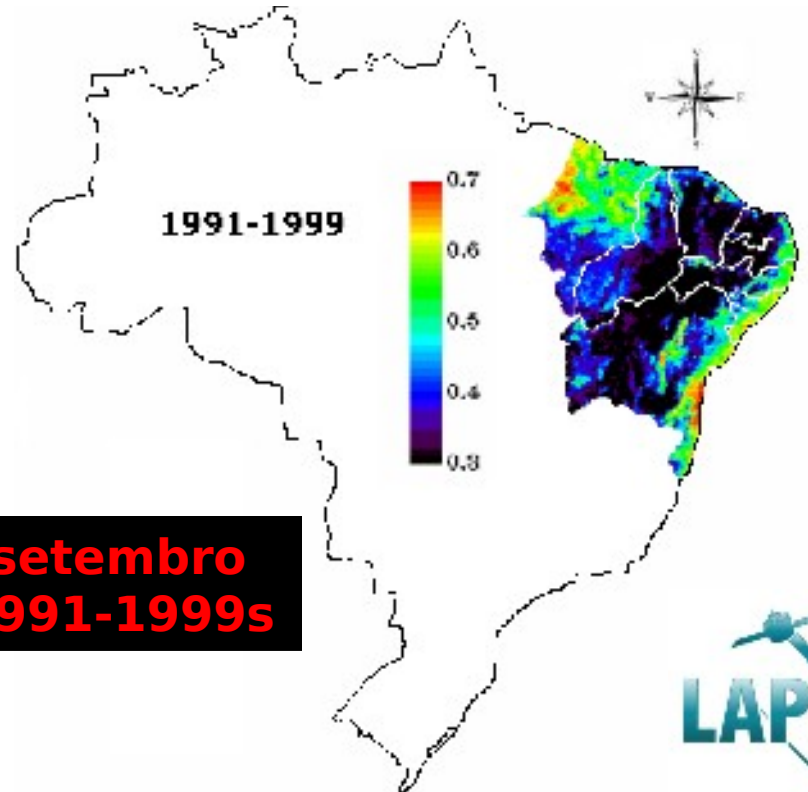
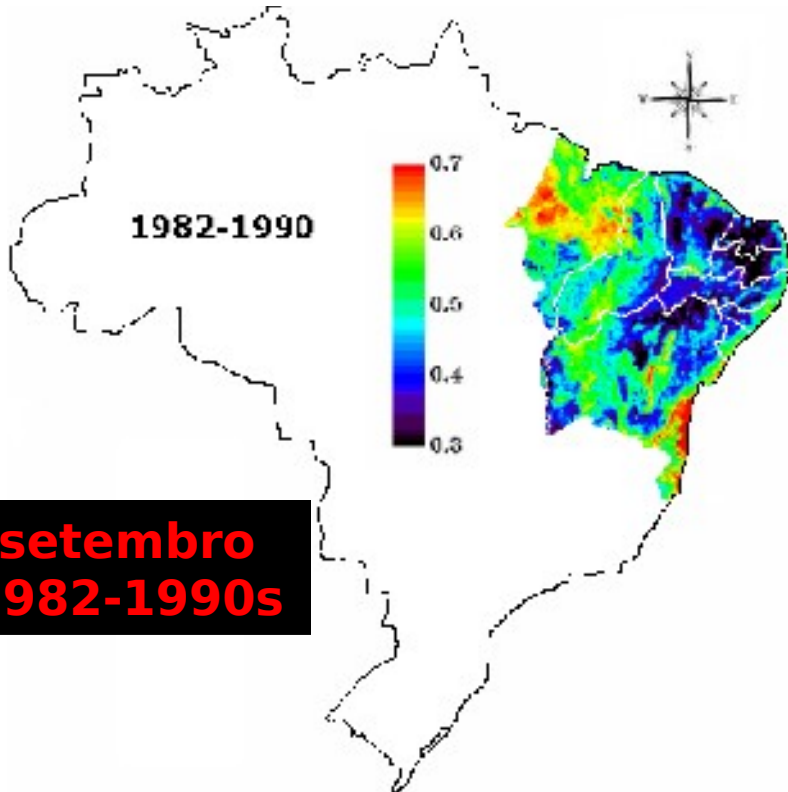
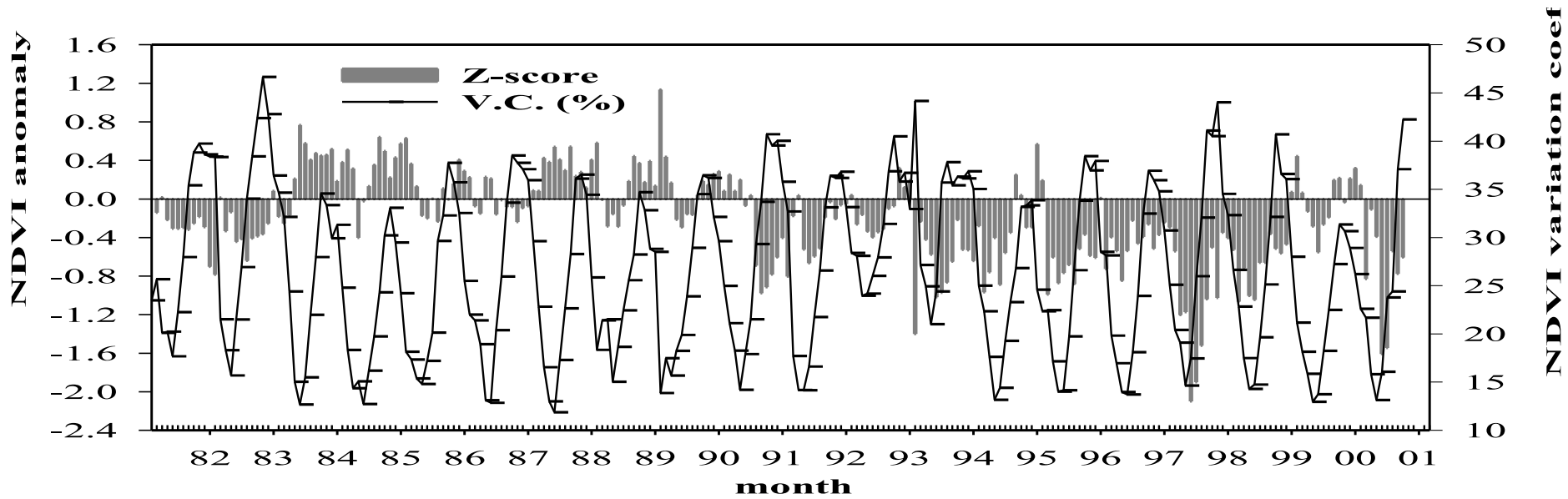




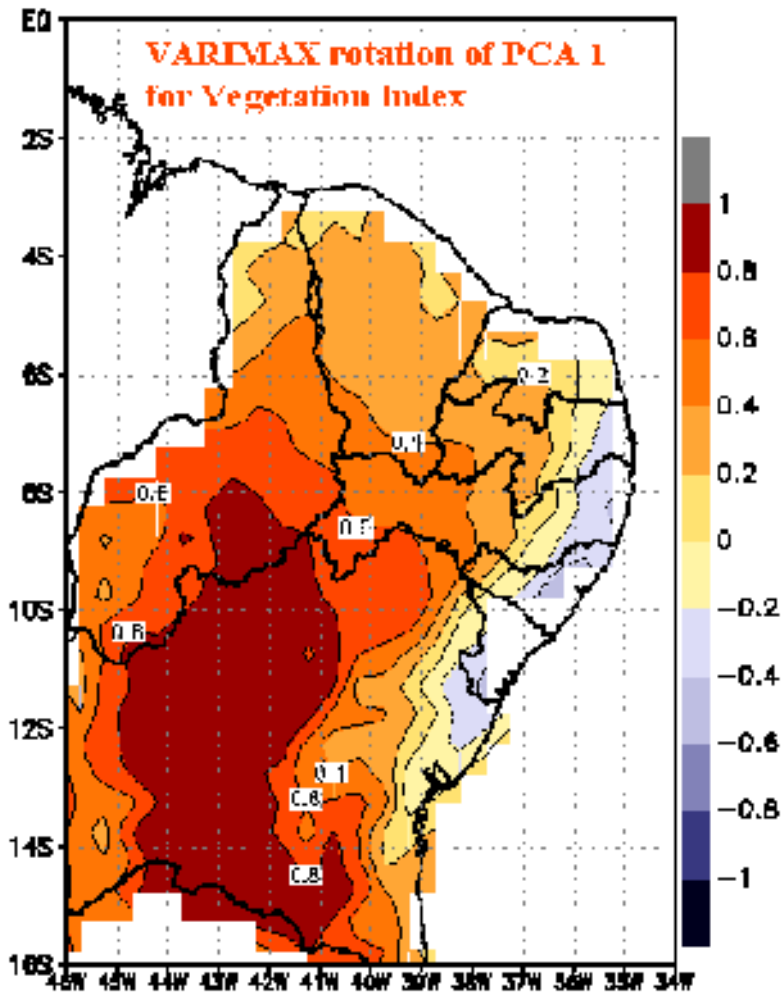


Nordeste do Brasil e TSM Pacifico

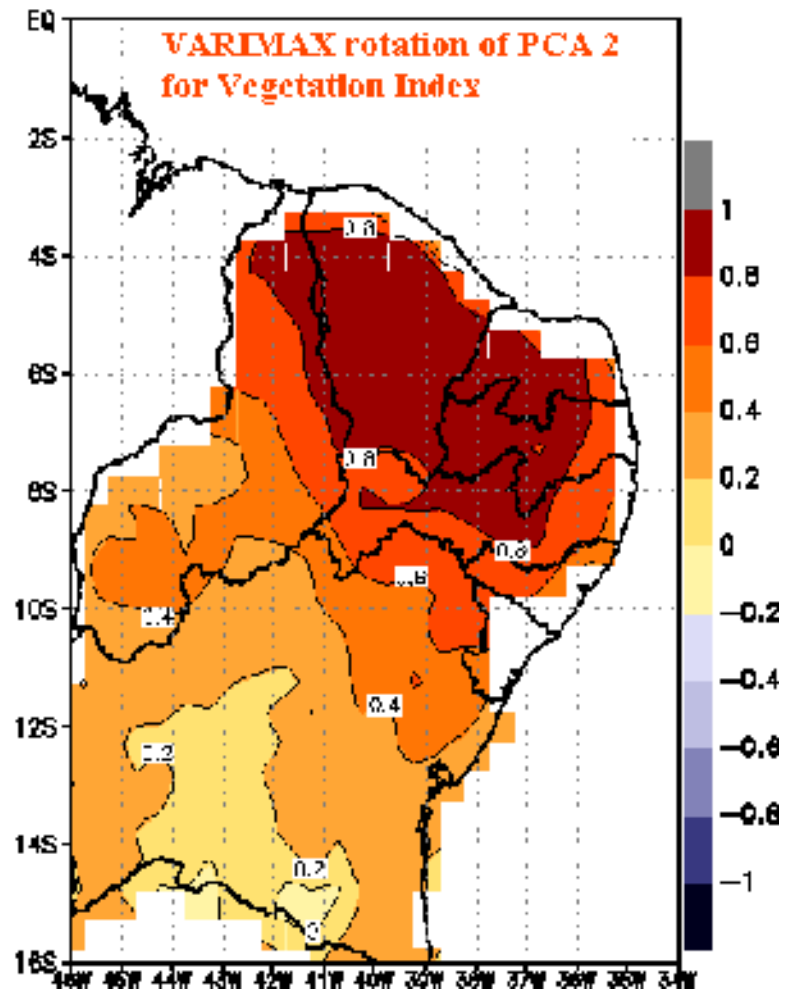




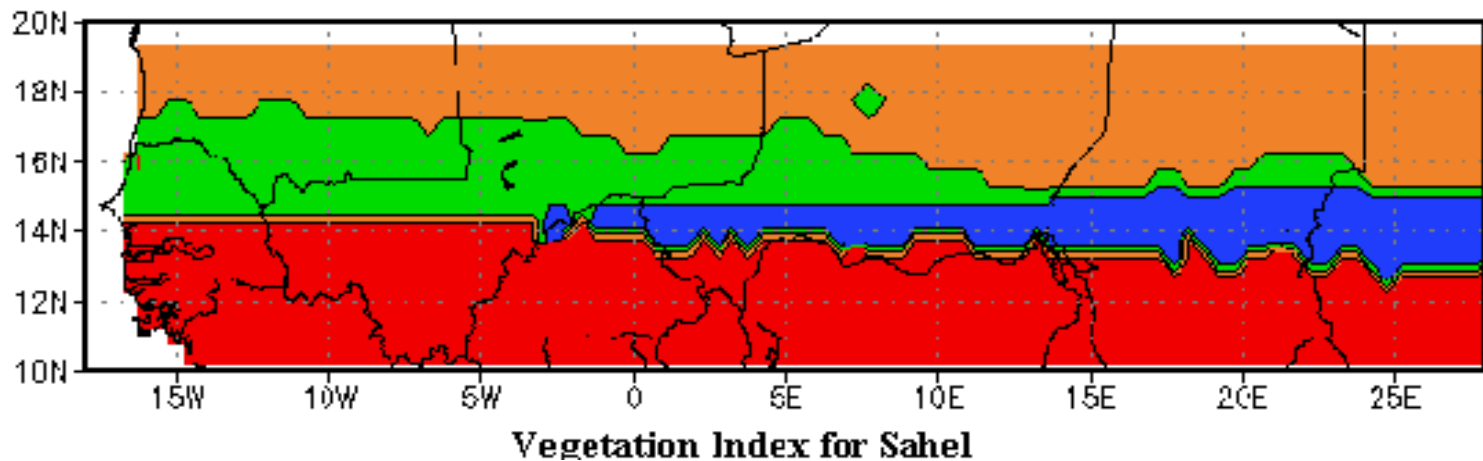
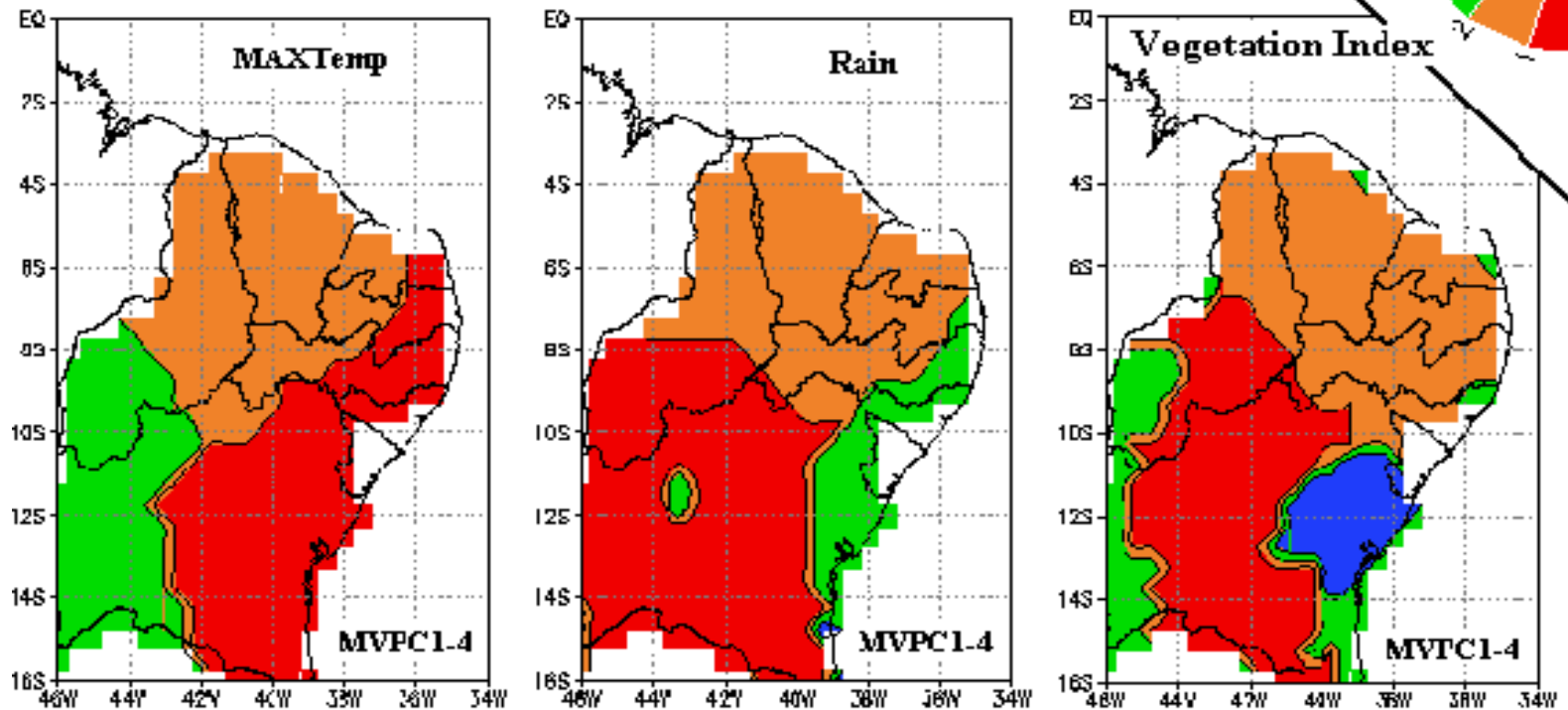
RPCA 1



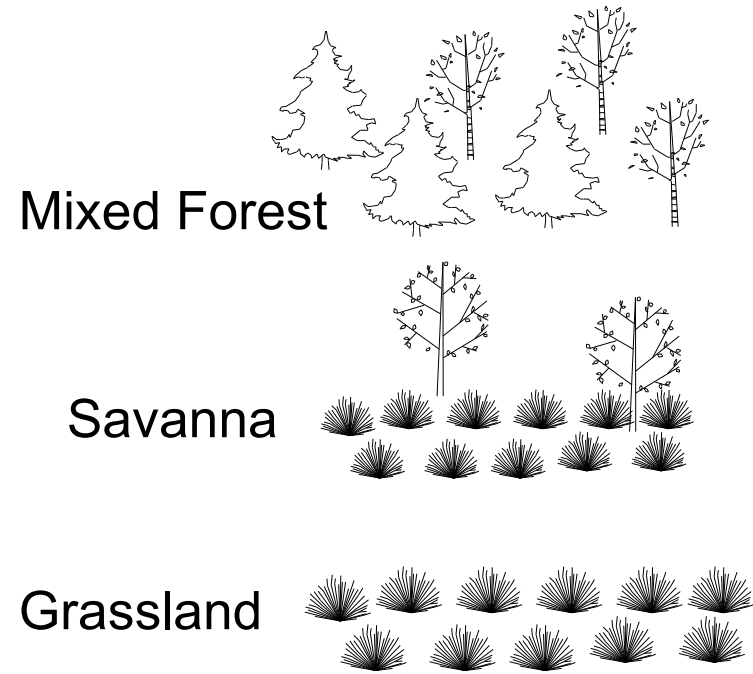
RPCA 2



Regionalization by PCAs



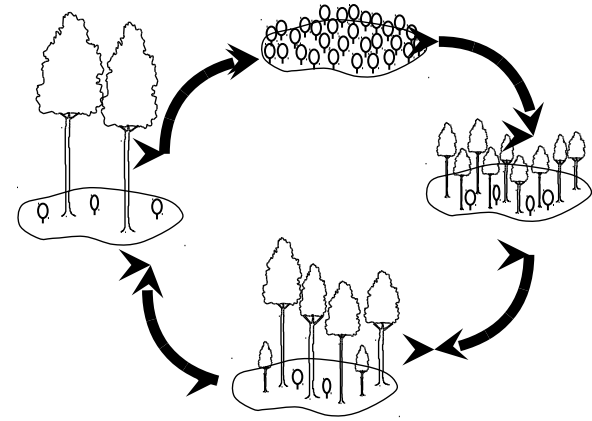
The research hypothesis



seasonal



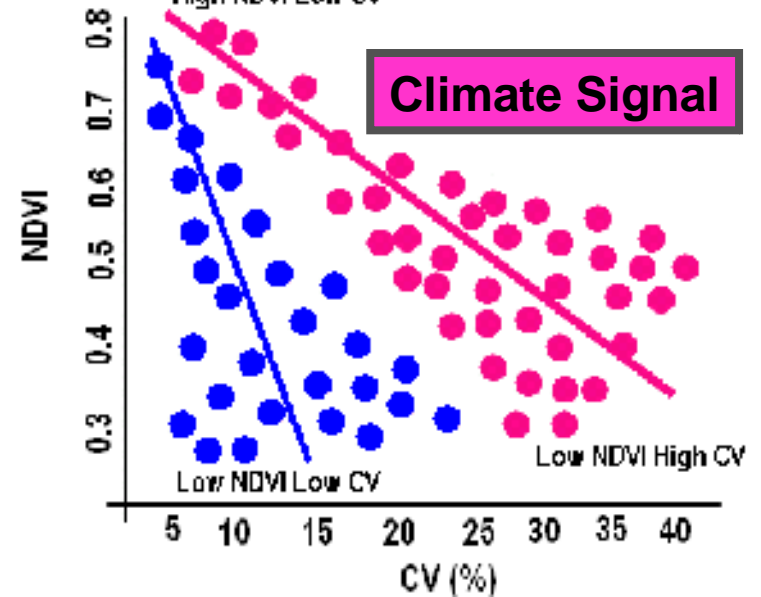
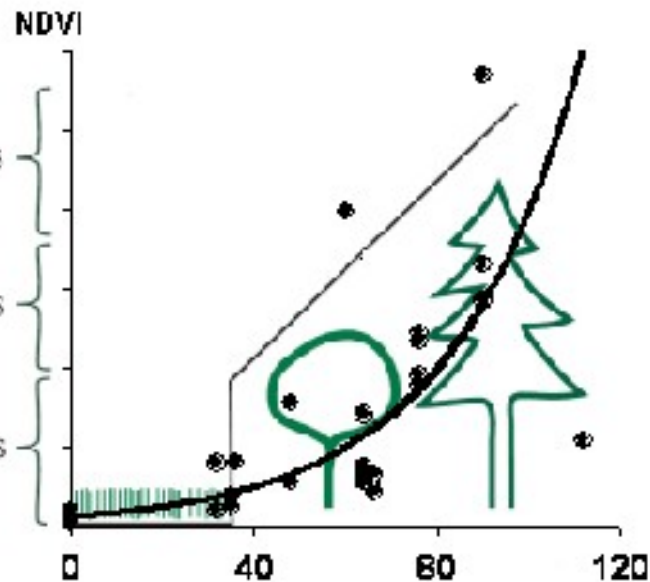
f (Vegetation dynamics) time



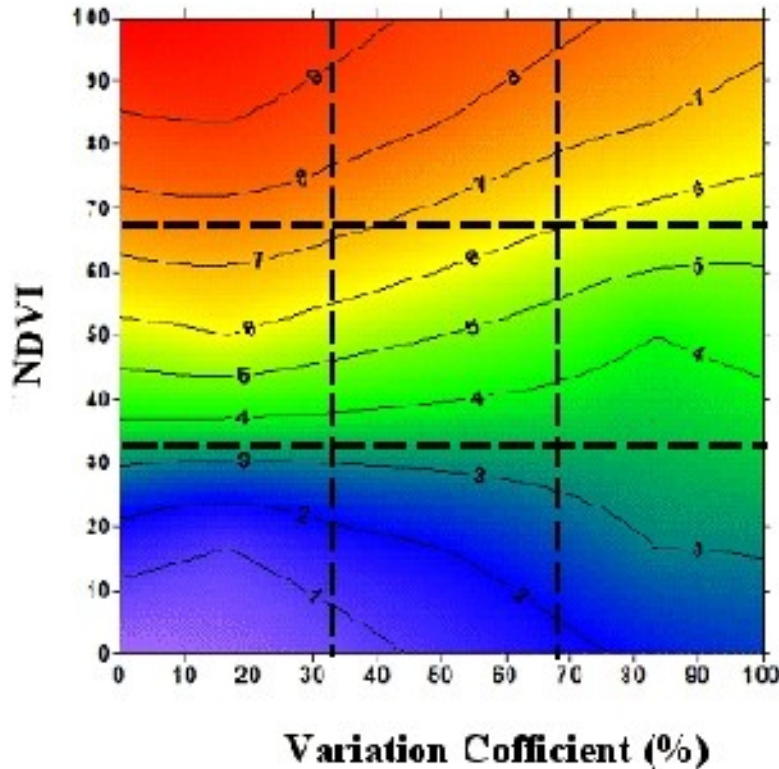
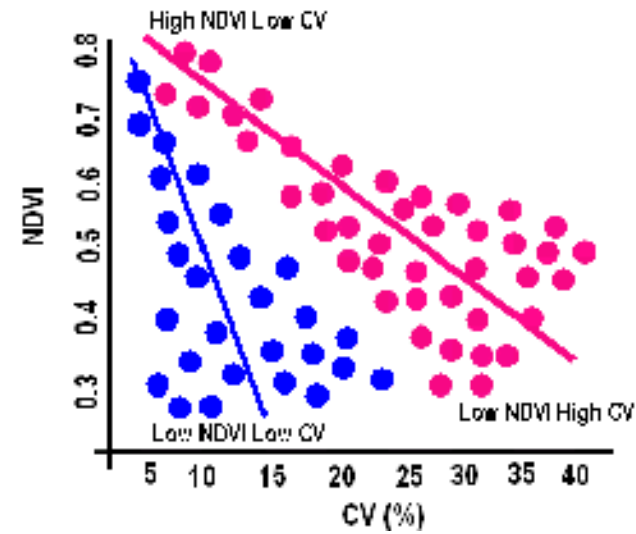
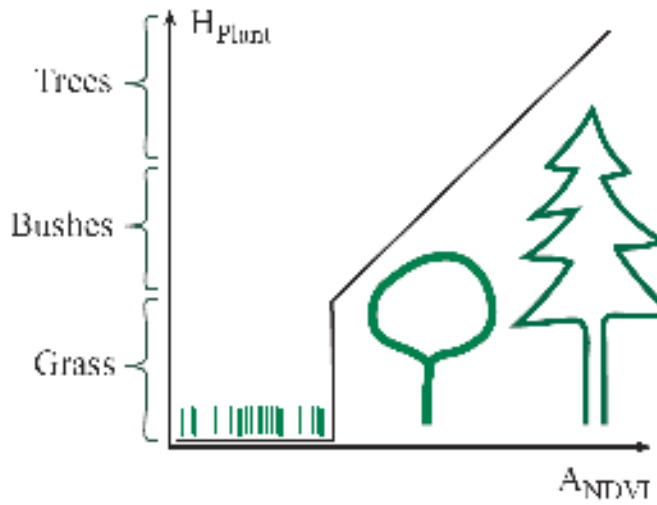
Human Signal

High NDVI Low CV

Climate Signal



• Research Hypothesis

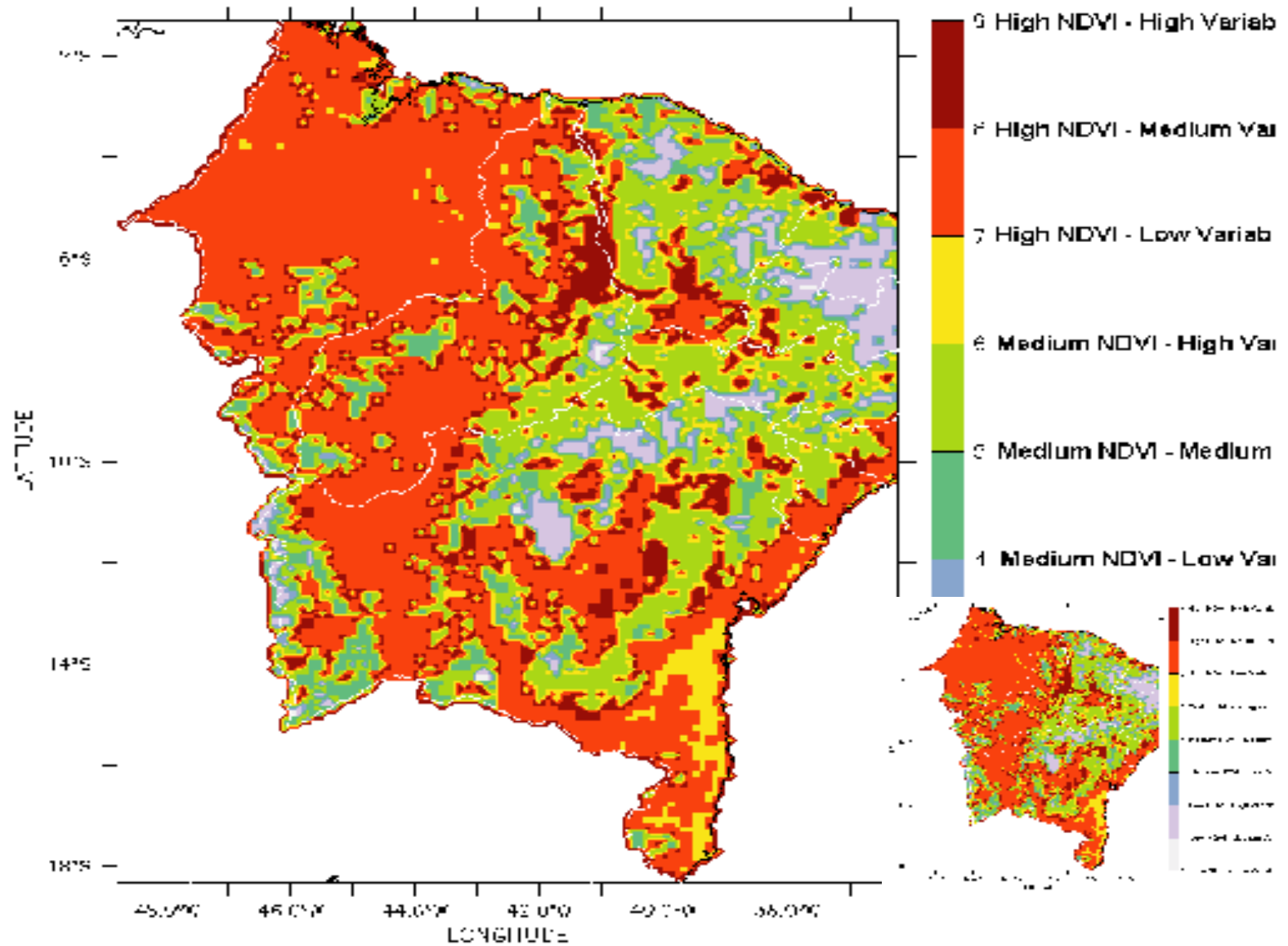


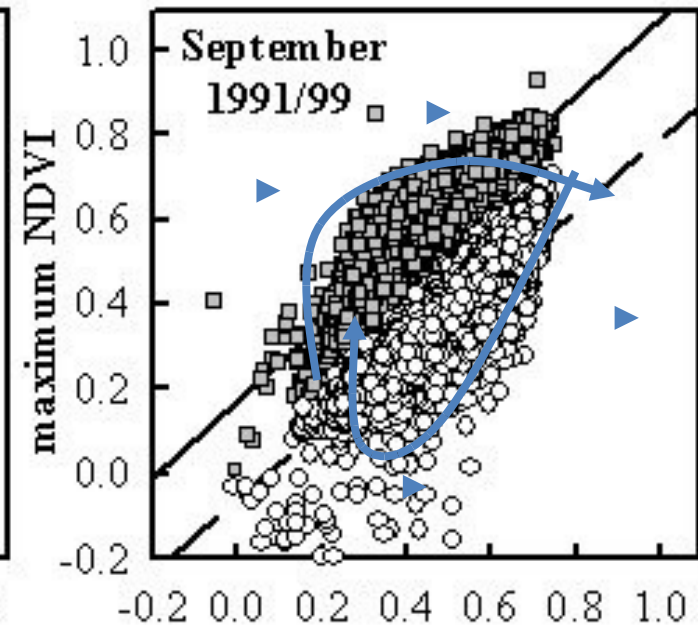
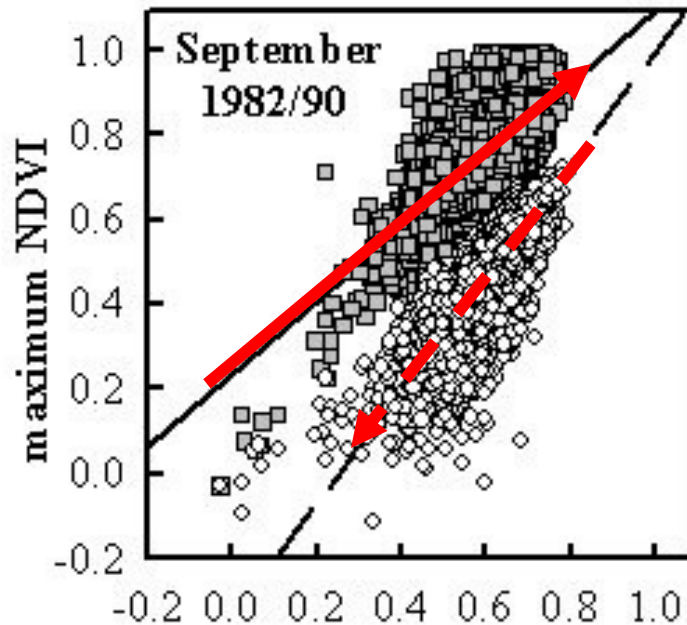
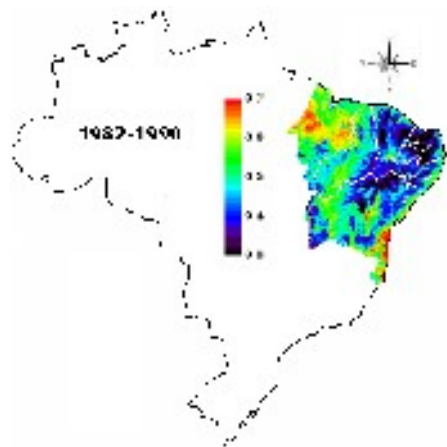
9	8	7
4	5	6
1	2	3

- 1.- Low NDVI - Low Variability
- 2.- Low NDVI - Medium Variability
- 3.- Low NDVI - High Variability
- 4.- Medium NDVI - Low Variability
- 5.- Medium NDVI - Medium Variability
- 6.- Medium NDVI - High Variability
- 7.- High NDVI - High Variability
- 8.- High NDVI - Medium Variability
- 9.- High NDVI - Low Variability

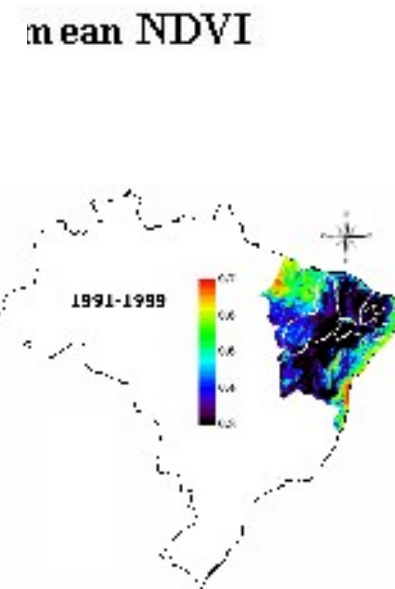
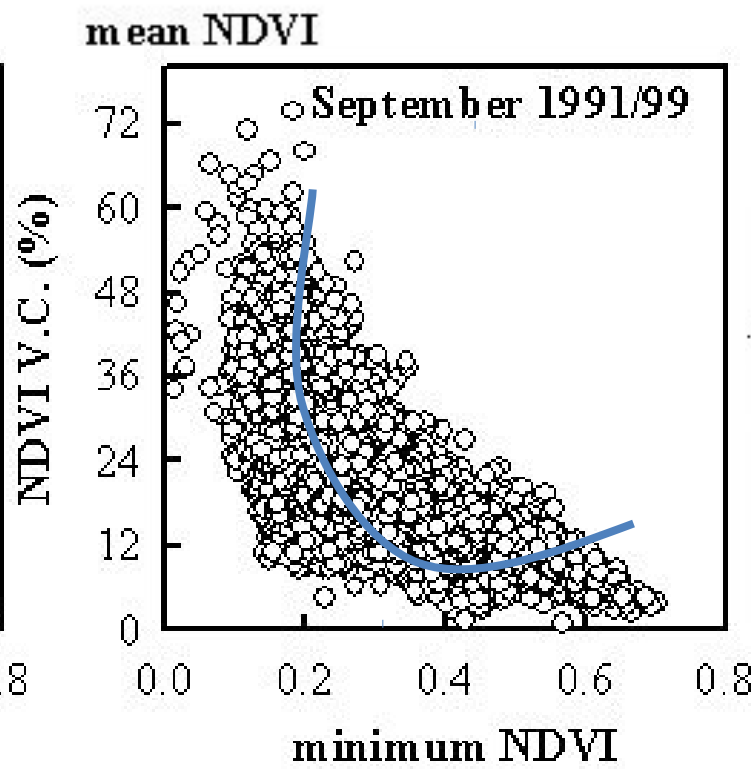
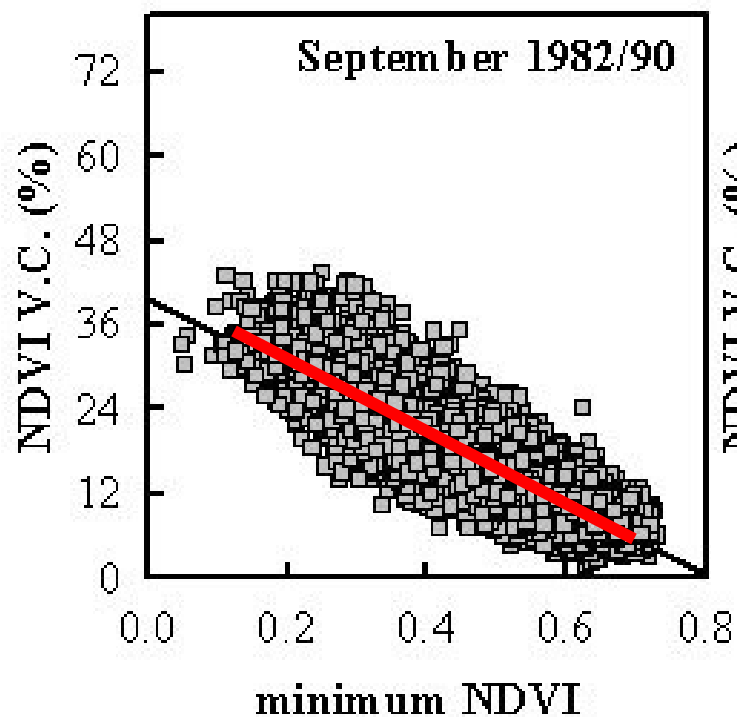
• Approach adopted

Resposta da vegetação à degradação ambiental

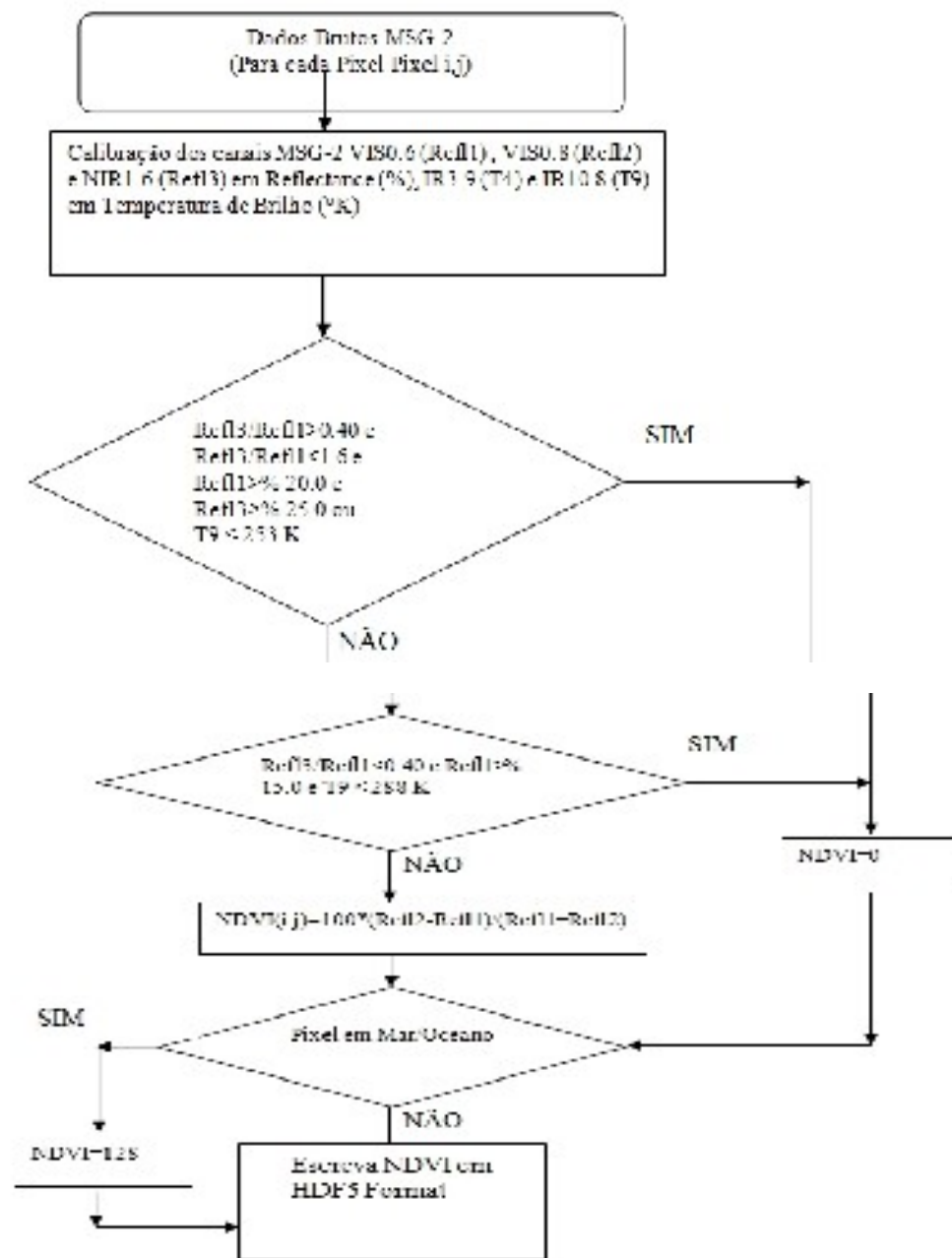




Fonte: Barbosa et al. (2006)

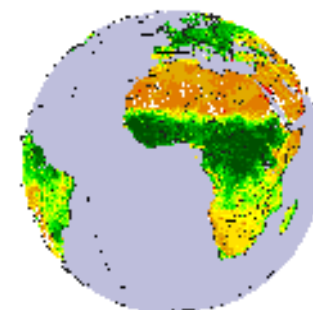
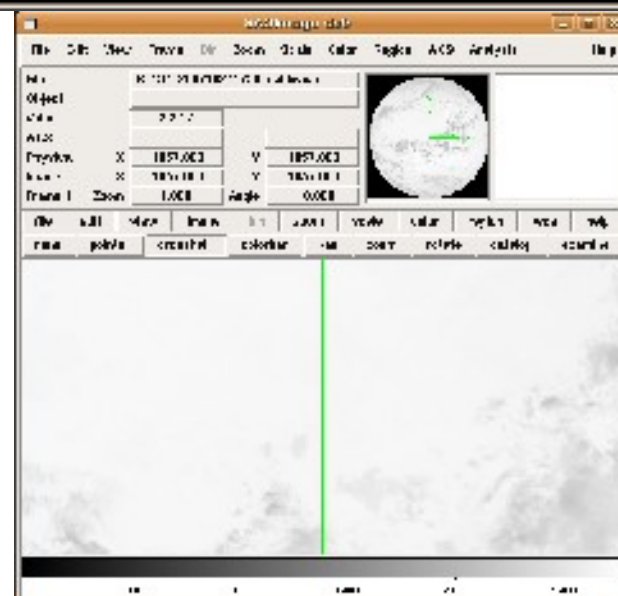


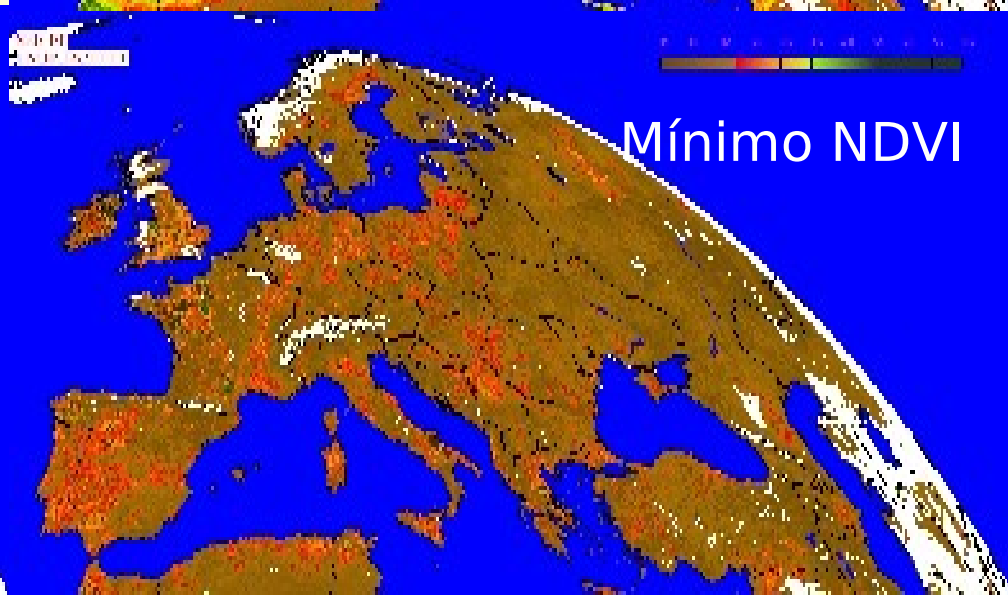
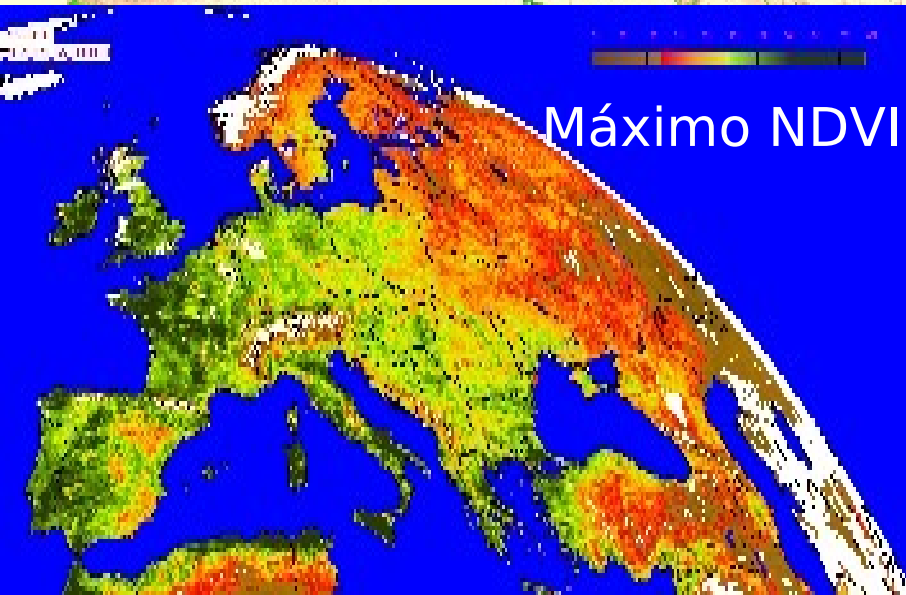
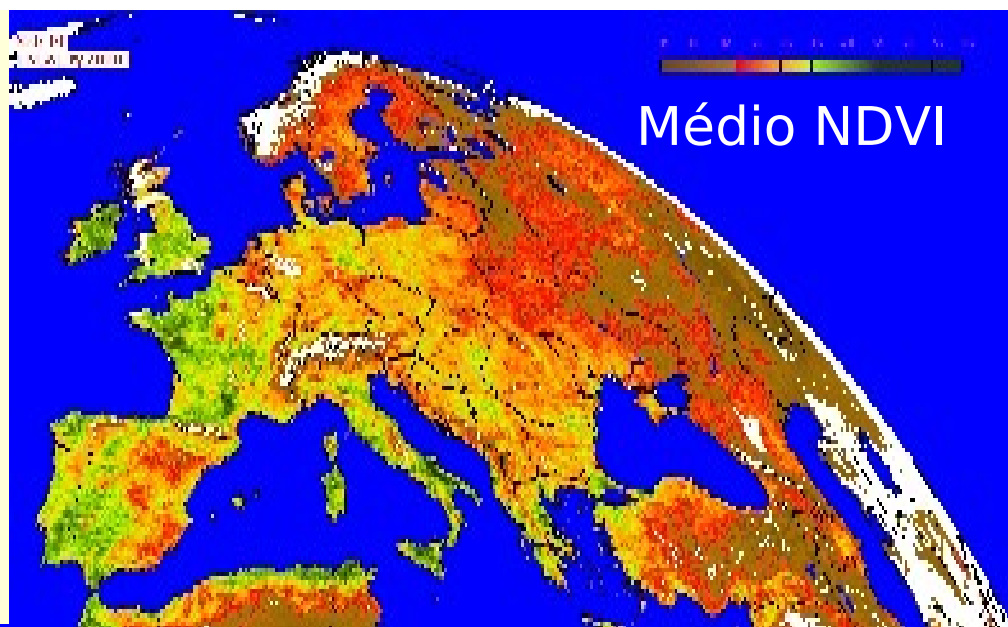
NDVI – MSG Algorithm Calibração



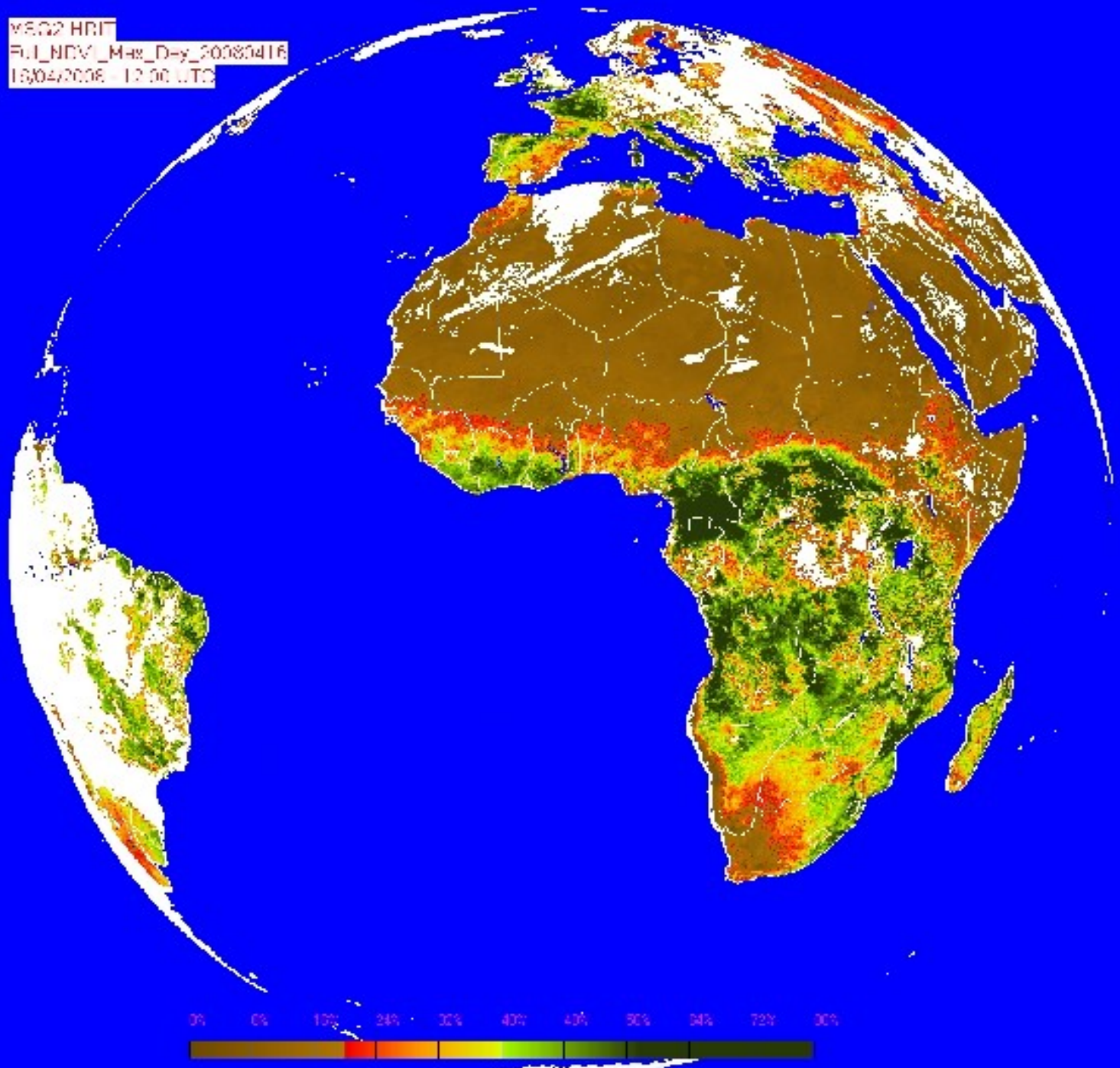
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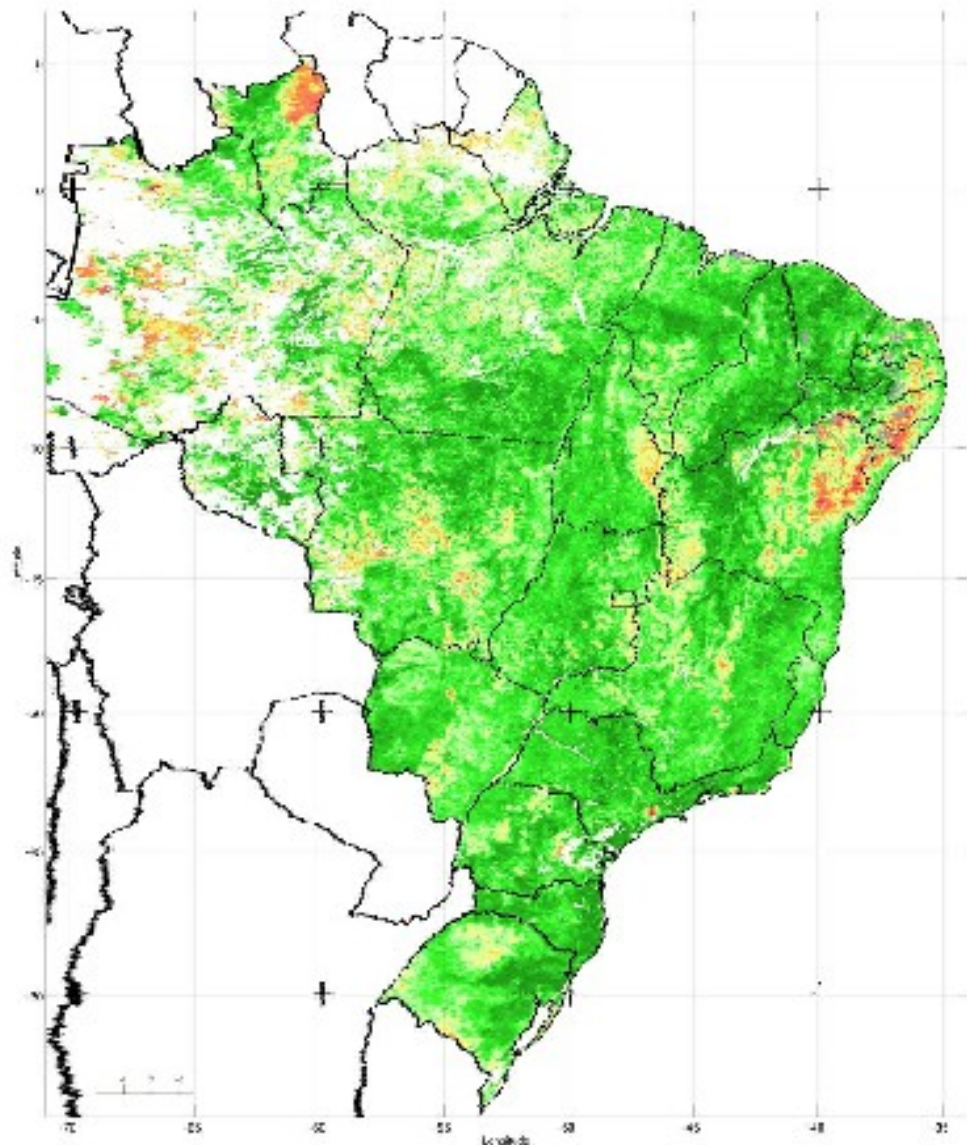
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root@lapis:processamento:/dados/DataChannel2 -24 Is H=FT0+200910231615+
H 968 MSG2 MSG2      r110      200910231615 (A)
root@lapis:processamento:/dados/DataChannel2 -24 Is H=TR_016+200910231615+
H 968 MSG2 MSG2      TR_016  000961  200910231615 C (B)
H 968 MSG2 MSG2      TR_016  000962  200910231615 C
H 968 MSG2 MSG2      TR_016  000963  200910231615 C
H 968 MSG2 MSG2      TR_016  000964  200910231615 C
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H 968 MSG2 MSG2      TR_016  000966  200910231615 C
H 968 MSG2 MSG2      TR_016  000967  200910231615 C
H 968 MSG2 MSG2      TR_016  000968  200910231615 C
root@lapis:processamento:/dados/DataChannel2 -24
root@lapis:processamento:/dados/DataChannel2 -24 Is H=TR0+200910231615+
H 968 MSG2 MSG2      TR_016  000968  200910231615 (C)
  
```





V6.02 HRT
P.L_NDV_Mar_Day_20080416
16:04:2008 - 12:00 UTC





INFORMATION

Some Difficulties for Disseminating

Often Information is Available (Especially Latin America)
(even “in excess”)

But:

**No Priorization
No Processing
No Analysis**



**NOT USED
EFFECTIVELY**

RECOMENDATIONS

- 1.- Recibir las **imágenes de satélite a tiempo real**, para ello instalar una **antena parabólica**.
- 2.- Lograr **licencia EUMETCast** para recibir las imágenes a tiempo real y otros productos sobre aplicaciones en fenómenos hidrometeorológicos que afectan a la sociedad.
- 3.- **Incluir el mapa de riesgo en la caracterización, monitoreo, evaluación y determinación de escenarios probables por sequía**
- 4.- **Establecer los niveles de riesgo hidrológico según la intensidad y duración de las sequías.**
- 5.- **Elaborar un Plan de Atención de Sequías**, que incluya un programa de gestión del agua para mitigar sus efectos, facilitar la adaptación a condiciones de sequía y administrar correctamente el agua en tiempo de escasez.
- 6.- **Replicar estos trabajos en otros sitios.**





MUCHAS GRACIAS
OBRIGADO

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