

INPE EARTH OBSERVATION APPLICATIONS PROJECT: PERSPECTIVES

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INPE: FROM DATA TO KNOWLEDGE



SATELLITES

Earth and Space Observation



LAND SYSTEMS

Satellite Control, reception and dissemination of spatial data



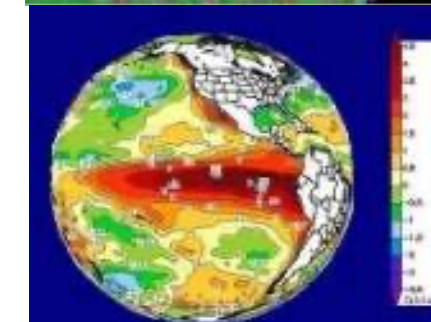
KNOWLEDGE GENERATION

R & D for Space and Environment



INFORMATION ACCESS

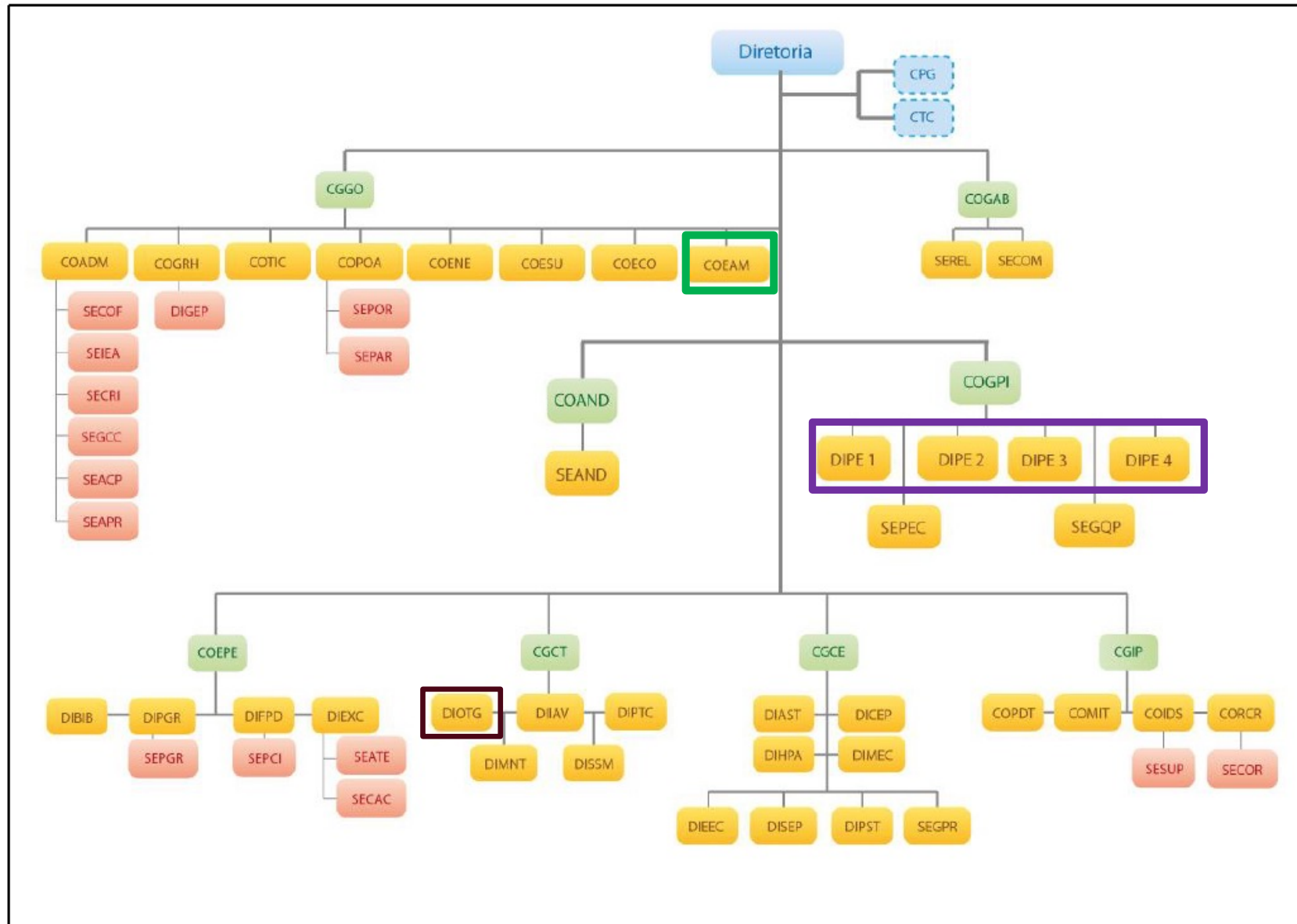
Products to society



- ✓ Divisão de Observação da Terra e Geoinformática - DIOTG
- ✓ Divisão de Impactos, Adaptação e Vulnerabilidades - DIIAV
- ✓ Divisão de Previsão de Tempo e Clima - DIPTC
- ✓ Divisão de Modelagem Numérica do Sistema Terrestre - DIMNT
- ✓ Divisão de Satélites e Sensores Meteorológicos - DISSM

<https://www.gov.br/inpe/pt-br/composicao/diretoria/coordenacao-geral-de-ciencias-da-terra-cgct>

INPE'S ORGANOGRAM



COEAM EARTH OBSERVATION APPLICATIONS PROJECT: PERSPECTIVES

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www.inpe.br/cra



**BRAZIL
DATA CUBE**



CAPACITY BUILDING IN SATELLITE FOREST MONITORING

DATA FROM 2010 - 2017

Capacitree



NORTH/CENTRAL AMERICA	SOUTH AMERICA	AFRICA	EUROPE	ASIA	OCEANIA
Professionals Trained: 37 Countries: 16 Projects: FAO - CARICOM - TCTP	Professionals Trained: 517 Countries: 12 Projects: CARICOM - TCTP - OTCA - FAO	Professionals Trained: 114 Countries: 20 Projects: COMIFAC - FAO - TCTP	Professionals Trained: 05 Countries: 01 Projects: FAO	Professionals Trained: 65 Countries: 14 Projects: FAO - TCTP	Professionals Trained: 10 Countries: 01 Projects: FAO

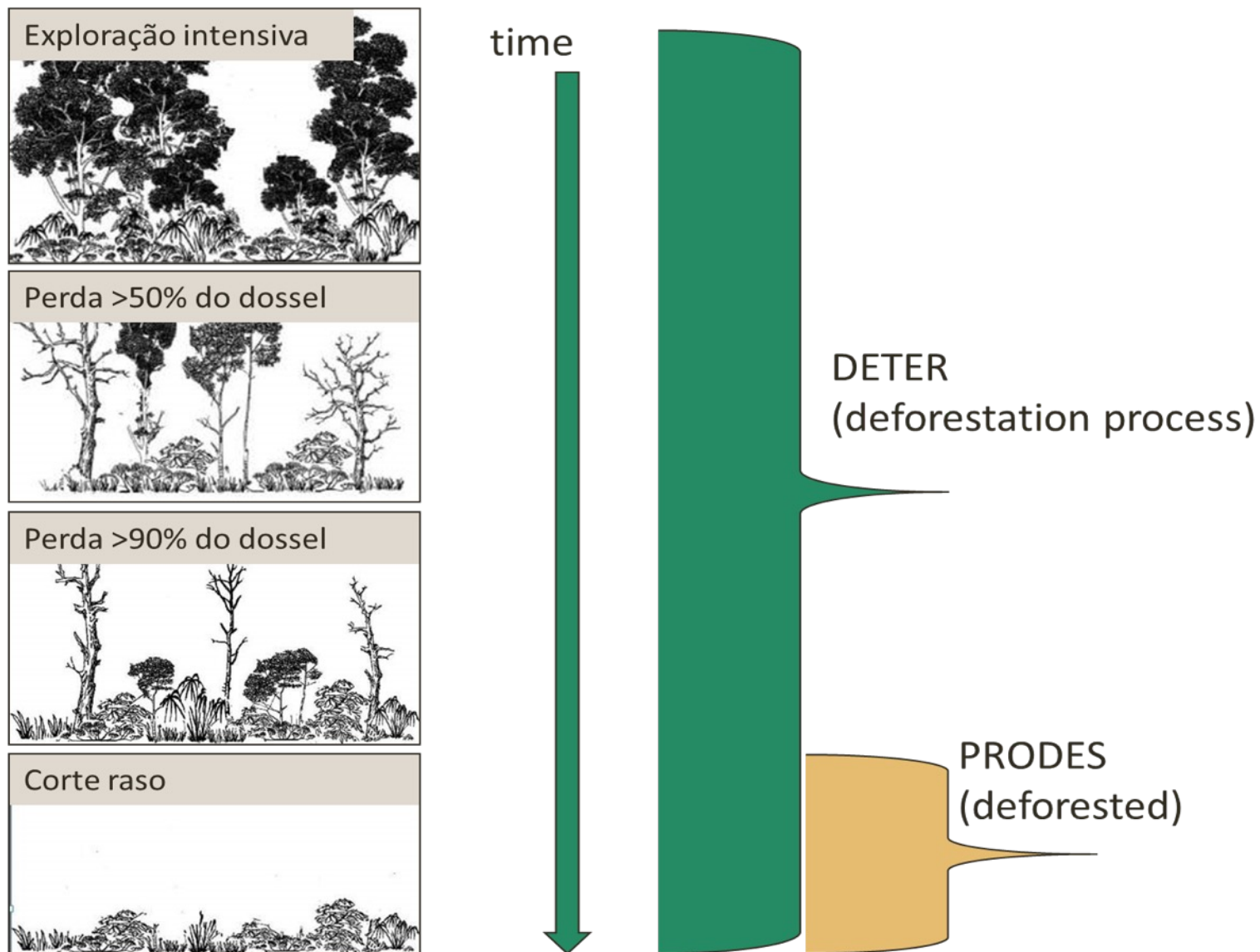
Capacitree



WHAT WE NEED FOR A MONITORING PROJECT?

- Demand
- Extensive research
- Capacity building
- Definition of replicable methodology
- Institutional arrangements
- Public policy
- Free data access
- National and international commitments
- Independency, Governance and Sovereignty

Projects: PRODES and DETER

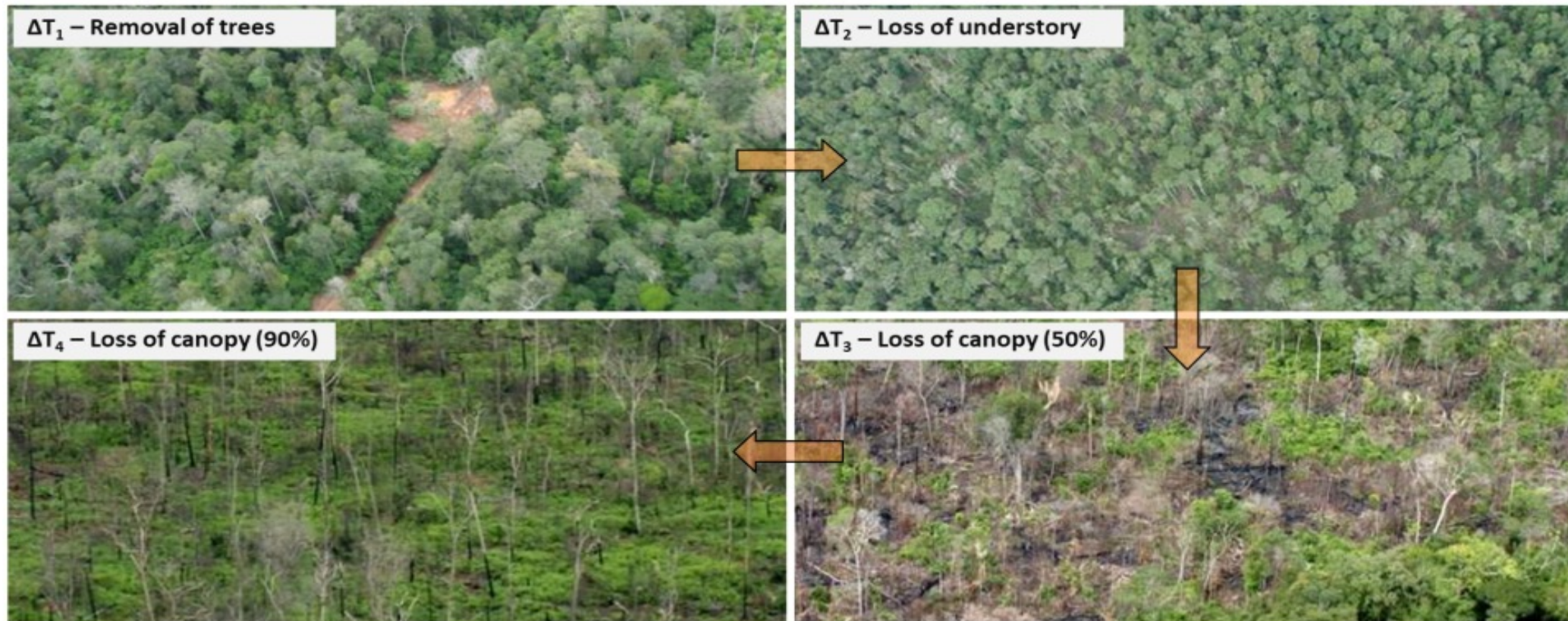


DETER Project

Deforestation and forest degradation

2004 – 2017: MODIS/Terra Aqua, 250m, minimum area > 25 ha

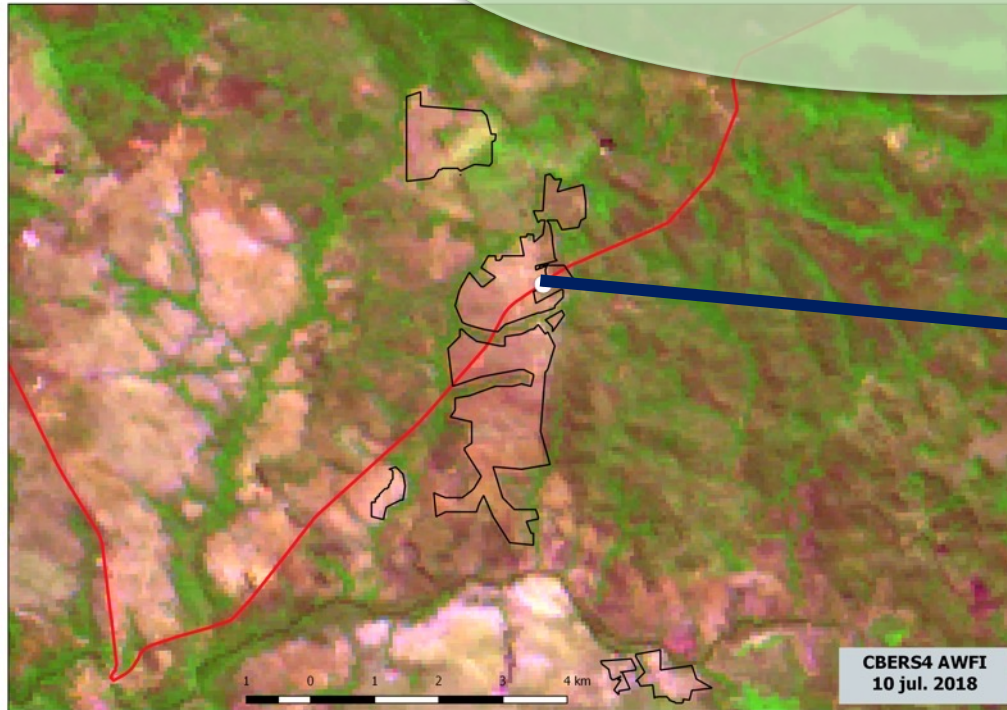
2014 – today: VFI/CBERS-4, 4A e Amazonia, 64m, minimum area > 3 ha



DETER: Daily monitoring

Incremental System

Daily increase of deforestation
moderate-resolution (WFI ~ 60 m)
Minimum Mapping Unit (MMU) 3 ha
Visual Interpretation
Team with very large experience

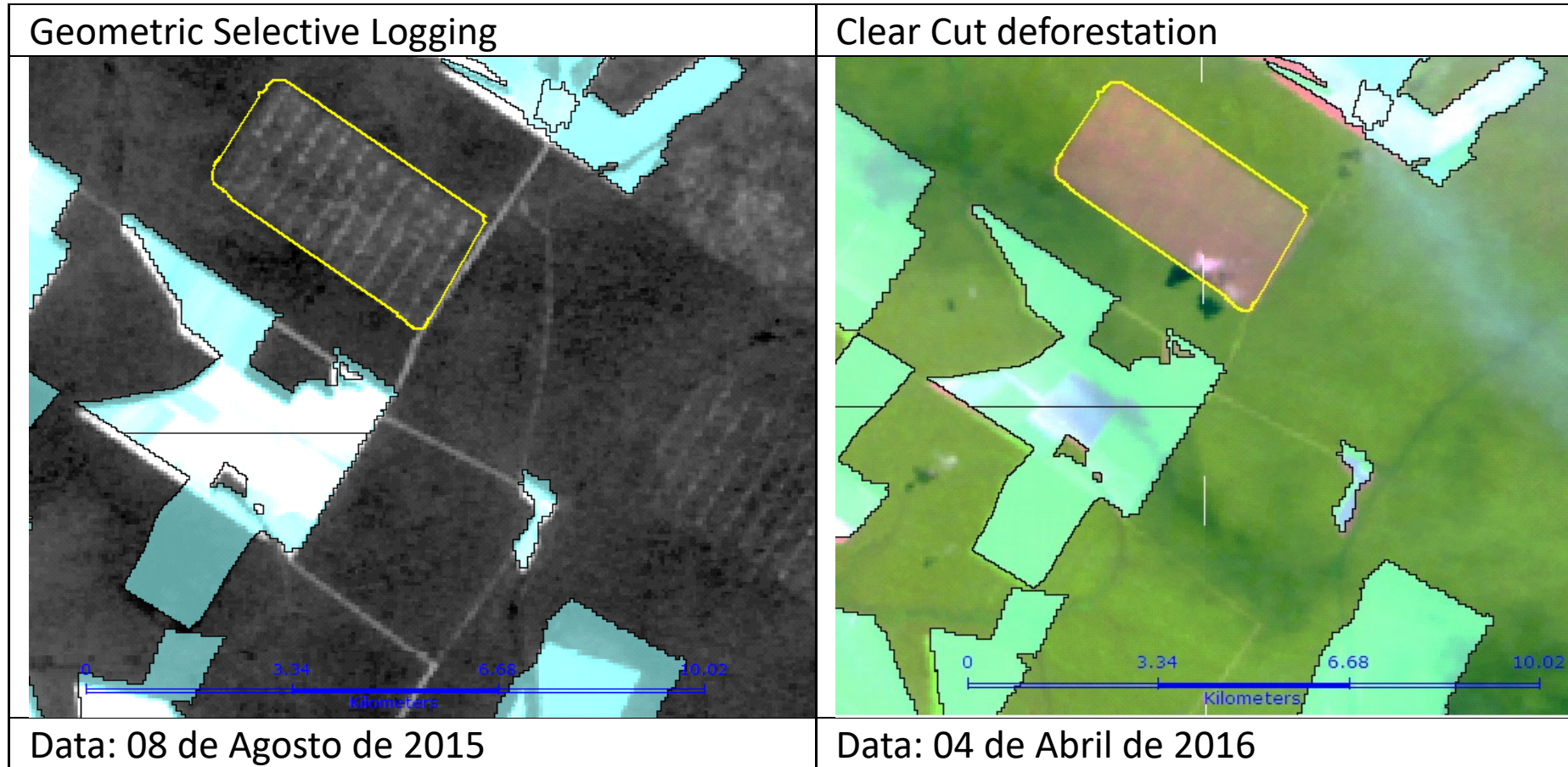


WFI July 10th, 2018

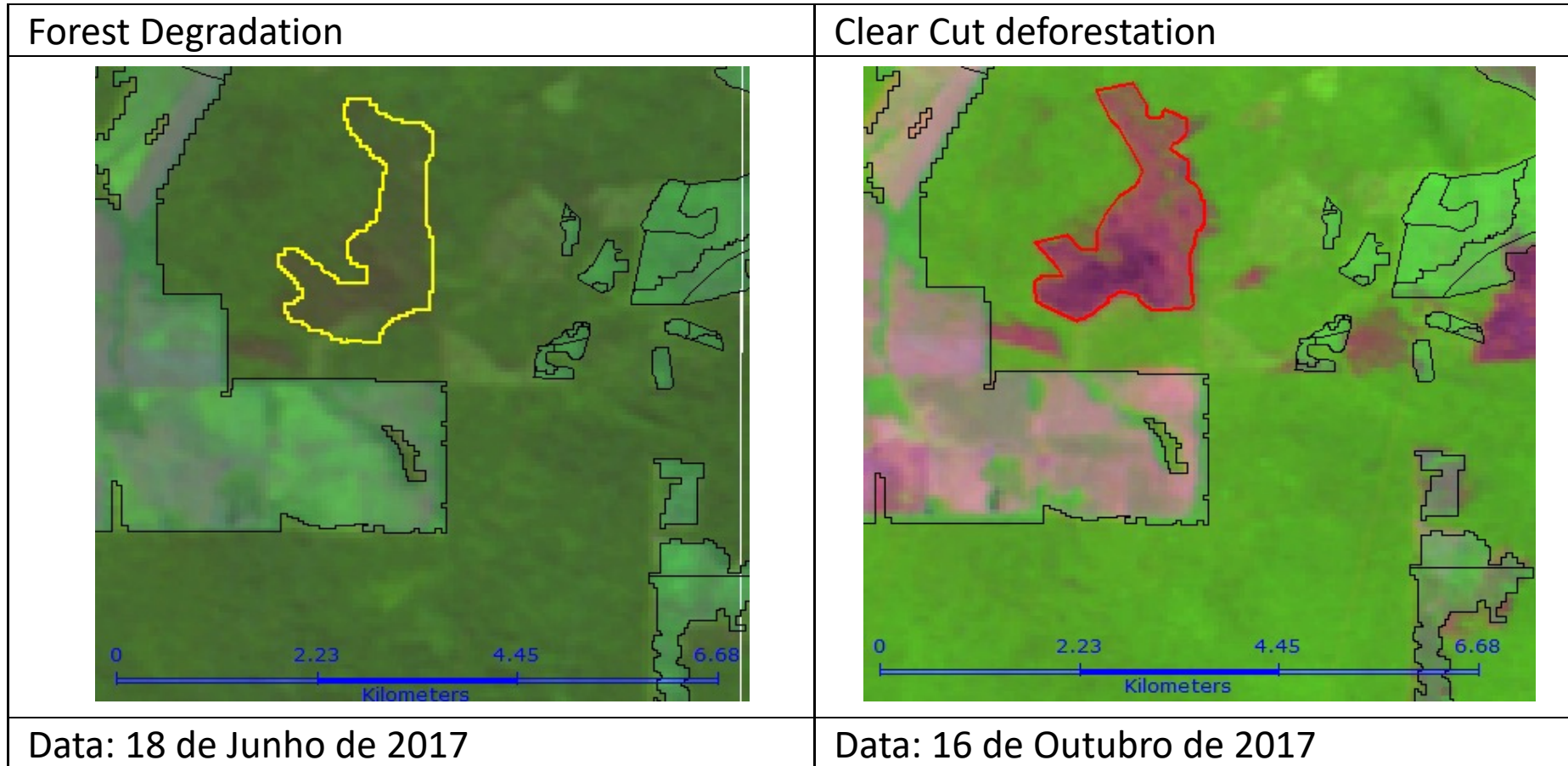


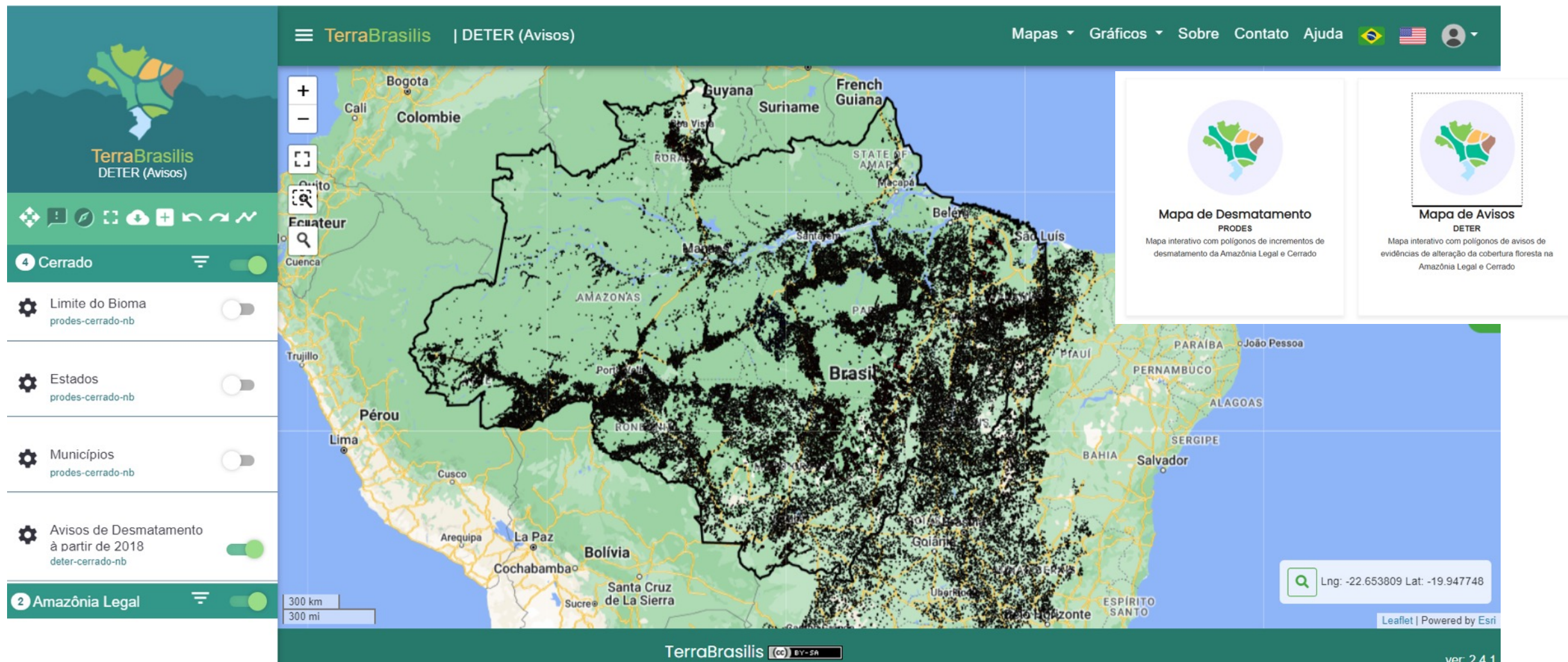
Field Mission: September 1st,
2018

IMPORTANCE OF DETER PROJECT CONTINUOUS MAPPING OF LAND COVER CHANGE

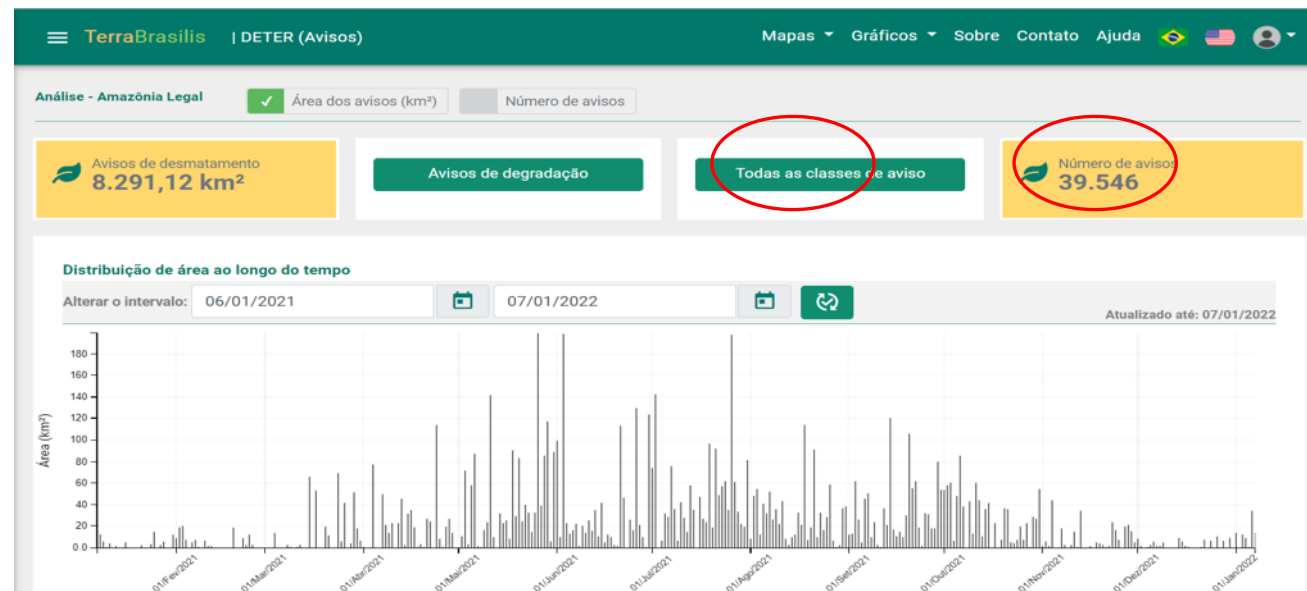


IMPORTANCE OF DETER PROJECT CONTINUOUS MAPPING OF LAND COVER CHANGE

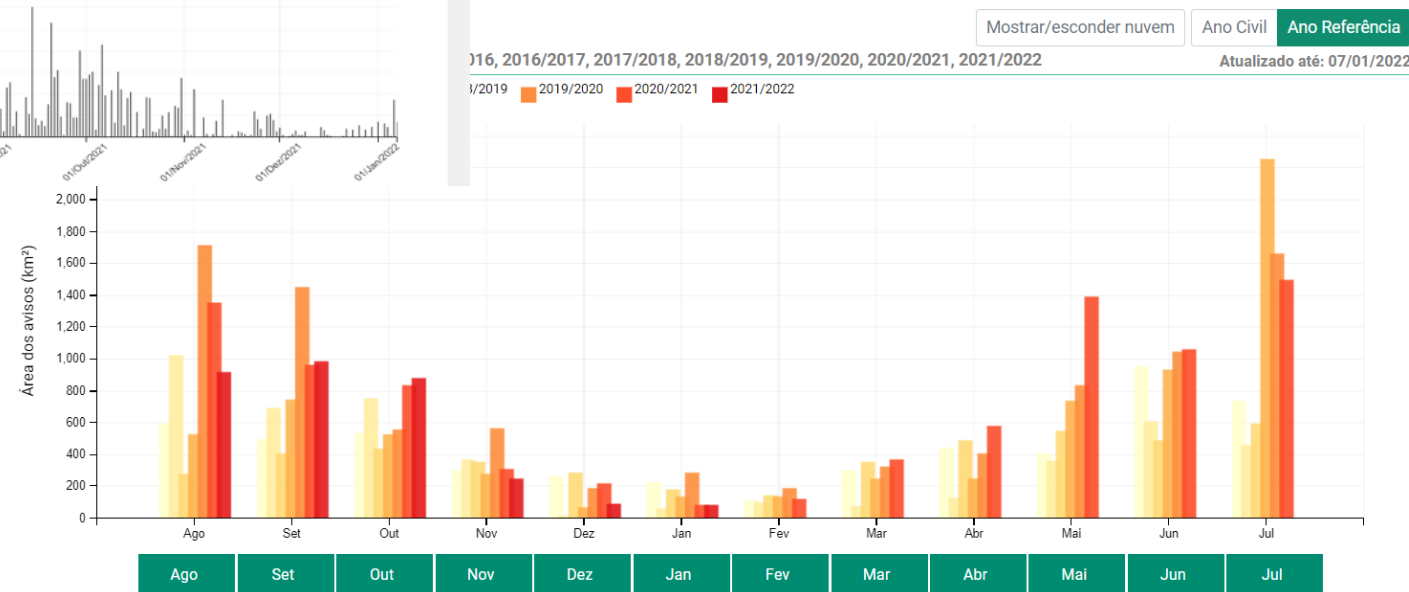




User defined analysis



Monthly Agregate



<http://terrabilis.dpi.inpe.br>

PRODES/DETER Processes: data quality

I - Mapping processes requirements

Image selection and processing Best detection period
Reduced cloud coverage

Visual interpretation Multi-disciplinar and experienced team
Legend and protocol standardization
Ancillary data
Information about regional or local specificity

Auditing Systematic process (100% of territory)
Visual inspection

Post-processing Consistency and processing rules checking

Map validation Stratified and random sampling
External staff

Data Dissemination Transparency (<http://terrabrasilis.dpi.inpe.br/>)
Technical reports
Scientific publications

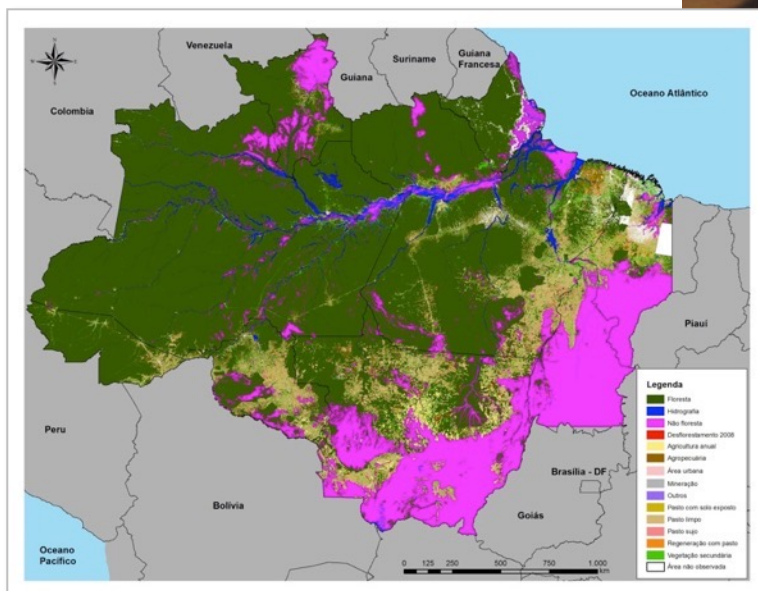
II - Validation

III - Transparency

TERRACLASS PROJECT



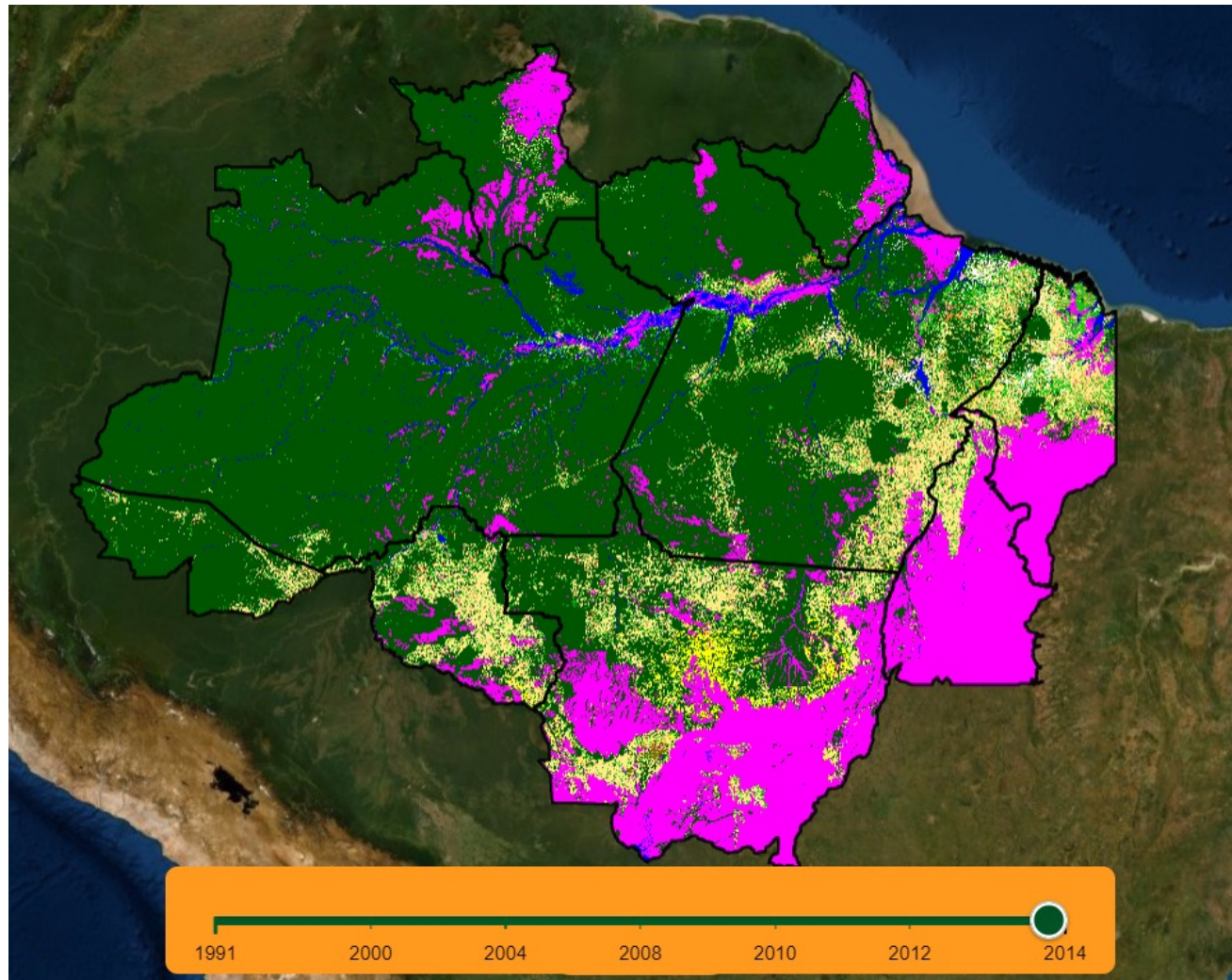
**BRAZIL
DATA CUBE**



- 19 classes of land use land cover
- TerraAmazon System and BDC Techniques
- INPE & Embrapa partnership for TerraClass Amazonia
- Perspectives:
 - INPE + IBGE + Embrapa = TerraClass Brasil
- Data available: 2004 – 2008 – 2010 – 2012 – 2014 - 2020
- Next maps: 2018 – 2021 – 2022

GeoPortal TerraClass: <https://www.terraclass.gov.br/>

TerraClass: Use of deforested areas



Vegetação Natural Florestal Primária	
Vegetação Natural Florestal Secundária	24,0%
Silvicultura	0,4%
Pastagem Cultivada Arbustiva	13,7%
Pastagem Cultivada Herbácea	49,6%
Cultura Agrícola Perene	0,2%
Cultura Agrícola Semiperene	0,3%
Cultura Agrícola Temporária	5,6%
Mineração	0,2%
Urbanizada	0,7%
Outros	0,9%
Não Observado	3,9%
Desflorestamento No Ano	0,6%
Não Floresta	
Corpo D'água	

www.terraclass.gov.br

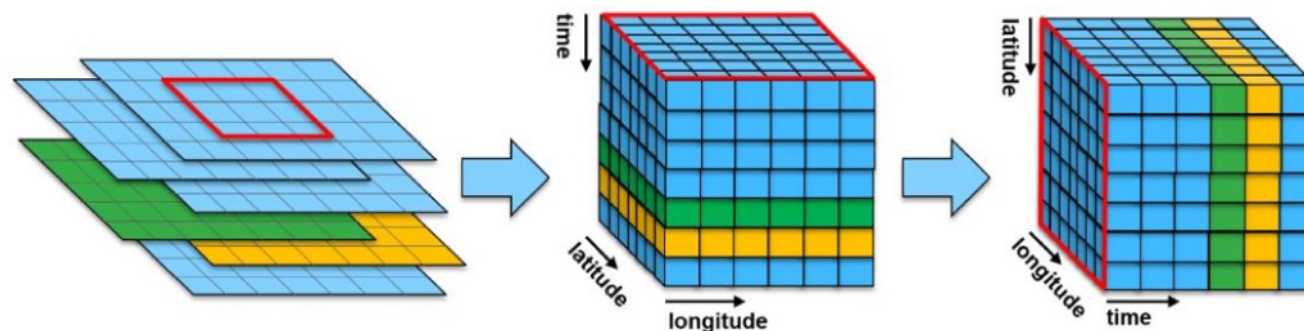
CHALLENGES? PERSPECTIVES?

- Environmental questions:
 - Deforestation pattern
 - Cloud cover
- Data source: different sensors available (optic and microwave)
- Image Processing techniques: ML / DL
- Processing on cloud
- Methodology development
- Accuracy Assessment
- Dissemination and publicity

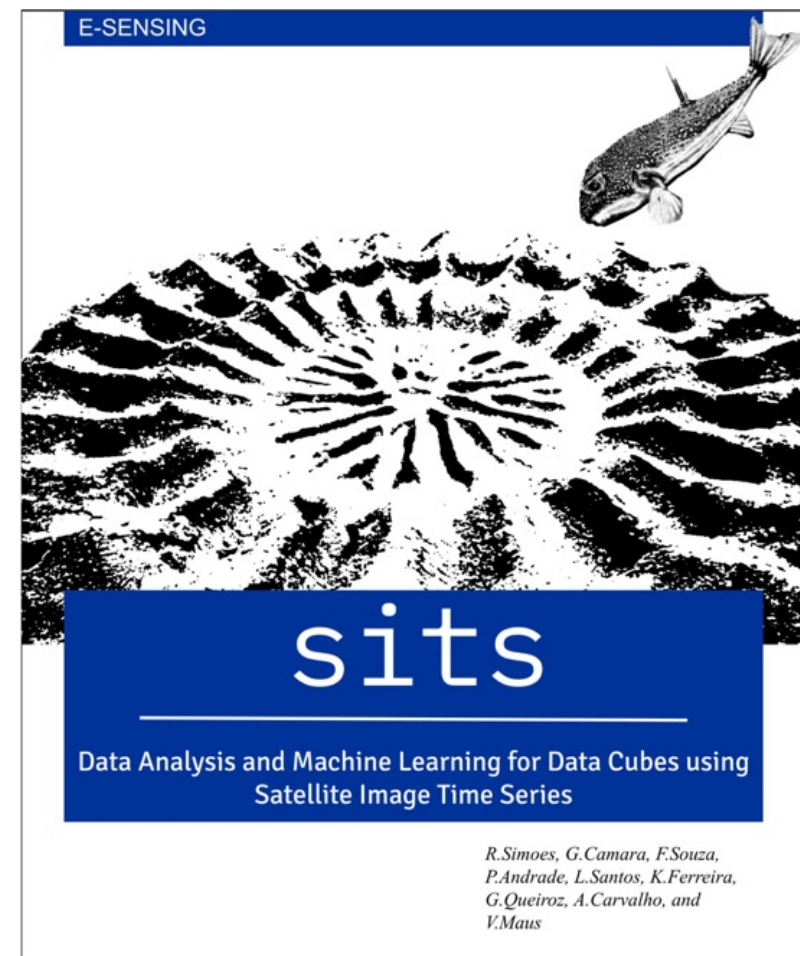
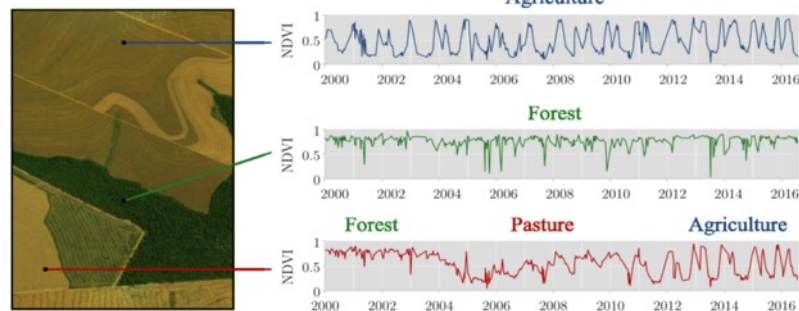
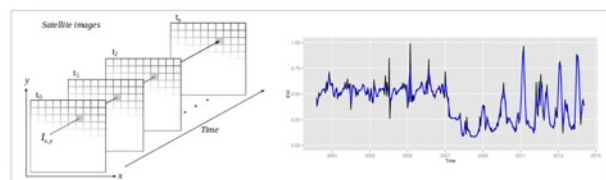
CHALLENGES? PERSPECTIVES?

- Environmental questions
 - *Deforestation pattern*
 - *Cloud cover*
- Data source: sensors (optic and microwave)
- Image Processing techniques for time series
- High performance image processing: on cloud? Other?
- Methodology development: new approaches
- Accuracy assessment
- Dissemination and publicity

New Technologies: Data Cube and SITS



Time series analysis



DISSEMINATION / PUBLICITY



International Society
for Photogrammetry and Remote Sensing

Commission III “Remote Sensing”

President: Laurent Polidori

Vice-president: Alessandra Gomes

Secretary: Jean François Faure

SELPER-Brasil



SFPT



Mid-term symposium



Sociedad Latinoamericana en
Percepción Remota y Sistemas
de Información Espacial



Simpósio SELPER International

SELPER-Brasil



Belém (Brazil), 4-8 November 2024

hosted by **UFPA** (Universidade Federal do Pará)

<https://selperbrasil.org.br/evento/simposio-da-comissao-iii-da-isprs-belem-para-brasil/>



THANK YOU!

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