INPE's EO contributions to CEOS (and GEO)

INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

Summary

Introduction

Forest monitoring operational initiatives

Data policy and software availability

CBERS for Africa initiative

Perspectives for 2010 – 2020

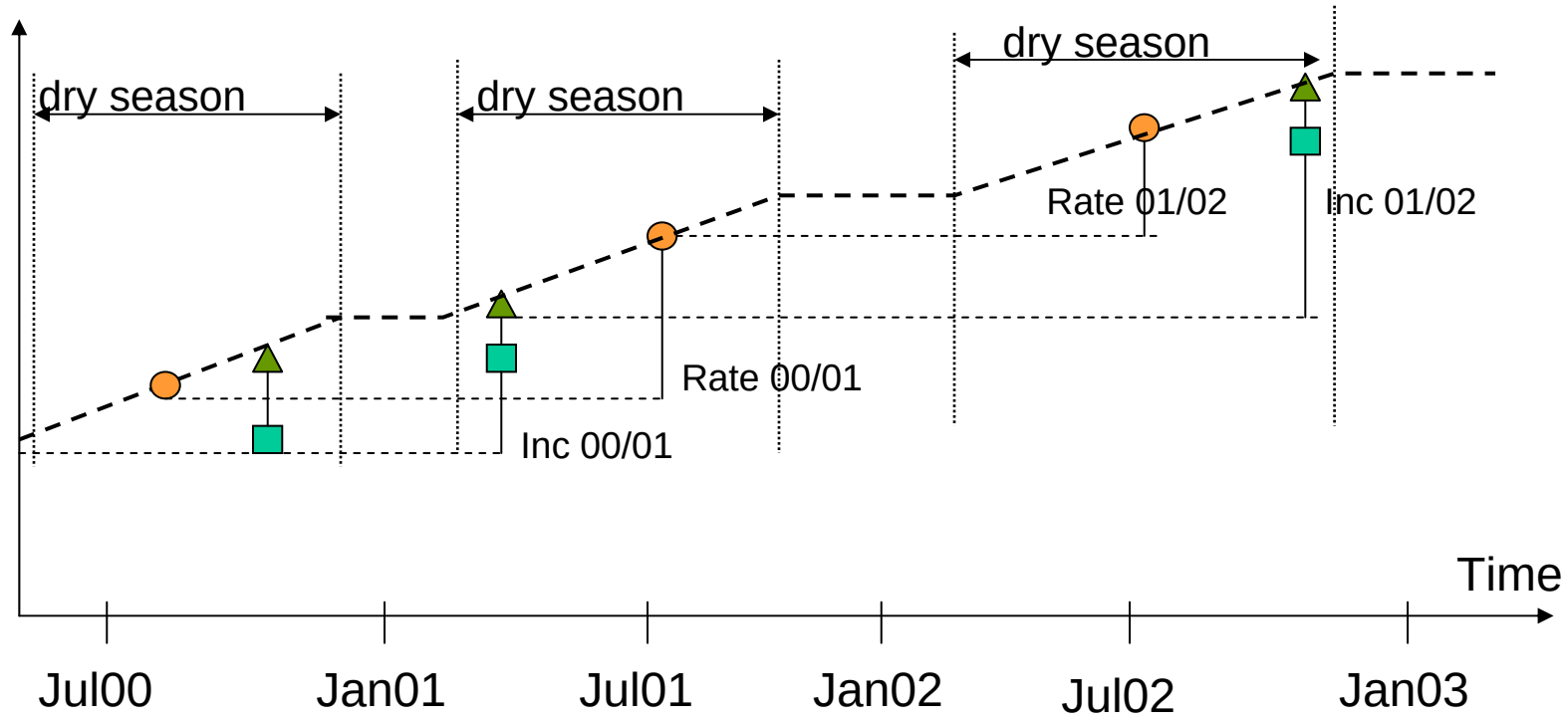
A perspective for EO

A constellation of satellites providing free global land imaging for all countries on Earth

Effective contributions to CEOS LSI and GEO data democracy and data sharing principles

Deforestation in the Amazon

PRODES project – deforestation rates



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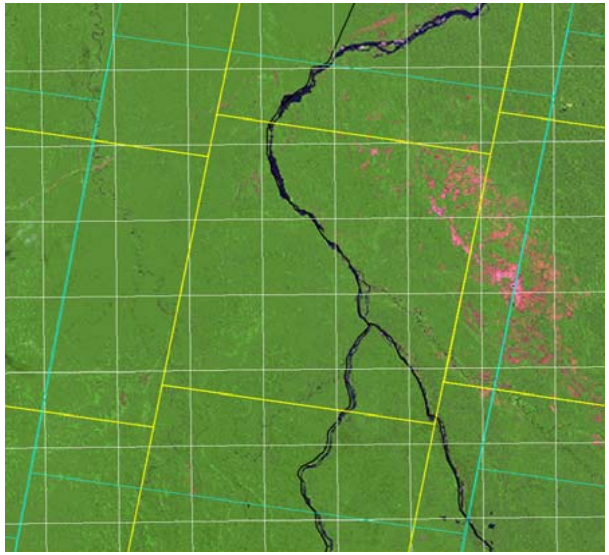
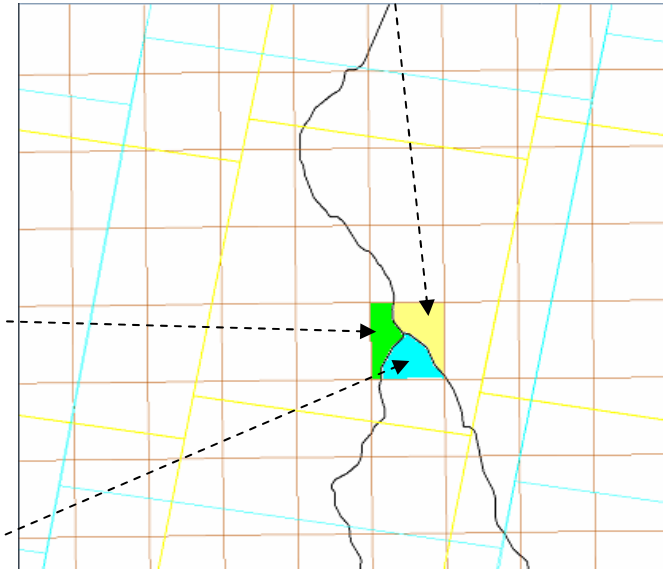
PRODES multi-data approach



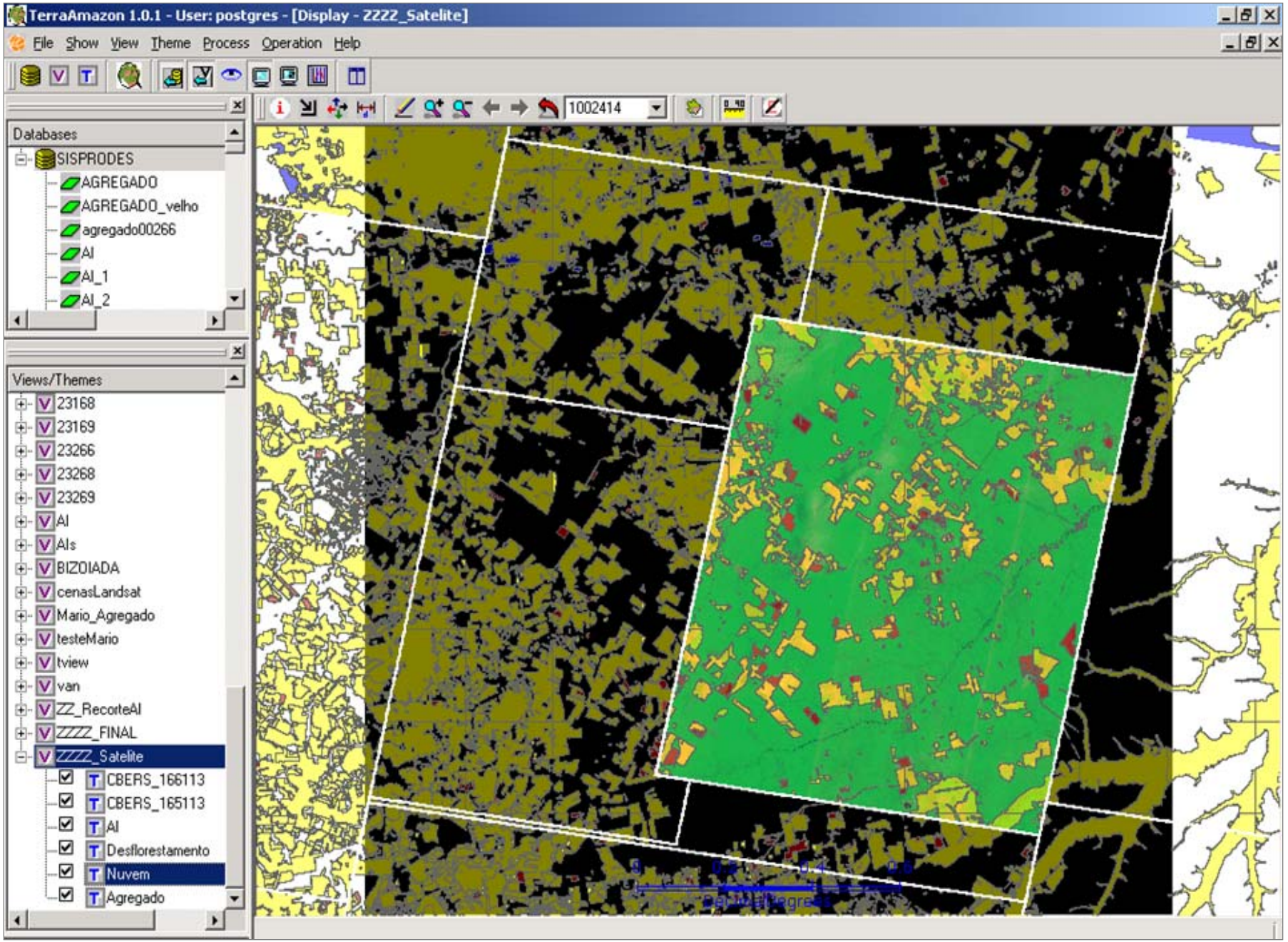
DMC

25km



LANDSAT

CCD/CBERS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23268
23269
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ZZZZ_FINAL
ZZZZ_Satelite
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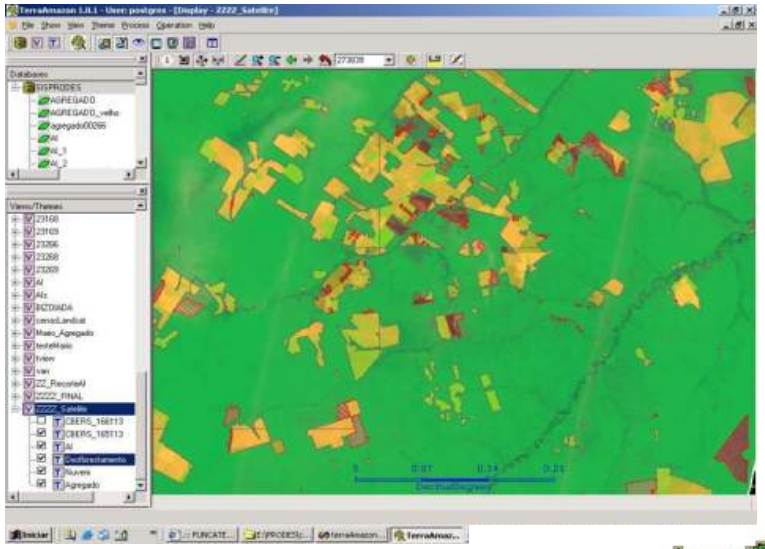
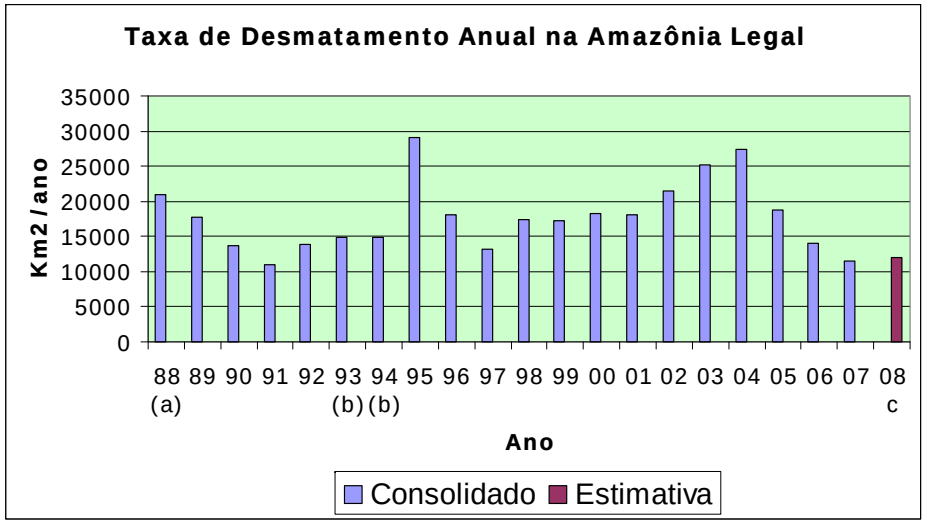
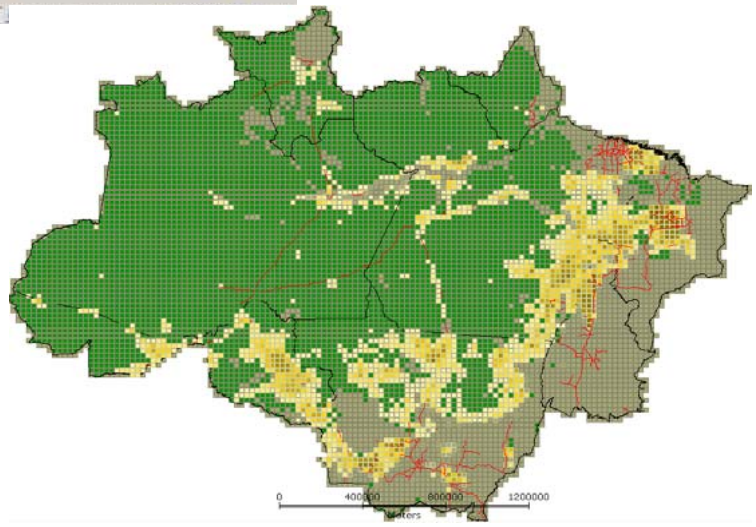
CBERS_165113
AI
Desflorestamento
Nuvem
Agregado

PRODES wall to wall assessment







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Main uses of PRODES results

- Effectiveness of deforestation control policies
- Increasing demands of concerned society for governmental actions
- Support for policy making at regional and local scales
- Public awareness of deforestation in the Amazon (www.obt.inpe.br/prodes)

But PRODES is not enough …

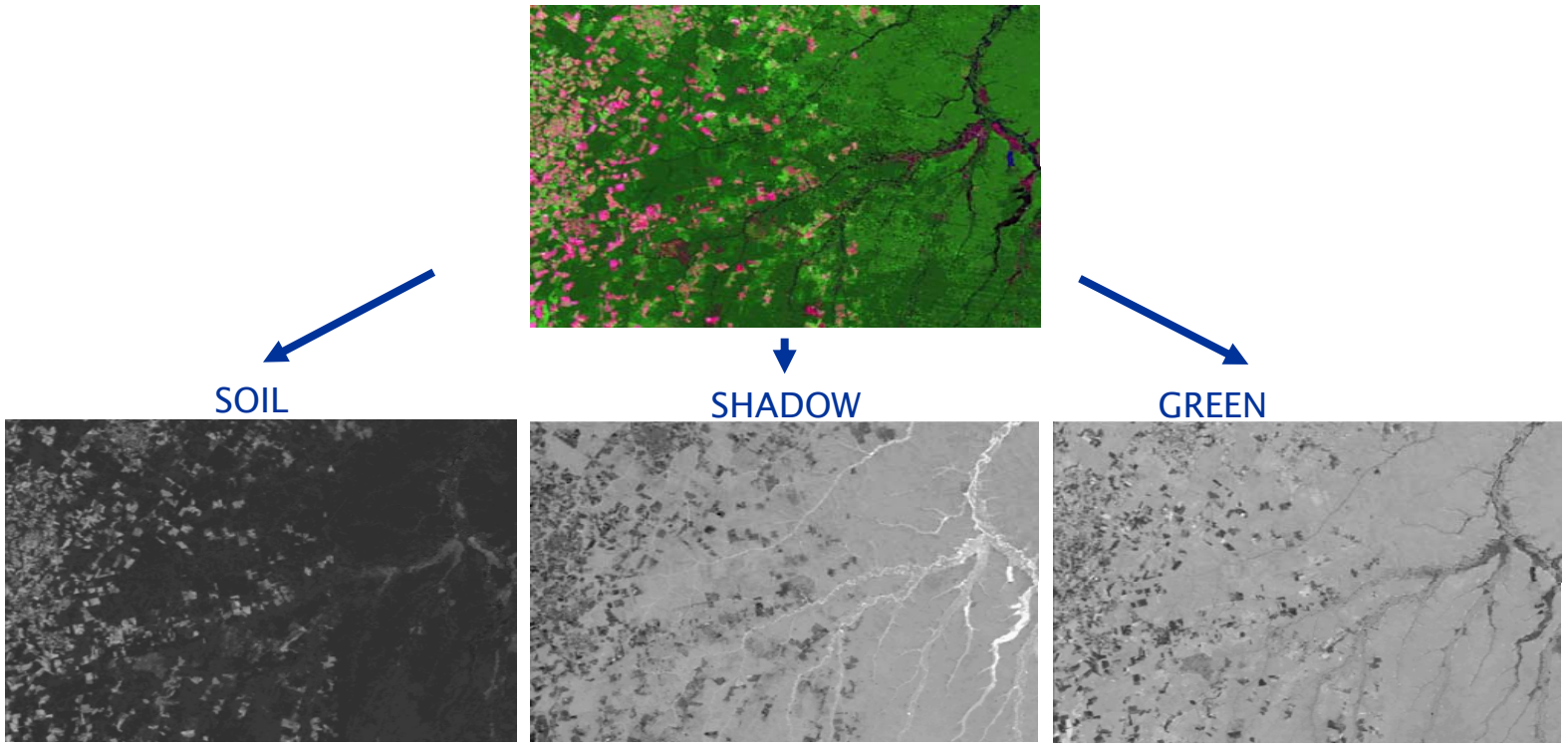
Results are obtained and published after the damage is done

It is difficult for the government to punish illegal deforestation after it is installed

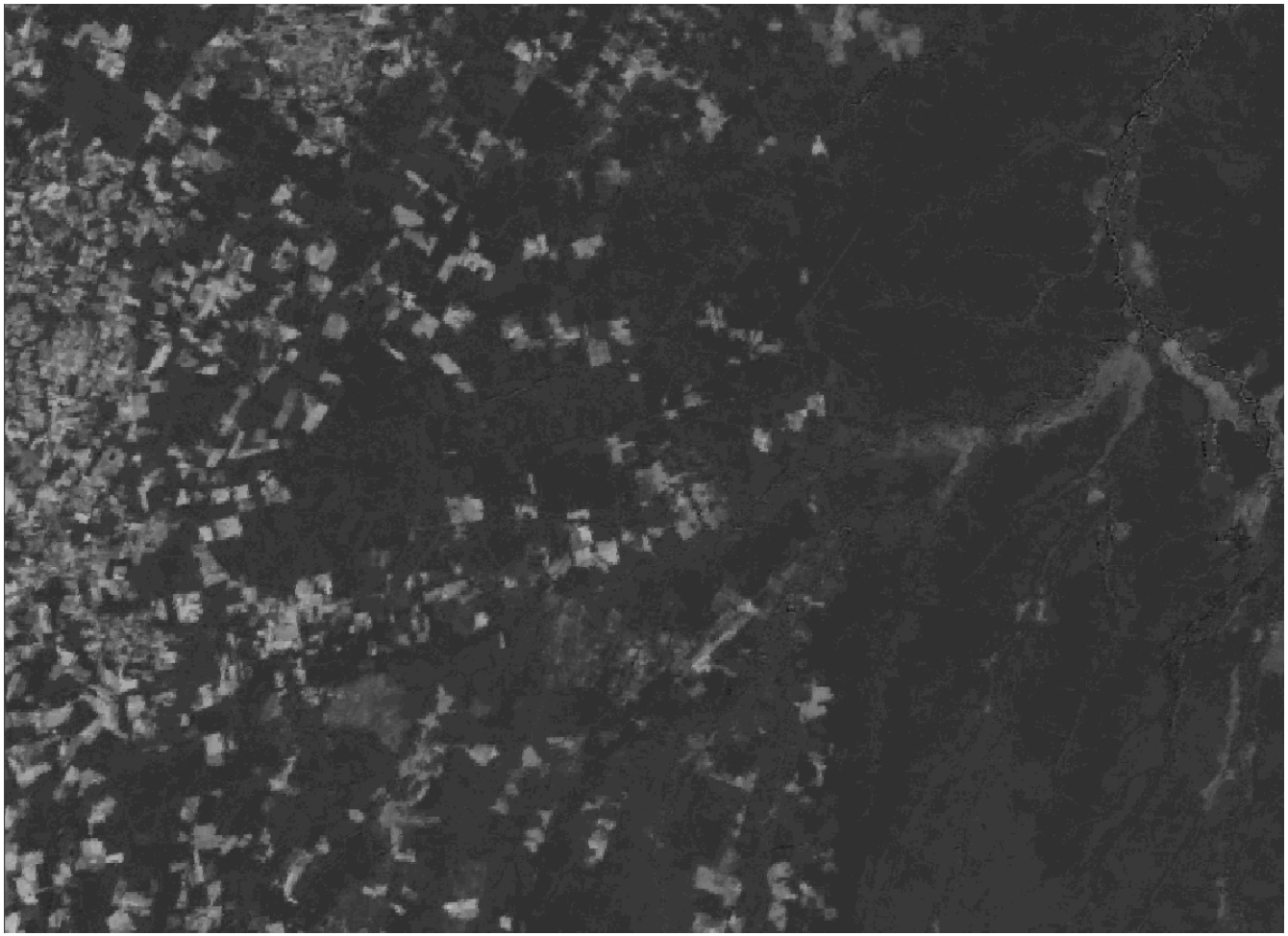
There are demands for data availability and faster information production

DETER project – near real time

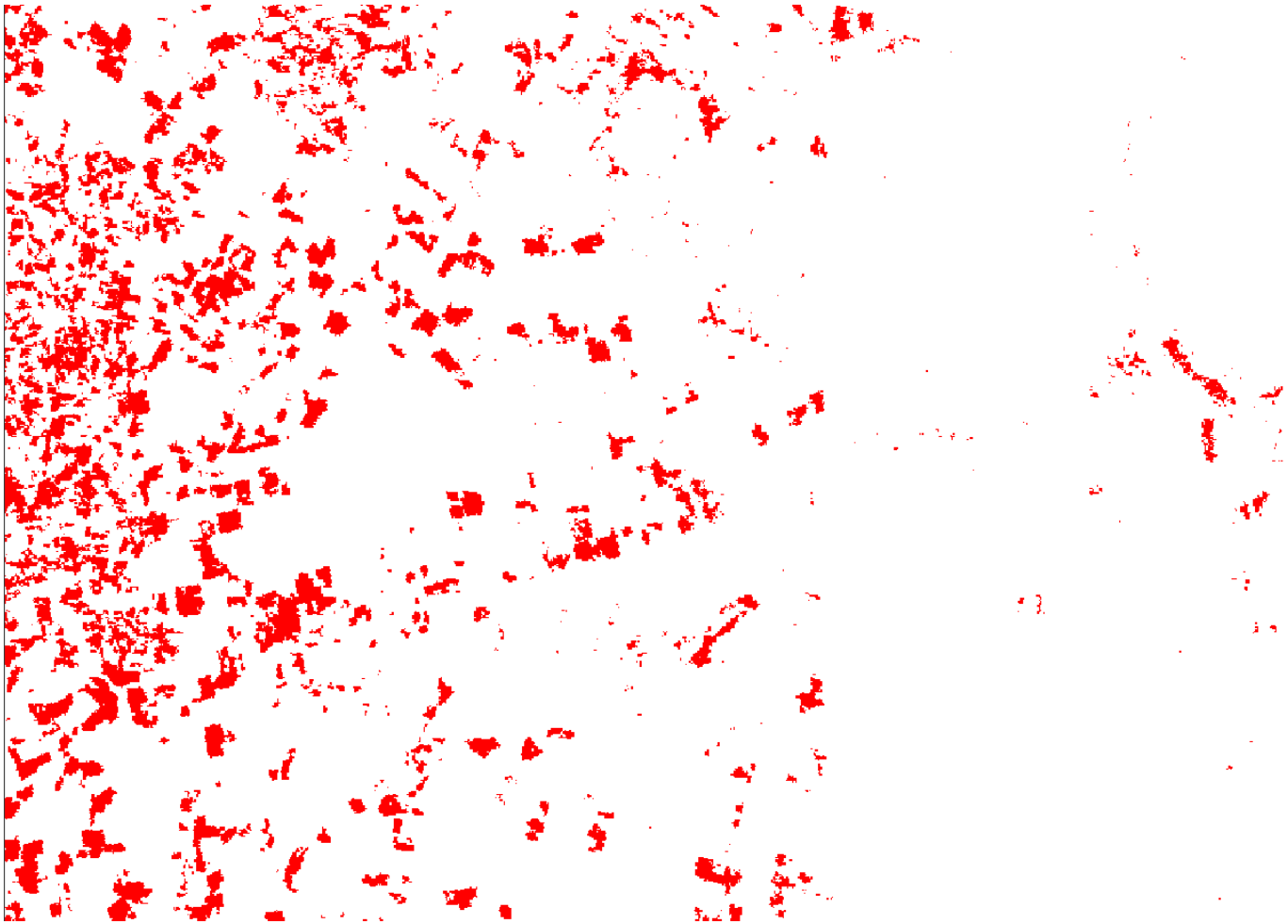
Same approach as PRODES with MODIS 250m



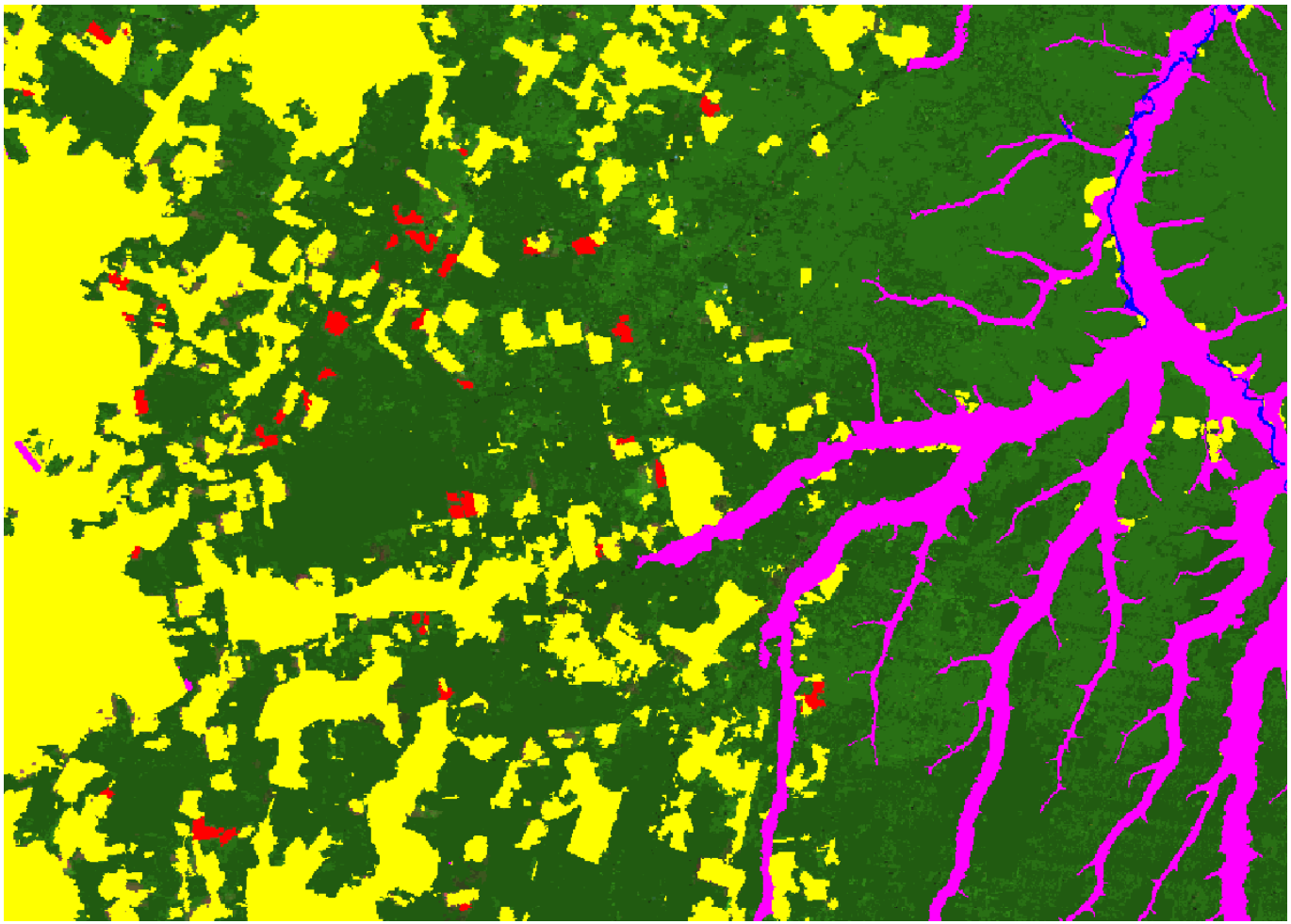
Soil image (April 22 to May 7, 2004)

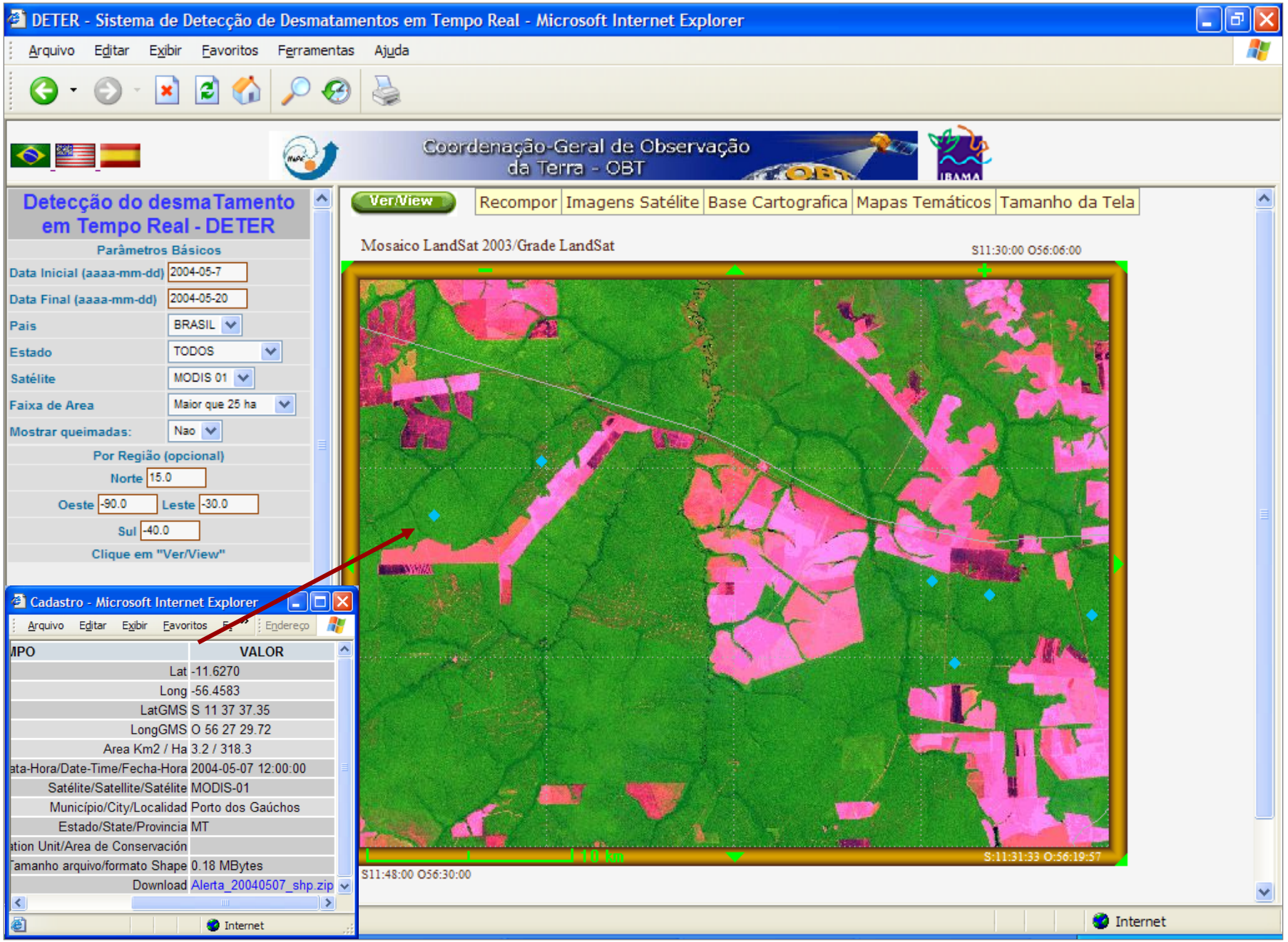


Classification of soil image



2003 extension + changes + image




DETER - Sistema de Detecção de Desmatamentos em Tempo Real - Microsoft Internet Explorer
Arquivo Editar Exibir Favoritos Ferramentas Ajuda
Coordenação-Geral de Observação da Terra - OBT
IBAMA
Detecção do desmaTamento em Tempo Real - DETER
Parâmetros Básicos
Data Inicial (aaaa-mm-dd) 2004-05-7
Data Final (aaaa-mm-dd) 2004-05-20
Pais BRASIL
Estado TODOS
Satélite MODIS 01
Faixa de Area Maior que 25 ha
Mostrar queimadas: Nao
Por Região (opcional)
Norte 15.0
Oeste -90.0 Leste -30.0
Sul -40.0
Clique em "Ver/View"
Ver/View
Recompor
Imagens Satélite
Base Cartografica
Mapas Temáticos
Tamanho da Tela
Mosaico LandSat 2003/Grade LandSat
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S:11:31:33 O:56:19:57
S11:48:00 O56:30:00
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LongGMS O 56 27 29.72
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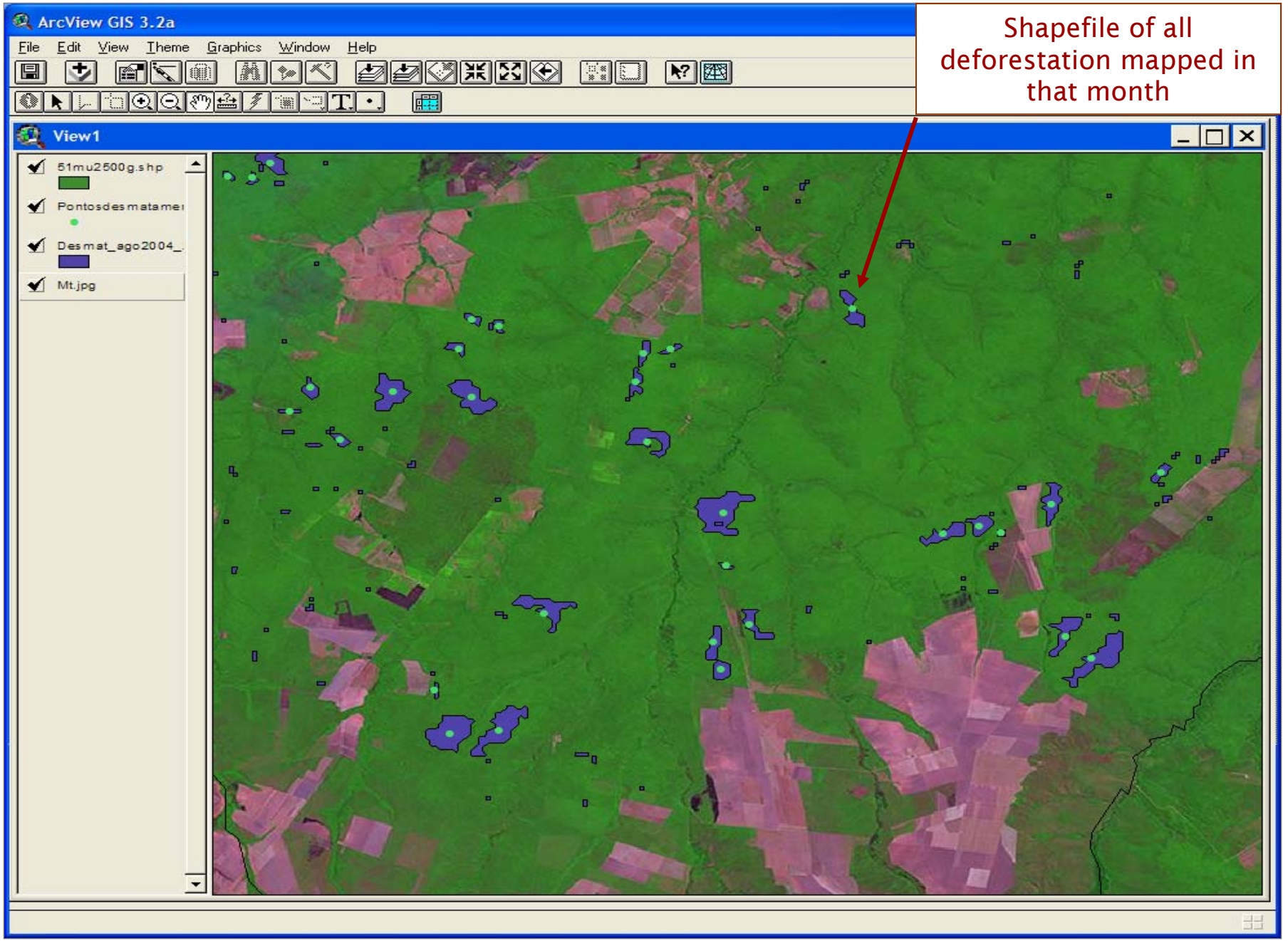
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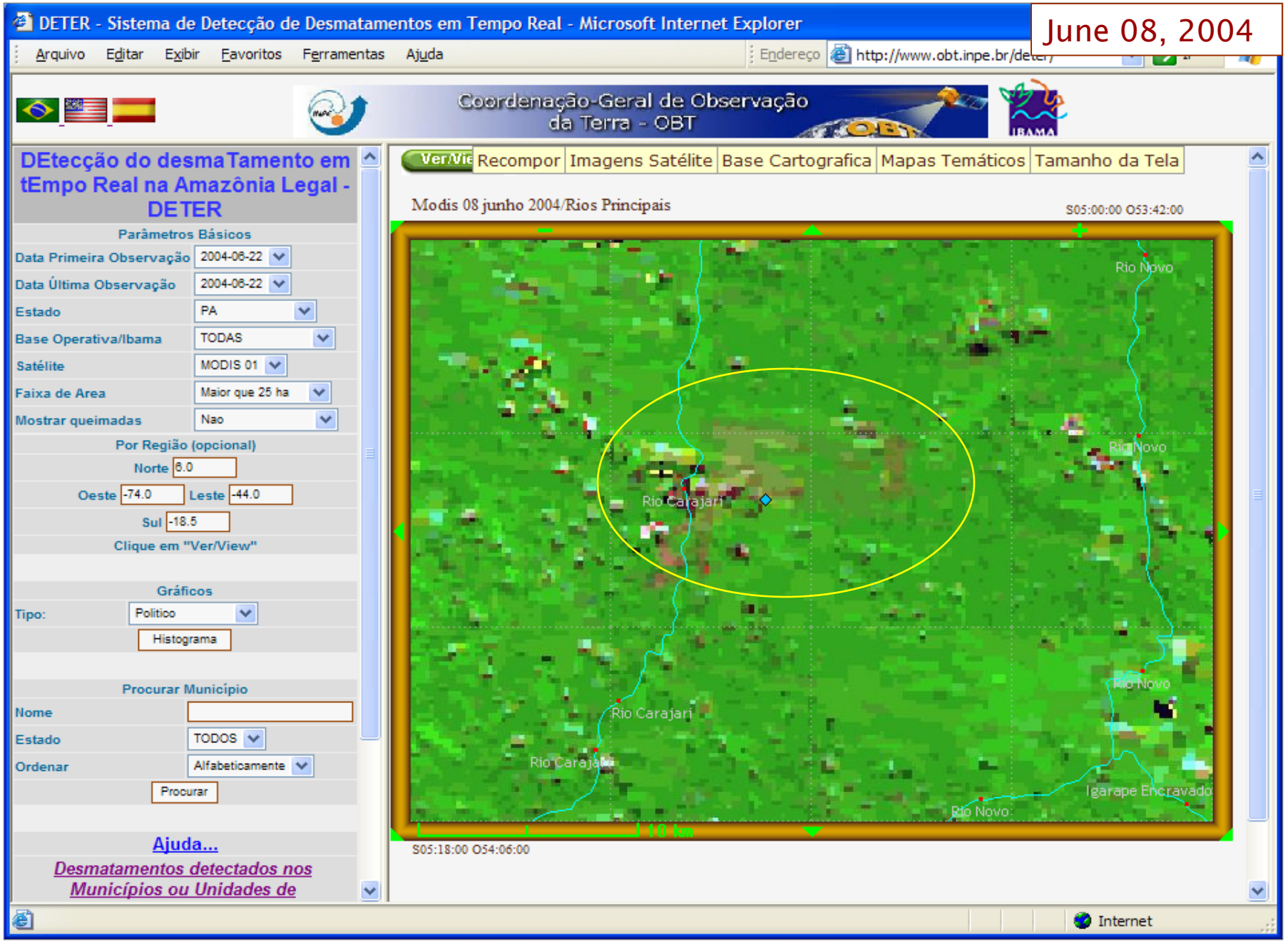
Shapefile of all deforestation mapped in that month


DETER - Sistema de Detecção de Desmatamentos em Tempo Real - Microsoft Internet Explorer
June 08, 2004
Arquivo Editar Exibir Favoritos Ferramentas Ajuda
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IBAMA
DEtecção do desmaTamento em tEmpo Real na Amazônia Legal - DETER
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Data Primeira Observação 2004-06-22
Data Última Observação 2004-06-22
Estado PA
Base Operativa/Ibama TODAS
Satélite MODIS 01
Faixa de Area Maior que 25 ha
Mostrar queimadas Nao
Por Região (opcional)
Norte 6.0
Oeste -74.0 Leste -44.0
Sul -18.5
Clique em "Ver/View"
Gráficos
Tipo: Politico
Histograma
Procurar Município
Nome
Estado TODOS
Ordenar Alfabeticamente
Procurar
Ajuda...
Desmatamentos detectados nos Municípios ou Unidades de
Ver/Vie
Recompor
Imagens Satélite
Base Cartografica
Mapas Temáticos
Tamanho da Tela
Modis 08 junho 2004/Rios Principais
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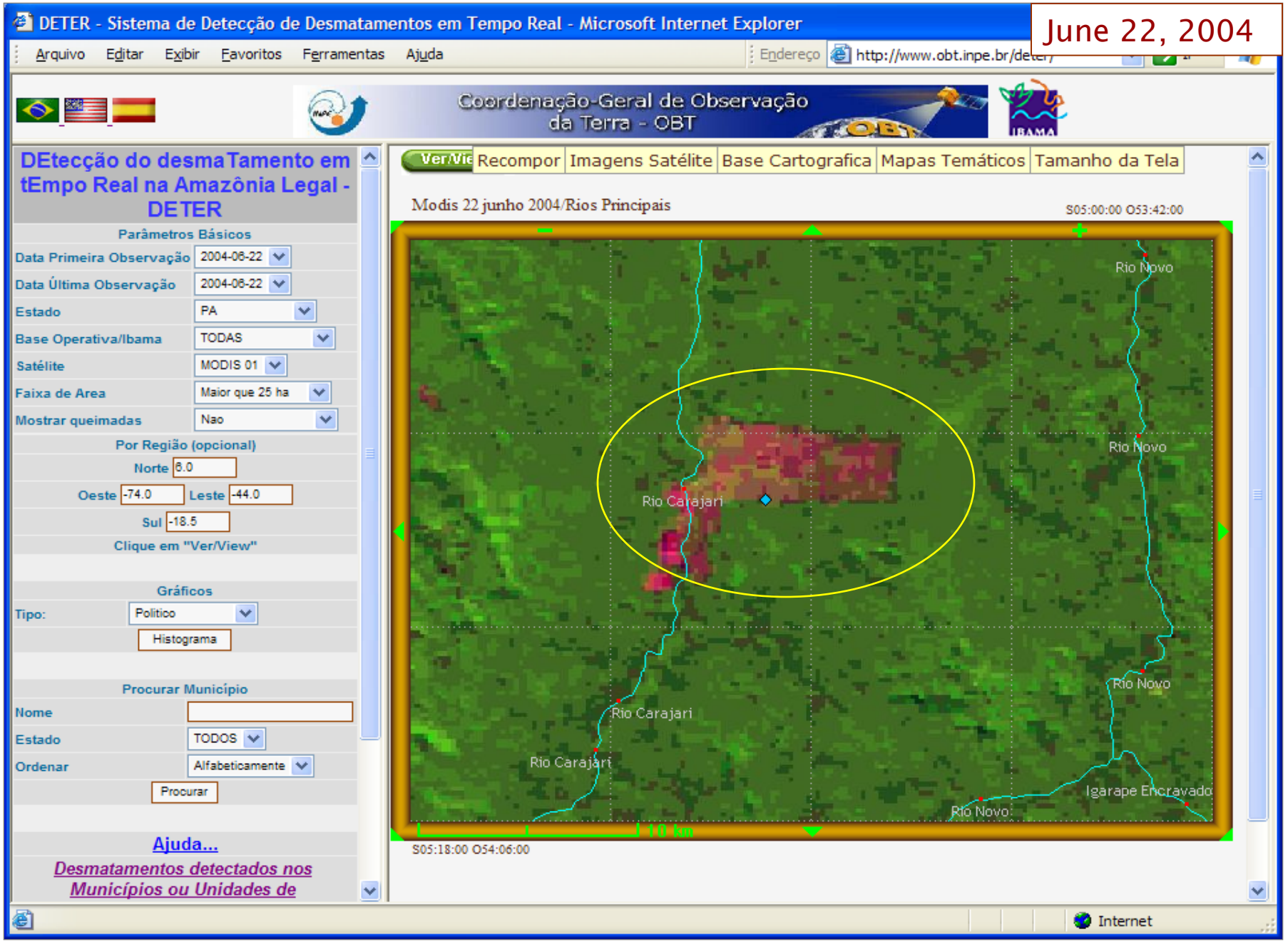
Rio Novo
Rio Carajari
Rio Novo
Rio Carajari
Rio Novo
Rio Carajás
Igarape Encravado
Rio Novo
10 km
S05:18:00 O54:06:00
Internet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Base Cartografica
Mapas Temáticos
Tamanho da Tela
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Rio Novo
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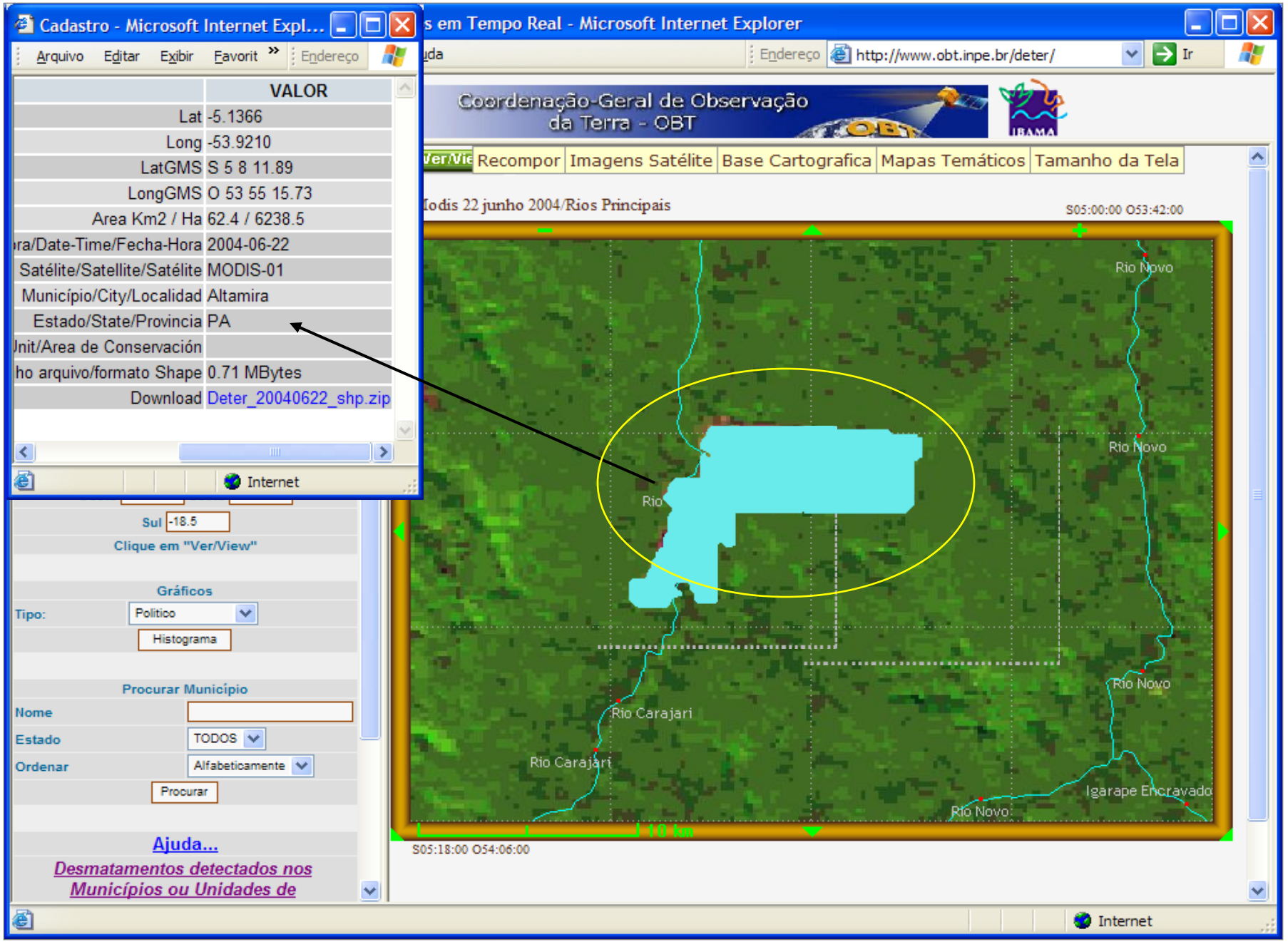
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LatGMS S 5 8 11.89
LongGMS O 53 55 15.73
Area Km2 / Ha 62.4 / 6238.5
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Satélite/Satellite/Satélite MODIS-01
Município/City/Localidad Altamira
Estado/State/Provincia PA
Unit/Area de Conservación
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Internet

Impacts of DETER

Faster information for strategic decisions by the deforestation control agencies

Better efficiency in law enforcement

Immediate public awareness by monthly information dissemination (www.obt.inpe.br/deter)

If it has been published in English …

Improved Monitoring of Rainforests Helps Pierce Haze of Deforestation

Deforestation produces a significant amount of greenhouse gas emissions through burning, clearing, and decay. But exactly how much?

SCIENCE VOL 316 27 APRIL 2007

Twenty-five years ago, the best way for Brazilian scientists to gauge the rate of deforestation in the Amazon was to superimpose dots on satellite photos of the world's largest rainforest that helped them measure the size of the affected area. INPE, the government agency responsible for remote deforestation monitoring, didn't release regional maps and refused to explain its analytical methods. The result was data that few experts found credible.

Today, Brazil's monitoring system is the envy of the world. INPE has its own remote-sensing satellite, a joint effort with China launched in 1999, that allows it to publish yearly totals of deforested land that scientists regard as reliable. Using data from NASA's 7-year-old Terra satellite, INPE also provides automated weekly clear-cutting alerts that other tropical nations would love to emulate.

[illegible] the need for measurement dots. "They've really turned things around," says forestry scientist David Skole of Michigan State University in East Lansing.

Generating good data on deforestation is more than an academic exercise. The process of cutting down forests and clearing the land—by burning the wood, churning soil for agriculture or grazing, and allowing the remaining biomass to decay—produces as much as 25% of the world's yearly emissions of greenhouse gases. That makes keeping tabs on deforestation a crucial issue for government officials negotiating future climate agreements—including a meeting next month in Bonn, Germany, and one next year in Bali to extend the 1997 Kyoto agreement after its 2012 expiration.

CBERS program timeline

- CBERS-1
  - September 1999 – March 2003
  - CBERS-2
    - October 2003 – March 2009
    - CBERS-2B
      - Launched in September, 2007
      - CBERS-3
        - Scheduled for June, 2011
      - CBERS-4
        - Scheduled for September, 2014

CBERS (free) data policy

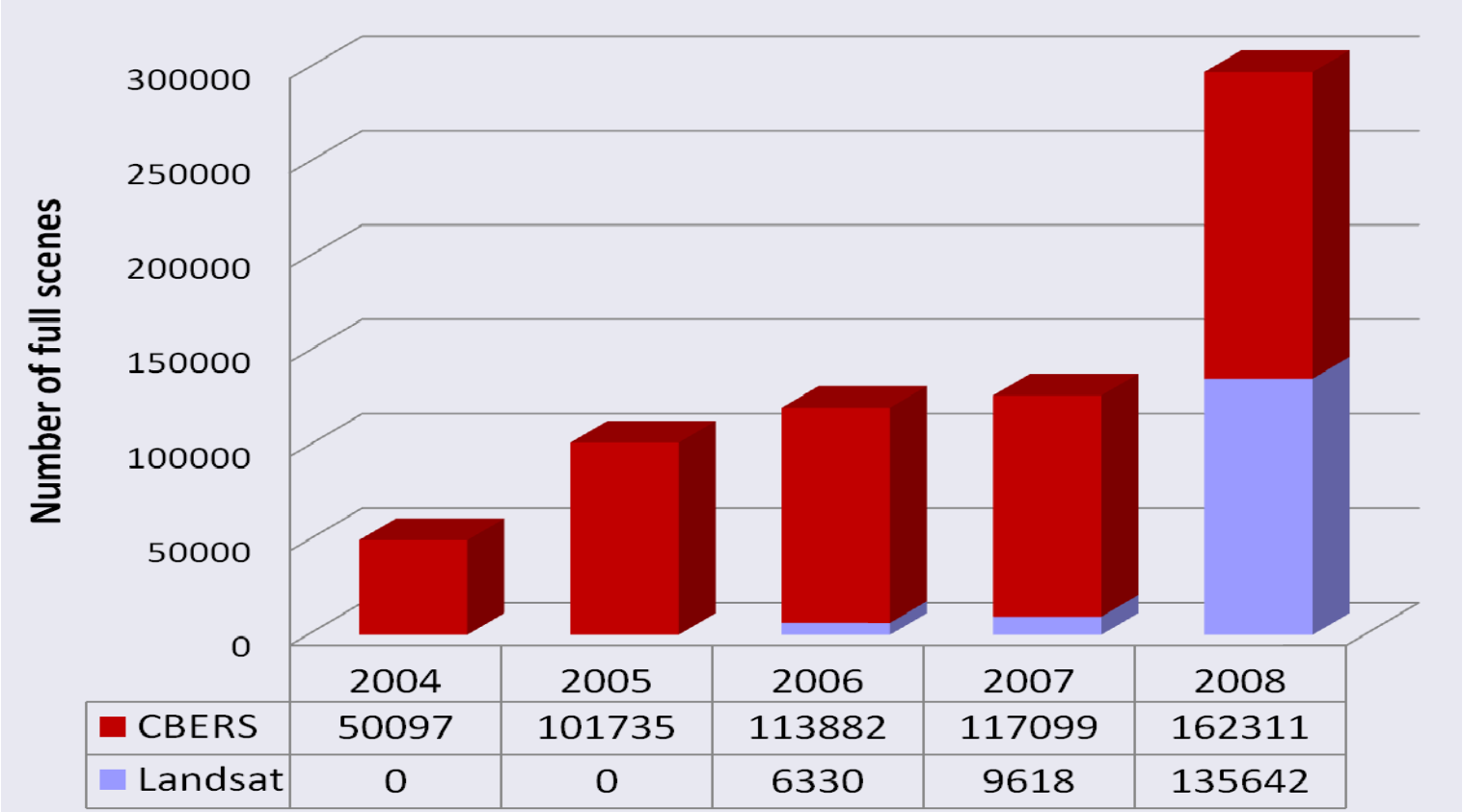
Data acquired over Brazil are available free of charges to anyone

Data acquired over China are available free of charges to the Chinese people

Brazil and China agree to apply the same data policy for Africa

Brazil applies the same policy for any country

CBERS and Landsat data distribution



	2004	2005	2006	2007	2008
CBERS	50097	101735	113882	117099	162311
Landsat	0	0	6330	9618	135642

CBERS program contributions

- CEOS LSI constellation
- GEO data democracy & data sharing tasks
- CalVal activities
  - CBERS direct downlink at USGS – EROS in 2006 and 2008 for cross-calibration with Landsat data
  - CBERS onboard data recorder used over Antarctica for the Dome-C experiment (QA4EO – WGCalVal)

Free and open-source software

SPRING (www.dpi.inpe.br/spring)

- General purpose GIS & image processing system
  - Freeware since 1996
  -

in 2010
- More than 100,000 users
- Windows and Linux versions
  - Available in English, Spanish, French, and Portuguese

Free and open-source software

- TerraLib (www.dpi.inpe.br/terralib)

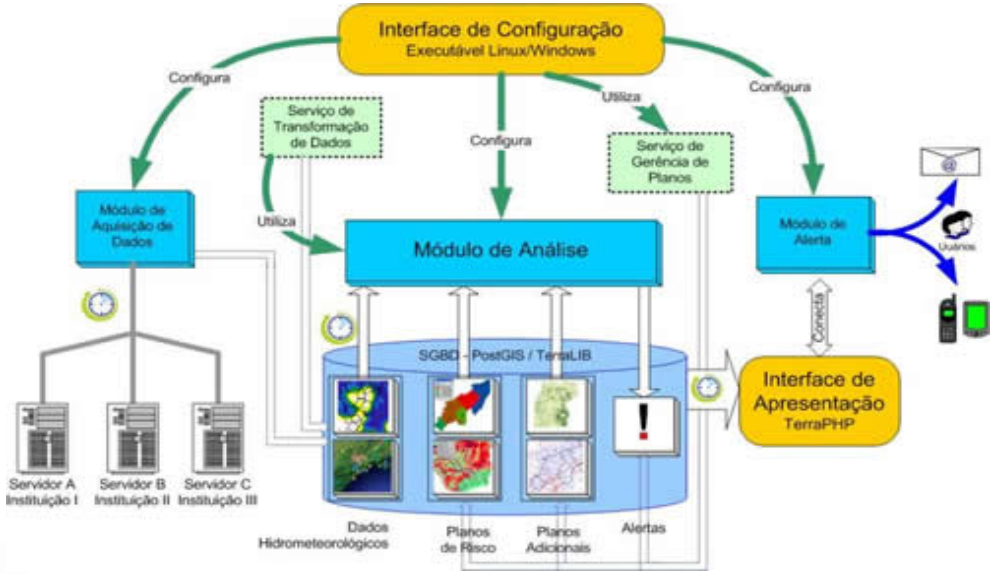
  - Open source GIS classes and functions library
  - Written in C++ and ‘almost’ OGC compliant
  - GNU LGPL (Lesser General Public License)
- TerraView (www.dpi.inpe.br/terraview)

  - Open source GIS application built on TerraLib
  - GNU GPL (General Public License)

Free and open-source software

Sismaden (www.dpi.inpe.br/sismaden)

SOA (Service Oriented Architecture) prototype for monitoring (risk alerts) natural disasters



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Free and open-source software

Marlin (www.dgi.inpe.br/CDSR)

- Open source application for satellite imagery visualization
- GNU GPL built on TerraLib
- Windows and Linux versions
- Support for GeoTIFF image file format
- Tools for geometric and radiometric analyses

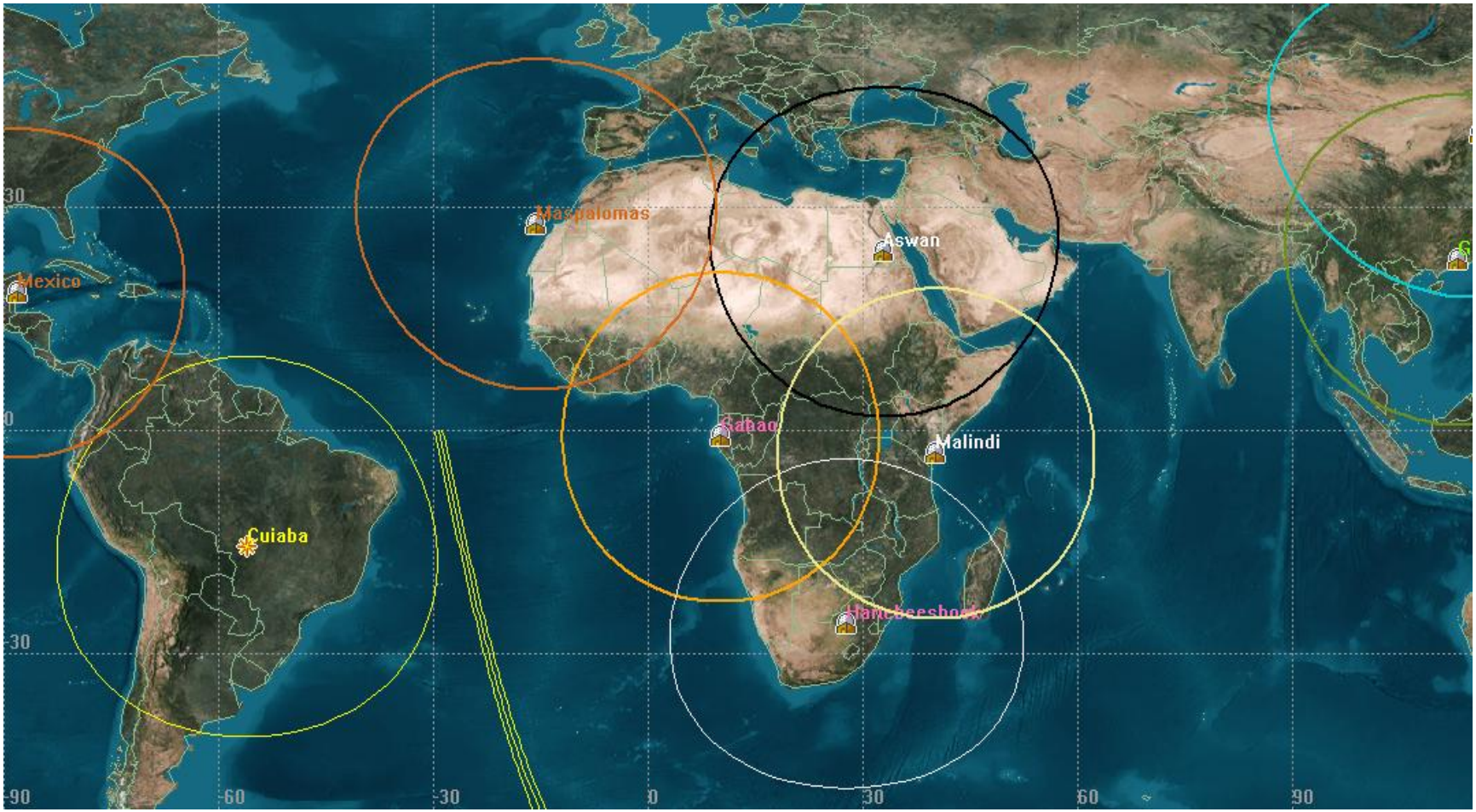
CBERS for Africa initiative

- Dissemination of free CBERS data for African countries
- Partnership with existing ground stations
- Adherence to the CBERS data policy
- GEO capacity building task
  - Training programs – Ghana (TerraView)
  - Free and open source software

CBERS for Africa initiative

- Agreements with three ground stations
  - CSIR, Hartebeeshoek, in South Africa
  - INTA, Maspalomas, in the Canary Islands, Spain
  - NARSS, Aswan, in Egypt
- Negotiations with ASI for Malindi, in Kenya
- Gabon has recently demonstrated interest in establishing a CBERS ground station
  - Cooperation with IRD, AFD, CNES

CBERS for Africa initiative



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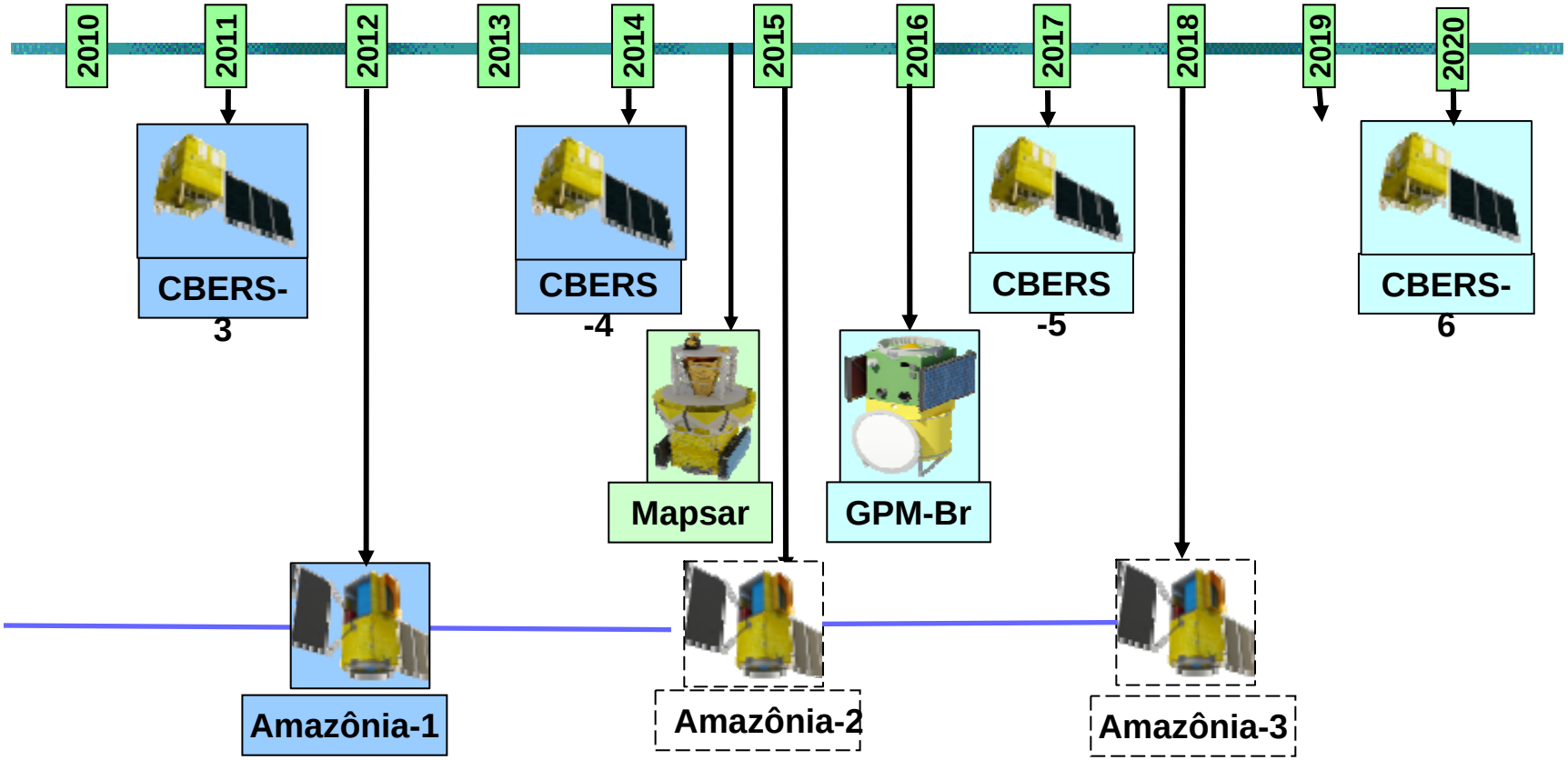
Perspectives for 2010

- Application of PRODES and DETER elsewhere
  - Indonesia, countries in the Equatorial Africa
  - Training at INPE's regional center in the Amazon
- GIS and Remote Sensing capacity building in Africa (GEO CB task)
  - Mozambique, South Africa
  - Extensive use of free and open source software
- Regular production of GIS-ready CBERS data

INPE's EO satellite program



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INPE’s EO contributions to CEOS (and GEO)

Julio Dalge
julio@dpi.inpe.br

Thanks!