

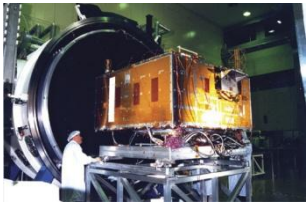


## FIP – Pilot Country Meeting

Institutional and technical aspects of measuring and monitoring emissions and removals of greenhouse gases from land use and land-use change in Brazil

Washington, 8 November, 2010

**Newton Paciornik**  
**Ministry of Science and Technology**  
**General Coordination on Global Climate Change**



# Outline

- Estimating CO<sub>2</sub> emissions and removals for the LULUCF sector as part of the Brazilian inventory of anthropogenic emissions and removals of GHG
- Other programs for measuring and monitoring mitigation actions
- Plans for the future

# Inventory of Anthropogenic emissions by sources and removals by sinks of GHG

- Part of the National Communication to the UNFCCC
  - Initial National Communication – December 2004
  - Second National Communication – Just published (in Portuguese) – English and Spanish versions (coming soon)
  - Work supported by the GEF
- Coordination and Overall responsibility
  - Ministry of Science and Technology (General Coordination on Global Climate Change)
- Participation of many institutions , governmental and non-governmental, universities, private sector (600 institutions, 1,200 experts)
- Public consultation process (last 6 months)
  - 18 background reports of the inventory

# Inventory of Anthropogenic emissions by sources and removals by sinks of GHG

- Specifically for LULUCF Sector
  - FUNCATE /INPE (National Institute for Space Research)
- Contributions
  - Ministry of Environment/IBAMA
  - IBGE (National Statistics Institute)
  - INPA (National Amazon Research Institute)
  - USP/CENA (University of São Paulo)
  - EMBRAPA (Ministry of Agriculture)
  - BRACELPA (Pulp and Paper Association)

# Technical aspects of measuring and monitoring net anthropogenic GHG emissions from LULUCF

- IPCC Good Practice for LULUCF (2003)
  - Relevance of the LULUCF sector for Brazil (75% of the total CO<sub>2</sub> net emissions in 1994 (Initial inventory))
  - Approach 3 for land representation (spatially explicit land use and land-use change)
    - Forest land (primary forest, secondary forests, reforestation, selective logging)
    - Grassland (native grassland, pasture)
    - Cropland (annual and perennial crops)
    - Wetlands (natural and reservoirs)
    - Settlements
    - Other land (dunes, mining)

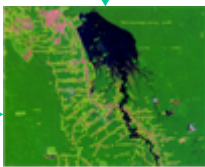
429 images  
years: 1994, 2002



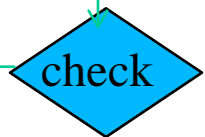
IMAGES



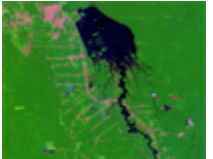
GEOREFERENCING



VISUAL IMAGE  
PROCESSING



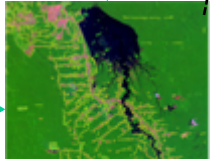




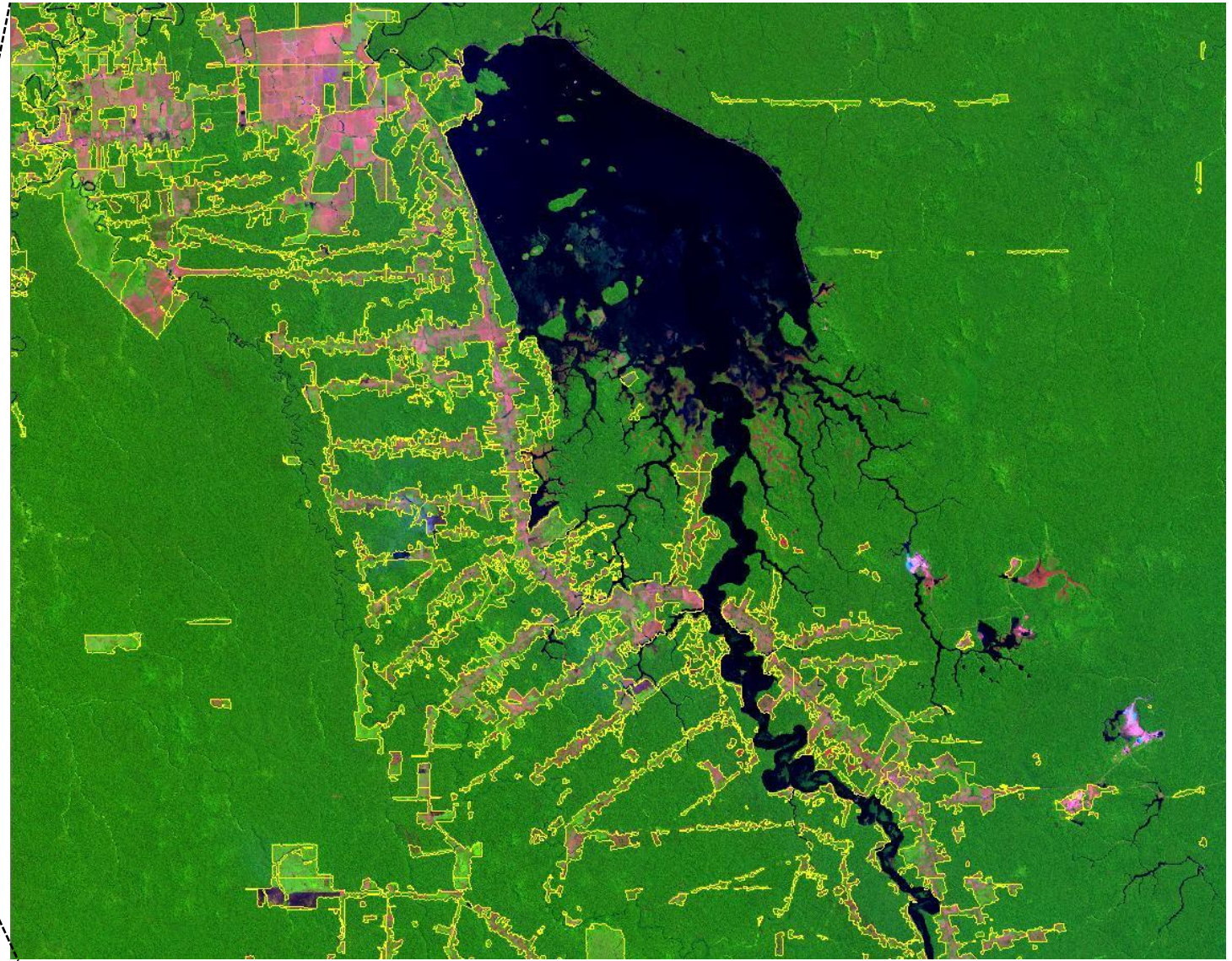
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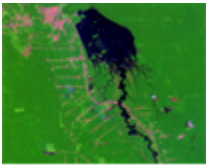
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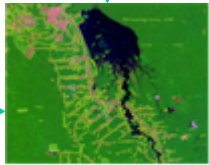




IMAGES



GEOREFERENCING



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1994



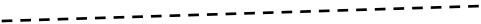
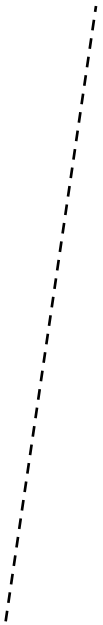
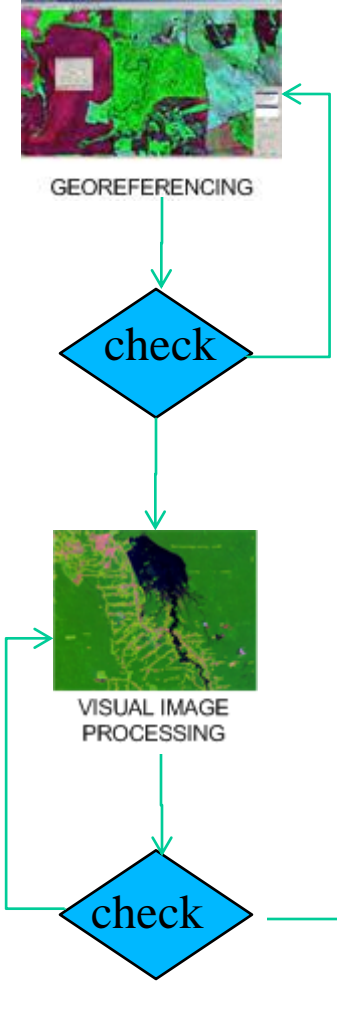
2002



Áreas Urbanas	Áreas de Pastagem	Áreas de Floresta
Áreas de Agricultura	Áreas de Pastagem	Áreas de Floresta
...	...	...



ORIGINAL  
VEGETATION







# Technical aspects of measuring and monitoring net anthropogenic GHG emissions from LULUCF

- Transition matrices between inventory times generated for each biome and for the national territory, identifying
  - Areas remaining under a same land category
  - Areas converted to other land-use categories
- Need additional information for estimating carbon stock changes for every pool
  - living biomass (above and below ground)
  - dead organic matter
  - soil carbon

# Technical aspects of measuring and monitoring net anthropogenic GHG emissions from LULUCF

- Integration of several information layers
  - Land use maps for 1994
    - based on analysis of satellite imagery of adequate spatial resolution (Landsat, CBERS – 25 – 30 metres spatial resolution) and other auxiliary data
  - Biome
  - Municipality boundaries
  - Vegetation Map (original vegetation cover)
  - Soil Map



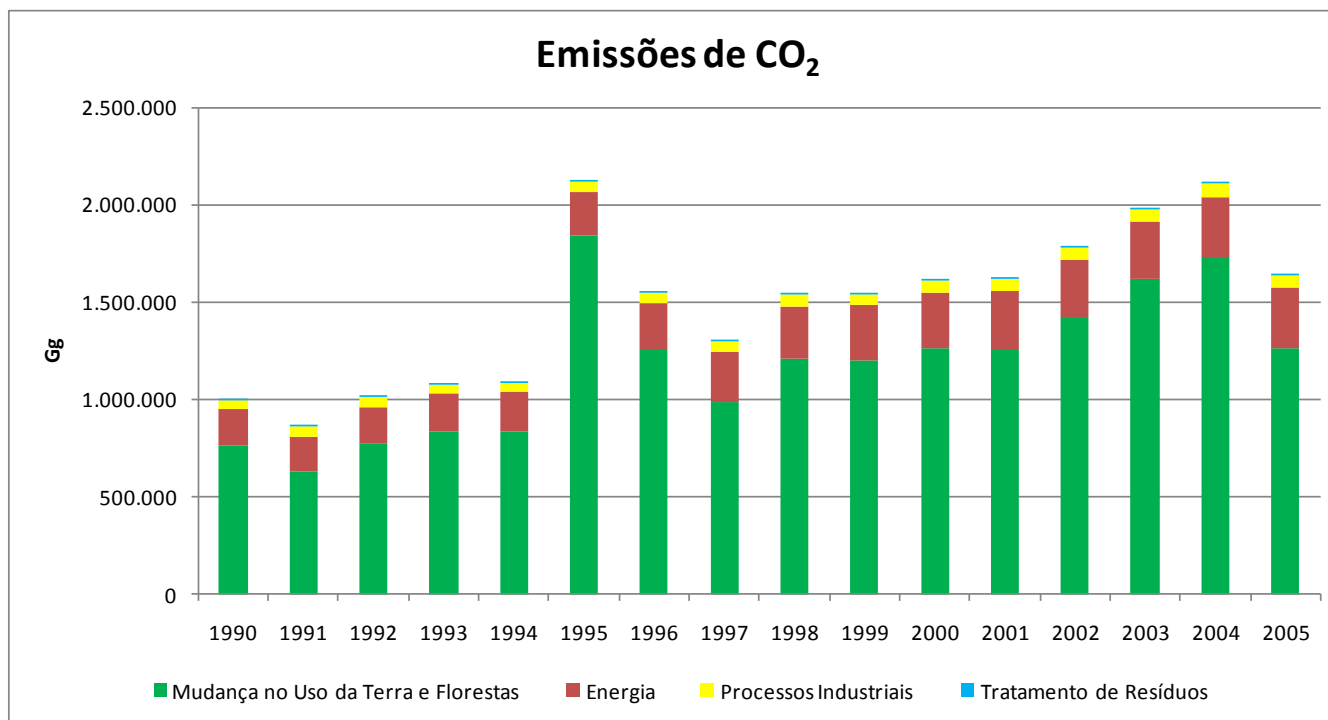


# Technical aspects of measuring and monitoring net anthropogenic GHG emissions from LULUCF

- Entire territory stratified in 7.5 million polygons
- Carbon stocks and other parameters
  - values dependent of land use, land-use change, biome, vegetation, biomass carbon pool, soil
  - Mix of tiers, from use of more complex modeling approaches to IPCC default values
- Emission estimates can be provided
  - per biome
  - per municipality
  - per land-use category

# Results and Further information

- [www.mct.gov.br/clima](http://www.mct.gov.br/clima)
  - Segunda Comunicação Nacional do Brasil





# Other Monitoring Programs

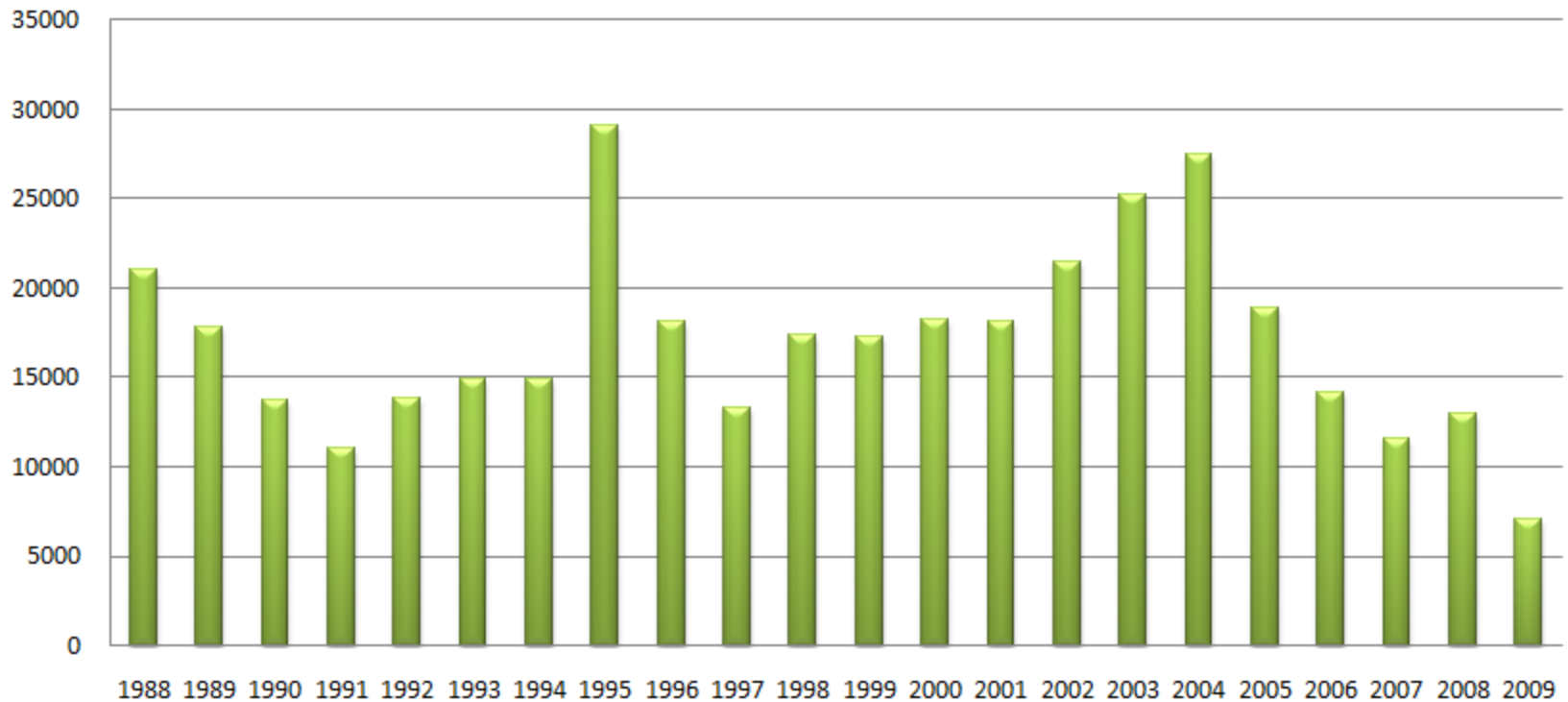
# Technical aspects of monitoring land-use change

## Other programs

- Heavily supported by use of satellite imagery of adequate resolution
  - Landsat, CBERS, ALOS, DMC...
  - Annual wall to wall assessment of the rate of gross deforestation in the Brazilian Amazonia (approximately 60% of the national territory)
  - Real time monitoring using satellite imagery of medium spatial resolution (MODIS, 250 meters)
    - Georeferenced identification of forest areas with signs of canopy alteration
    - Information used by the governmental enforcement agency (IBAMA) to guide their control initiatives

# Annual rate of gross deforestation in the Brazilian Amazonia – 1988 to 2009

**Desmatamento Anual na Amazonia Legal por corte raso (km<sup>2</sup>)**





# Other programs

- Action Plan to Prevent and Control Deforestation in the Legal Amazonia (PPCDAM)
  - Coordinated by the Presidential Staff Office, involving 13 Ministries
  - Created in 2004
  - Main tool to guide the definition of public policies to control deforestation in the region
- Action Plan to Prevent and Control Deforestation in the Cerrado (PPCerrado) - recently created
  - 20% of net emissions from LULUCF Sector

# Planned future activities

- Estimation of net emission from land use and land-use change for 2010 (1990 for consistent time series)
- To monitor changes in forest cover for all biomes using a similar approach used for Amazonia and Cerrado
- To monitor forest degradation (non-authorized selective logging activities, biomass burning)
- Implement the national forest inventory
- Support and monitoring the sustainable pig iron charcoal based production program (increase renewable biomass use)

# Conclusions

- Methodologies and tools in place for measuring and monitoring land use and land-use changes
  - can be replicated
  - can be applied for mitigation projects
- Relies in the availability of satellite images and carbon stock information
  - best results when country specific carbon stock information is available in a disaggregated manner



# http://www.mct.gov.br/clima

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**Ministério da Ciência e Tecnologia**

O MCT INDICADORES LEGISLAÇÃO FONTES DE FINANCIAMENTO UNIDADES DE PESQUISA

VERSÃO ACESSÍVEL

**CLIMATE CHANGE**

**Sections**

**Interministerial Commission**

- Decree of July 7, 1999, amended by Decree of January 10, 2006
- Projects submitted to the Interministerial Commission under the Clean Development Mechanism
- Resolutions of the Commission
- Circular no. 3291, of September 8, 2005, of the Collegiate Board of Officers of the Central Bank of Brazil

**Clean Development Mechanism**

- Procedures for submitting a CDM project to the Interministerial Commission on Global Climate Change
- Forms for the preparation of the Project Design Document under the CDM (most recent version in the website of the CDM Executive Board)
- Approved baseline and monitoring methodologies

**Highlights**

**Brazil's Contribution to Prevent Climate Change White Paper**  
Year 2007 [See also...](#)

**Intergovernmental Panel on Climate Change - Climate Change 2007 (Fourth Assessment Report of the IPCC)**

[Summary for Policymakers of the Synthesis Report \(draft copy\)](#)

[Group I Summary for Policymakers: The Physical Science Basis](#)

[Group II Summary for Policymakers: Impacts, Adaptation and Vulnerability](#)

[Group III Summary for Policymakers: Mitigation of Climate Change](#)

**Current status of CDM project activities in Brazil and in the world**  
*Last compilation from the UNFCCC webpage: April 7, 2008*

**Climate Change - English**

- The Science of Climate Change
- The United Nations Framework Convention on Climate Change
- Brazil and the Convention
- National Communication
- Negotiations
- The Kyoto Protocol
- Clean Development Mechanism (CDM)
- Climate Change - PPA
- Interministerial Commission on Global Climate Change
- Carbon Sequestration Leadership Forum (CSLF)
- Brazilian Climate Change Forum
- Methane to Markets
- Major Economies Initiatives
- Events
- Talk to us
- Publications
- Selection of Consultants

