



MINISTÉRIO DA CIÊNCIA E TECNOLOGIA
INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

National Institute for Space Research (INPE)

Earth Science System Center (CCST)

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Acknowledgment: Ana Paula Aguiar, Milton Kampel, Simone Costa, Nelson Ferreira, Jose Marengo

Primeira Jornada de Informação Ambiental: Avances y Desafíos hacia una Gobernanza Ambiental

Santiago – Chile

3 y 4 de diciembre de 2013



INPE's organization, mission, objectives

Space and Atmospheric Sciences



A pioneer at INPE, this area comprehends the physical and chemical investigation of phenomena occurring in the atmosphere and outer space of interest for the country. It runs researches and experiments in the fields of Aeronomy, Astrophysics, and Space Geophysics.

Earth Observation

Involves scientific and technological knowledge in the fields of remote sensing and geoprocessing, natural resources survey and environmental monitoring. It carries out activities in the fields of researching, development and applications in the areas of Remote Sensing and Digital Image Processing.





INPE's organization, mission, objectives

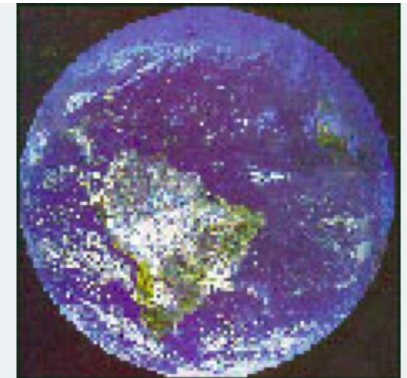
Space Engineering and Technology



An area focused on the development on space systems and technologies intended for a number of applications, such as the execution of projects and construction of satellites and land-based systems. It carries out development actions in the fields of Space Mechanics and Control, Aerospace Electronics, Ground Systems and Manufacturing.

Weather Forecast and Climate Studies

Develops researching and activities in the fields of Meteorological Sciences, Meteorology by satellite, Weather Forecasting, and Climate. The operational activities for weather and climate forecasting are carried out with the operation of a supercomputer, which renders possible reliable weather and climate forecasting within a reasonable notice.





INPE's organization, mission, objectives

Satellite Tracking and Control Center



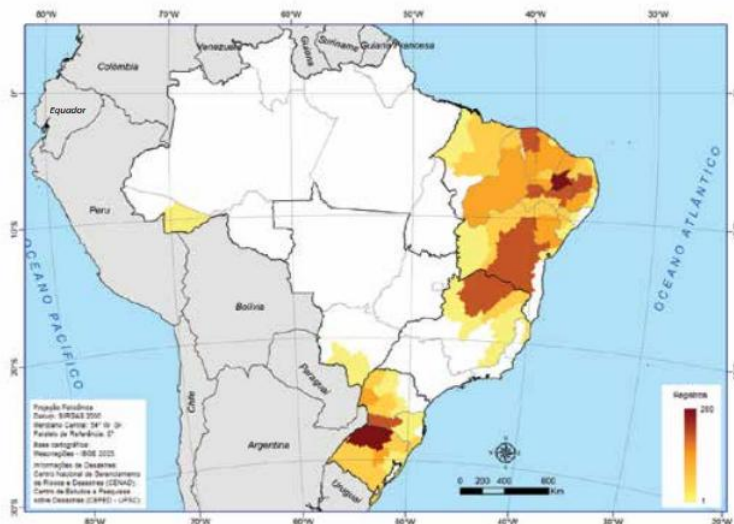
It comprises the development of control systems for satellites on low orbit and geostationary satellites. It encompasses activities carried out at the São José dos Campos Campus, and at the Earth Stations in Cuiabá – MT, and Alcântara – MA.

Integration and Testing Laboratory

It develops highly specialized activities on component qualification and space systems, making development, assembly, integration and tests on space systems, as well as qualification and analysis of failures on components for both space and industry use in the country, under international standards.



Natural Disasters In Brazil 2012



Mapa 9 – Desastres Naturais Causados por Estiagem e Seca em 2012

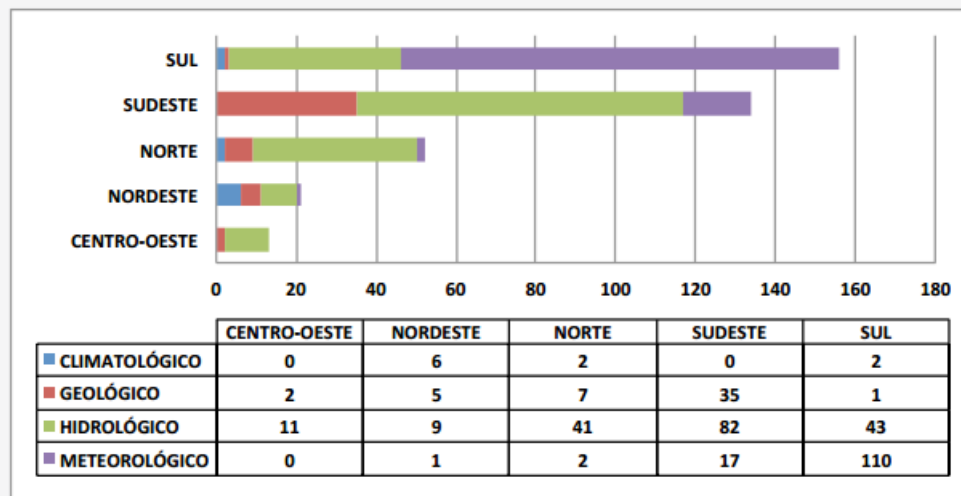


Gráfico 7 – Comparativo entre Região e Tipo de Desastre

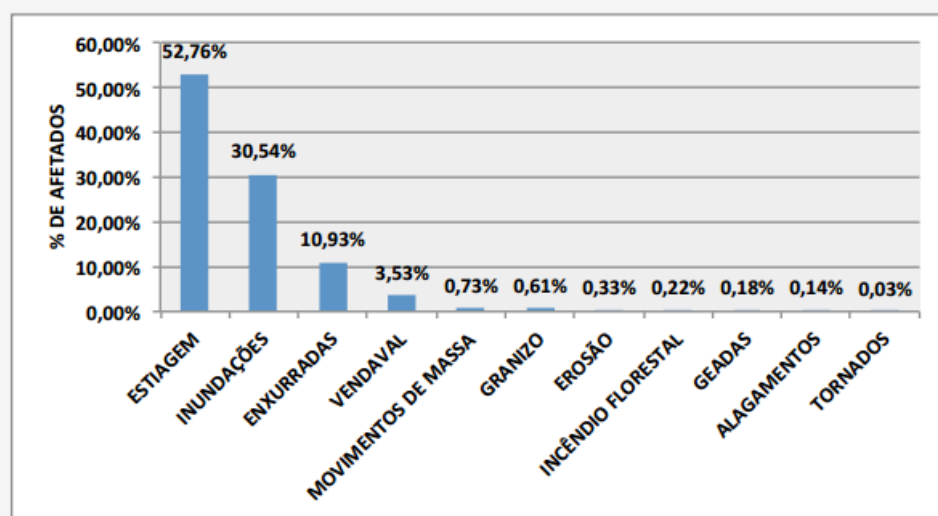
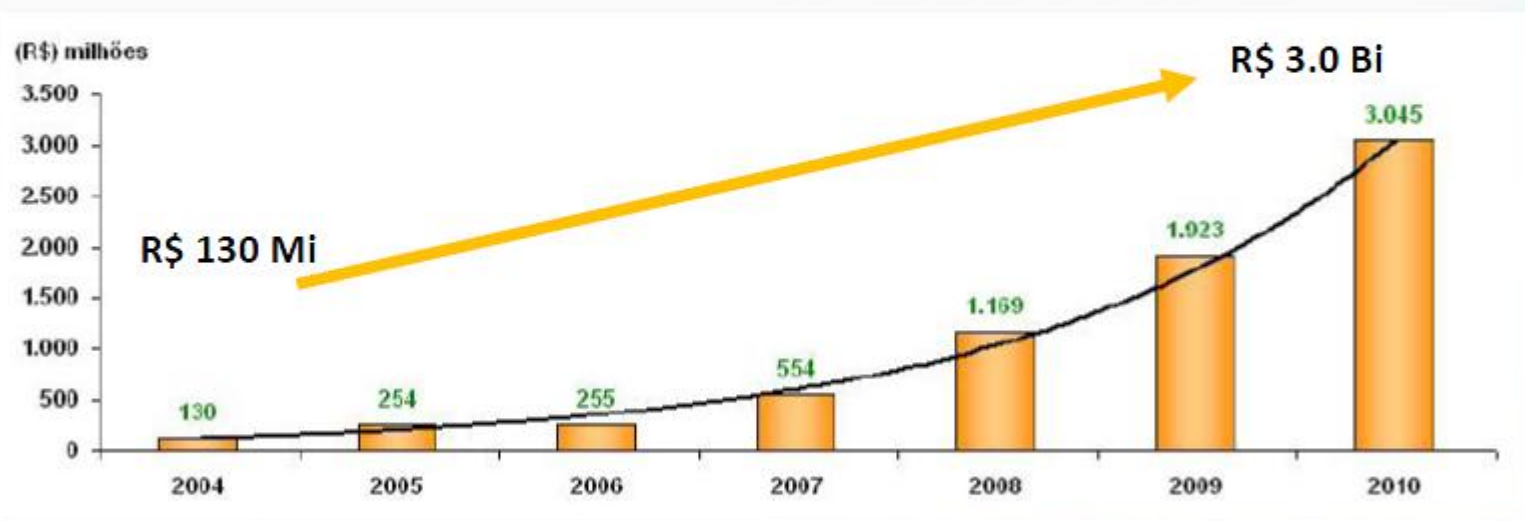


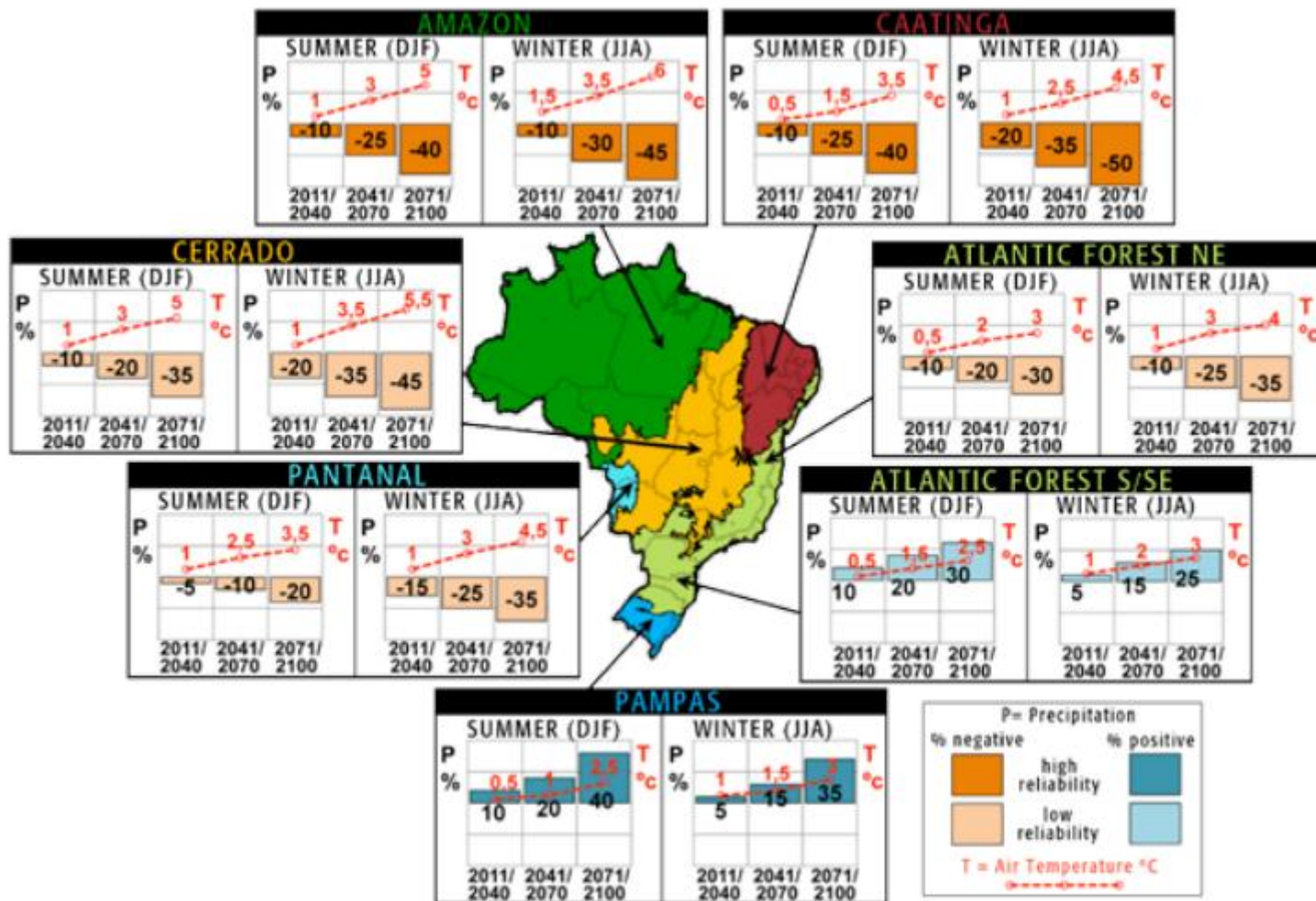
Gráfico 4 – Afetados por Tipo de Desastre – 2012

..incremento de 23 X no gasto do Governo Federal em 7 anos



Fonte: SIGPLAN - Programa 1029 / PPA 2008-2011 e Secretaria de Planejamento e Investimentos Estratégicos (MPOG)

Climate projections based on the scientific results of global and regional climate modelling





Earth System Science Center at INPE

Mission, Objectives, Thematic Research Groups



Earth System Science Center (CCST) at INPE



An initiative of the Brazilian government, the CCST-INPE was established in 2008 to lead the Brazilian research community in a national inter-disciplinary effort to generate the information needed by decision makers in government, and in vulnerable sectors and communities, to manage the risks of climate change impacts.

The mission of this center is:

- 1) To generate interdisciplinary knowledge for the national development with equity and for the reduction of environmental impacts in Brazil and in the world;
- 2) To provide top quality scientific information in order to guide public policies on mitigation and adaptation to global environmental change.

Based at the INPE's campuses in Sao Jose dos Campos and Cachoeira Paulista, in the state of Sao Paulo, the CCST maintains a partnership between various centers at INPE, federal and state universities, research centers and NGOs, at the national and international level.

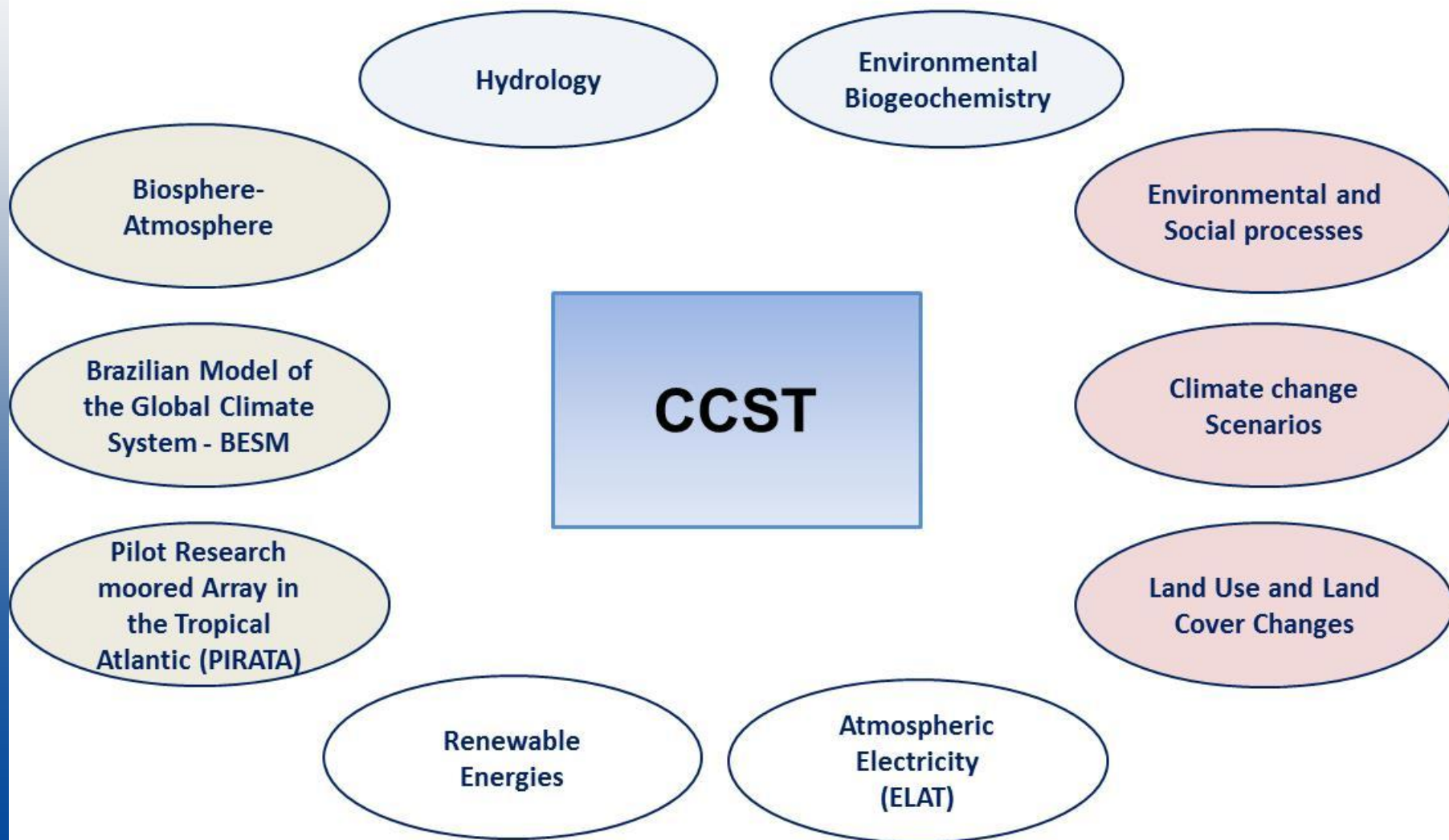
MAIN TASKS

- investigating the need of society for advice regarding questions related to the climate
- being a link between climate-researchers and climate-advisors in Brazil
- integrate research data on the climate-system and preparing this for the needs of users
- providing this information to customers via products, which are sector-specific and tailored to suit users needs
- coordinating feedback from users to scientists

SERVICES AND PRODUCTS

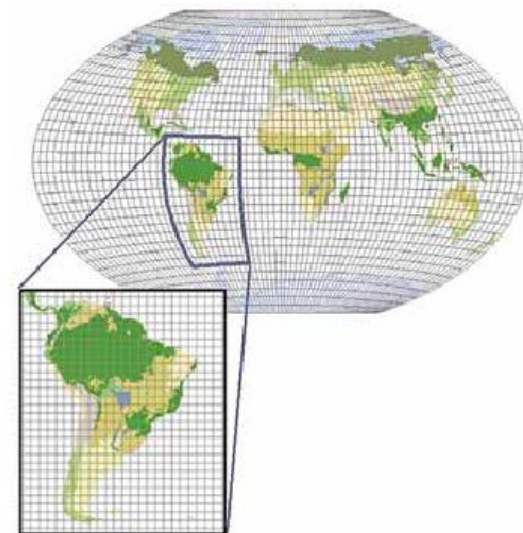
- identifying users-needs regarding questions on climate
- in-house production of climate-simulations for replying to users requests
- to initiate practice oriented research projects
- supporting the interpretation of climate-simulations
- consultation regarding uncertainties of models
- arranging expert-workshops
- to provide data and information regarding climate questions

THEMATIC AREAS



Future climate change scenarios in South America

Understanding possible impacts of climate change under different emissions scenarios at a fine, regional scale is recognized to be fundamental if action is to be taken to mitigate climate change, as well as for informing adaptation planning



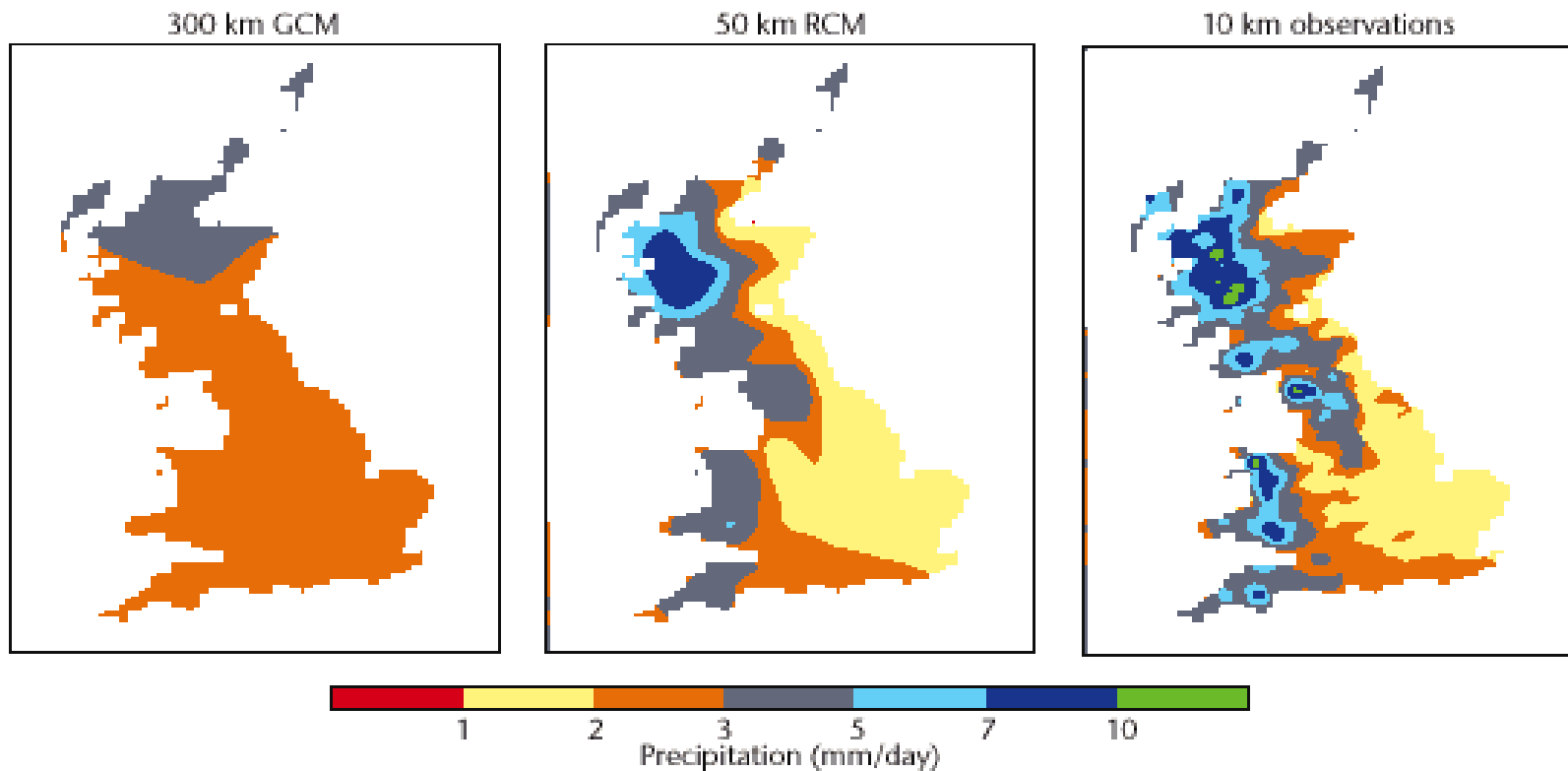
Key Research Question

What will be the changes in patterns of regional rainfall, air temperature and winds, as well as rainfall and temperature extremes in South America, during the 21st century?

How can the uncertainties in the projections of future climate generated by global and regional models be estimated?

Regional Climate Model (RCM)

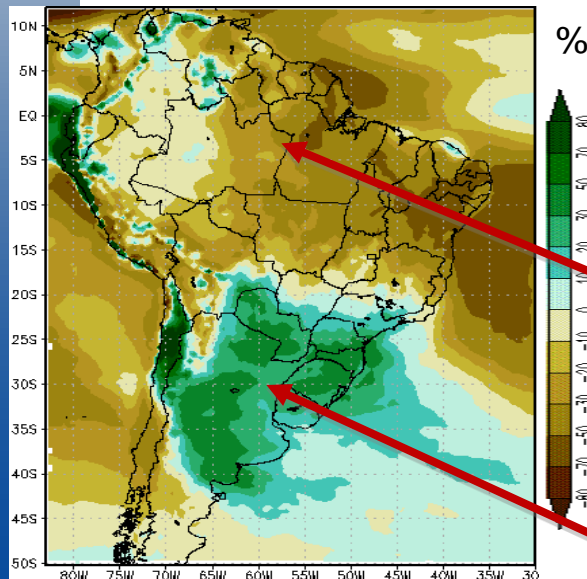
- Their main advantage is that they allow for higher resolution climate modelling. In most cases, higher resolution = more useful and higher quality information



RCMs simulate current climate more realistically

Previous experiences: Future climate change scenarios in South America derived from HadCM3-Eta 40 km

Future climate change scenarios in South America derived using the Eta CPTec 40 km regional model, forced with the BC of the HadCM3 global model, (A1B) suggest that climate change show **regional variability**



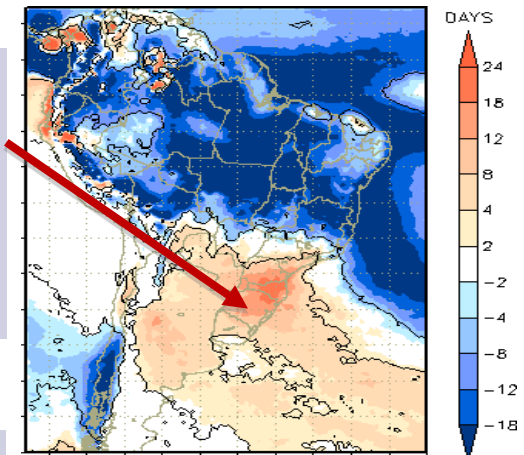
Rainfall changes (%) in 2071-2100 relative to 1961-90.

Amazônia and Northeast Brazil
→ rainfall deficiency

Southeastern South America → rainfall increase

Projections until the end of the 21st Century show **changes in extremes of rainfall more important than in the total of rainfall**

Increase in the frequency of intense rainfall in 2071-2100 relative to 1961-90



Increase in the number of consecutive dry days in 2071-2100 relative to 1961-90

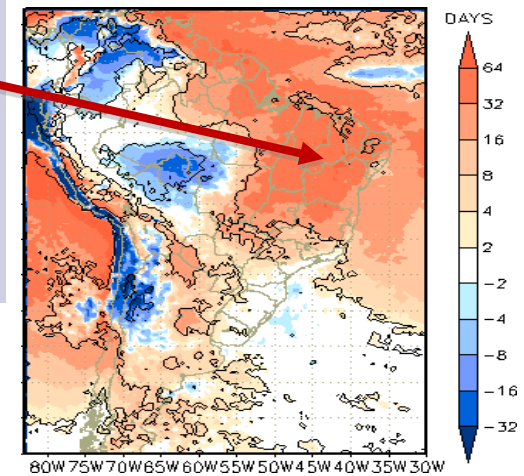




Figure 8 – Major River Basins in Brazil (ONS, 2007)¹³

Basin	A2	B2
Paraná River	0.7%	-1.2%
Grande	0.1%	-0.8%
Paranaíba	-1.4%	-1.9%
Paranapanema	-1.4%	-2.5%
Parnaíba	-0.8%	-0.7%
São Francisco	-4.3%	-7.7%
Tocantins-Araguaia	-0.1%	-0.3%
Average	-1.0%	-2.2%

Schaeffer et al. 2008

Results of flow indicate a general negative trend in flow with varying seasonal impacts.

However, because of the pluriannual reservoir capacities, the energy generation results do not fall as much in light of the changes induced by a new rainfall regime.

In the major Paraná Basin, the difference in energy generation between the A2 and B2 scenarios and the reference projections are all within 2.5%, being the difference greater in the B2 scenario.

Apart from the Paraná River and the Grande Basin, which show a slight increase in energy production in the A2 scenario, the results show a fall in energy production throughout the analysis period.

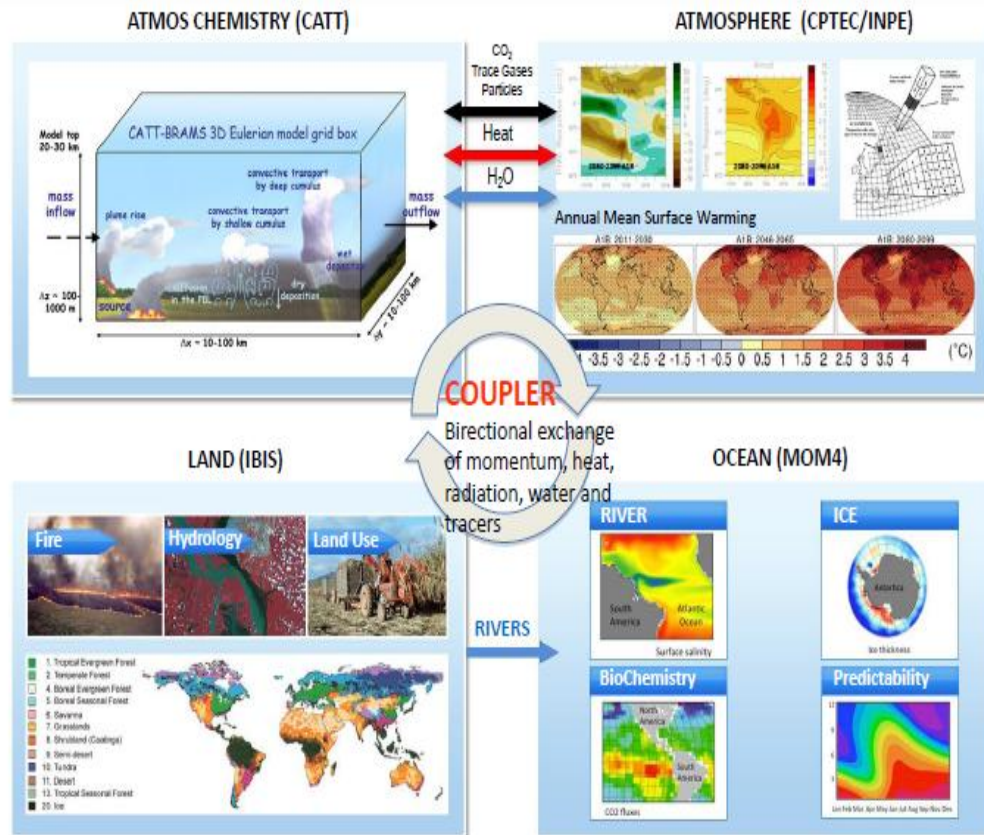
In the Basins located in the northeast and centre-west regions (Parnaíba, São Francisco and Tocantins-Araguaia), the energy results also show a decrease in generation as the consequence of the lower flow inputs to the hydroelectric plants of these basins.

Just as the flow results, the São Francisco Basin seemed to be the most affected by global climate change. The decrease in energy production would reach more than 7% in the B2 scenario.

Brazilian Model of the Global Climate System - BESM

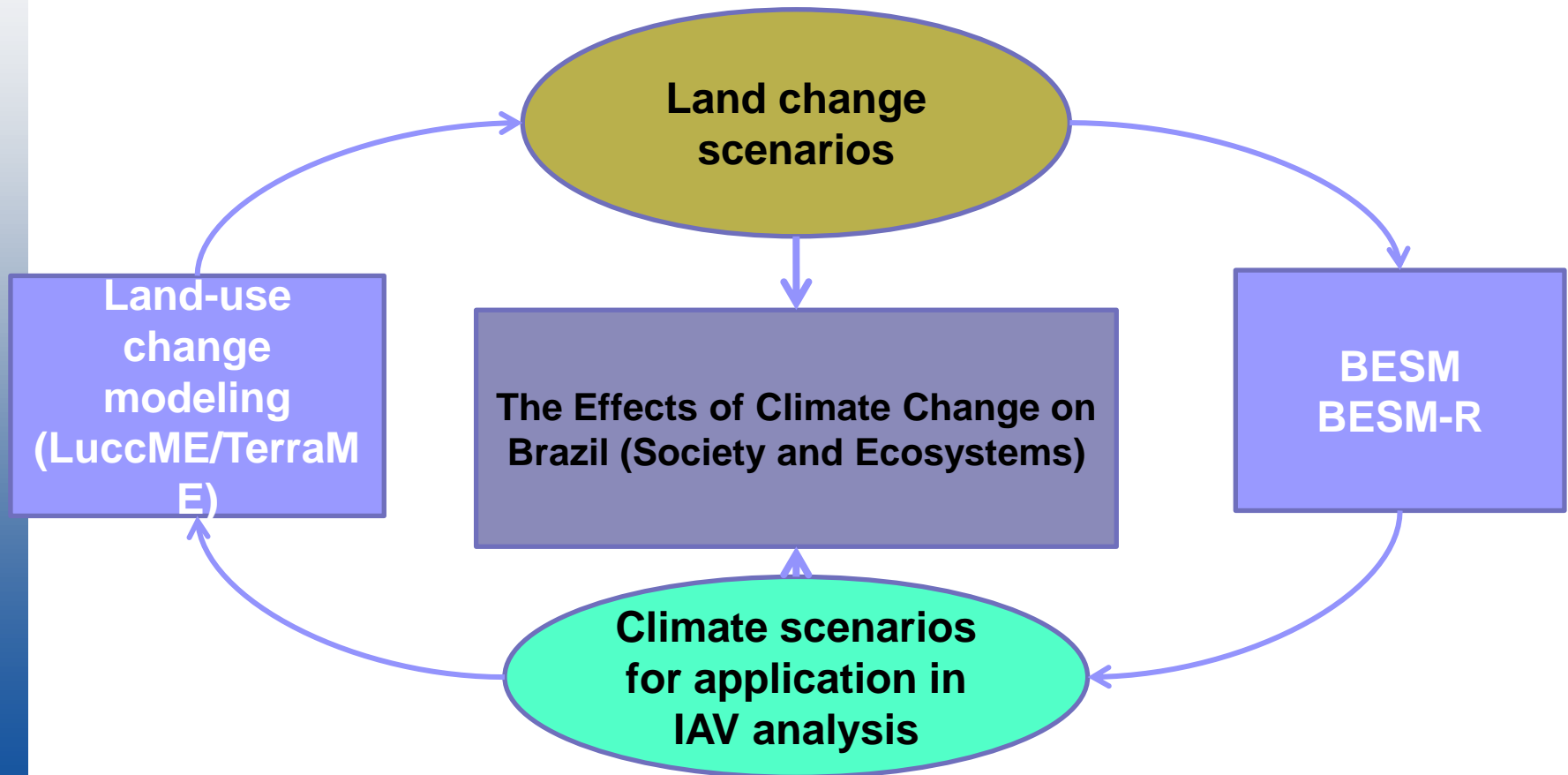
This project aims at the development of the BESM, a coupled ocean-atmosphere-cryosphere-biosphere-chemistry model that allows the study and simulation of global climate variability and change, incorporating expert knowledge about tropical rainforest dynamics and its interactions with the atmosphere.

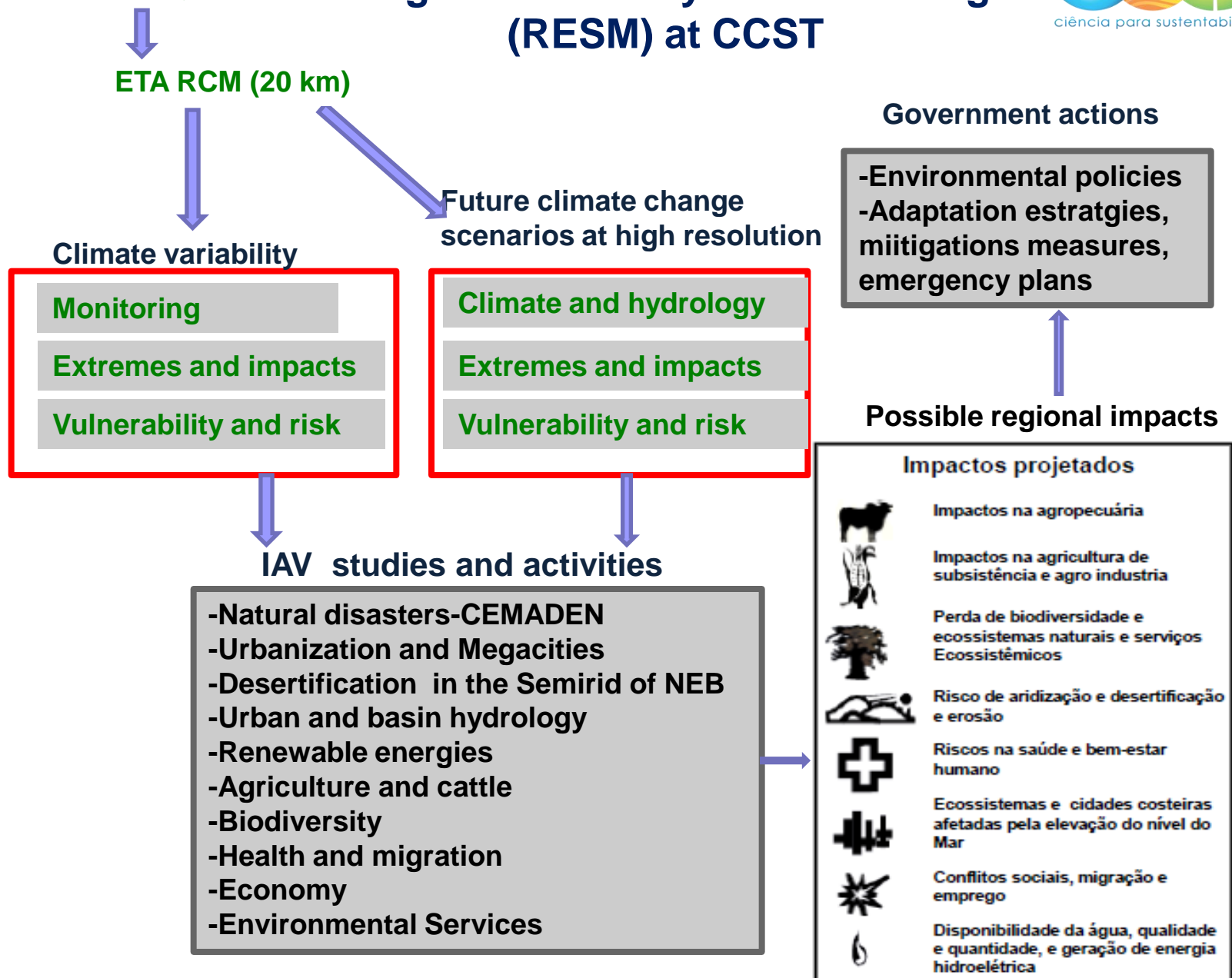
One of the most important aspects of the development of the BESM is the multinational cooperation involving leading research institutions from Brazil, the United States, India, UK and South Africa.



- Met Office Hadley Centre (additional HadGEM2-ES realizations contributed by INPE/CCST)

INTERDISCIPLINARY APPROACH








Download data from the CCST website



Centro de Ciência do Sistema Terrestre



HOME INSTITUCIONAL NOTÍCIAS EVENTOS PUBLICAÇÕES RELATÓRIOS COMUNIDADE CIENTÍFICA FALE CONOSCO

Cenários de Mudanças Climáticas Futuras - Brasil e América do Sul

Seja Bem-vindo!

O portal "Cenários de Mudanças Climáticas Futuras" é um repositório de dados de projeções climáticas futuras do Centro de Ciência do Sistema Terrestre (CCST/INPE) e que tem como objetivo apoiar as atividades de ensino, pesquisa e outras aplicações em meteorologia, hidrologia, saúde pública, meio ambiente, etc.

Estes dados foram gerados a partir do conjunto de dados de fronteiras do modelo global (HadCM3) do Met Office - Hadley Centre do Reino Unido, cenário de emissões A1B, para todo o domínio da América do Sul, utilizando o modelo regional Eta com resolução espacial de 20 e 40 Km. Os dados correspondem ao período de 1961-1990 (clima presente) e 2010-2040, 2041-2070 e 2071-2100 (clima futuro).

Nenhuma informação deste portal (envolvendo, por exemplo, informação textual, digital, reprodução ou publicação em qualquer formato) pode ser utilizado com intenção comercial sem autorização expressa do representante legal da Instituição.

Maiores informações ver o manual do usuário e documentação técnica

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[Recuperar Senha](#)

GUIA DO USUÁRIO

Manual do Usuário



PUBLICAÇÕES

Chou et al., 2012
Marengo et al. 2012

LINKS ÚTEIS

METOFFICE
IPCC

CONTATO



Ministério da
Ciência, Tecnologia
e Inovação



PAÍS RICO É PAÍS SEM POBREZA



Renewable Energies

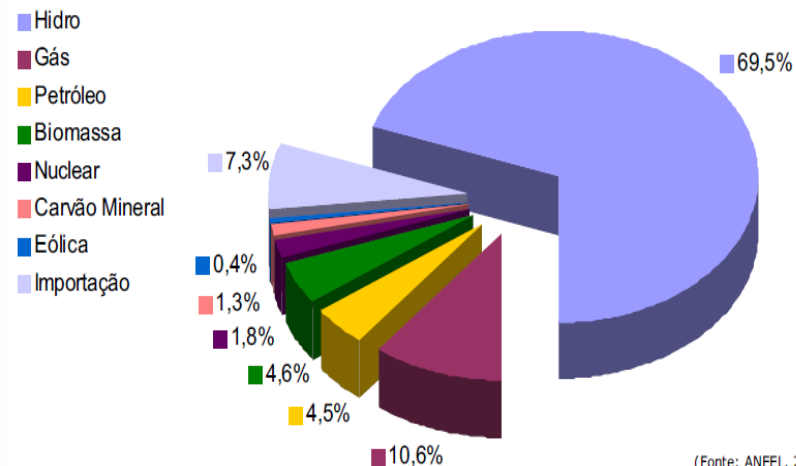
To act in an interinstitutional and interdisciplinary approach, in studies of alternative energy in the context of climate and environment, together with the electric sector, society and government sectors that have to do with electric planning and decision making

- To study the climatic and environmental impact of the use of fossil fuel energy and conventional energies (hidraulic, nuclear, biomass...)

- To study forms of renewable energy such as eolic and solar

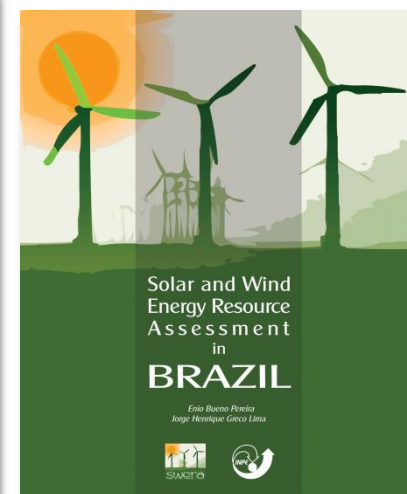
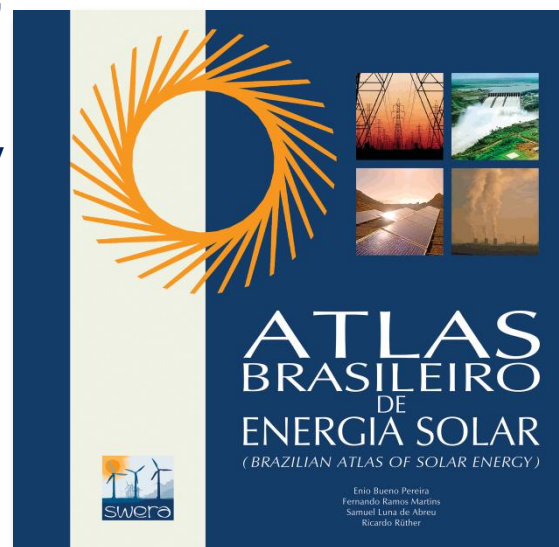
- To develop process and methods to quantify and project the availability of natural renewable energies

Generation of electric energy in Brazil(CEPEL)

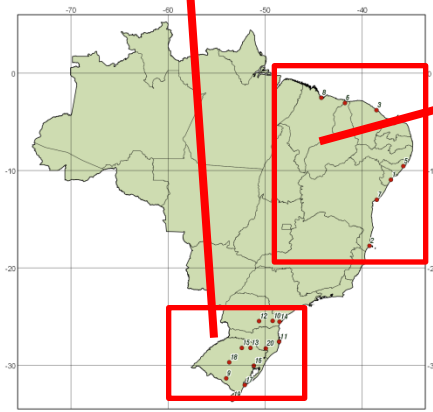
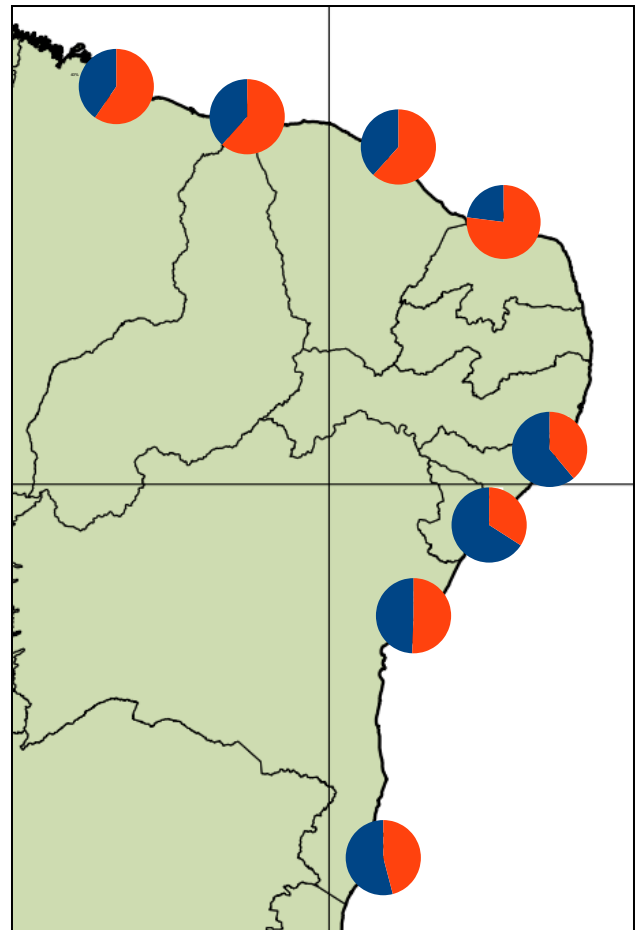
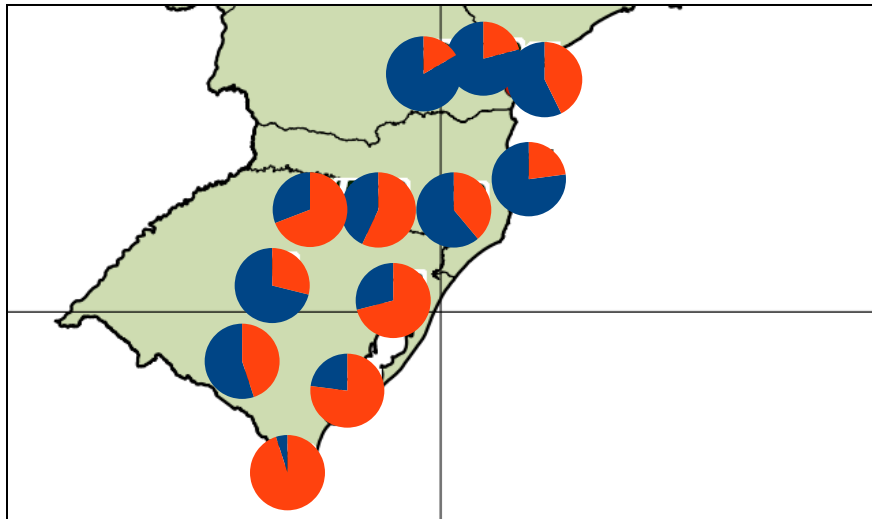


(Fonte: ANEEL, 2009)

Atlas of Solar Energy and SWERA project(PNUMA-GEF)



Projections of wind potential in Brazil-future climate



BRAZILIAN CLIMATE AND HEALTH OBSERVATORY



Given the complexity of processes that drive climate change impacts on human health, it is necessary to gather data from different institutions in order to understand, monitor, and project these outcomes; these data include not only climatic and human health variables, but also trends in socio-demographic and environmental factors, and institutional capacity.

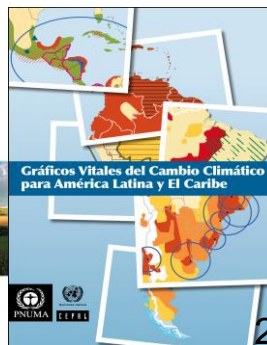
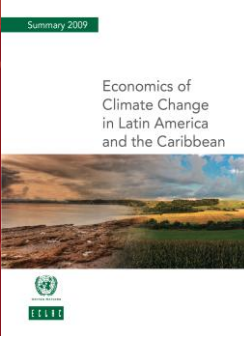
The experience of the Brazilian Climate and Health Observatory demonstrates how to bring multiple institutions and stakeholders together to support actions to decrease human health vulnerability to climate change.

The Challenge to Communicating Climate Change



Fonte: Marengo, 2009.

We have a vital role to play in providing as much information, as possible, about climate.





Earth Observation at INPE

Mission, Objectives



Earth Observation mission and objectives

Specify, assess and use EO satellite data for the benefit of Brazil

Support the Brazilian Space Program in the conception of missions, data processing and related applications

Develop open source software for image processing and GIS

Run a Data Center for EO image processing, archiving and distribution in Brazil

Investigate the environmental modeling of the Brazilian ecosystems



Fostering the concept of public-good data

Brazil, 2004

INPE set a free data policy for CBERS in Brazil
CBERS data available free of charges on the Web
Impacts on EO consulting and services in Brazil
Increasing EO data distribution for society

South Africa, 2007

Announcement of the CBERS for Africa Initiative
Extension of CBERS free data policy for Africa

America, 2008

USGS adopted a free data policy for Landsat
Landsat image data also available free of charges

Europe, 2009

ESA announced a free data policy for Sentinels



CBERS distribution under free data policy

SATELLITE	CAMERA	DOWNLOADS 2008	DOWNLOADS 2009
CBERS-2	IRMSS	3,043	2,490
	CCD	56,529	23,009
	WFI	258	116
CBERS-2B	HRC	46,360	119,676
	CCD	61,895	60,058
	WFI	1,207	1,224
NUMBER OF USERS		16,118	19,807



Applied research in Geoinformatics

Spring, TerraLib, TerraAmazon, TerraMA²



GIS software implementation – SPRING

Georeferenced Information Processing System

Home | Downloads | Support | Manuals | Data | Publications | News | Links

SPRING

Spring > English > Home

What is SPRING?

SPRING is a state-of-the-art GIS and remote sensing image processing system with an object-oriented data model which provides for the integration of raster and vector data representations in a single environment. SPRING is a product of Brazil's National Institute for Space Research ([INPE/DPI](#) ([Image Processing Division](#))) with assistance from:

- [EMBRAPA/CNPq](#) - Brazil's Agricultural Research Agency.
- [IBM Brasil](#)
- [TECGRAF](#) - Computer Graphics Technology Group.
- [PETROBRÁS](#) / CENPES
- [K2Sistemas](#)

The SPRING project has received substantial support from CNPq (National Research and Development Agency) through its programs RHAIE and [PROTEM/CC](#) ([GEOTEC](#) project).

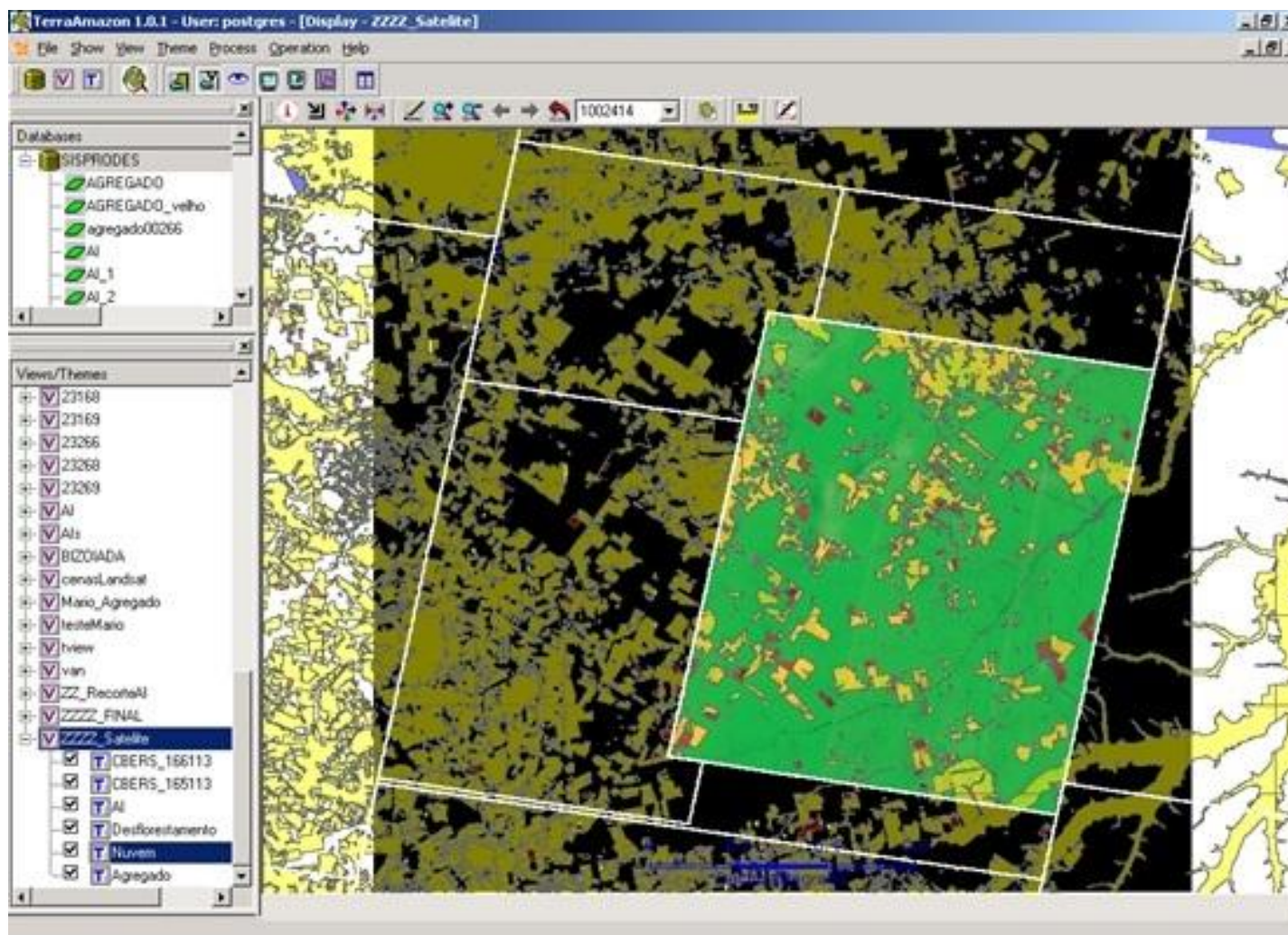
SPRING main features

- An integrated GIS for environmental, socioeconomic and urban planning applications.
- A multi-platform system, including support for Windows95/98/NT/XP and Linux.
- A widely accessible freeware for the GIS community with a quick learning curve.
- To be a mechanism of diffusion of the knowledge developed for the INPE and its partners with the introduction of new algorithms and methodologies.

Scientific Citation of SPRING



Database management – TerraAmazon





Monitoring, Analysis and Alert – TerraMA²



Ministério da Ciência e Tecnologia

Destaques do governo



TerraMA²



Monitoring, Analysis and Alert

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TerraMA2 (old SISMA DEN) is a software product, a computational system, based on a Service Oriented Architecture (SOA), which provides the technological infrastructure required to develop operational systems for environmental risks monitoring and alert. TerraMA2 provides services to gather updated data through internet and to add it to the alert system database; services to manipulate/analyze new data in real time and check if a risk situation exists by comparing with risk maps or a defined model; services to execute/edit/create new risk and alert models; services to create and notify alerts to system users; and other basic and advanced services.

System Operation

The alert system operation requires access to updated data from observations and forecasts, in addition to risk maps of the targeted areas or mathematical models that define the risks.

- **System Operators:** The system operators are organizations that monitor the possibility of disaster events.
- **Alert Clients:** The alert clients are agents with capability to execute preventive actions to reduce losses if the disaster occurs.

Database

- **Dynamic Data** - report on the condition of variables obtained at intervals time.
- **Static data** - contain information about the pre-conditions for the occurrence of a disaster. Your update should be performed whenever a pre-condition is changed or when the model of occurrence of the disaster is updated.
- **Additional data** - other information to aid the location of risk areas and populations vulnerable to disaster or equipment examined.

Av dos Astronautas, 1.758
Jd. Granja - CEP: 12227-010
São José dos Campos - SP
Brasil
Tel: 55 (12) 3945-6500

News

New data ETA15km
Forecast Model.

The ETA models 20 and
40km will be
discontinued from
October 30, 2011.

Links



TerraLib

TerraView

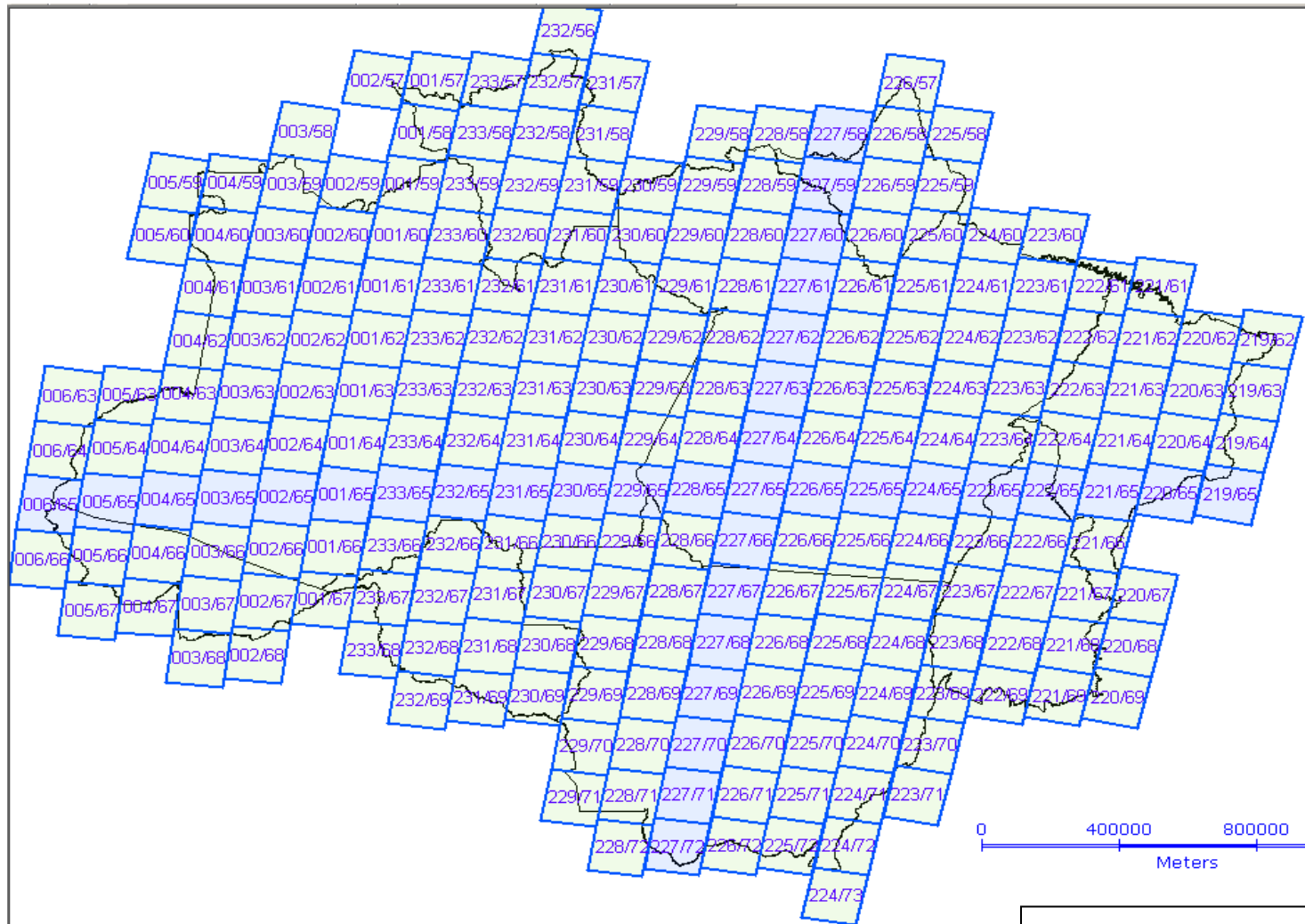




Forest Monitoring in the Amazon

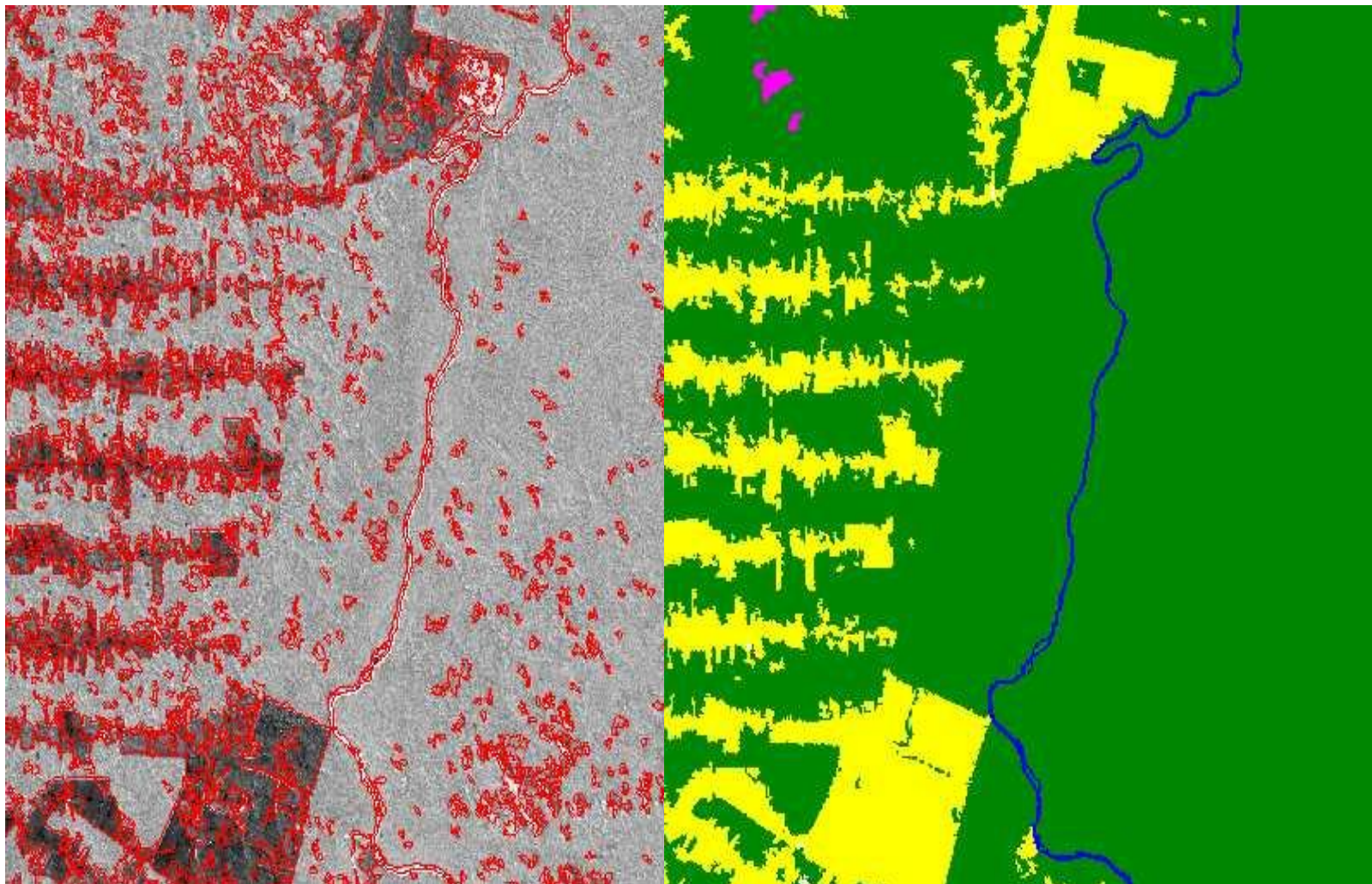
Clear Cut Inventory & Real Time Alerts

Monitoring the Brazilian Amazon Forest

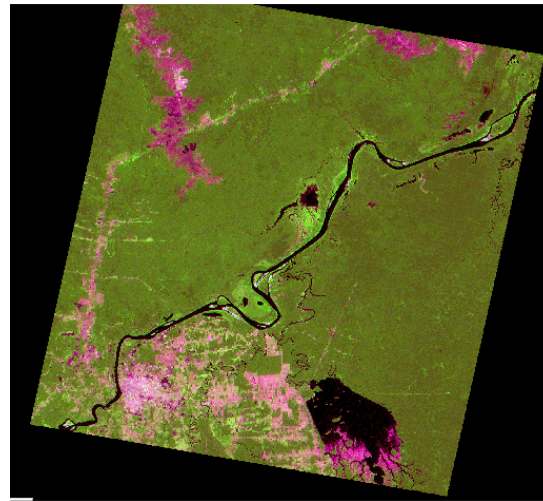


233 Landsat Images

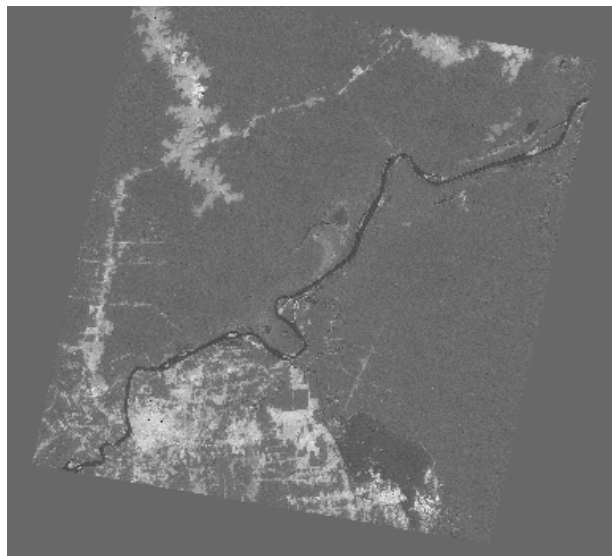
Image segmentation and classification



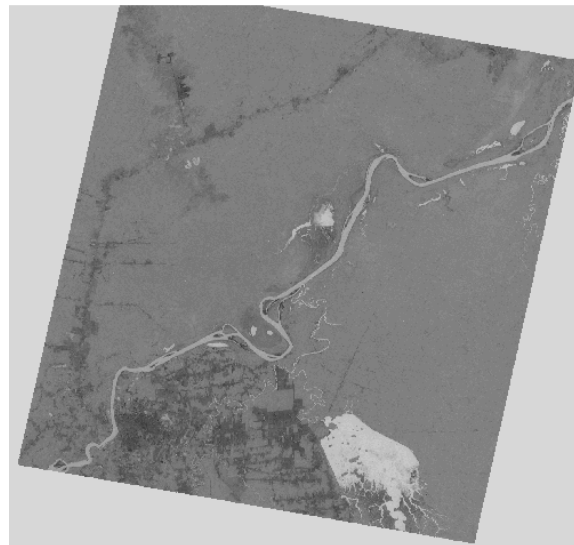
Application of linear mixing model



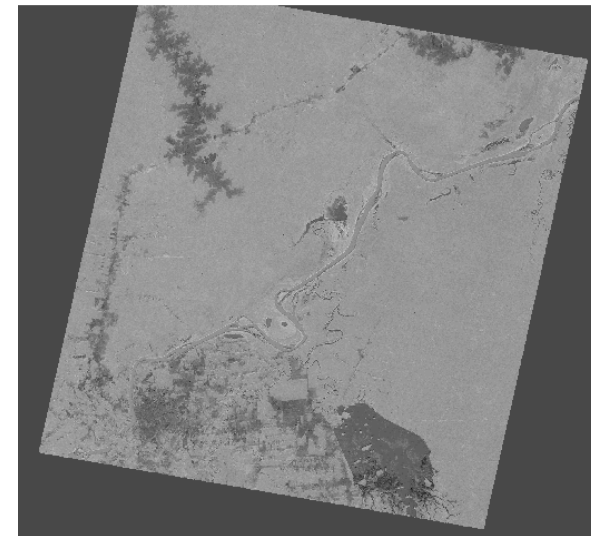
SOIL

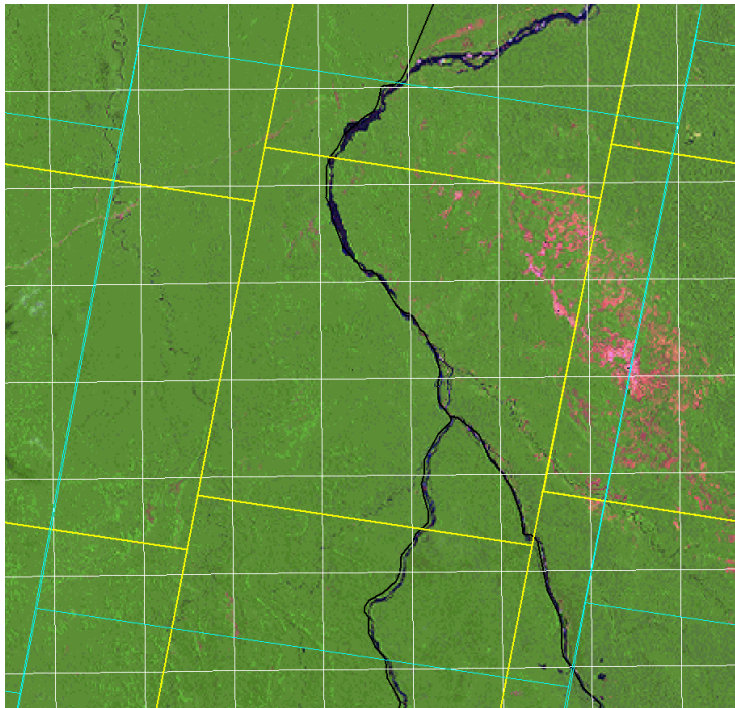


SHADOW



GREEN VEGETATION



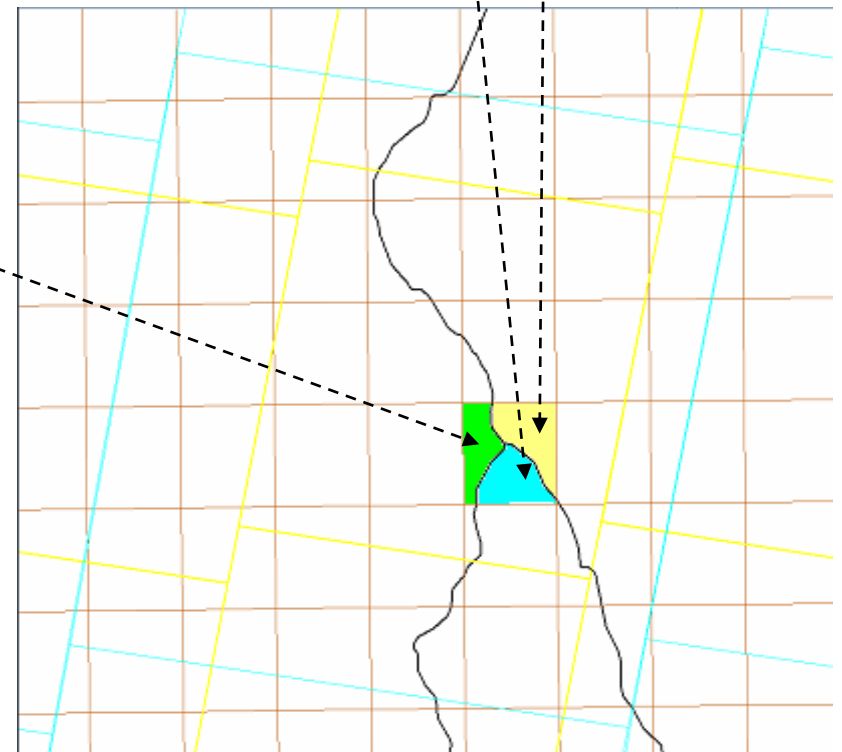


LANDSAT

Multidata approach (cloud cover)

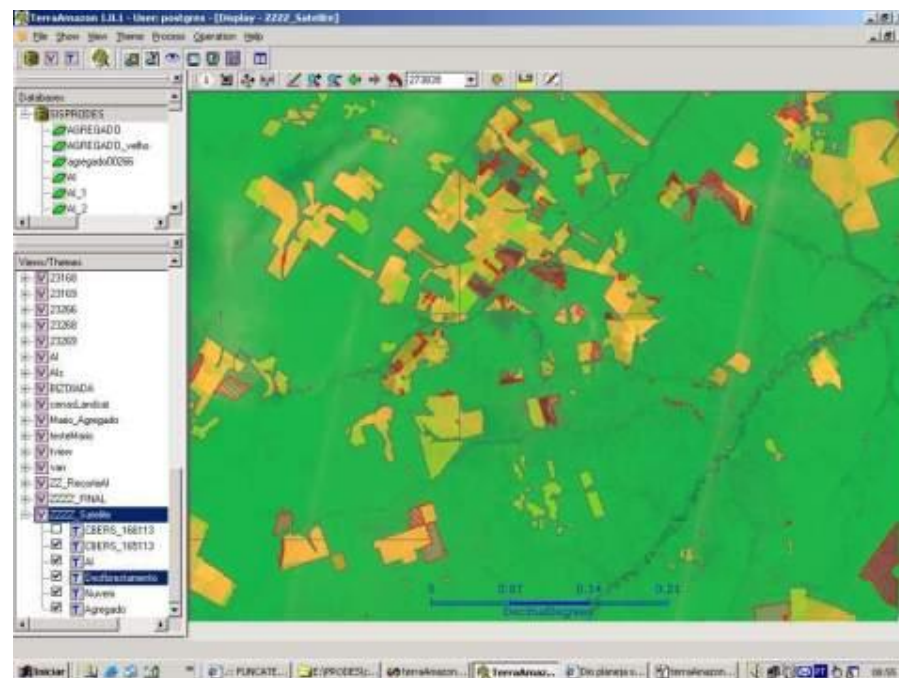
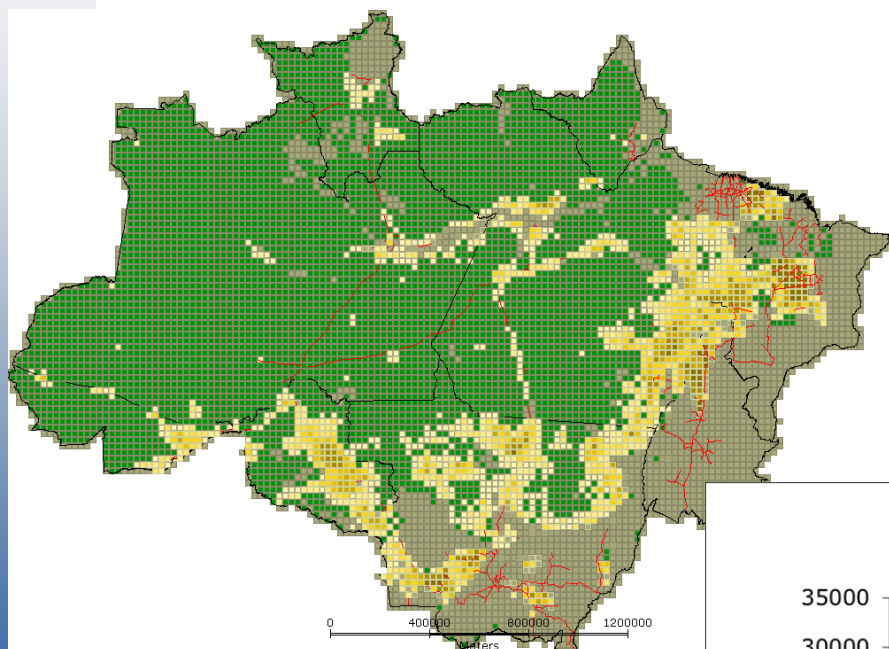
CCD/CBERS

DMC

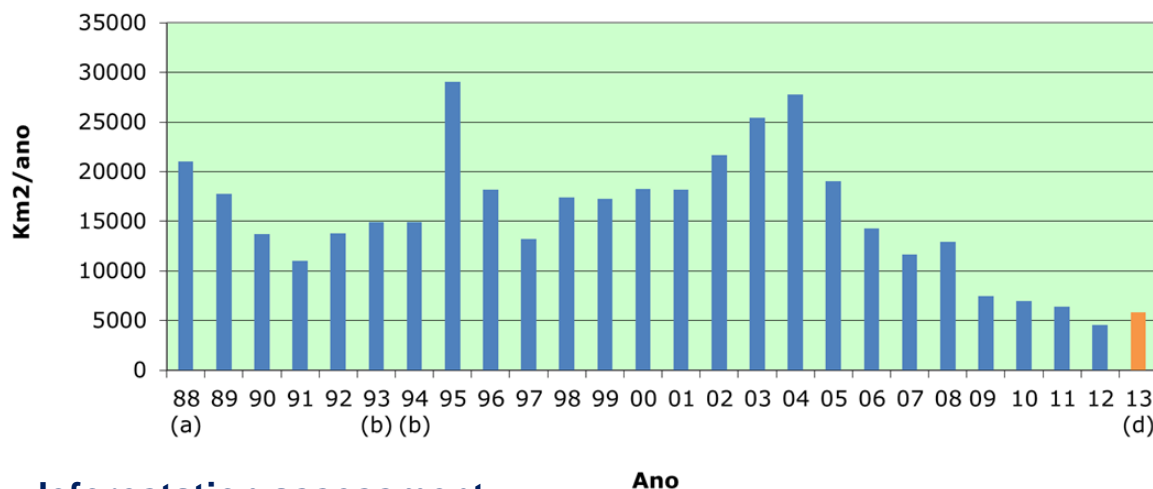


- LANDSAT
- CBERS
- SISPRODES
- State boundaries

PRODES: Amazon Deforestation Monitoring



Deforestation rates series since 1988



Wall to wall spatially explicit yearly deforestation assessment



Main uses of PRODES results

- Evaluation of efectivity of deforestation control policies
- Public awareness of the deforestation in the amazon (www.obt.inpe.br/prodes)
- Means for the concerned society to demand governmental action on the issue
- Support for policy making at regional and local scales



But PRODES is not enough ...

- Results are obtained and published after the damage is done
- Difficulty of the government to punish illegal deforestation after it is installed
- Demands for faster information production



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DETER Near Real Time Deforestation Detection with MODIS

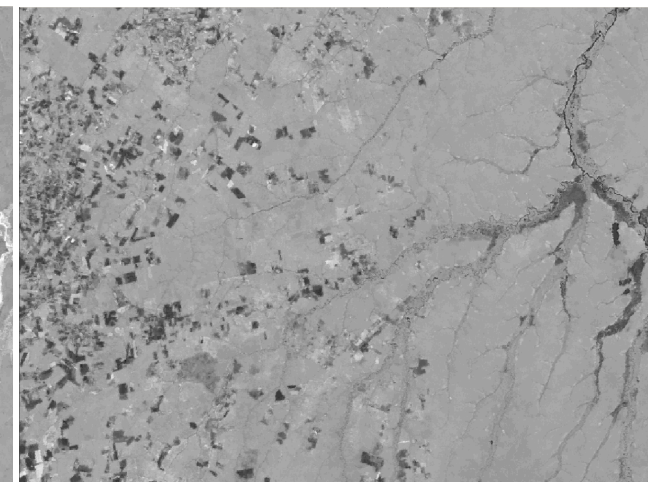
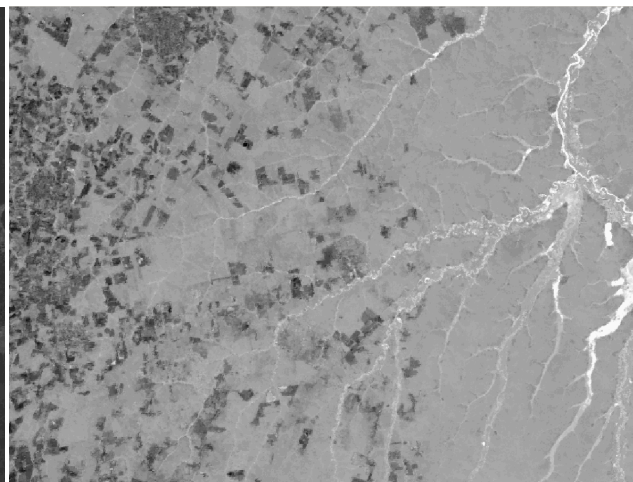
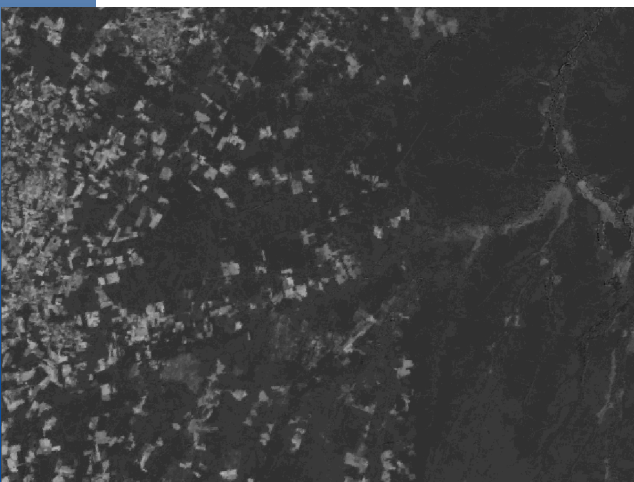
DETER – Same approach as PRODES but different spatial resolution



Soil

Shadow

Green Vegetation





Coordenação-Geral de Observação da Terra - OBT



Detecção do desmatamento em Tempo Real na Amazônia Legal - DETER

Parâmetros Básicos

Data Primeira Observação: 2004-05-07

Data Última Observação: 2004-06-08

Estado: TODOS

Base Operativa/Ibama: TODAS

Satélite: MODIS 01

Faixa de Área: Maior que 25 ha

Mostrar queimadas: Nao

Por Região (opcional)

Norte: 8.0

Oeste: -74.0 Leste: -44.0

Sul: -18.5

Clique em "Ver/View"

Gráficos

Tipo: Político

Histograma

Procurar Município

Nome:

Estado: TODOS

Ordenar: Alfabeticamente

Procurar

Ajuda...

Desmatamentos detectados nos

Municípios ou Unidades de

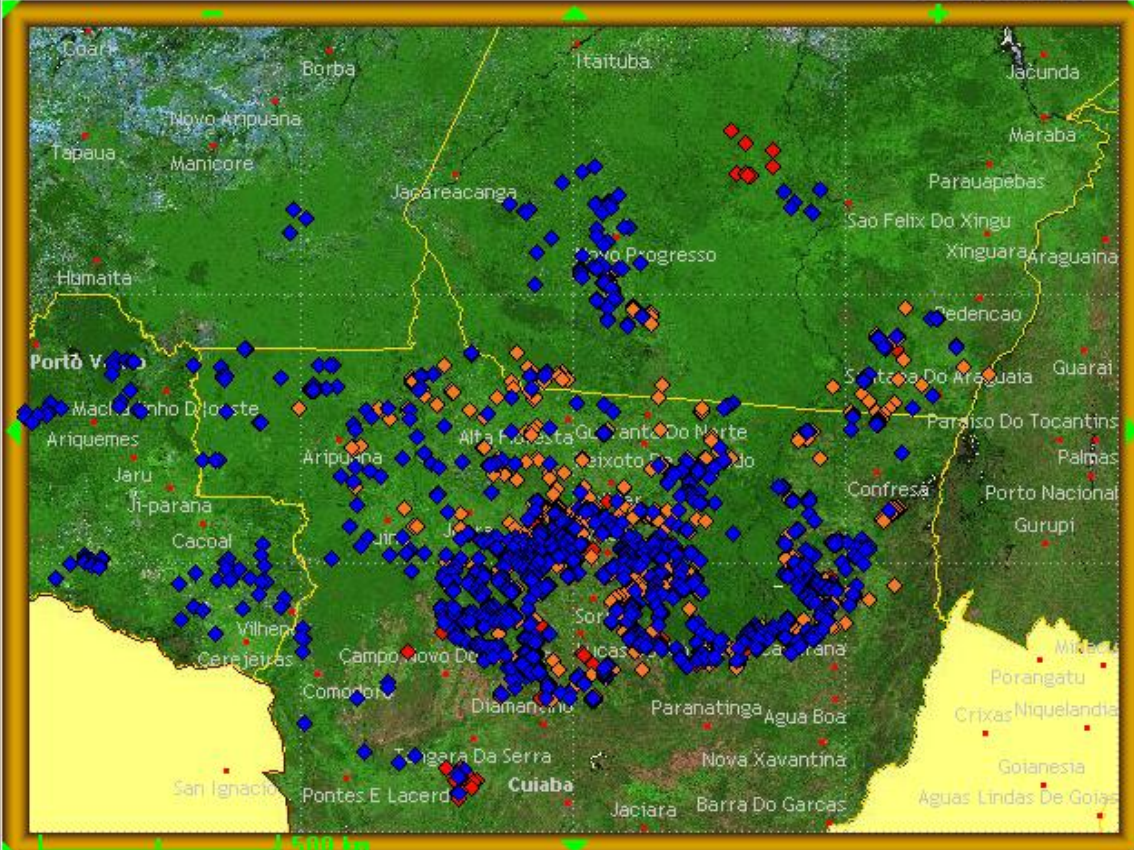
Conservação...

000043

Ver/View Recompôr Imagens Satélite Base Cartografica Mapas Temáticos Tamanho da Tela

Modis 07 Maio 2004/Divisão Política

S04:00:00 O48:00:00



S16:00:00 O64:00:00

Nesta tela existem 2024 de um total de 2069 pontos de alerta no periodo de 2004-05-07 a 2004-06-08

Saída dos dados/Export data/Salida de los datos Selecionar/Select/Seleccionar



Deforestation alerts – MODIS and AWiFS

DETER - Desmatamento nos Municípios e Unidades Conservação - Microsoft Internet Explorer

Endereço: <http://www.obt.inpe.br/deter/bduc.html>

Links: Proarco-Ibama, BD-Queimadas, Queimadas-Cptec, phpMyAdmin, Geo Calc, Prodes Digital, BD UCs, Banco Itaú, BD Municípios, Google

Coordenação-Geral de Observação da Terra - OBT

DETER - Desmatamento nos Municípios e Unid. Conservação

Parâmetros Básicos

Data Inicial (aaaa-mm-dd): 2004-05-01
Data Final (aaaa-mm-dd): 2004-07-07
Estado: TODOS
Base Operativa/Ibama: TODAS
Satélite: MODIS 01
Faixa de Área: Maior que 25 ha
Agrupar por: Unidade Conservação
Tipo: UC Federal + Estadual
Nome UC Federal: Todas
Nome UC Estadual: Todas
Executa

Gráficos
Tipo: Municípios
Histograma

Municípios Críticos
Faixa Criticidade: Crítica
Mostra

Receba um relatório resumido dos desmatamentos nos municípios / UCs em seu email. Inscreva-se...

2) [S090502062415220040608120000](#) (clique p/ ver)
Tipo UC: **Federal** Nome: **Buffer Interno F.N. Jamari**
Município/Estado: **Cujubim/RO**

Nr	Lat	Long	LatGMS	LongGMS	Data	Satelite	Area (Km2/Ha)
1	-9.0839	-62.6981	S 9 5 2.07	O 62 41 52.99	2004-06-08	MODIS-01	1.0472 / 104.7
2	-9.2673	-62.6969	S 9 16 2.15	O 62 41 49.01	2004-06-08	MODIS-01	2.0560 / 205.6
Area Total							3.1032 / 310.3

[Gera arquivo .txt](#) / [Save .txt file](#) / [Graba archivo .txt](#)

3) [S094220055533520040608120000](#) (clique p/ ver)
Tipo UC: **Estadual** Nome: **Buffer Interno P.E. do Cristalino**
Município/Estado: **Alta Floresta/MT**

Nr	Lat	Long	LatGMS	LongGMS	Data	Satelite	Area (Km2/Ha)
1	-9.7189	-55.4922	S 9 43 7.88	O 55 29 31.99	2004-06-08	MODIS-01	0.6140 / 61.4
2	-9.7056	-55.8931	S 9 42 20.10	O 55 53 35.29	2004-06-08	MODIS-01	1.1241 / 112.4
Area Total							1.7381 / 173.8

[Gera arquivo .txt](#) / [Save .txt file](#) / [Graba archivo .txt](#)

4) [S120653063004020040608120000](#) (clique p/ ver)
Tipo UC: **Federal** Nome: **Buffer externo R.B. do Guaporé**
Município/Estado: **São Miguel do Guaporé/RO**

Nr	Lat	Long	LatGMS	LongGMS	Data	Satelite	Area (Km2/Ha)
1	-12.1149	-63.0111	S 12 6 53.77	O 63 0 40.11	2004-06-08	MODIS-01	1.8194 / 181.9
2	-12.3122	-63.5224	S 12 18 43.86	O 63 31 20.67	2004-06-08	MODIS-01	3.6604 / 366.0
Area Total							5.4798 / 548.0

[Gera arquivo .txt](#) / [Save .txt file](#) / [Graba archivo .txt](#)

5) [S26049500920040521120000](#) (clique p/ ver)
Tipo UC: **Estadual** Nome: **A.P.A. Ilha do Bananal/Cantão**
Município/Estado: **Caseara/TO**

Nr	Lat	Long	LatGMS	LongGMS	Data	Satelite	Area (Km2/Ha)
----	-----	------	--------	---------	------	----------	---------------

Internet

Report by automatic e-mail

New deforestation detected in Conservation Unities and municipalities



Impact of DETER

Information for strategic decisions by deforestation control agencies - Federal, State and Municipal levels

Better efficiency in law enforcement

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

But...

DETER is not a good predictor of deforestation rate

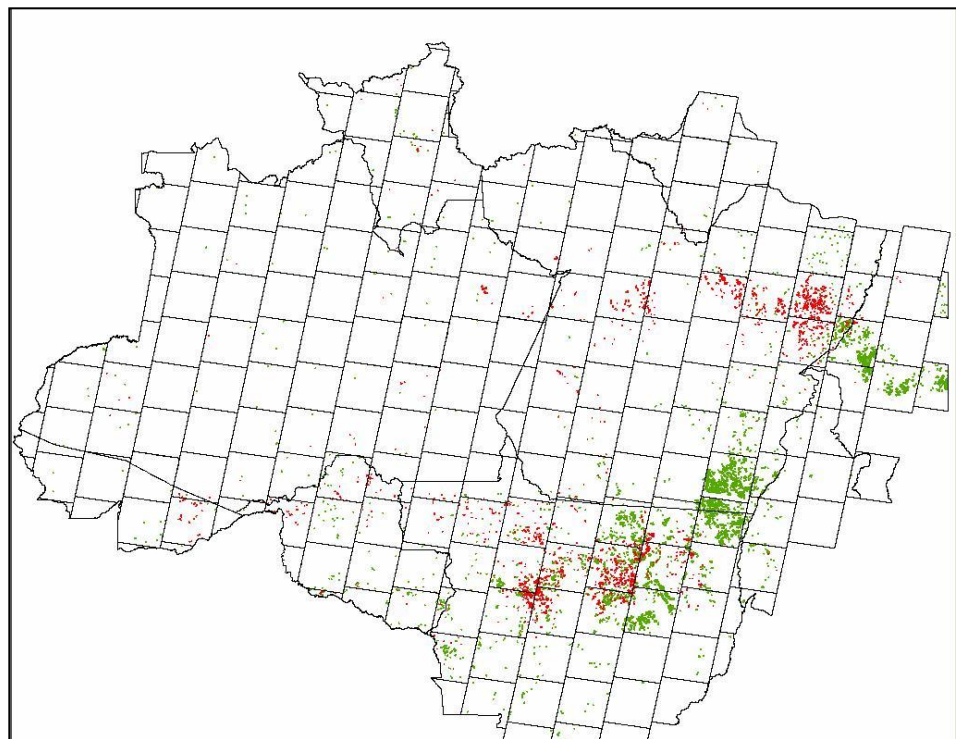


MINISTÉRIO DA CIÊNCIA E TECNOLOGIA
INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

Monitoring the state of the forest: DEGRAD

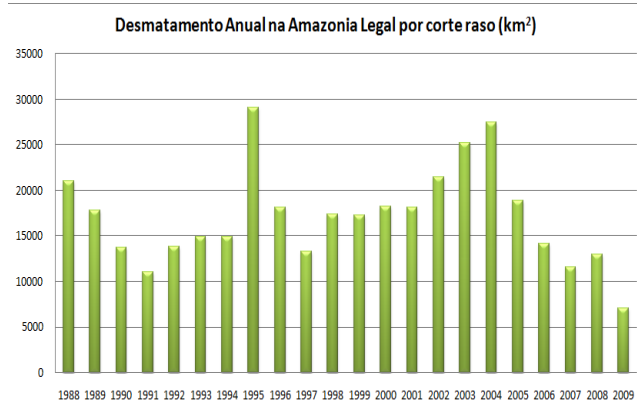
DEGRAD – Forest degradation

UF	2007(KM 2)	2008(KM2)
Acre	122.80	121.34
Amazonas	257.46	412.42
Amapá	50.42	63.18
Maranhão	1976.75	4230.70
Mato Grosso	8951.14	12987.74
Pará	3899.23	8264.82
Rondônia	412.32	643.32
Roraima	137.28	171.39
Tocantins	179.71	522.18
TOTAL	15987.10	27417.10

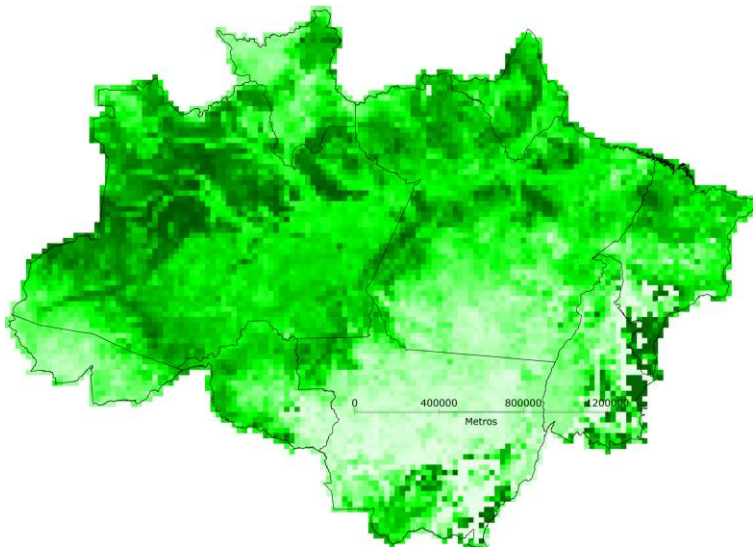
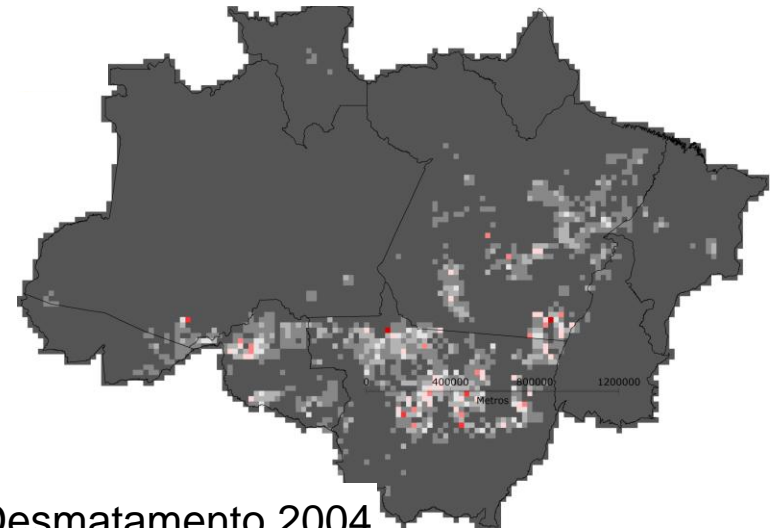


Modeling the spatial and temporal heterogeneity of deforestation-driven carbon emissions: the INPE-EM framework applied to the Brazilian Amazon

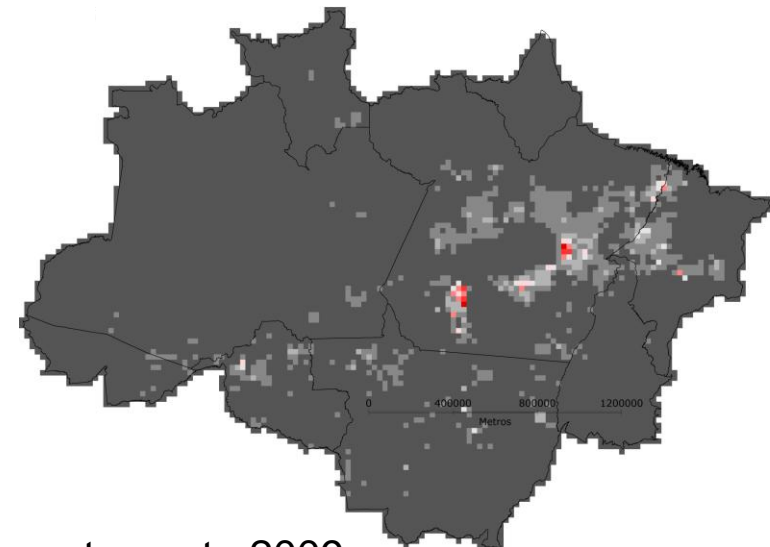
Tier 1 Emission Calculation =
Clear cut x mean biomass x % Carbon



Aguiar et al. (2012) Global Change Biology

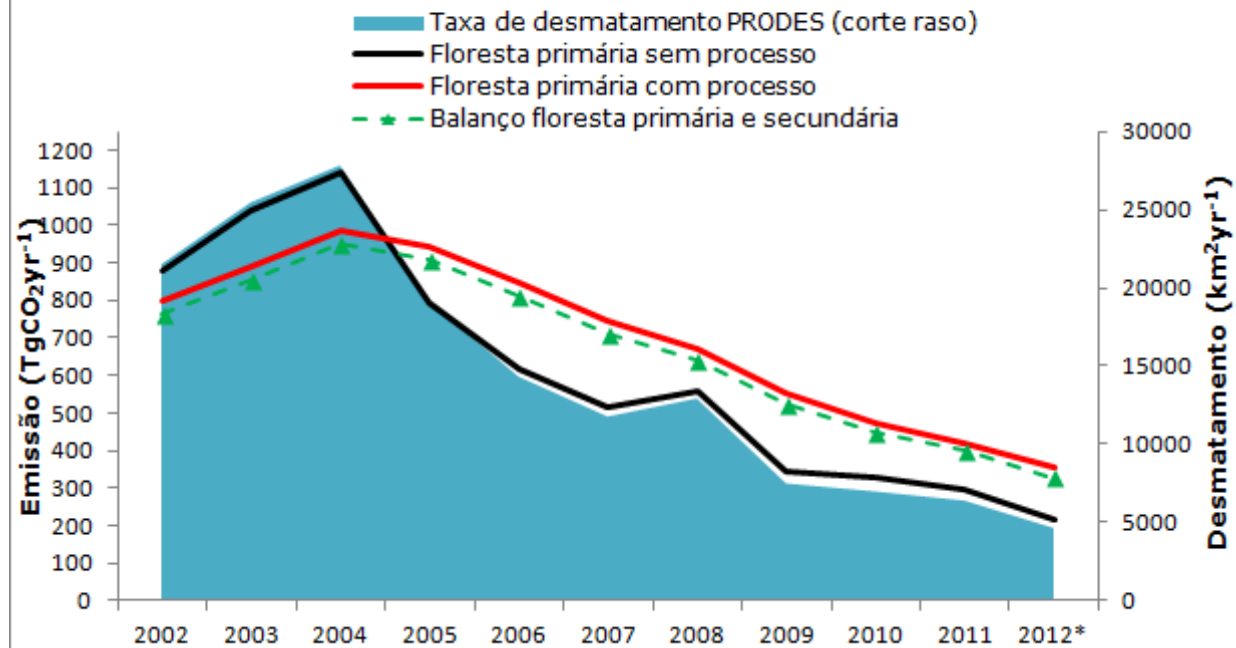


Biomassa (Saatchi et al., 2007)

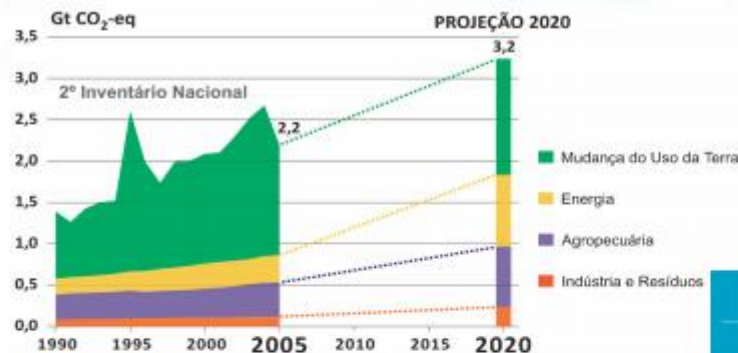
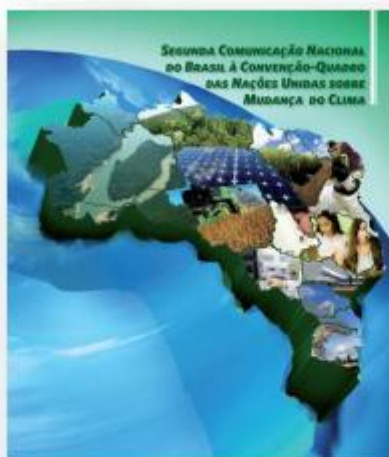




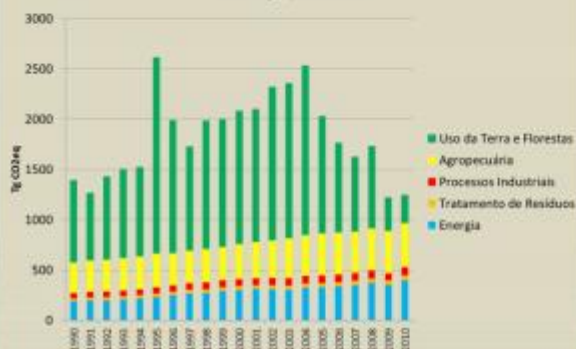
Estimativas de emissão de CO₂ para a Amazônia INPE-EM/BRAmazonia (PF15F1B1)



Evolução das emissões de GEE ref. LU no Brasil

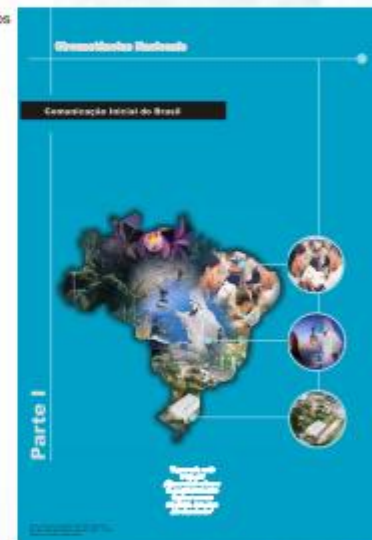


Emissões brasileiras de gases de efeito estufa
Período 1990-2010
em CO₂ equivalente



Sectores	Energia	Processos industriais	Solventes e outros produtos	Agropecuária	Mudança no uso da terra e florestas	Tratamento de resíduos	Total
Gaseos	Gg	Gg	Gg	Gg	Gg	Gg	Gg
CO ₂	236.505	16.870			776.331		1.029.706
CH ₄	401	3		10.131	1.805	803	13.173
N ₂ O	9	14		603	12	12	650
HFC-23		0,157					0,2
HFC-134a		0,125					0,1
FC ₂		0,345					0,3
CF ₄		0,035					0,0
SF ₆		0,002					0,0
NO _x	1.601	11		239	448		2.300
CO	12.266	510		2.787	15.787		31.360
NM VOC	1.596	358	521				2.474

Fonte: Comunicação Nacional Inicial do Brasil à Convenção-Quadro das Nações Unidas sobre Mudança do Clima (MCT, 2004)





DSA/CPTEC-INPE

MISSÃO: A Divisão de Satélites e Sistemas Ambientais realiza **pesquisas científicas** baseadas em medidas de satélites, e **desenvolve** métodos de observação e de estimativa de variáveis atmosféricas e de superfície.

Gerar Informações de caráter **operacional** para serem usadas: i) no monitoramento de tempo e clima, e ii) na assimilação de dados em modelos de previsão numérica.

Meteorologia
Ciências Florestais
Oceanografia
Meio Ambiente

Clima
Hidrologia
Defesa Civil

Gerenciamento de Recursos Hídricos
Agricultura
Proteção ao Voo



Aplicações

Banco de imagens – Acervo online

Ministério da Ciência e Tecnologia

INPE INSTITUTO NACIONAL DE PESQUISAS ESPaciais

Home Contato Mapa Site A DSA

DSA Divisão de Satélites e Sistemas Ambientais

BANCO DE DADOS DE IMAGENS

Opções: Tempo Clima Previsão Numérica Satélite Ondas Energia Dados Observacionais Qualidade do Ar Mudanças Climáticas Pesq. & Desenvol. Pós Graduação

Goes Meteorosat Goes + Meteorosat 15 em 15 minutos Goes + Meteorosat 3 em 3 horas Noaa Aqua/Terra

Data: 2009/04/20 Fonte: Meteorosat 9 Projeção: Retangular Setor: América do Sul

Clique nas abas para exibir/ocultar canais:

Vis 0.6 Vis 0.8 NIR 1.6 IR 3.9 WV 6.2 SPW 10.8 SPW 12 CO2 13.4 IR 9 Vis

Vis 0.6		Vis 0.8		NIR 1.6		IR 3.9		WV 6.2		SPW 10.8		SPW 12		CO2 13.4		IR 9 Vis	
Baixa	Alta	Baixa	Alta	Baixa	Alta	Baixa	Alta	Baixa	Alta	Baixa	Alta	Baixa	Alta	Baixa	Alta	Baixa	Alta
18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00	18:00
17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45
17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30	17:30
17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15
17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00	17:00
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15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00	15:00
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12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15	12:15
12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00
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11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15	11:15
11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00	11:00

Meteorosat

Tempo Clima Previsão Numérica Sate.

Goes Meteorosat Goes + Meteorosat 15

Data: 2009/04/20 Fonte:

Infra		Vapor		Colorida	
Baixa	Alta	Baixa	Alta	Baixa	Alta
17:45	17:45	17:45	17:45	17:45	17:45
17:15	17:15	17:15	17:15	17:15	17:15
17:00	17:00	17:00	17:00	17:00	17:00
16:45	16:45	16:45	16:45	16:45	16:45
16:30	16:30	16:30	16:30	16:30	16:30
16:15	16:15	16:15	16:15	16:15	16:15
15:45	15:45	15:45	15:45	15:45	15:45
15:30	15:30	15:30	15:30	15:30	15:30
15:15	15:15	15:15	15:15	15:15	15:15
15:00	15:00	15:00	15:00	15:00	15:00
14:45	14:45	14:45	14:45	14:45	14:45
14:15	14:15	14:15	14:15	14:15	14:15

Goes + meteorosat
15 em 15 minutos

Dados Observacionais Qu

Goes + Meteorosat 3 em 3 horas

Goes + Meteorosat Projeção: Retangular

Composta Color. Cirrus Realçad.

Baixa	Alta	Baixa	Alta
14:45	14:45	14:45	14:45
11:45	11:45	11:45	11:45
08:45	08:45	08:45	08:45
05:45	05:45	05:45	05:45

Goes + meteorosat
3 em 3 horas

Tempo Clima Previsão Num.

Meteorosat Goes + h

Data: 2009/04/2

Aqua Terra

Ch 01	Ch 20
14:22	03:37
12:47	01:07

Aqua / Terra

Noaa 18

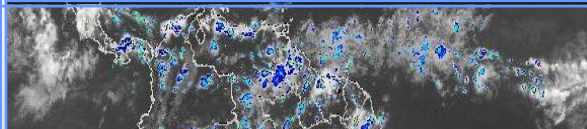
Ch 3 Ch 4 Mos

Mos A	Mos D	Ch 3	Ch 4	Mos
16:26	16:26	04:26	04:26	04:26
05:27	05:27	03:27	03:27	03:27
03:49	03:49	02:49	02:49	02:49

Noaa

Produtos

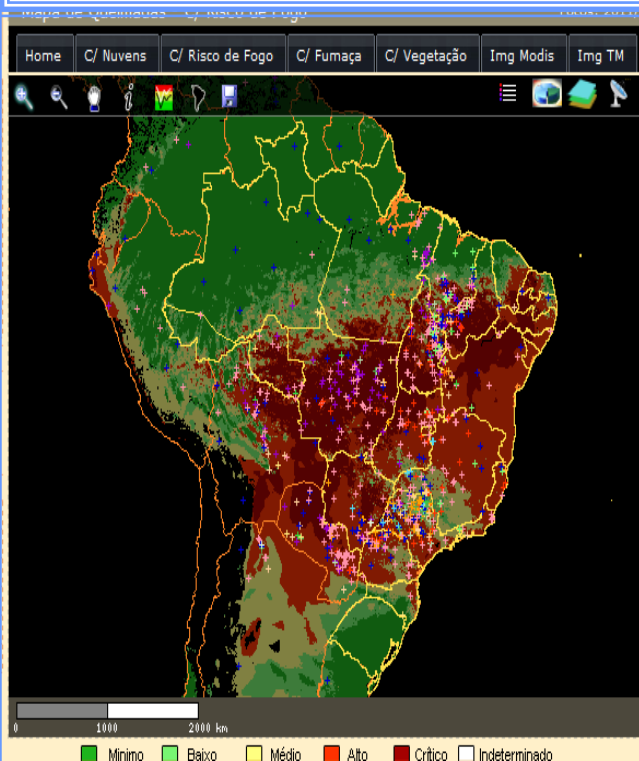
Precipitação/Satélite



Precipitação / Radar



Queimadas



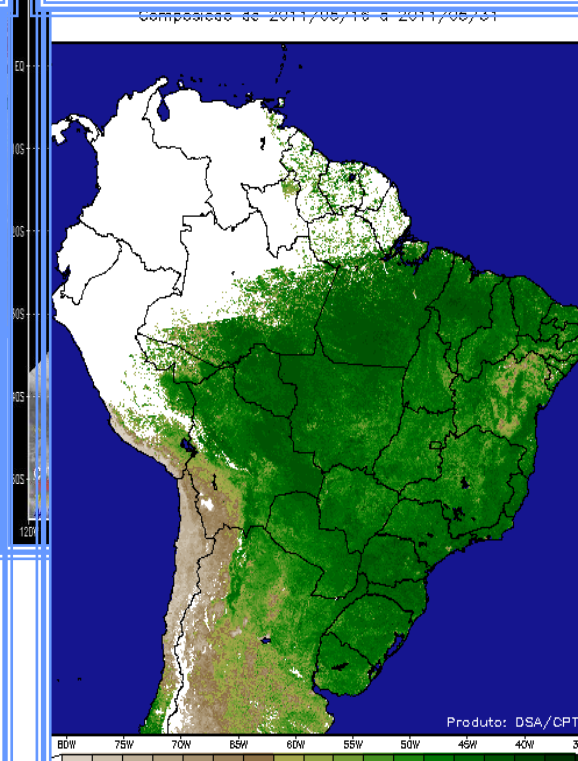
Sistemas Convectivos



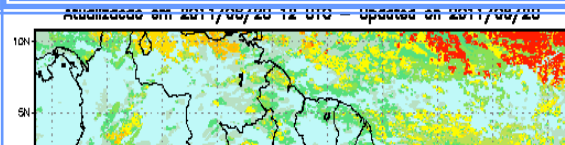
Ventos na troposfera



NDVI



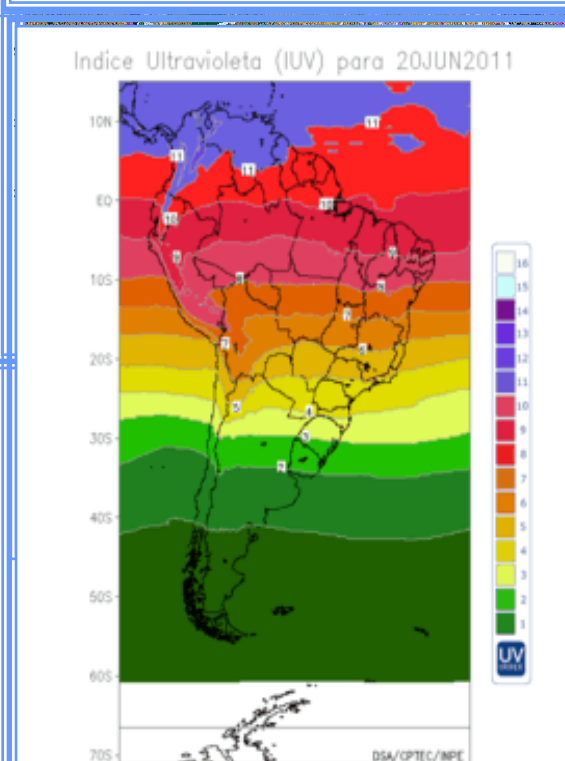
Monitoramento/Secas



Classificação/Nuvens



Índice Ultravioleta





National Institute of Science and Technology for Climate Change



65 National Institutions participate in the INCT for Climate Change

One of the largest environmental research networks in Latin America

Scientific and Technological Research Projects

The Scientific Basis

1 3 5 7
2 4 6 8

Projects

- 1** Detection and Attribution of Climate Change and Natural Variability
- 2** The Amazon
- 3** Changes in Land Use
- 4** Global Biogeochemical Cycles
- 5** Oceans
- 6** Greenhouse Gases
- 7** Biosphere-Atmosphere Interactions
- 8** Reduction of Uncertainties in Models and Climate Change Scenarios

Impacts, Adaptation and Vulnerability Studies

9 11 13 15 17
10 12 14 16 18

Projects

- 9** Climate Change Scenarios for the 21st Century
- 10** Agriculture
- 11** Water Resources
- 12** Renewable Energy
- 13** Biodiversity
- 14** Human Health
- 15** Coastal Zones
- 16** Urbanization and Mega-cities
- 17** The Economy of Climate Change
- 18** Science, Technology and Policy Studies

Mitigation

19 20 21

Projects

- 19** Emissions from Lakes and Reservoirs
- 20** Combustion Processes
- 21** Reducing Emissions from Deforestation and Forest Degradation (REDD)

Tecnological Products (Models, Geo-Sensors, Natural Disasters Risks)

22 23 24 25 26

Projects

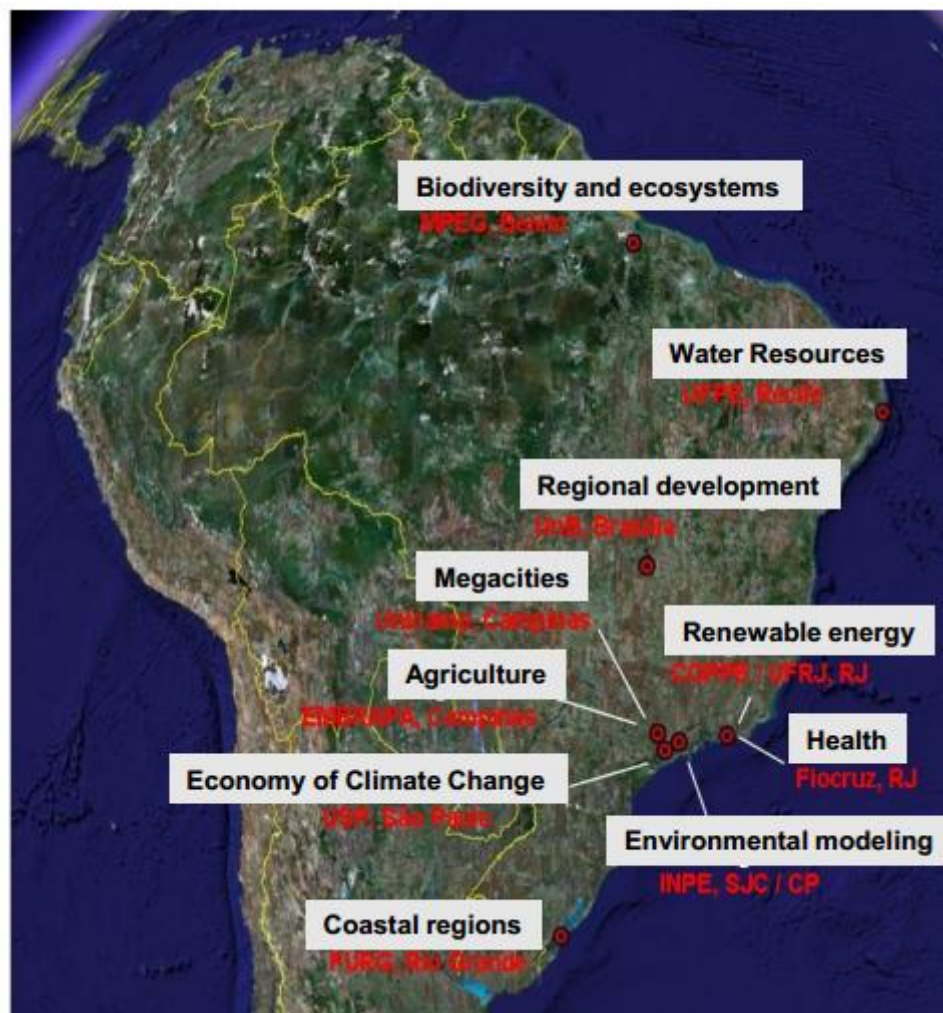
- 22** Global Climate Change Modeling: the Brazilian Model of the Global Climate System (MBSCG)
- 23** CPTEC's Atmospheric Global Circulation Model
- 24** Multi-scale modeling: a Challenge for Future Modeling Efforts
- 25** Observational Technologies for Climate Change
- 26** Early Warning System in Support of Natural Disaster Risk Reduction

Brazilian Research Network on Climate Change

Scientific partner of the INCT FOR CLIMATE CHANGE **139 research groups**
76 Brazilian Institutions

In response to the urgency that the challenge of global climate change imposes on society, and the critical need for high quality and relevant scientific knowledge to inform the public policy process on this, the Federal Government of Brazil, through its Ministry of Science and Technology (MCT), established the Brazilian Research Network on Climate Change (Rede CLIMA), with the following goals:

The Rede Clima was created by the Ministry of Science and Technology in 2007. Its objective is to generate and disseminate new knowledge about climate change in Brazil, in such a way that the country can respond to the challenges imposed by climate change, and also to prepare for international negotiations on climate.



POST-GRADUATION COURSE AT CCST/INPE

The Doctoral program in Earth System Science (PG-CST) provides high-level training in environmental areas of research. It offers to the students broad access to INPE's facilities in support of advanced research and teaching. The program seeks to facilitate the process of finding financial assistance for doctoral students through national education-oriented agencies, such as CAPES, CNPq and FAPESP, among others.





OBRIGADO – GRACIAS – THANK YOU

More information on the CCST-INPE can be found at:

www.ccst.inpe.br

www.inpe.br

lincoln.muniz@gmail.com

+55 12 3186-9540

Ministério da Ciência e Tecnologia
BRASIL
INPE
Centro de Ciência do Sistema Terrestre
ciência para sustentabilidade

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PROJETOS
LABORATÓRIOS ASSOCIADOS
PROGRAMAS
SOFTWARE
ENSINO
APRESENTAÇÕES
PUBLICAÇÕES
Artigos
IPCC-AR4 (ENG)
IPCC-AR4 (POR)
Riscos das Mudanças Climáticas no Brasil
Plano Nacional sobre Mudança do Clima
IMPrensa
Notícias
Na Mídia
FAQ
FAQ IPCC-AR4
LINKS
FALE CONOSCO

NOSSA PROPOSTA É CONTRIBUIR PARA:

Conservar a Vitalidade e a Diversidade do planeta Terra

LINKS
EVENTOS

Mudanças Climáticas
SONDA
SÃO PAULO SCHOOL ON GLOBAL CLIMATE MODELING
SPSGCM

NOTÍCIAS

INPE se prepara para receber o GLP
Organizado pelo escritório internacional do Global Land Project (IPO), que a partir de janeiro terá sede no Instituto Nacional de Pesquisas Espaciais (INPE), o workshop sobre "Mudanças de Uso da Terra na América do Sul".
01/12/2011

DETER registra em outubro 386 km² de alertas de desmatamento
As áreas de alerta de desmatamento e degradação na Amazônia somaram 386,06 km² em outubro, conforme os dados registrados pelo DETER, o sistema de detecção do desmatamento em tempo real do Instituto Nacional de Pesquisas Espaciais (INPE).
01/12/2011

Monitoramento agrícola global terá apoio do INPE
Imagens de satélites e observações meteorológicas serão usadas para monitorar safras e melhorar a informação sobre a oferta de alimentos em escala global. Boa parte da crescente população mundial está nos países que enfrentam os maiores problemas com a insegurança alimentar.
29/11/2011

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