



# EARTH OBSERVATION IN BRAZIL

## CBERS DATA DISTRIBUTION AND IMPACT OF OPEN DATA POLICY

José Carlos N. Epiphanyo

Rozane Fonseca Silva

Instituto Nacional de Pesquisas Espaciais –  
INPE/MCT/Brazil

Contacts:

[epiphanyo@dsr.inpe.br](mailto:epiphanyo@dsr.inpe.br)

[rozane@dir.inpe.br](mailto:rozane@dir.inpe.br)

Industry Symposium: "*Earth  
Observation Services Industry: Market  
Opportunities*"

COPUOS - Vienna – Feb/2012



# INPE – Brazilian National Institute for Space Research



## WHO WE ARE

Main civilian R&D organization for space activities in Brazil

Staff of 2500

50 years in 2011



INPE headquarters, 2004, São José dos Campos, SP



## MISSION

“Carry out research and development in space, atmospheric and environmental sciences, and provide unique products and services for the benefit of Brazil”



images: NASA-INPE

**We know earth observation data is essential for the planet...**





# Earth Observations at INPE

## Remote Sensing Data Sources

- CBERS, Landsat-1,2,3,5,7, ERS-1, SPOT-1,2, Radarsat-1, Terra, Aqua, etc

## Remote Sensing Ground Segment

- Cuiabá Ground Station Remote Sensing Data Center

## Remote Sensing Research and Applications

### GIS Technology Research and Applications

Amazon Regional Center (INPE Amazonia)  
→ Focus on capacity building on the monitoring of tropical forests

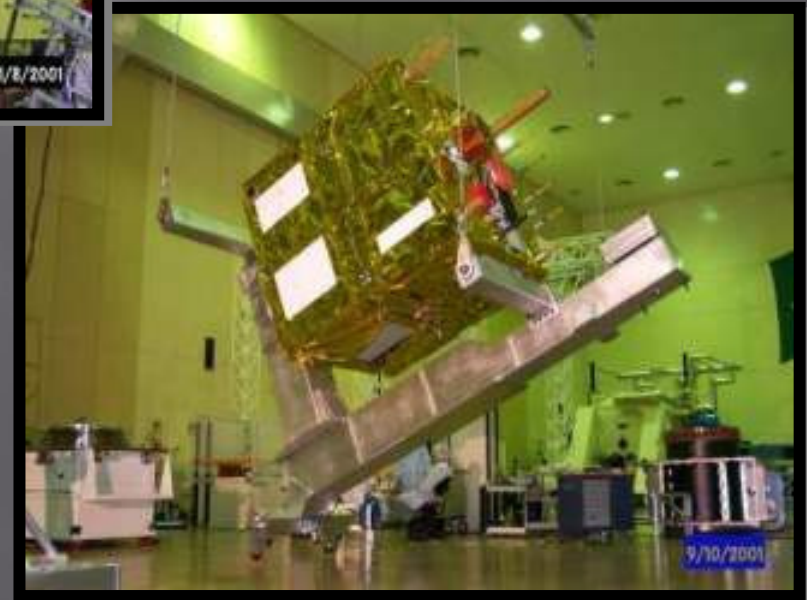


Cuiabá Ground Station:  
CBERS, LANDSAT,  
SPOT, MODIS,  
RADARSAT



# CBERS PROGRAM

## China-Brazil Earth Resources Satellite





# CBERS FAMILY



CBERS 1  
1999 - 2003

CBERS 2  
2003 - 2007

CBERS-2B  
2007-2010

CBERS 3  
2012 - 2015

CBERS 4  
2015 - 2018



# CBERS: Main Features

	Imager Instruments	Spatial resolution	Spectral resolution
CBERS-1	3	20-260m	Pan/Vis/NIR/SWIR/TIR
CBERS-2	3	20-260m	Pan/Vis/NIR/SWIR/TIR
CBERS-2B	3	2.7-260m	Pan/Vis/NIR
CBERS-3	4	5-80m	Pan/Vis/NIR/SWIR/TIR
CBERS-4	4	5-80m	Pan/Vis/NIR/SWIR/TIR





# CBERS APPLICATIONS

## Other

Reservoirs monitoring

Coastal monitoring (e.g. oil spills)

Urban studies and planning

Education at various levels

Land and environmental protection

Geology (prospection, mapping, etc.)

Government actions

Crop identification and mapping

Crop modeling

Crop insurance

Precision farming

## Agriculture

Crop x environment stress

Crop fuel x food production

Early deforestation warning

Forest identification and mapping

Deforestation mapping

Forest protection

## Forest

Environmental licensing

Forest/parks protection



# CBERS Data in Brazil: Market Information



## After 2004: changes in data distribution and access policies

With CBERS 2, Brazil adopted an open data distribution policy, ensuring free access through the internet to its catalogue and to full resolution images.

Online registration: any user can browse the catalogue, choose as many images as he wants, and download them for immediate use, with no cost, bureaucracy and working on a simple and fast catalogue system.

The same policy was adopted for CBERS-2B and will be adopted for CBERS-3 when it is launched.

The same policy was extended to neighboring countries under the footprint of the Cuiaba-Brazil ground station and archived at INPE's catalogue.



# Relation user X catalogue

http://www.obt.inpe.br/catalogo/

INPE Catálogo de Imagens

Parâmetros Básicos

Satélite: CBERS 2

Instrumento: CCD

Intervalo de Tempo: Sazonal

De: 04/1999

Até: 04/2004

Cobertura de Nuvens Máxima

Q1: 02, Q2: 02, Q3: 04, Q4: 04

Quick Look: Pequeno, Grande

Município: \_\_\_\_\_ Estado: \_\_\_\_\_

Órbita: \_\_\_\_\_ Ponto: \_\_\_\_\_

De: Até: De: Até:

Por Região

Norte: 10

Oeste: 90, Sul: 40, Leste: 30

Interface Gráfica

Lat: 17, Lon: 48

Bem-vindo à página que permite a interação entre você e o Banco de Imagens do CBERS -Satélite Sino-Brasileiro de Recursos Terrestres. O INPE espera que você faça o melhor proveito possível dos produtos CBERS. Solicitamos que você nos envie os resultados dos seus trabalhos com as imagens do CBERS, bem como seus comentários e sugestões. Isso permitirá que possamos continuar trabalhando e melhorando a área de produtos do sistema.

1. PESQUISAR IMAGENS do seu interesse por órbita/ponto, por região ou por meio de imagens completas é necessário que você
2. CADASTRAR-SE junto ao INPE: esse é usuário do sistema e das áreas de aplicação serão repassados a ninguém, senão único
3. ACESSAR o Catálogo e solicitar imagem custo para download.
4. FAZER DOWNLOAD DE IMAGENS: cat imagens - geralmente são arquivos de vídeo (RMSS e 8 Mb para cada banda WFI). Voc produto desejado. Para solicitação e

As imagens poderão ser obtidas LIVRES D produtos, o custo segue a tabela oficial.

6. Ao fazer o download ou aquisição de qu contidos na Licença de Uso das Imagens C

Para dúvidas, sobre o uso de imagens ou o

INPE Catálogo de Imagens

Parâmetros Básicos

Satélite: CBERS 2

Instrumento: CCD

Intervalo de Tempo: Sazonal

De: 01/1977

Até: 02/2005

Cobertura de Nuvens Máxima

Q1: 00%, Q2: 00%, Q3: 00%, Q4: 00%

Quick Look: Pequeno, Grande

Município: São Paulo Estado: São Paulo

Órbita: \_\_\_\_\_ Ponto: \_\_\_\_\_

De: Até: De: Até:

Por Região

Norte: 10

Oeste: 90, Sul: 40, Leste: 30

Interface Gráfica

Lat: 23.548, Lon: 46.836

INPE Catálogo de Imagens

Página 1

CB2CCD 162/131-2004-04-16	CB2IRM 162/131-2004-04-16	CB2CCD 162/131-2004-03-21	CB2IRM 162/131-2004-03-21
CB2CCD 162/131-2004-02-24	CB2IRM 162/131-2004-02-24	CB2CCD 162/131-2004-01-29	CB2IRM 162/131-2004-01-29

Index of /catalogo/tmp/epiphanio416 - Netscape

File Edit View go Bookmarks Tools Window Help

http://www.dpi.inpe.br/catalogo/tmp/epiphanio416/

Name	Last modified	Size	Description
Parent Directory	25-Mar-2004 15:23	-	
CBERS 2 CCD1XS 20040..>	18-Mar-2004 01:23	17.6M	
CBERS 2 CCD1XS 20040..>	18-Mar-2004 01:23	15.0M	
CBERS 2 CCD1XS 20040..>	18-Mar-2004 01:23	20.3M	
CBERS 2 IRM 20040225..>	18-Mar-2004 01:30	1.5M	
CBERS 2 IRM 20040225..>	18-Mar-2004 01:30	1.6M	
CBERS 2 IRM 20040225..>	18-Mar-2004 01:30	1.5M	
CBERS 2 IRM 20040225..>	18-Mar-2004 01:30	775k	

Downloading CBERS\_2\_CCD1XS\_20040225\_153\_104\_BAND3.tif.zip

You have chosen to download a file of type: "WinZip File" [application/zip] from http://www.dpi.inpe.br/catalogo/tmp/epiphanio416/

What should Netscape do with this file?

Open using WinZip

Save this file to disk

Always ask before opening this type of file

Advanced... OK Cancel

# CBERS Image Catalogue (Internet): access to all data

Portugues **INPE** Catálogo de Imagens [Cadastro](#) [Log In](#) [Carrinho](#) [Ajuda](#)

Página 1

**Parâmetros Básicos**





Satélite: CBERS 2  
Instrumento:   
Intervalo de Tempo:  Sazonal  
De: 05 / 1999  
Até: 05 / 2004  
Cobertura de Nuvens Máxima  
Q1:   
Q2:   
Q3:   
Q4:   
Quick Look:  Pequeno  Grande

Município: São paulo Estado:   
Executar

Órbita: De   
Até   
Ponto: De   
Até   
Executar

Por Região  
Norte: 10.  
Oeste: -90. Leste: -30.  
Sul: -40.  
Executar

Interface Gráfica  
Lat: -28.021 Lon: -54.936  
Navegar

CB2CCD 162/131-2004-04-16 	CB2IRM 162/131-2004-04-16 	CB2CCD 162/131-2004-03-21 	CB2IRM 162/131-2004-03-21 
CB2CCD 162/131-2004-02-24 	CB2IRM 162/131-2004-02-24 	CB2CCD 162/131-2004-01-29 	CB2IRM 162/131-2004-01-29 
CB2CCD 162/131-2004-01-03 	CB2IRM 162/131-2004-01-03 	CB2CCD 162/131-2003-11-12 	



# CBERS-2/2B Distribution

Today, in Brazil, all organizations linked to remote sensing, environment, agriculture etc. are CBERS users.

Requests	360,000+
Scenes	900,000+
Registered users	100,000+
Registered institutions	6,000+
Countries	60+

By end of 2011



# Institutional Distribution

Government	23 %
Private	51 %
Education	26 %



## Other impacts of data policy change (2009 Users Survey)



- Two CBERS users surveys have been conducted in Brazil. The last one in 2009.
- They provided a sample picture of the profile of CBERS users community relative to the data acquired by the Brazilian ground station in Cuiabá.
- They illustrated further benefits brought about by the policy of free access to CBERS data in Brazil.

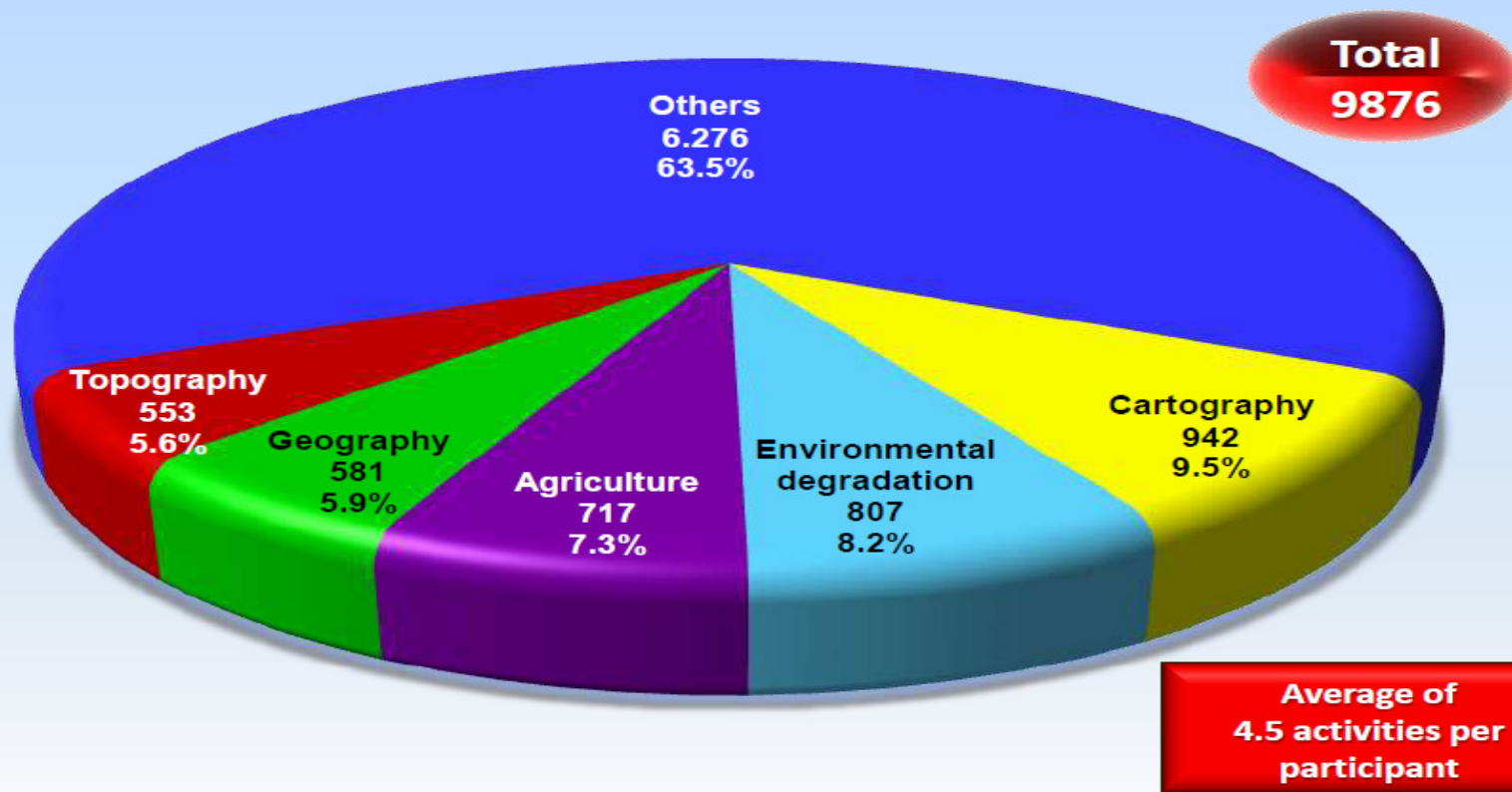


# Benefits of policy change



Increased number of projects, new small business, easy access to historical and current data, easy to make demonstration and proof-of-concept projects, etc

## ***Economic activities that received application of the CBERS images by the participants***



Note: In this question occurred the possibility of multiple indications, so there's the possibility about the number of indications being bigger than the participants.



# What do CBERS users say?

The screenshot shows a web browser window displaying the ArcIMS Viewer interface. The browser's address bar shows the URL <http://200.101.6.242/website/MT/viewer.htm>. The page header includes the logo for 'Tecnomapas' and the text 'MTWEB'. The main content area features a map of a region in Mato Grosso, Brazil, with the town of Querência highlighted in yellow. The map shows various land use zones, rivers (Ribeirão Beais, Córrego das Flores, Rio do Forno, Rio do Sulazão), and roads (MT 243, MT 109). A legend on the right side of the map lists a series of CBERS satellite images from 2004, with '1759\_2004.tif' selected. A status bar at the bottom of the map area displays the message: '1759\_2004.tif é a camada Ativa agora'. The browser's status bar at the very bottom shows the text 'Mapa: -52°5'16...' and the Internet Explorer logo.

*“CBERS brought the freedom to have data immediately available when you need it.”*



# What do the private companies say about free CBERS data?

Enables new business development

Facilitates trial uses for new clients

Planning new applications becomes easier

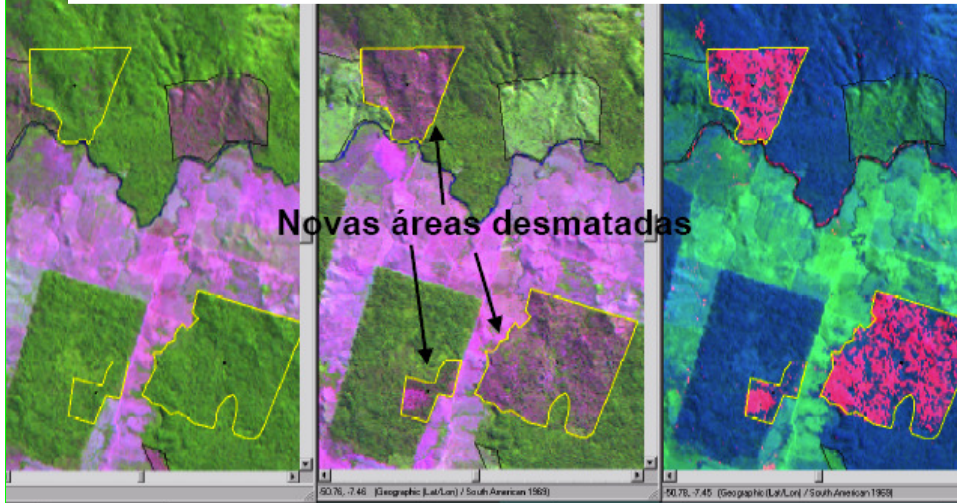
Creates jobs by reducing cost of data buys

Increases quality by adding data previously unavailable

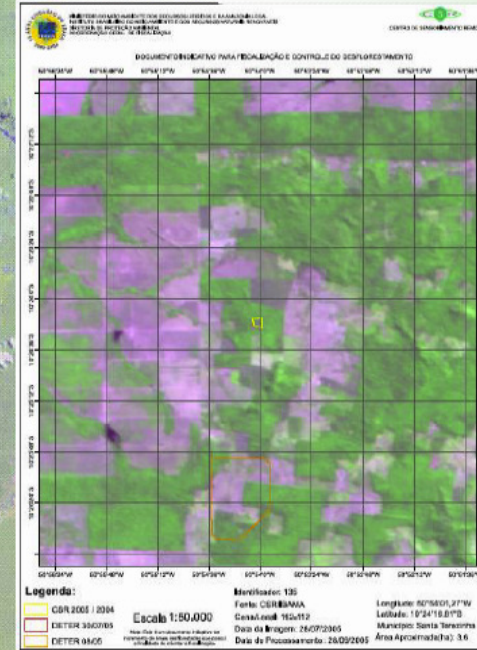


# CBERS applications for sustainable development: a few examples

# Deforestation - Amazonia: CBERS multitemporal analysis



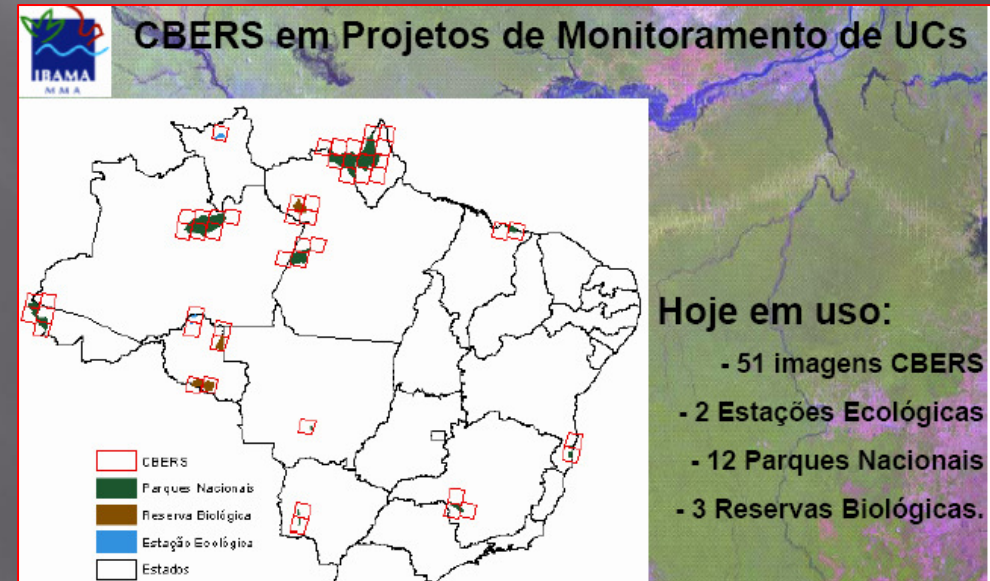
## DOCUMENTO INDICATIVO PARA FISCALIZAÇÃO - DIF



- Documento A4 de localização para cada polígono de desflorestamento
- Precisão no cálculo da área desflorestada
- Localização geográfica
- Localização do município
- Nome do técnico responsável

## CBERS for Monitoring Conservation Units

- Fires
- Deforestation
- Mining activities
- Illegal occupation



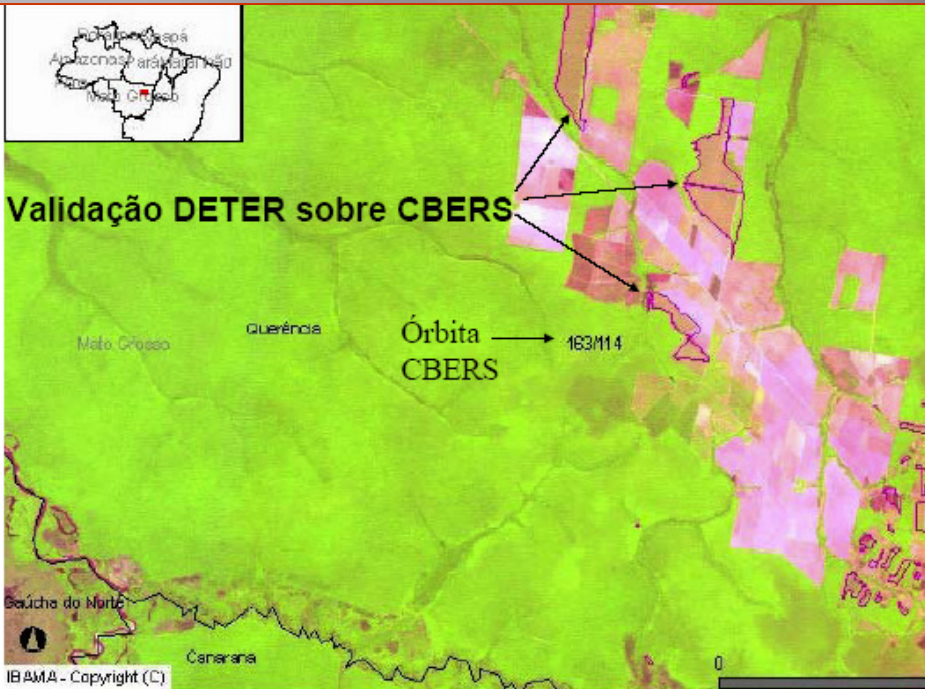
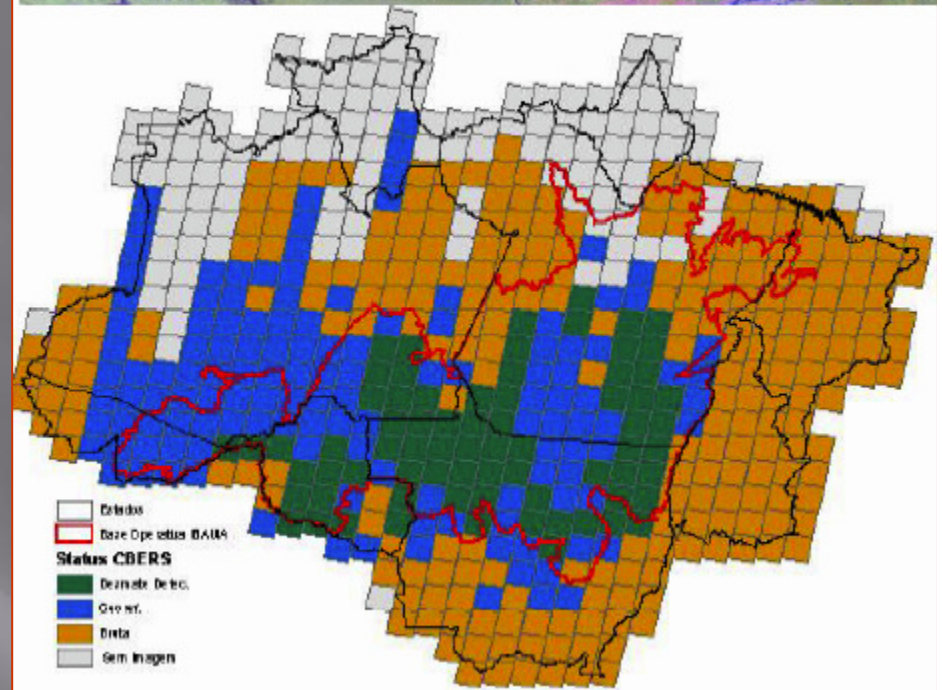
Hoje em uso:

- 51 imagens CBERS
- 2 Estações Ecológicas
- 12 Parques Nacionais
- 3 Reservas Biológicas.



# Monitoring new deforestation areas

## Imagens CBERS no Programa Desmatamento



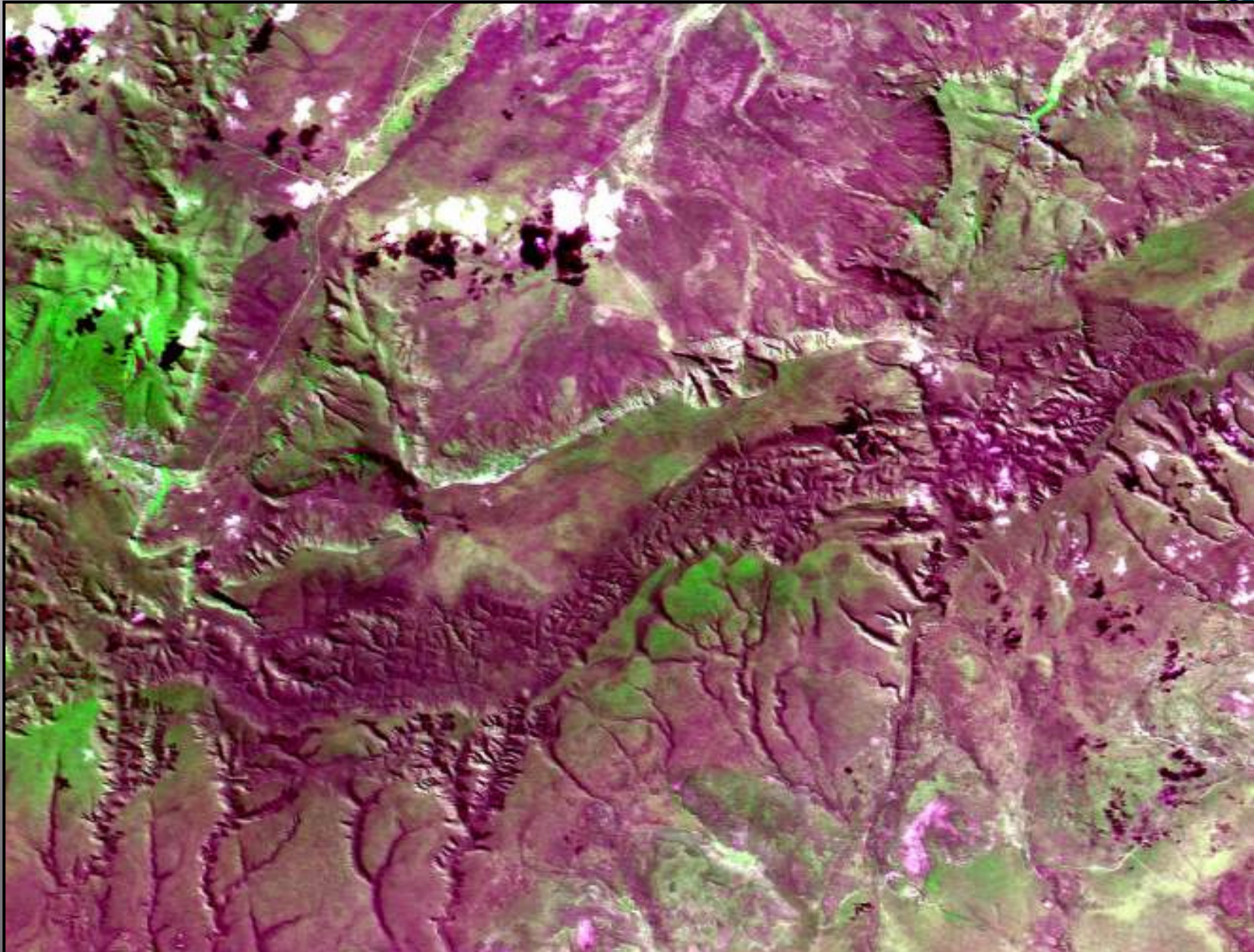


# Land Use Patterns





# Geomorphology



# Fire scars



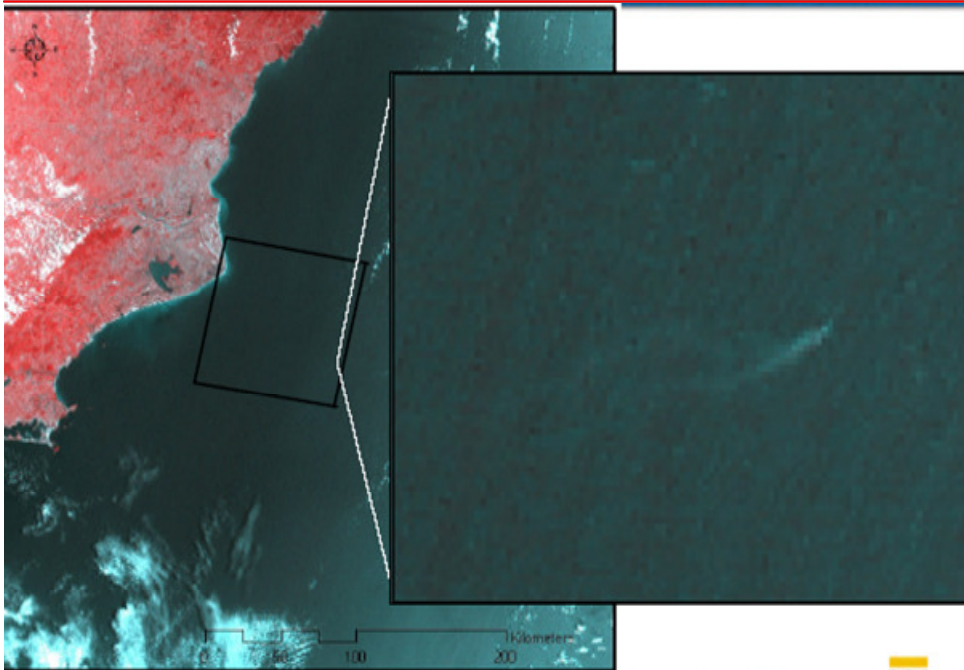
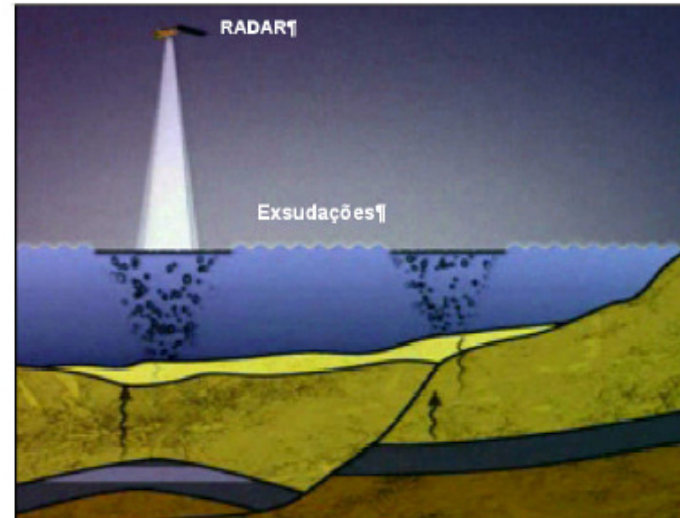




- Causadas por variações na pressão estática dos reservatórios
- Fenômenos intermitentes

## CBERS for:

- Oil detection in the ocean surface
- Ocean and coastal monitoring
- Leaking monitoring





- Environmental monitoring and protection
  - Sand extraction/mining: impacts on the rivers
  - Identification of potential pollution sources
- Environmental licensing

Licenciamento Ambiental de Atividades potencialmente degradadoras/poluidoras - Avaliação de Impacto Ambiental

### Exemplo: Atividade Mineraria

Empreendimentos com a palavra "areia" no nome

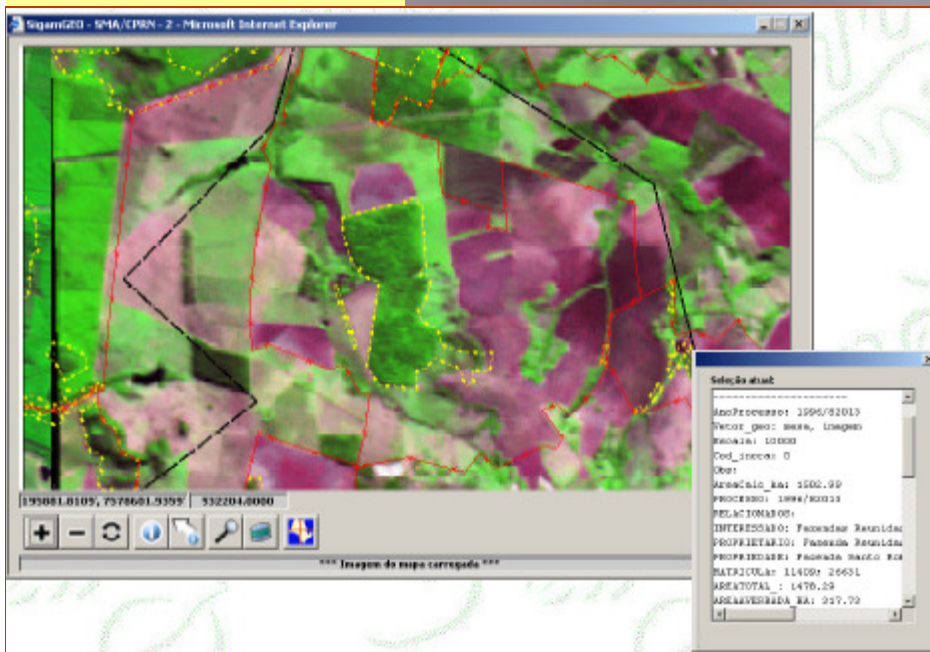
nonCategoria	nonStatus	nonEmpresa
EIA E RIMA	Em análise	Porto de Areia Abaeté - Fazenda Santa Teresa
EIA E RIMA	Em análise	Extração e Comércio de Areia Santa Teresa
EIA E RIMA	Em análise	Transm - Extração e comércio de Areia e Transporte Rodoviário
EIA E RIMA	Em análise	Extração - Extração, Com. Comércio e Transporte de Areia - Bairro Fig...
EIA E RIMA	Aprovado	Porto de Areia Graminha - Bairro Paracatu Vermelho
EIA E RIMA	Em análise	Rialda - Com. Comércio de Areia, Pedra e Tijolo - Bairro Paracatu Vermelho
EIA E RIMA	Em análise	Extração de Areia Areibir - estrada municipal Gravina
EIA E RIMA	Em análise	Novareia - Com. Comércio e Extração de Areia - Cibra I
EIA E RIMA	Aprovado	Porto de Areia Galbal Ltda

idProj	nonNumero	non...	nonCategoria	nonEmpresa	nonMunic...
SMA	00007020	1990	EIA E RIMA	Extração e Com. Comércio de Areia Vale do...	TALMATA
SMA	00007020	1990	EIA E RIMA	Mineração de Areia Extração do Sítio LU...	TALMATA
SMA	00007020	1990	EIA E RIMA	San Marco - Extração e Comércio de Are...	TALMATA
SMA	00007020	1990	EIA E RIMA	Mineração de Areia Para Extração do Sítio LU...	TALMATA
SMA	00007090	1992	EIA E RIMA	PORTO de Areia Tubarão Ltda	TALMATA
SMA	00007192	1991	EIA E RIMA	Sao Luiz Com. Comércio de Areia Ltda - Extra...	TALMATA

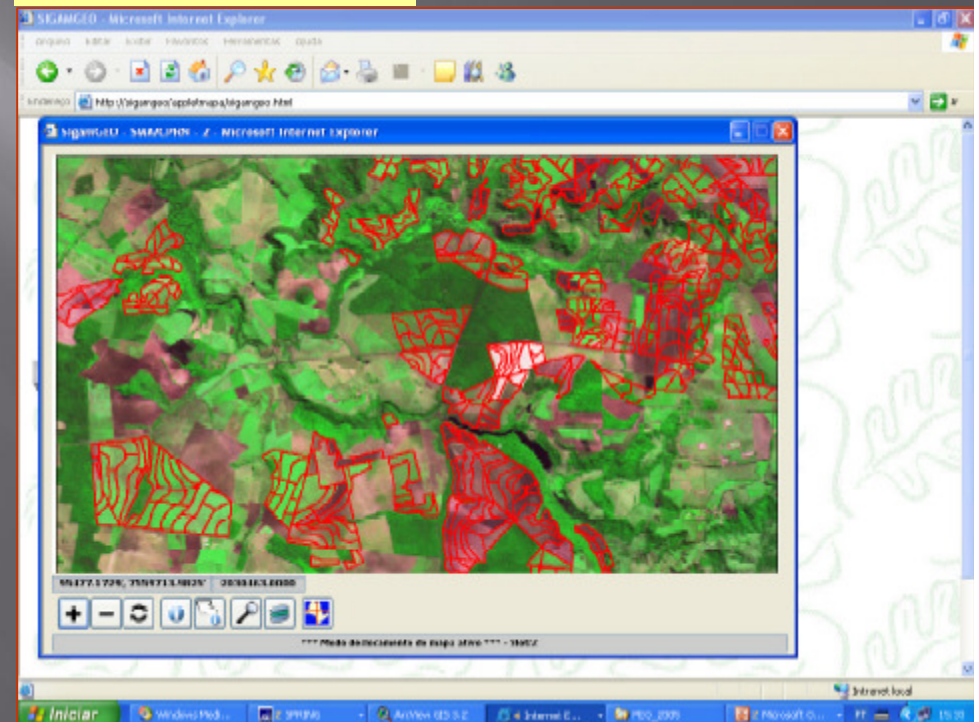


- Environmental Database updating
  - Before CBERS: each 3 to 4 years
  - After CBERS: annual basis

## Protected areas



## Licensing maps

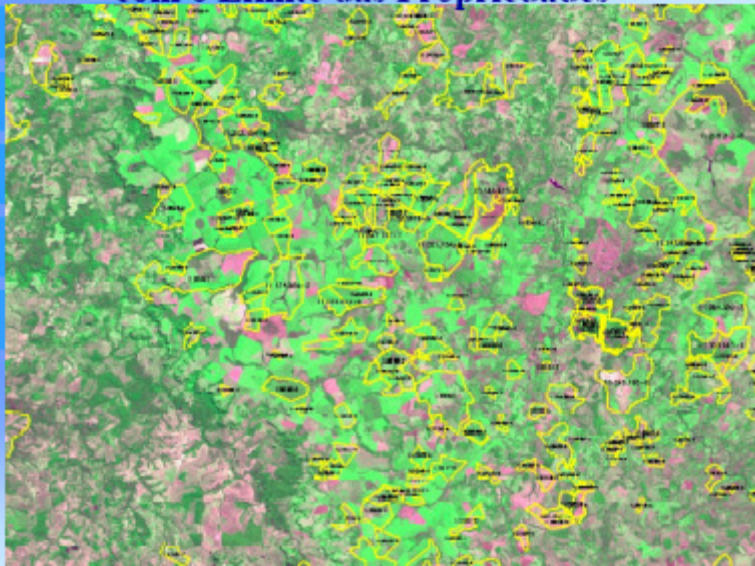




## Agriculture monitoring for controlling purposes

•2,000 (90%) farmers are  
monitored

### Imagem do Satélite CBERS - Município de Jataí com o Limite das Propriedades



CBERS/CCD - Órbita 161 e ponto 120, data de passagem em 14/05/2005



ESTADO DE GOIÁS  
SECRETARIA DE ESTADO DA FAZENDA  
SUPERINTENDÊNCIA DE GESTÃO DA AÇÃO FISCAL  
DELEGACIA REGIONAL FISCAL DE MINEIROS

## Notification

RAZÃO SOCIAL: **Fazenda Paraíso**

SOCIO: André Luiz M. da Silva

CCE: 11.019.072-6

ENDEREÇO: **Rua J-17 Qd. 5 lote 10 – Mineiros - GO**

De acordo com o disposto nos Artigos 145, 147 inciso II e 151, da Lei n.º 11651/91 – Código Tributário do Estado de Goiás e nos artigos 1º e 5º da IN 549/02-GSF, fica o contribuinte acima identificado NOTIFICADO a apresentar ao servidor fiscal a que esta subscrive, os seguintes documentos :

Notas fiscais de saída de janeiro de 2003 até a presente data, no prazo improrrogável de 10 dias;

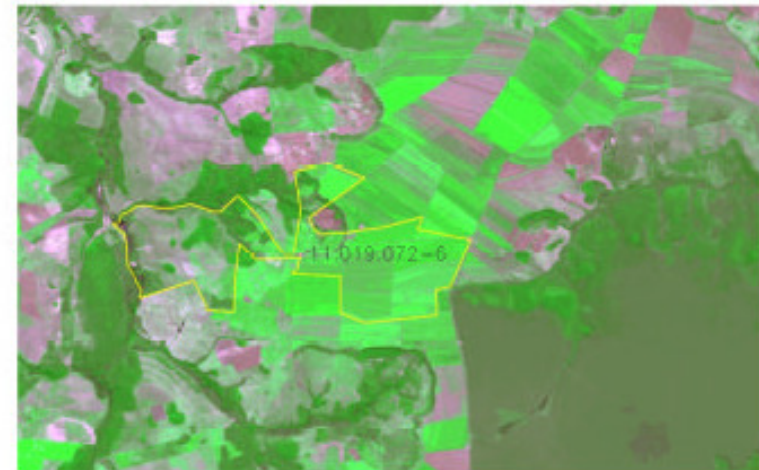
Podem ser entregues cópias dos documentos, as quais devem estar acompanhadas dos originais para autenticação pelo funcionário receptor.

O não cumprimento da presente notificação implicará a penalidade prevista no Artigo 71, inciso XV, alínea "a" da Lei 11651/91, de 26 de dezembro de 1991.

Mineiros

Local, Data

Agente do Fisco



Área plantada de aproximadamente 2000 ha  
Imagem CBERS, maio de 2005

Propriedade **Fazenda Paraíso**



# CBERS/HRC: High Resolution



São Paulo Airport - HRC/CBERS-2B



# Key Notes

- ▣ **There is an enormous demand for remote sensing data in the world**
- ▣ The open data distribution policy adopted in Brasil became an instrumental tool for market development
- ▣ **Free on-line data access significantly increased the number of users of earth observation data in Brazil**



# Key Notes

- ▣ Free data enabled new businesses development in Brazil and widened the market for value-added Earth observation products
- ▣ **The current reality of the market for Earth Observation data and products in Brazil is a reflex of the country's free distribution policy**
- ▣ Even though the Brazilian experience is mostly in the use of medium resolution images, the current market indicators should provide a good idea of the potential market for high resolution images in the country



# Brazilian Remote Sensing Symposium

Meeting	Venue	Total
X SBSR - 2001	Foz do Iguaçu, PR	510
XI SBSR - 2003	Belo Horizonte, MG	810
XII SBSR - 2005	Goiânia, GO	1,100
XIII SBSR - 2007	Florianópolis, SC	1,200
XIV SBSR - 2009	Natal, RN	1,406
XV SBSR - 2011	Curitiba, PR	1,610

## XV SBSR

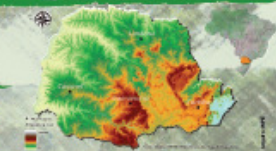
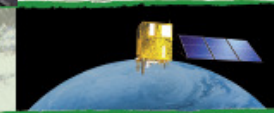
**Submitted papers:** 1,547  
**Papers accepted:** 1,207 (78%)  
**Registrations:** 1,610  
**Oral Sessions:** 24 sessions (99% presentations)  
**Poster Sessions:** 991 papers (+90% presentations)

# XV SBSR

Brazilian Remote Sensing Symposium

April 30 to May 5, 2011

Estação Embratel Convention Center



Papers submission  
deadline:  
November 10, 2010



[www.dsr.inpe.br/sbsr2011](http://www.dsr.inpe.br/sbsr2011)

2013  
Foz do  
Iguaçu





# Thank you

