MINISTÉRIO DA CIÊNCIA E TECNOLOGIA
INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

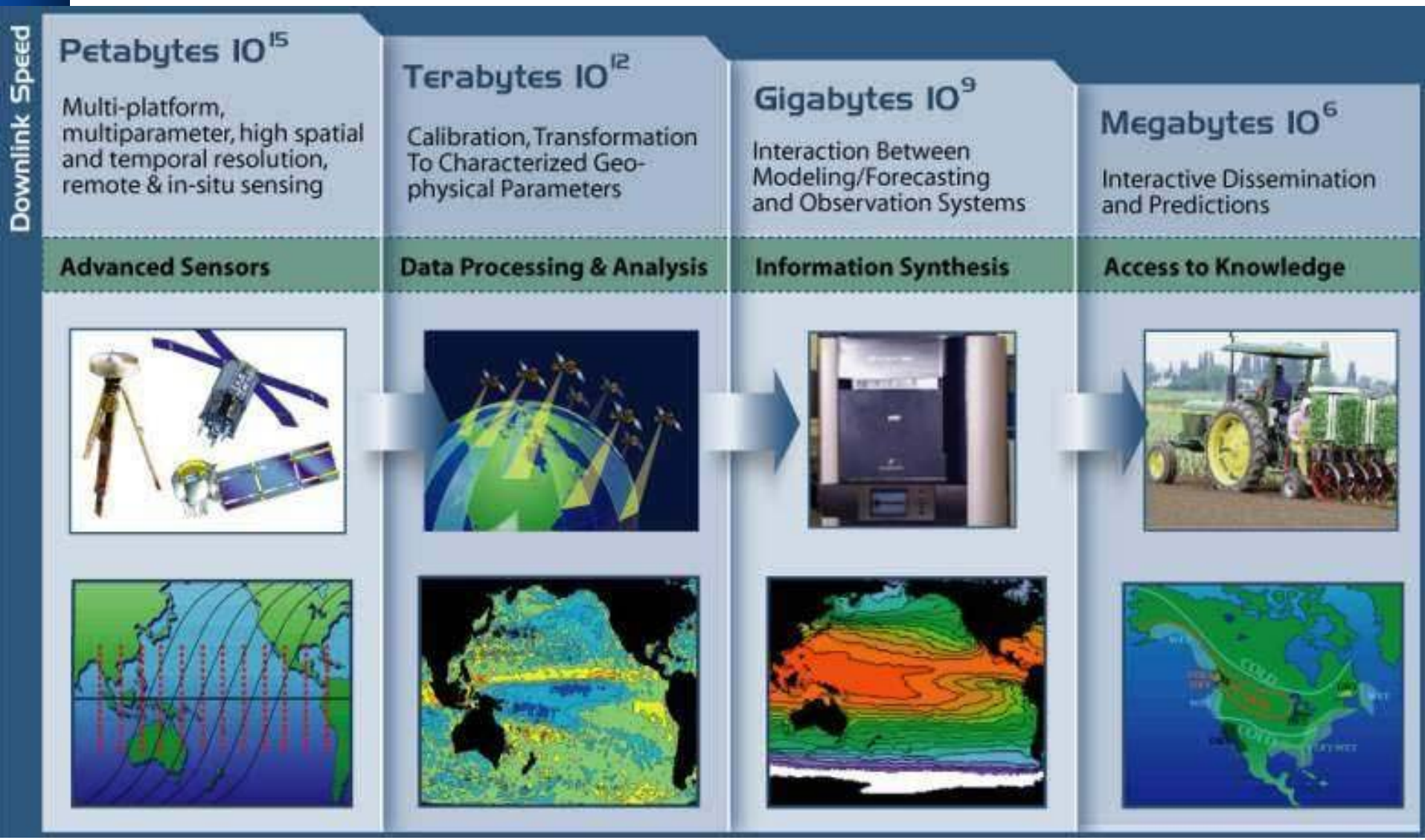
GEO Capacity Building Workshop, May 2006

The CBERS satellite, data policy and social benefits

Gilberto Câmara

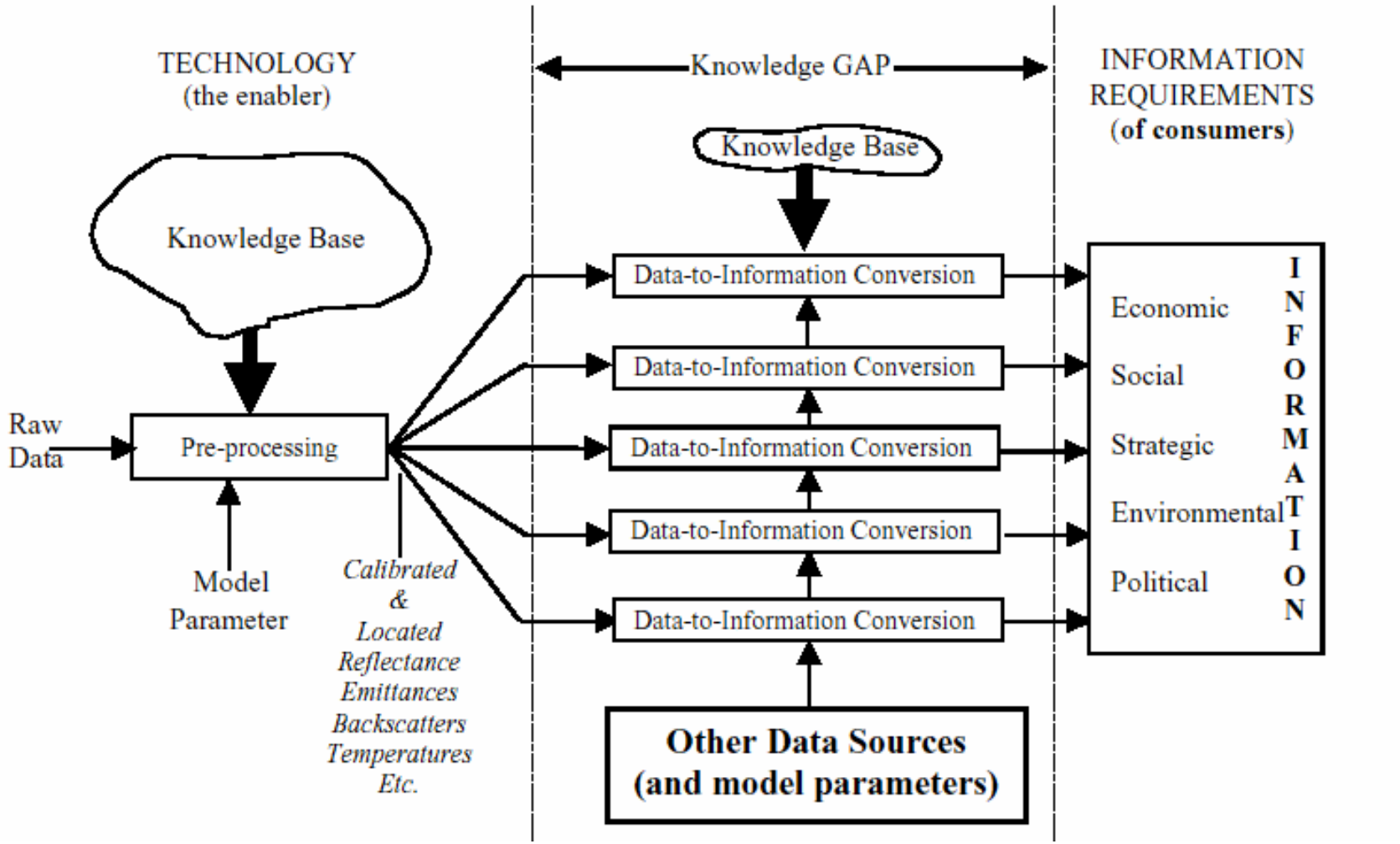
Director, National Institute for Space Research

From EO to societal benefits



source: NASA

Knowledge gap in Earh Observation



source: John McDonald (MDA)

The key question

How do we build capacity building in Earth Observation?

- Our answer: Make all sectors of society use publically funded EO data...
- ...by removing the barriers to entry!

Barriers to entry in Earth Observation

- Lack of data
  - Much EO data is expensive or unavailable
- Lack of tools
  - Good software is required to explore EO data
- Lack of expertise
  - We need to build capacity at a massive scale

Removing the barriers to entry

- Lack of data
  - Make EO data free!
- Lack of tools
  - Produce good open source software for EO data handling!
- Lack of expertise
  - Provide open access to on-line training and to scientific literature!

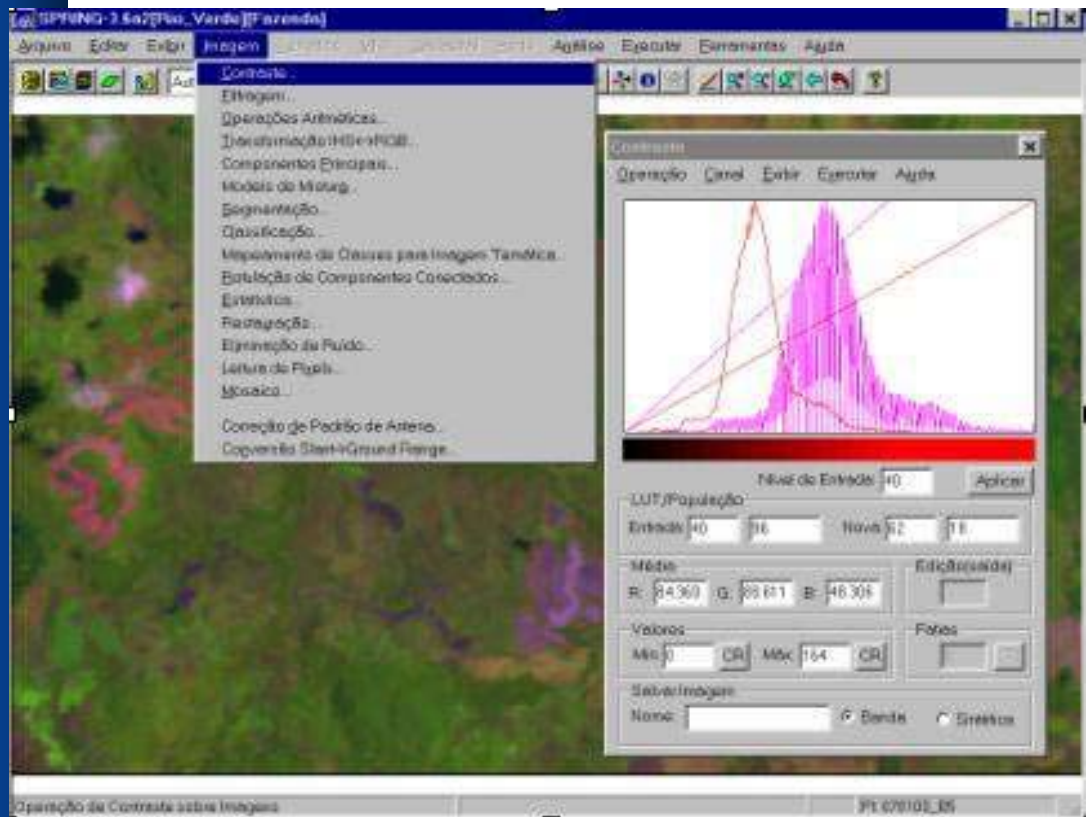
The “White-Box” Model

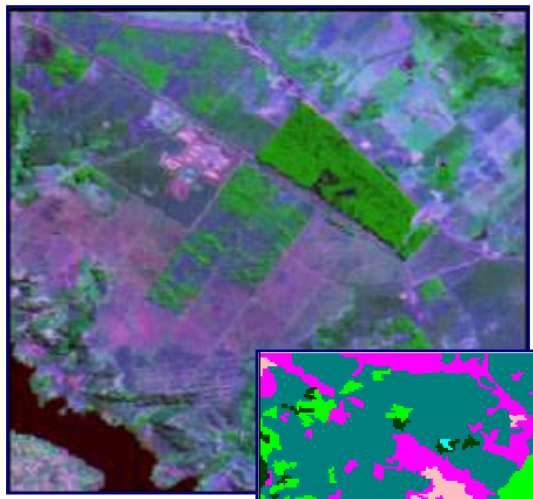
results = people + data + software

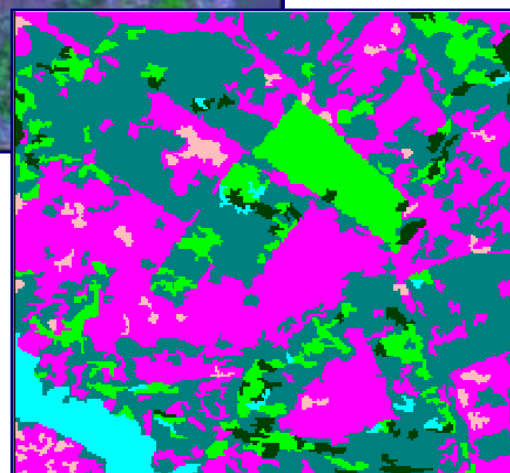
- People
  - “Learning by Doing” x “Learning by Using”
- Data
  - Timely and free geospatial data sets
- Software
  - Adequate data analysis and Integration

Tools Challenge

- SPRING – Image processing and GIS software.
  - Multi-platform (Windows, Linux, Solaris)
  - Web: http://www.dpi.inpe.br/spring (25.000 downloads)







Tools Challenge

- Why Open-Source GIS?
- “Deadlock” situation
  - Small size of commercial earth observation markert
    - Not enough income for R&D investment
  - Improvements on information extraction
    - Needed for the market to grow
- Knowledge extraction procedures
  - very little technological innovation
  - limited academic research in EO-GIS integration

The Expertise Challenge

- Academic institutions in US and Europe
  - producing qualified personnel for developing world
  - graduates of these institutions have initiated their own research groups in their native countries
  - needed and useful: Should continue
  - provides only a limited capacity to respond to developing world needs

The Expertise Challenge

- Research system in the developed world
  - discourages the production of training material
  - there are good books on GIS and Remote Sensing!
  - unfortunately, these books are in English and are expensive
- Need for innovative responses
  - Open-source (on-line) books in many languages
- Brazilian experience
  - three-volume set (“Introduction to GIS”, “Spatial Analysis”, “Spatial Databases”)

The need for global land observation

- The world is changing rapidly
  - Climate Change is here to stay
- Global land observation is a crucial need for the world, but its future is uncertain
  - MODIS is very useful,but has no future
  - What will happen to LANDSAT?
- Global land observation systems are a public good

Uncle Scrooge and the Internet

- Uncle Scrooge:

  "A penny saved is a penny earned"

- The anti-Uncle Scrooge principle:

  "A pixel saved is a penny wasted"

- Why is that so?
  - "Value comes from use"

The Internet paradox

- The Internet has reduced the cost of data distribution to very close to zero
- Society responds very quickly to open availability of free data and good on the Web

Brazilian and Chinese Strategy for CBERS

- CBERS images received in Brasil are freely available on the Internet for Brazilian and Latin American users
- CBERS images received in China are freely available on the Internet for Chinese users
- A high-quality image processing software (SPRING) is also available free on the Internet in Brazil

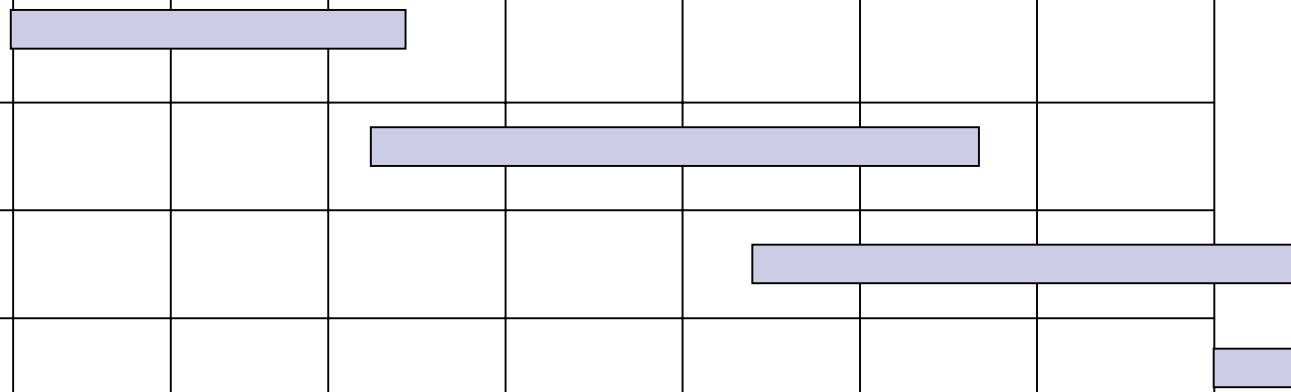
CBERS: China-Brazil Earth Resources Satellite

- Brief History
  - Initial agreement signed in July 6th, 1988, covering CBERS-1 and 2.
  - In 2002, both governments decided to expand the initial agreement by including CBERS-3 and 4.

- Program objectives
  - Build a family of remote sensing satellites to support the needs of users in earth resources applications
  - Improve the industrial capabilities of space technology in Brazil and China

CBERS Program Timeline

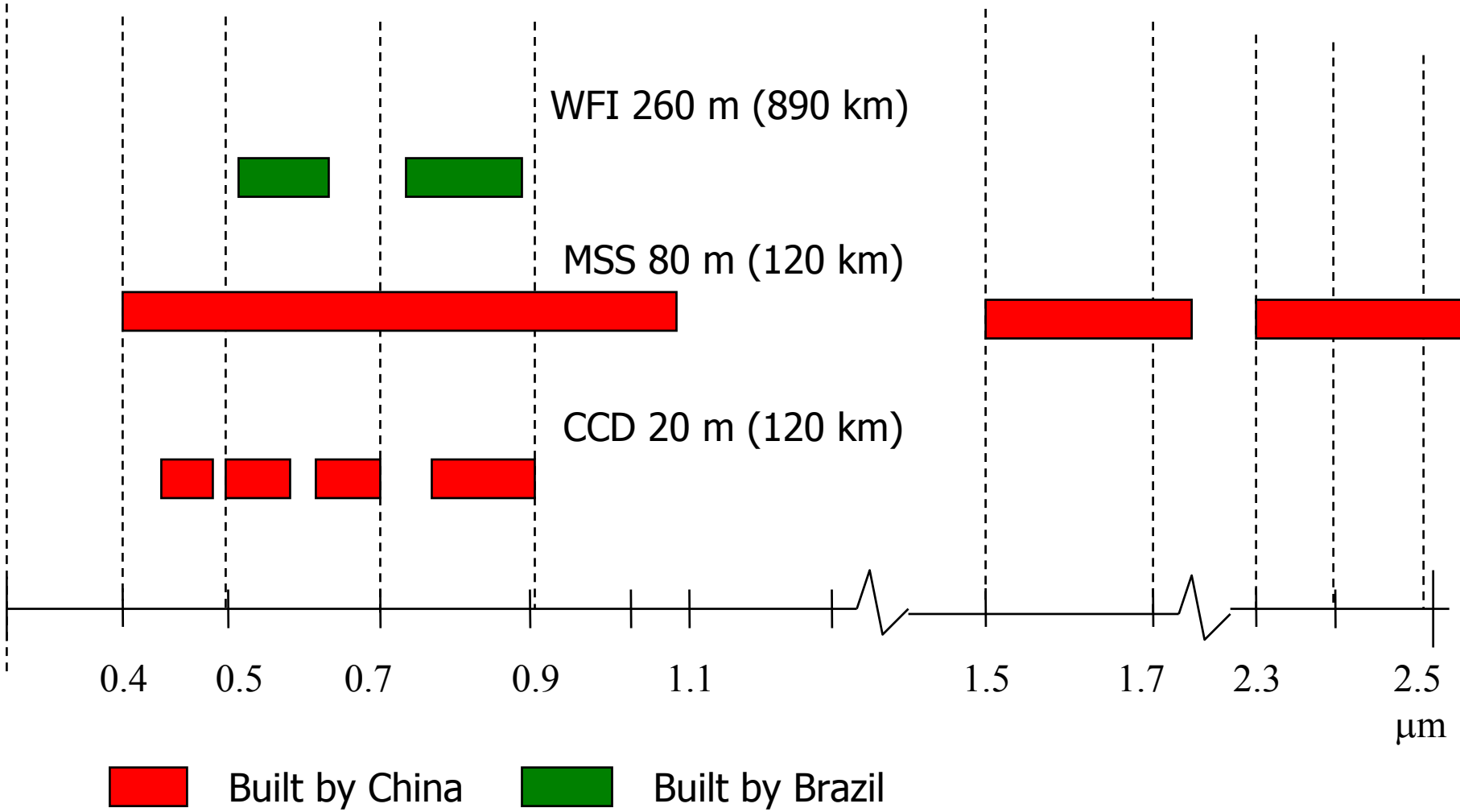
	Launch Date	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*
CBERS-1	1999							
CBERS-2	2003							
CBERS-2B	2007							
CBERS-3	2008							
CBERS-4	2012							



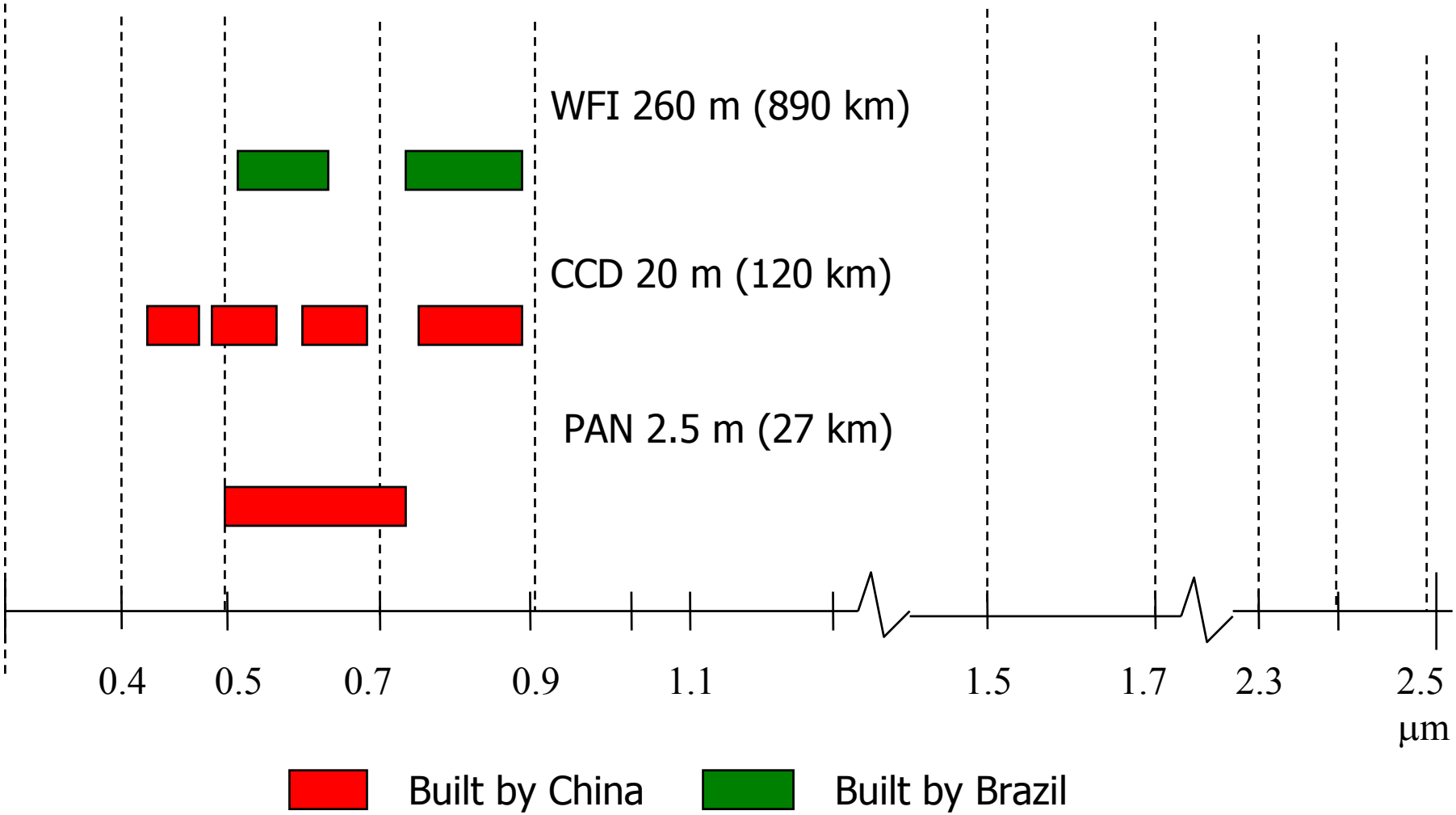
CBERS-2

CBERS-2 Launch
(21 October 2003)

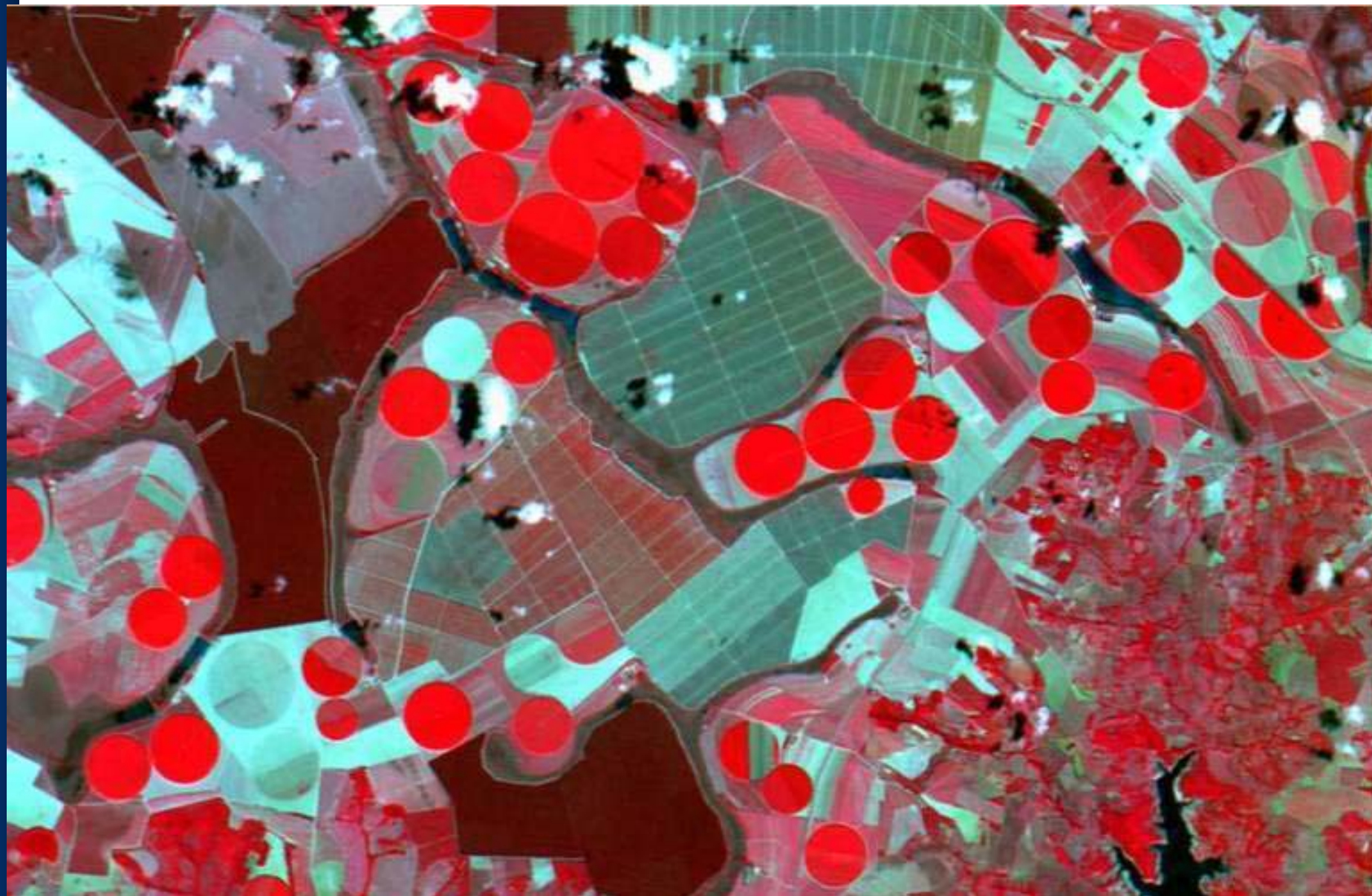
CBERS 1,2 Sensor Configuration

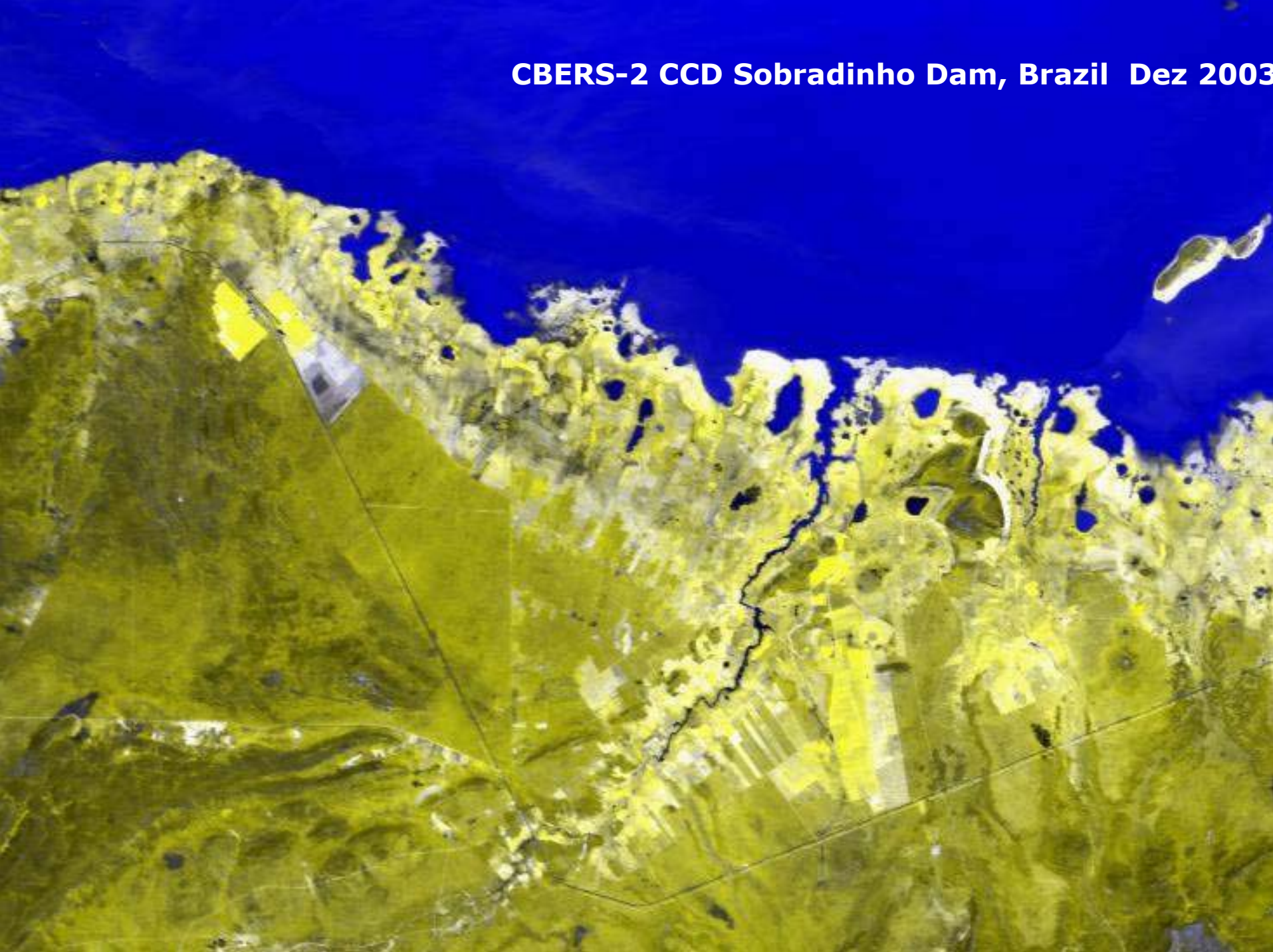


CBERS-2B Sensor Configuration



CBERS-2 CCD, Minas Gerais, Brazil




CBERS-2 CCD Sobradinho Dam, Brazil Dez 2003

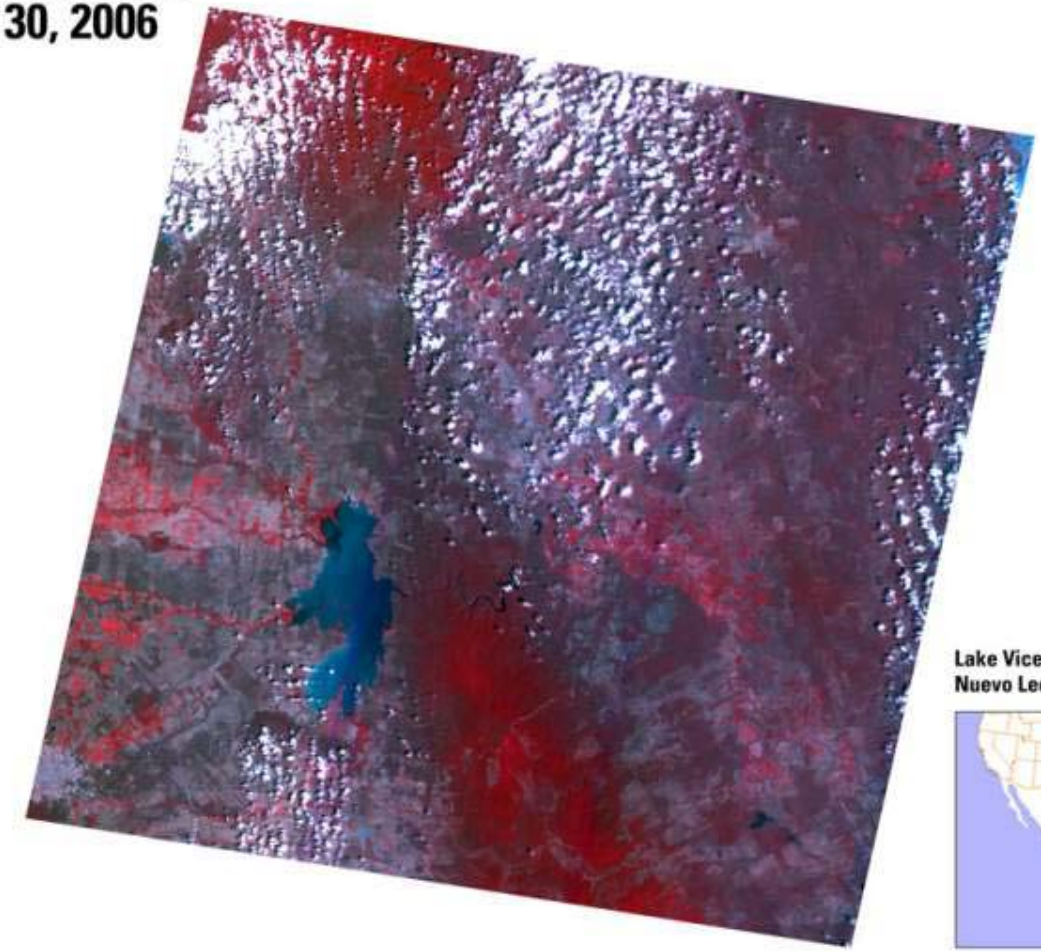
- CBERS-2 image from Louisiana, EUA
- Obtained from on-board data recorder

USGS
science for a changing world

CBERS-2 data downlinked to USGS EROS

Path 218, Row 73

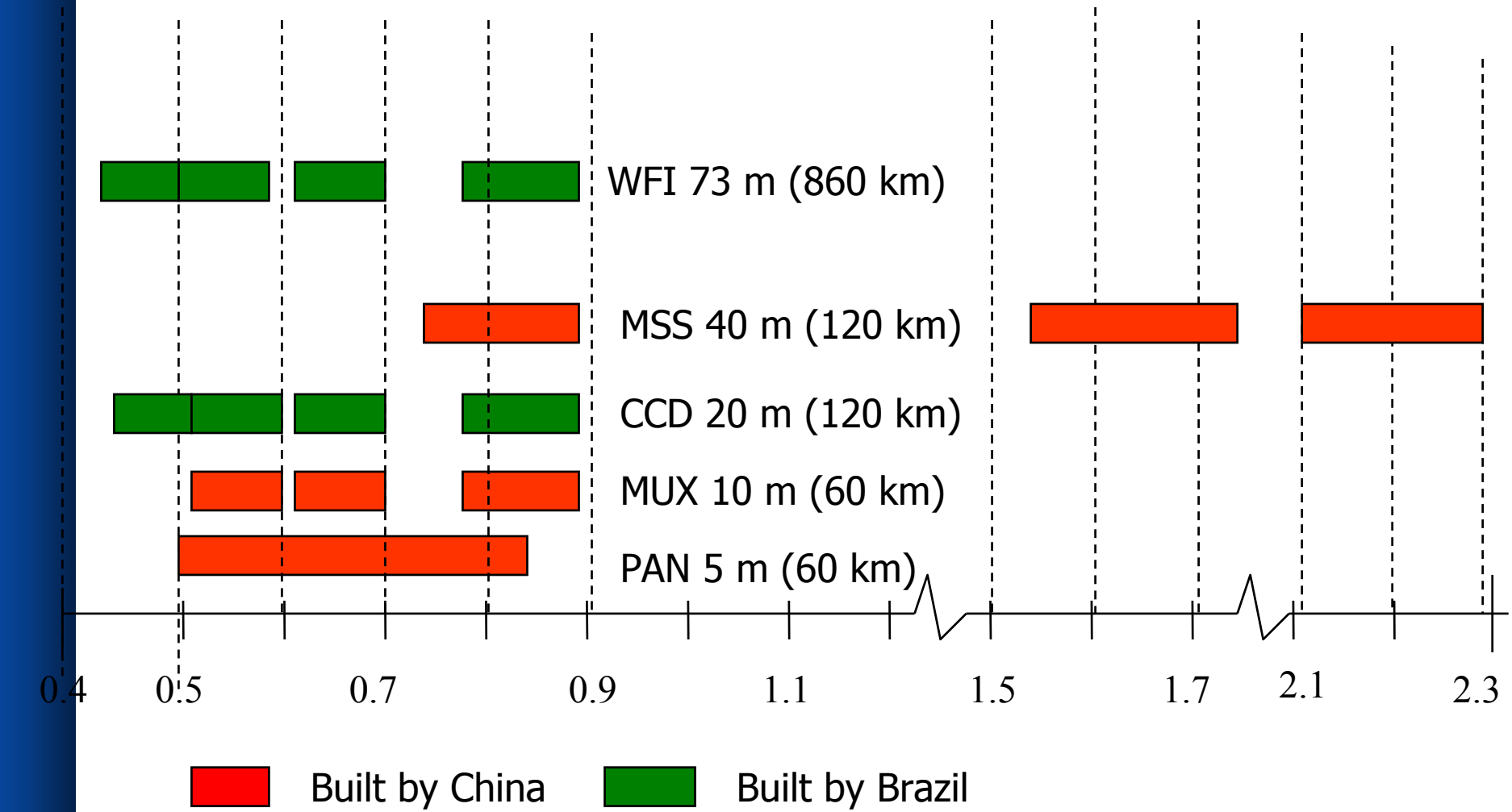
March 30, 2006



Lake Vicente Guerraro,
Nuevo Leon, Mexico

U.S. Department of the Interior
U.S. Geological Survey

CBERS 3 – 4 Sensor Configuration

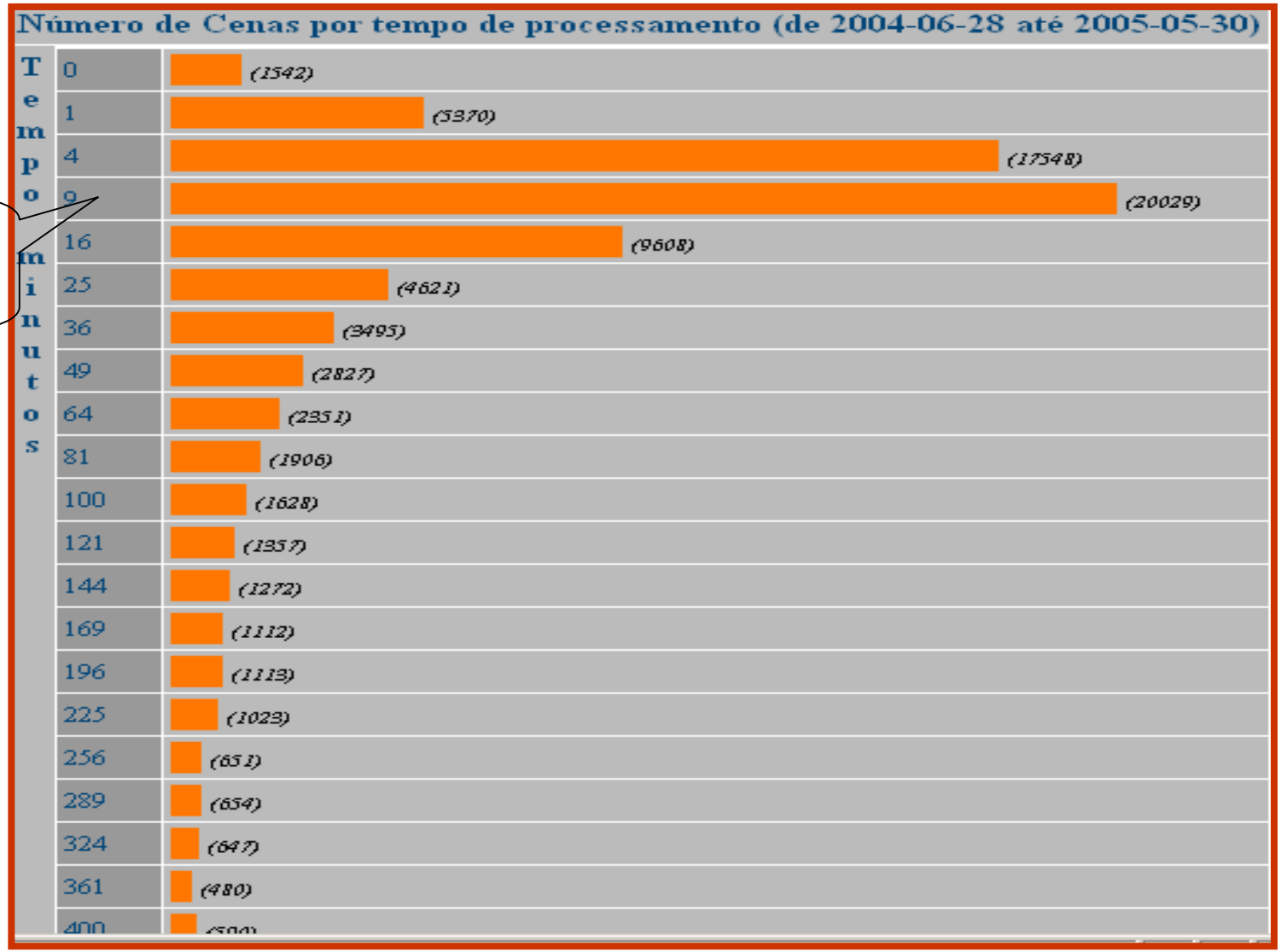


CBERS Image Distribution in Brazil (1st May 2004 to 1st May 2006)

Total number of full CCD scenes distributed (145 Mb/scene)	210,000
Number of institutions and companies	4,500
Number of scenes produced per week	2170
Average time to process a user request	10 min
Production environment	8 PCs/Linux

Time to respond an image request

9 minutes



Catálogo de Imagens

INPE Catálogo de Imagens

Cadastro | Log In | Carrinho | Ajuda

Parâmetros Básicos

Satélite: CBERS 2

Instrumento:

Intervalo de Tempo: Sazonal

De: 05 / 1999

Até: 05 / 2004

Cobertura de Nuvens Máxima

Q2

Q4

Quick Look: Pequeno / Grande

Município | **Estado**

o paulo

Executar

Órbita | **Ponto**

Até | De | Até

Executar

Por Região

Norte: 10.

Oeste: -90. Leste: -30.

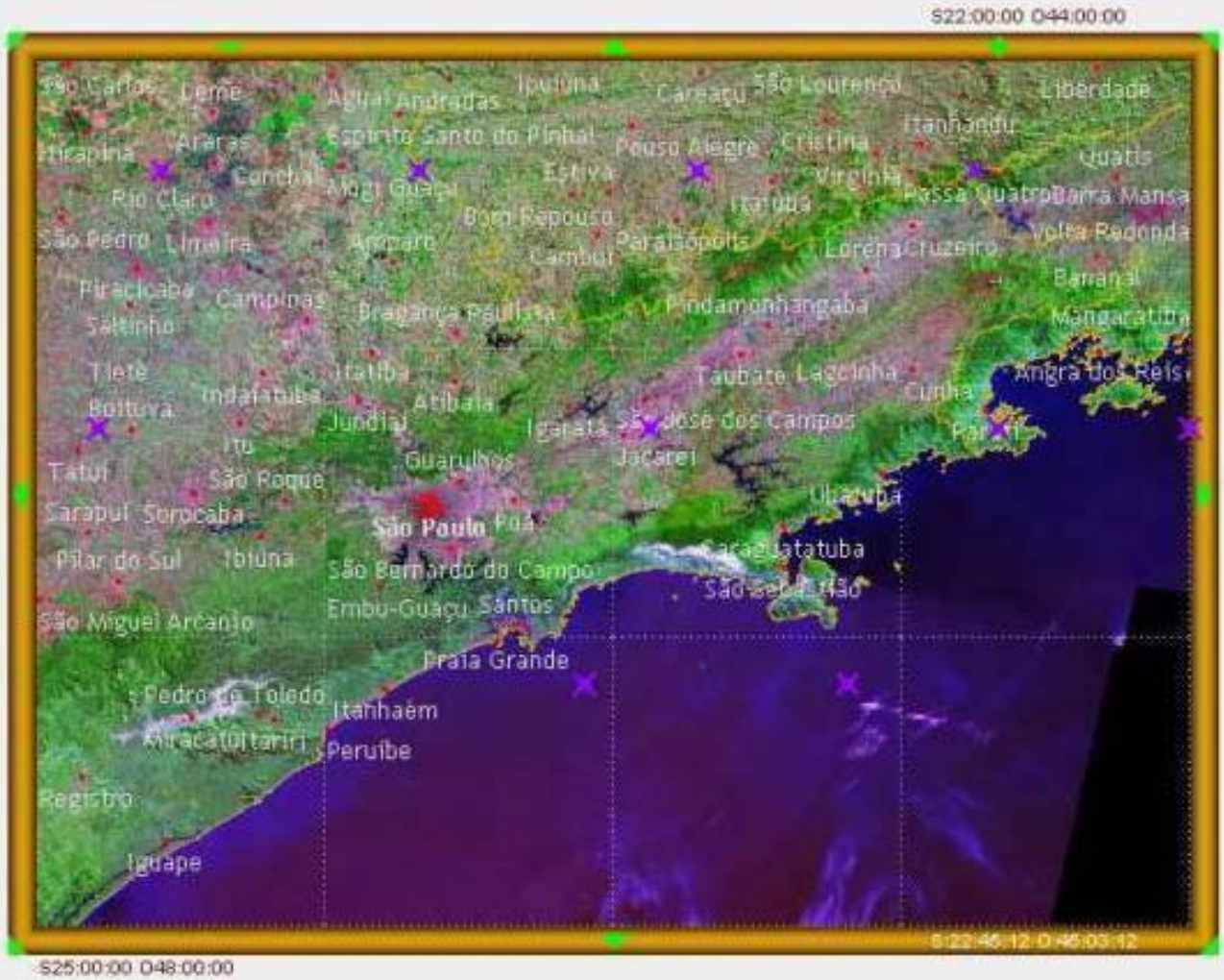
Sul: -40.

Executar

Interface Gráfica

Lat: -23.548 Lon: -46.636

Navegar



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Sul: -40.

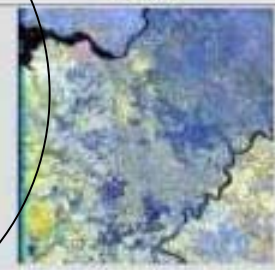
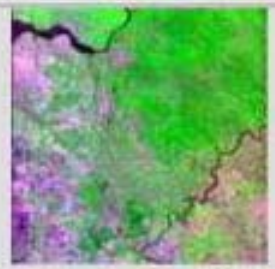
Executar

Interface Gráfica

Lat: -28.021 Lon: -54.936

Navegar

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
			
CB2CCD 162/131-2004-01-03	CB2IRM 162/131-2004-01-03	CB2CCD 162/131-2003-11-12	
			

Cadastro de Cenas

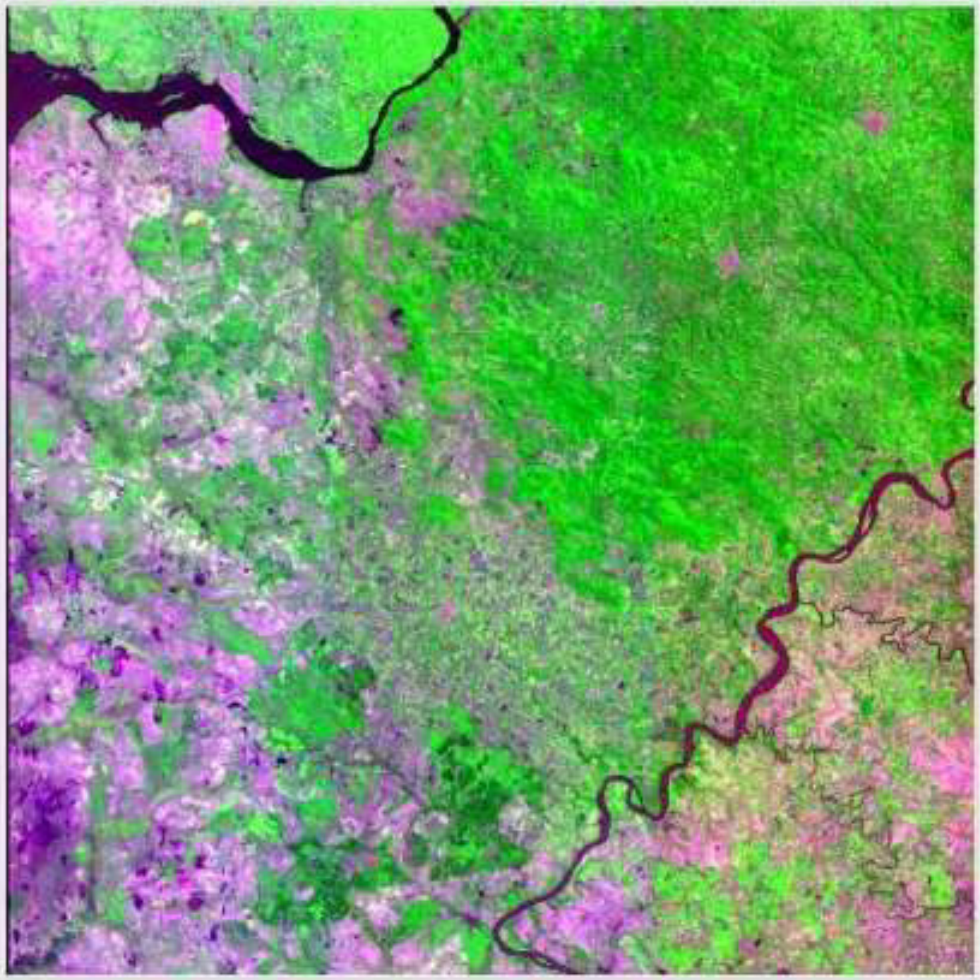
Satélite	CB2
Sensor	CCD
Órbita	162
Ponto	131
Data de Passagem	2004-02-24
Revolução	1814
Latitude Norte	-27.13910
Longitude Oeste	-56.19860
Latitude Sul	-28.30930
Longitude Leste	-55.32020
Tempo Central(GMT)	13:47:07
Orientação da Imagem	8.50435
Azimute Solar	65.218
Elevação Solar	55.1644
Perda de Bits	
Varreduras Perdidas	
Varreduras Perdidas (%)	
Perda de Sincronismo	

Cobertura de Nuvens

Q1 14	Q2 0
Q3 11	Q4 6

ado de Cobertura de Nuvem A

Colocar no Carrinho



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

Catálogo de Imagens

Portugues

INPE Catálogo de Imagens

Cadastro | Log In | Carrinho | ? Ajuda

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

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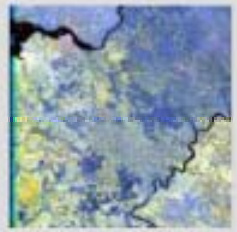
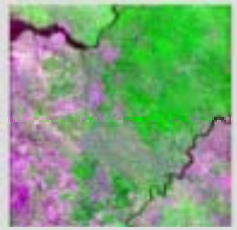
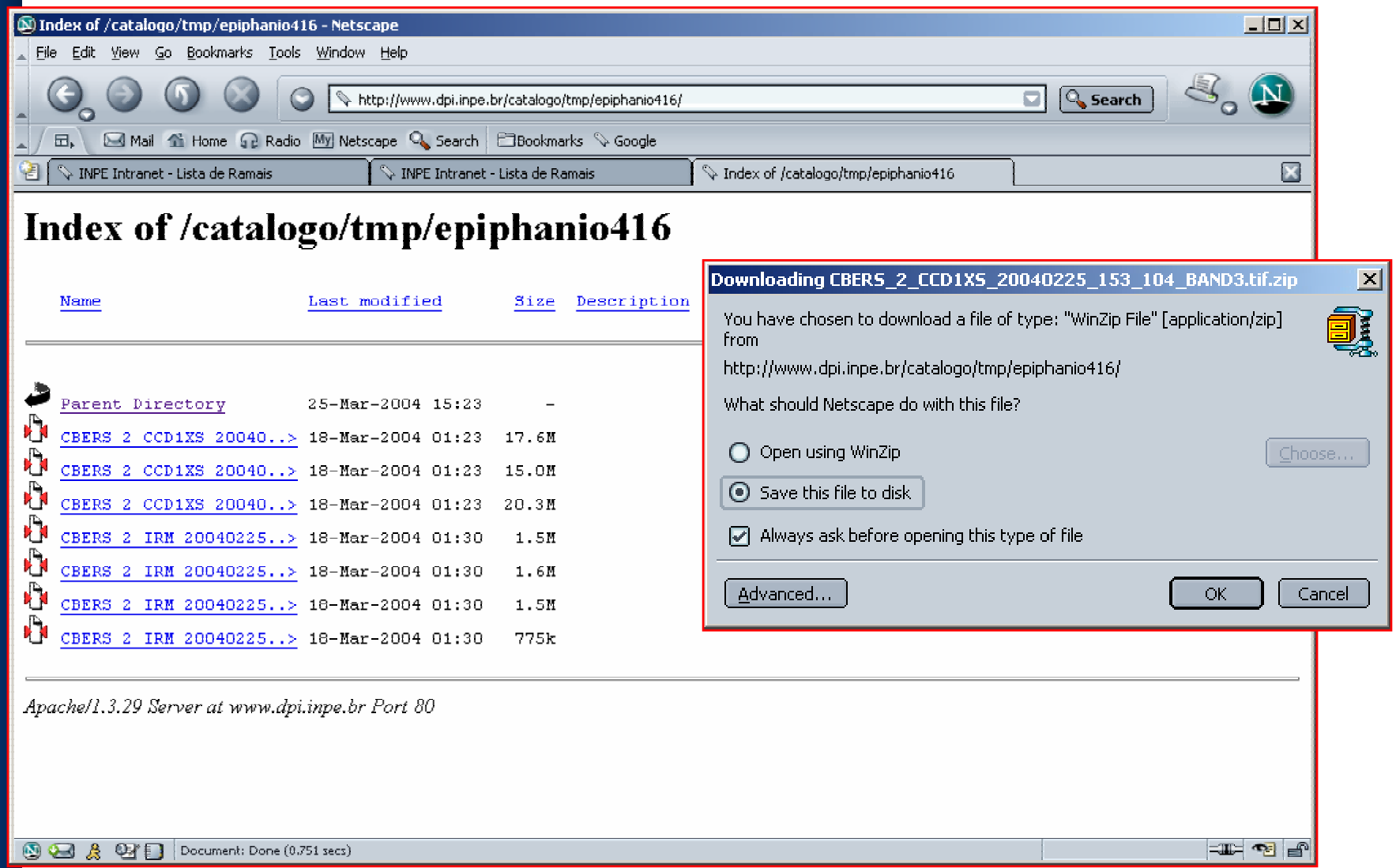
Navegar

CB2	IRM	162	131	2004-03-21			Suprimir
CB2	CCD	162	131	2004-03-21			Suprimir
CB2	CCD	162	131	2004-02-24			Suprimir
CB2	IRM	162	131	2004-02-24			Suprimir

Pedido

Clique no botão Pedido e você receberá uma messagem com os links para as imagens que você pediu.

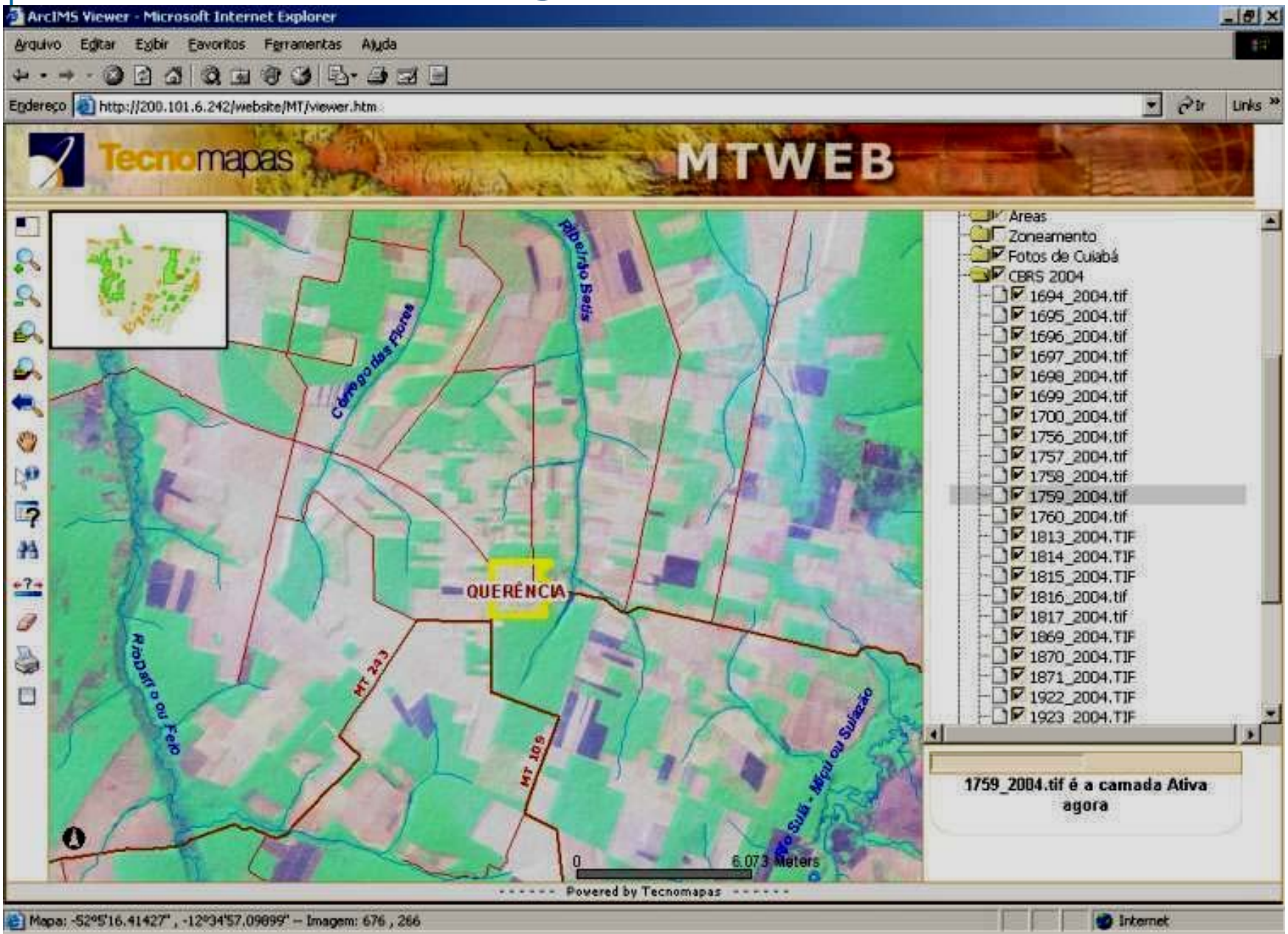
FTP area for User



User Distribution(%)

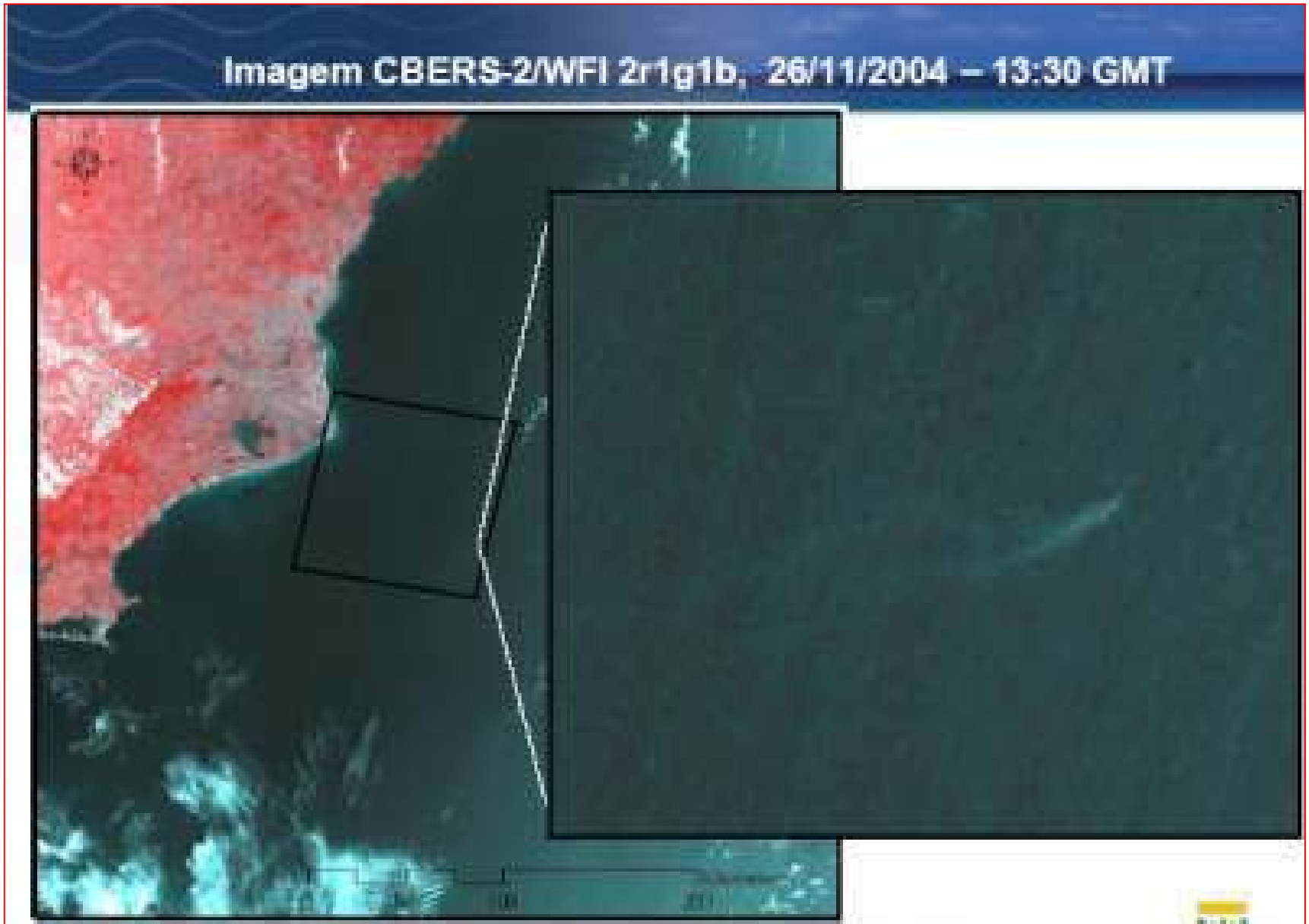
Government Institutions	23%
Educational Sector	26%
Private Companies	51%

Private Farm Management



Tax Enforcement in Agriculture

Oil Spill Monitoring (Large Swath Data)



Propaganda and Marketing

What do we get from free data?

- *"With zero cost data access, technology dissemination has a much greater impact."*
- *"CBERS brought the freedom to have data immediately available when you need it."*

- Free EO data and free EO technology create new users and new applications
- Increases the need for other types of EO data

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 work quality by adding data previously unavailable

What have we learned?

- There is an enormous demand for remote sensing data in developing countries
- Free on-line data access can significantly increase the number of users of earth observation data
- The CBERS data policy has been extremely well-received by government and society in Brazil

One world, one dream...

Free Earth Observation data for all!

One world, one dream...

- A consortium of Earth Observation satellites for global land observation (5m+)
- A network of cooperating ground stations
- EO data free on the Internet, with global weekly coverage


thank you !
谢谢！
São Paulo – Rio Janeiro
(WFI)