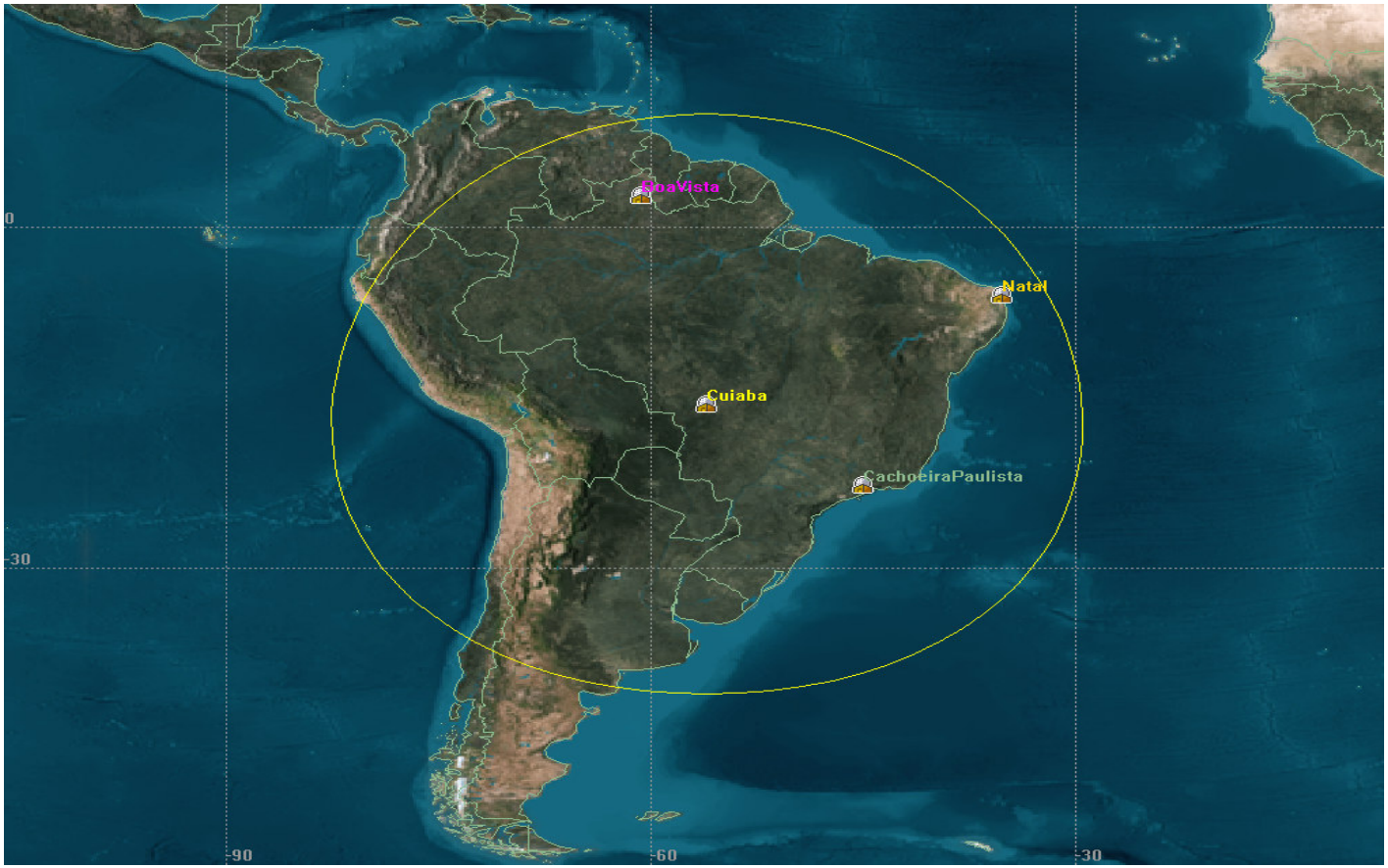
Status of CBERS-2B

Data reception, archiving, processing, and distribution

JACIE 2008, Fairfax, USA

INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

CBERS-2B Reception



INPE INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

INPE Ground Station

Reception Facilities in Cuiabá
Geodetic center of South America

INPE INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

Receiving Station

Main characteristics

- 3.6m Seaspace antenna
- 10.0m and 11.8m Viasat antennas
- Tracking from about 0º
- 3 receiving channels at 375MHz IF
- 2 receiving channels at 720MHz IF

Currently receiving

- Landsat-5, CBERS-2, CBERS-2B
- Aqua and Terra
- Radarsat-1 (eventually, upon request from MDA)

CBERS-2B Ingestion and Archiving

MS^3 Multi Satellite Station System (KEPLER ES)

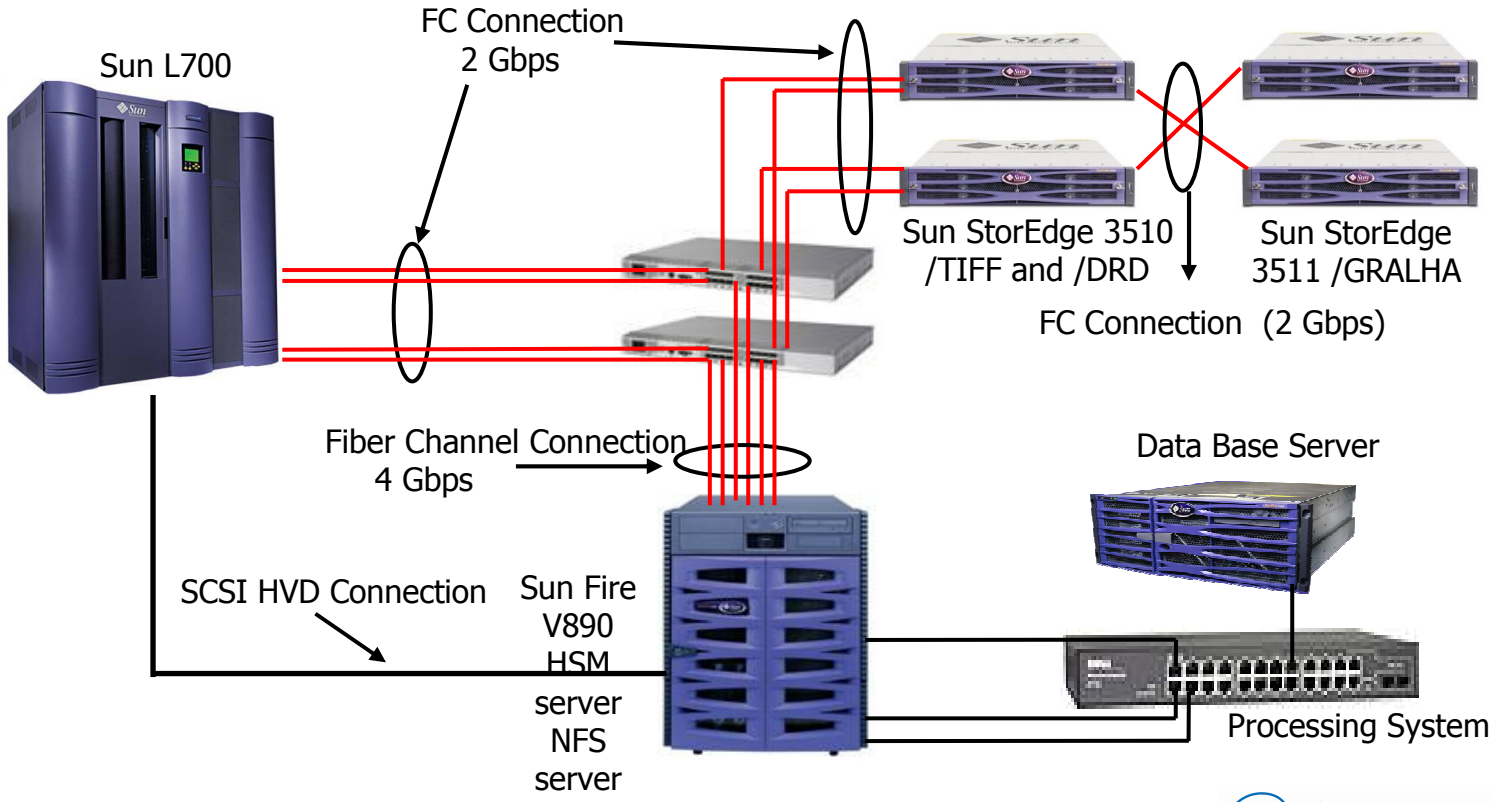
- CBERS-2 and 2B, Landsat-5 and 7, Radarsat-1, SPOT-4
- Capture board: up to 400 Mbps (EDT PCI GP SSE 400)
- Based on open source and standards: Linux, GCC, HDF
- Moving window display (except Radarsat-1 and SPOT-4)
- DRD and RCC formats

DAS Direct and Archive System (MDA)

- Landsat-5, Spot-4, Radarsat-1, ERS-1 and 2
- Capture board: up to 150 Mbps

Archiving

Remote Sensing Data Center (CDSR)



INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

Archiving

CDSR Architecture

- L700 Tape Library
  - 700 tapes LTO3 (from 400GB to 800GB, depending on the compression rate achieved)
  - Drives: 4 x LTO3
  - 215TB used at this moment
- Disk Space
  - 11TB total (1.1TB DRD, 7.1TB GRALHA, 2.8TB GEOTIFF)
- HSM Server
  - Sun Fire V890 (8 UltraSPARC IV, dual-core, 32GB)
- Data Base Server (MySQL) : Sun Fire V440

Archiving

Data Archived in the Tape Library (L700)

- DRD (Dated Raw Data) format
  - 21,744GB (CBERS-2), 5,004GB (CBERS-2B), 918GB (Landsat-1), 2,534GB (Landsat-2), 1,372GB (Landsat-3), 38, 645GB (Landsat-5), 3,595GB (Landsat-7)
- GRALHA format (HDF)
  - 8.3TB (all satellites)
- GeoTIFF products
  - 2,408GB (CBERS-2), 644GB (CBERS-2B), 695GB (Landsat-1/2/3), 19,381GB (Landsat-5), 1,085GB (Landsat-7)
- CADU (MODIS)
  - 2,926GB (Terra), 3,191GB (Aqua)

Archiving

CDSR Data Availability

- Web-enabled Internet Access
  - Landsat-1/2/3 catalogued images are available for HTTP download
  - CBERS-2/2B catalogued images are available for HTTP download
  - Landsat-4/5/7 images are being processed and catalogued for HTTP download
- Scenes approved by quality control (cloud cover) are processed and stored as standard GeoTIFF products for immediate download

CBERS-2B Processing

Processing Facilities in Cachoeira Paulista

Processing Systems

MS^3 Processing System (KEPLER ES)

- CBERS-2 and 2B, Landsat-1, 2, 3, 4, 5, and 7
- IBM-PC platform (distributed processing system, presently 18 computers)
- Based on open source and standards: Linux, GCC, HDF, GeoTIFF, XML, Apache, PHP, Perl
- Processing controlled from a user-friendly web interface

Product Generation and Catalog (MDA)

- Currently not being used
- SGI platform: Origin 200 and 2000

Processing Systems

MS^3 Processing System (KEPLER ES)

G2T: Gralha to TIFF product

Marlin: image visualization and evaluation

Sailfish: sensor characterization, sensor simulation, and image analysis.

Processing Systems

Level 0 – GRALHA (HDF)

raw image + auxiliary + calibration data

Level 1 – Radiometric correction (TIFF)

CCD – radiometric problem in the overlap area of the arrays

Level 2 – System geometric correction

Level 3 – GCP geometric correction

CCD – database over the whole country

Level 4 – Ortho-image

CCD – use the SRTM

Processing Systems

>98% Engineering group (satellite built)
<2% Sensor characterization campaign,
sensor calibration campaign,
software development and updates,
and application program.

To create a group with the responsibility of sensor characterization, sensor calibration, and image evaluation and analysis

Processing Systems

More intensive participation during the pre-launch sensor calibration tests (radiometric and geometric)

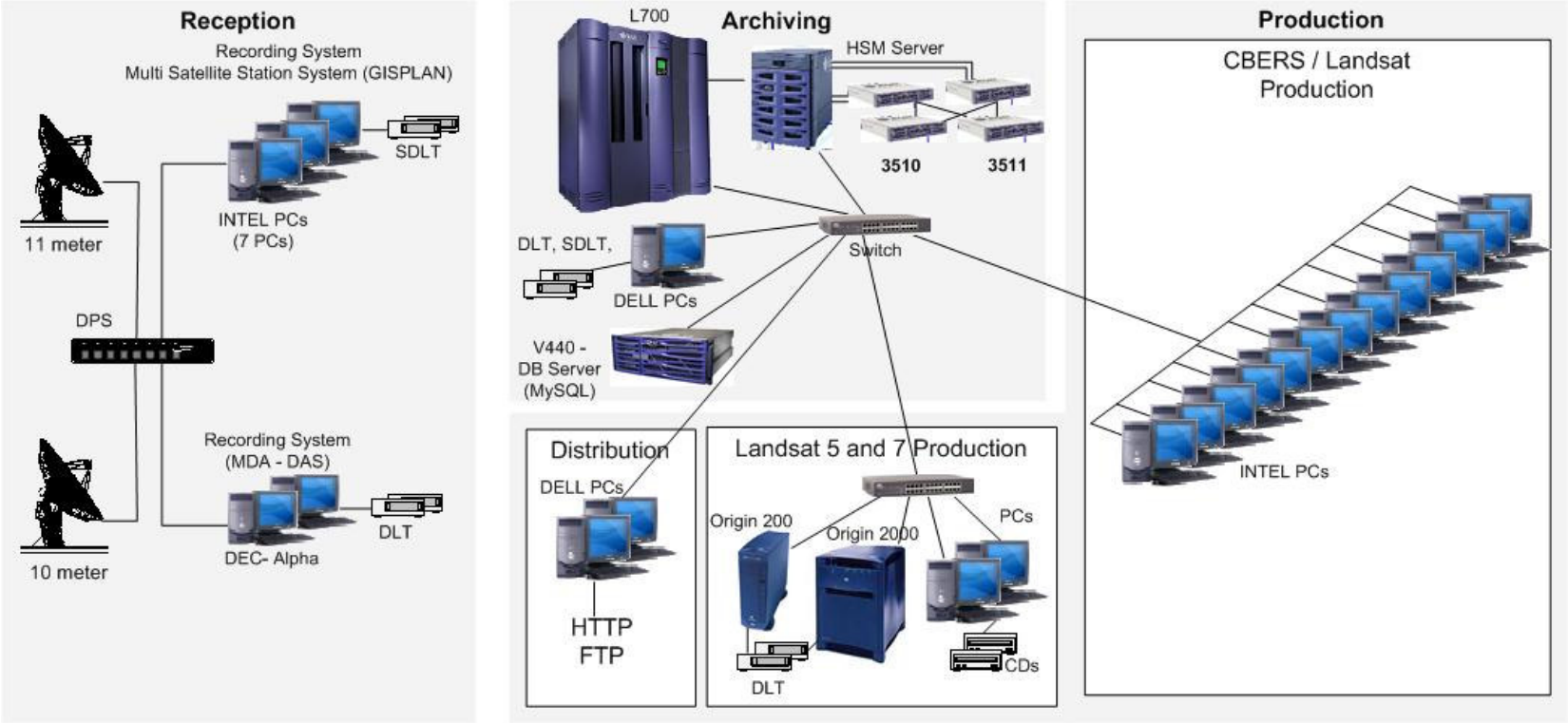
More frequent sensor characterization and calibration campaigns using world-wide test sites

More strong relationship with international partners

Bring the Brazilian Academia to embrace this task-force

INPE Ground Station

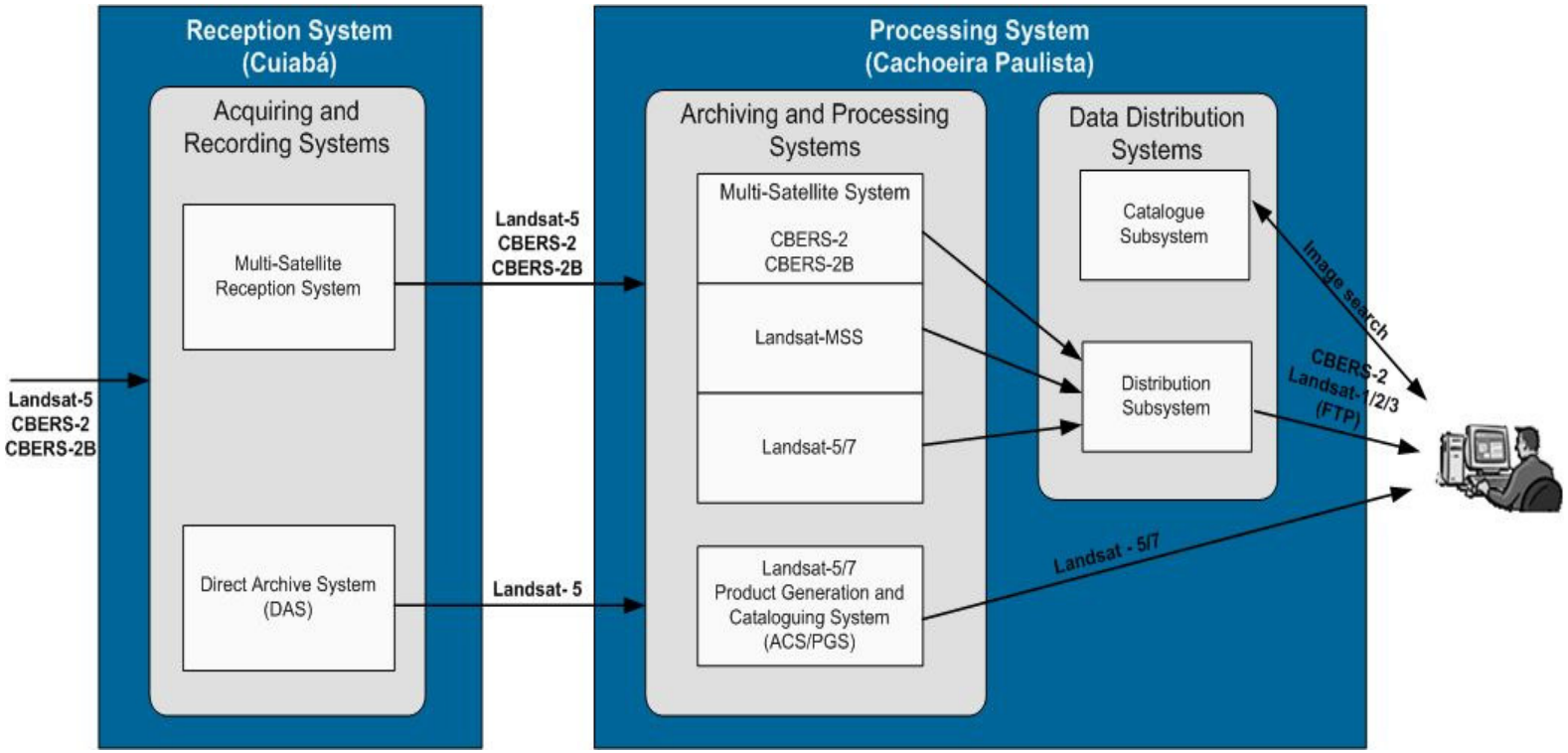
Ground Station Hardware



INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

INPE Ground Station

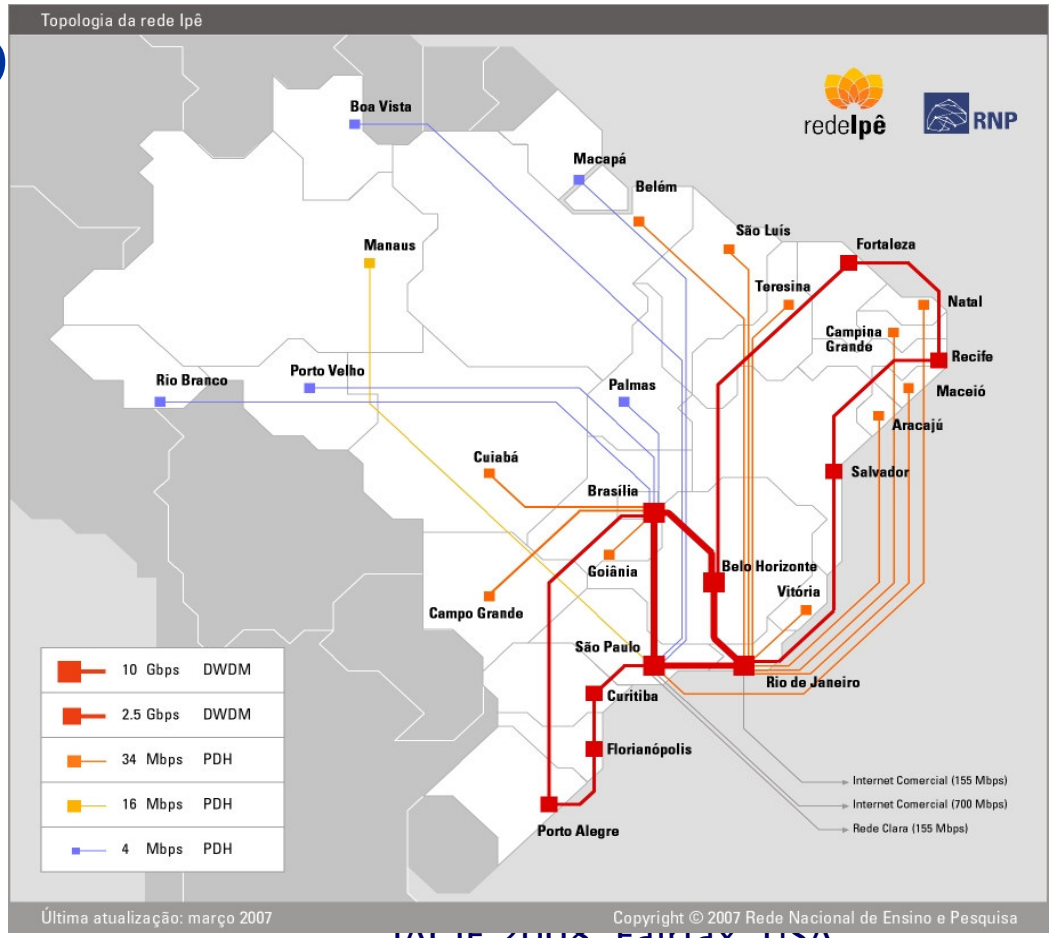
Receiving and Processing Systems



INSTITUTO NACIONAL
DE PESQUISAS ESPACIAIS

CBERS-2B Distribution

Brazilian Research Network – RNP



INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

Distribution System

Unified Catalog System

- Simple web browser interface with free download
- Access to Landsat-1, 2, 3, 5, and 7, and CBERS-2 and 2B databases
- Based on open source: Linux, MySQL, Apache, PHP
- Comprehensive search engine
  - Satellite, sensor, date, WRS, country, city, map navigation, geographic coordinates
- User registration is required before downloading
- Catalog features a variety of statistics
  - Requests by user, time to fulfill users requests, scenes by date, scenes by users

Distribution System

CBERS-2/2B:

over 10.000 scenes per month (CCD)
CBERS-2B is increasing day by day
large demand for HRC

Free distribution data policy

Typical Scene Delivery Times

Less than 16 minutes to fulfill about 30% of users requests for CBERS-2/2B and Landsat-1/2/3/4/5/7 data

Minutes	%
0	2,83
1	7,14
4	12,33
9	6,73
16	3,43
> 16	67,54
Total	100,00

2007: Less than 9 minutes to fulfill about 70% of users requests for CBERS-2

CBERS-2B Updates

- Star sensors may be affected by a magnetic anomaly in South America
  - Under investigation
- Star sensor number 2 presented problems right after launch
  - CAST is investigating this issue
- The Brazilian Data Catalog is open to the public for CCD and WFI

CBERS-2B Updates

Acceptance tests for the decompression system of HRC were done last October, in China

The decompression system is now running at INPE but is not fully operational yet

INPE has been recording all HRC data and some images have been already produced

CBERS-2B in Africa

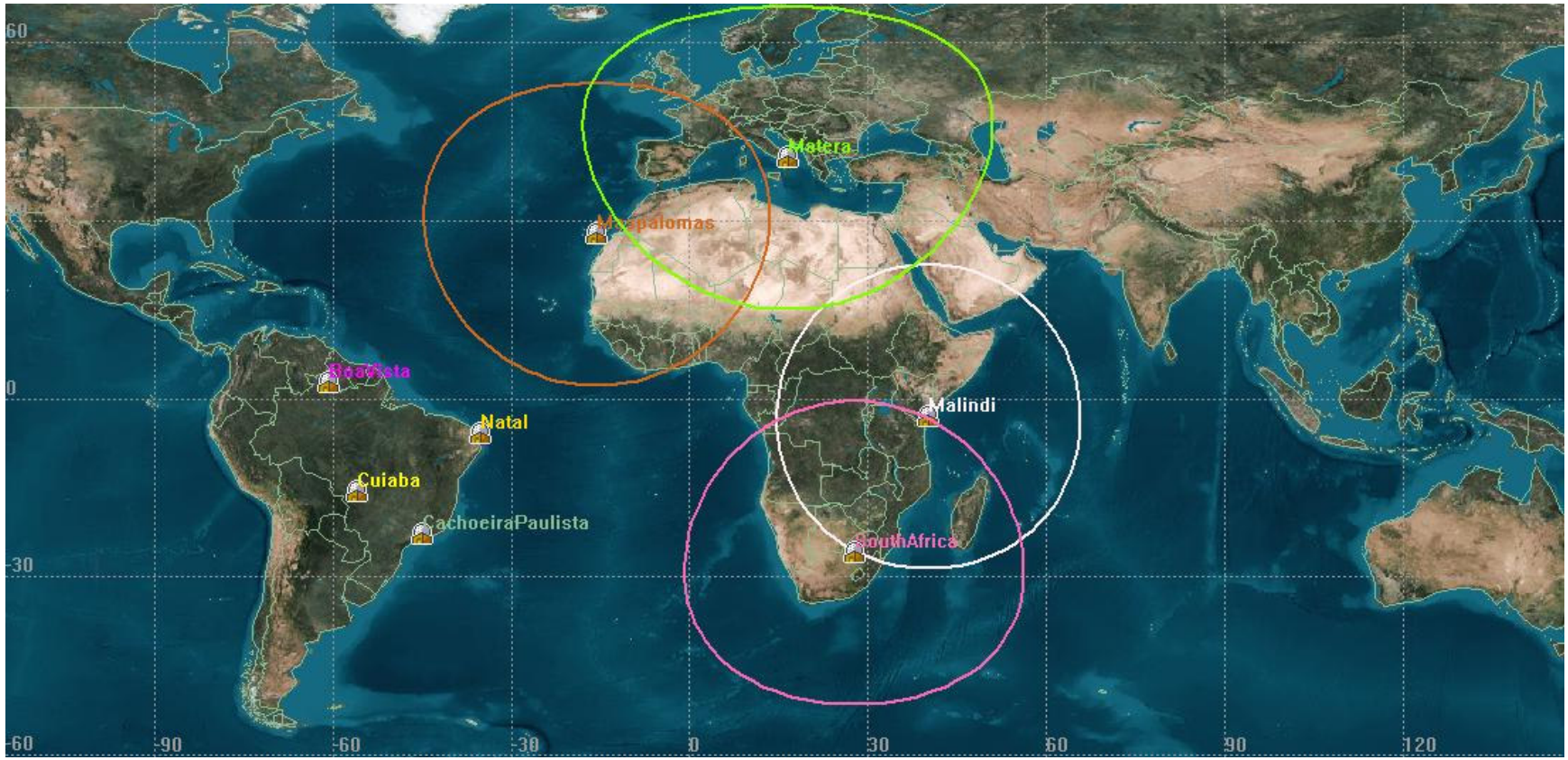
Four ground stations were identified

- CSIR, Hartesbeesthoek, in South Africa
- INTA, Maspalomas, in the Canary Islands, Spain
- ASI, Malindi, in Kenya
- ASI, Matera, in Italy

It has been decided that CRESDA will work with CSIR and INPE will update Maspalomas

- Reception tests are tentatively scheduled for late April
- Agreements with ASI are under development

CBERS-2B in Africa



INPE INSTITUTO NACIONAL DE PESQUISAS ESPACIAIS

CBERS-2B in the Caribbean

Installation of a new ground receiving station in northern Brazil

- Tentatively operational late 2009
- Increase image availability over the Caribbean

Look Ahead

CBERS-3&4

Push-broom sensors: visible + NIR
Scanner: NIR + SWIR + TIR

Better sensor characterization

+

Better knowledge about the calibration parameters

=

Better use of different instruments

Status of CBERS-2B

Data reception, archiving, processing, and distribution

Antonio Machado
antonio@kepleres.com

Julio Dalge
julio@dpi.inpe.br

Thanks!

INPE
INSTITUTO NACIONAL
DE PESQUISAS ESPACIAIS