Atelier « Dégradation Forestière »
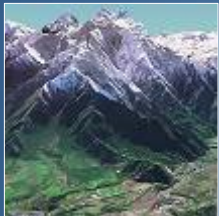
➔**Contribution de Spot image pour la fourniture de données satellite dans le cadre de projets environnementaux**

Ghislain GONZALES

Responsable des applications Agriculture et Forêts

Paris – AFD – 10-11 Mars 2008

SPOT IMAGE

www.spotimage.com

Agenda

➔ **Who we are**

➔ **Forest applications**
- **Satellite imagery and Spot Image solutions**
- **Forest monitoring and potential use for REDD**
    - ☐ EcoValCarbon
    - ☐ Imazon project: detection of deforestation and illegal logging
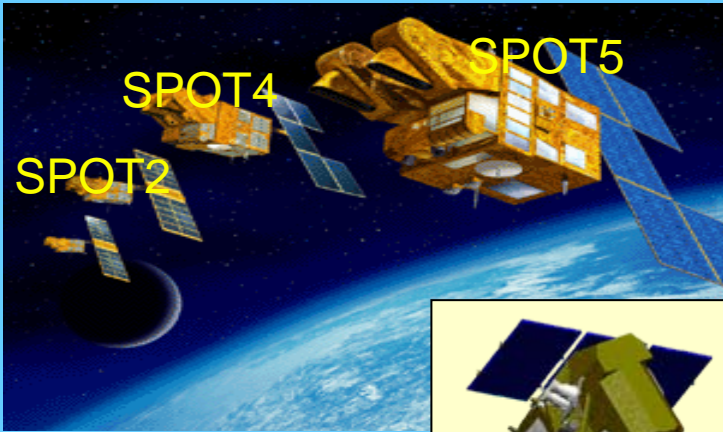   - ☐ Direct Receving Station

➔ **Planet Action Initiative**

SPOT IMAGE

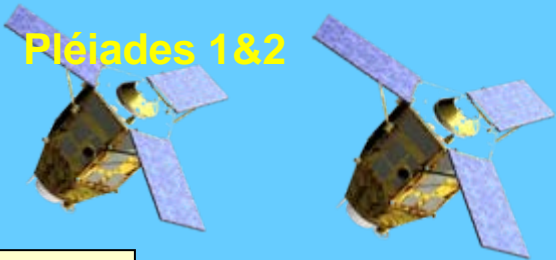**To bring satellite imaging and geographic information solutions to private and public sector worldwide**

AF
AQ

ISO 9001
VERSION 2000

N° QUAL/2001/16726

SPOT IMAGE

Spot Image, an outstanding satellite fleet to serve our customers

Operated by Spot Image

SPOT4

SPOT5

SPOT2

Pléiades 1&2

Coming

Operated by our partners

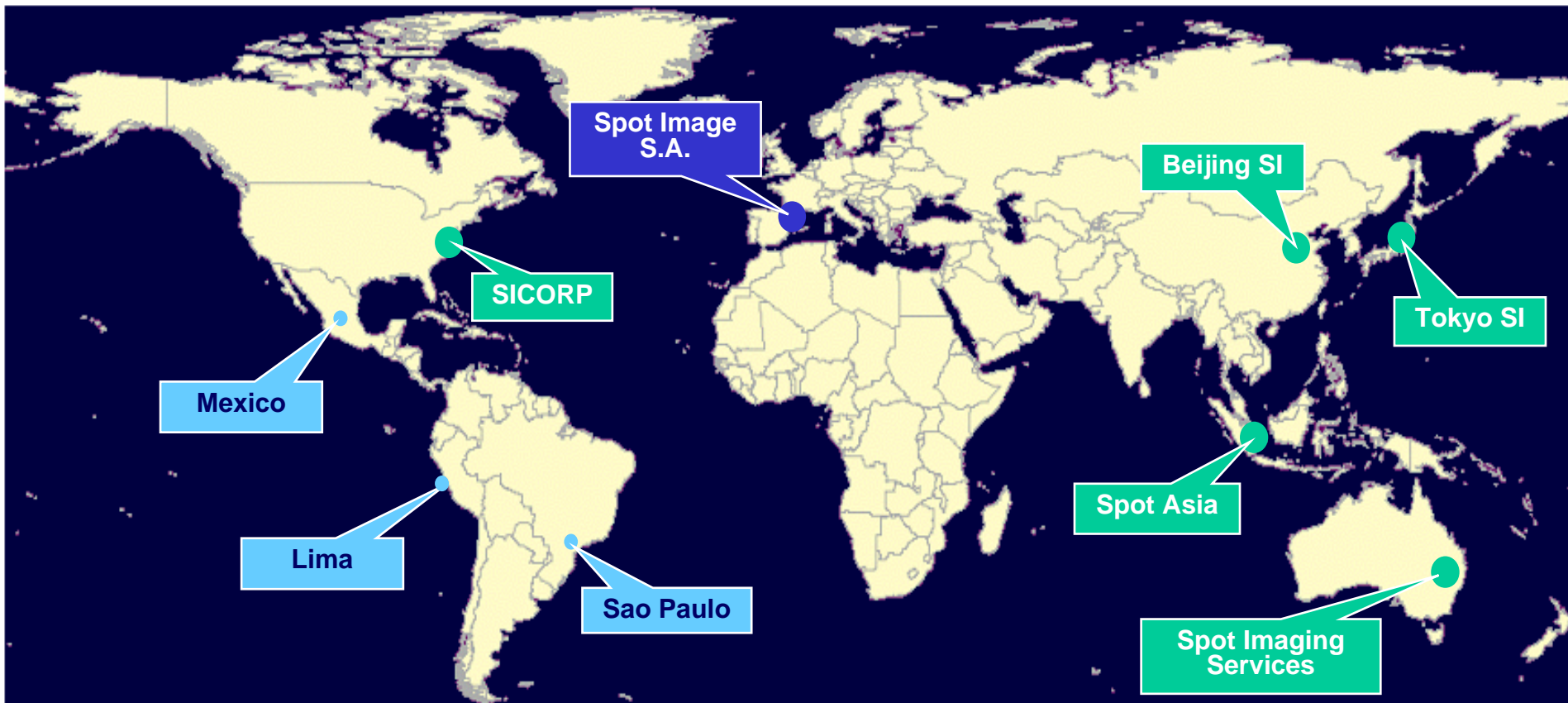**Formosat-2**   **Kompsat-2**   **TerraSAR-X**

Satellite operations, geographic solutions and partnerships are our key asset

SPOT
IMAGE

# Spot Image Group today

- **230 employees**
- **5 subsidiaries**
- **3 foreign offices**

Map labels:

- Spot Image S.A.
- Beijing SI
- Tokyo SI
- SICORP
- Mexico
- Lima
- Sao Paulo
- Spot Asia
- Spot Imaging Services

IMAGE

A unique network of 32 Active SPOT direct receiving stations

SSC
Kiruna

CCT
Prince Albert

Iunctus Geomatics
Lethbridge

US Air Force
EV II

US Air Force
EV III

US Air Force
EV IV

US Air Force
EV V

Aserca
Mexico

CSTARS
Miami

Fundación Instituto
de Ingenieria (FII)
Caracas

Unité Espace
Cayenne

US Air Force
EV I

Spot Image
Toulouse

ESA
Maspalomas

ITU
Istanbul

ISA
Tel-Aviv

NARSS
Assouan

KACST
Riyad

ScanEx
Ivanteevka

ScanEx
Irkutsk

SUPARCO
Islamabad

RSGS
Miyun

ScanEx
Magadan

ImageONE
Yorii

ADD
Taejon

CSRSR
Chung-Li

GISTDA
Bangkok

MACRES
Temerloh

CRISP
Singapore

LAPAN
Pare-Pare

CSIR
Hartebeesthoek

Raytheon Australia
Adelaide

- ● Main receiving station
- ● SPOT 2 & 4 direct receiving station
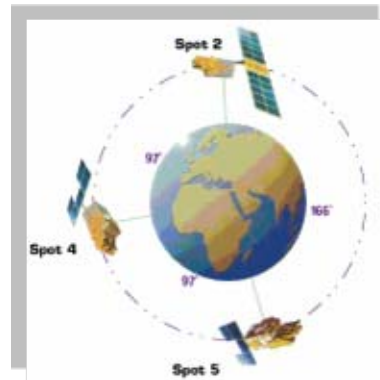- ● Direct receiving station including SPOT 5
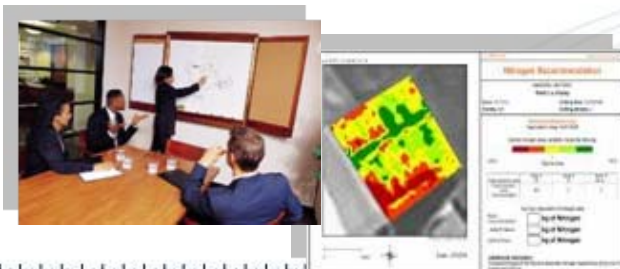
SPOT IMAGE
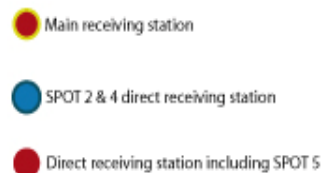
One Company – Four skills

SPOT satellite constellation Operator

Data Producer and Distributor

Projects & (Web) Services

Ground station Distributor and Operator

7

To meet every application need
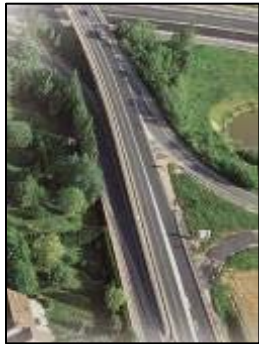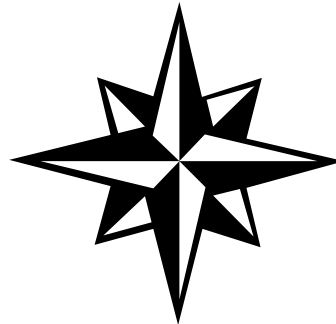

Cartography, cadastral mapping

Agriculture

Forestry

Defence, intelligence

Land planning and management

Telecoms

Oil, gas, mineral and groundwater exploration

Disaster management & mitigation

Fisheries

SPOT IMAGE

One Stop Shop concept
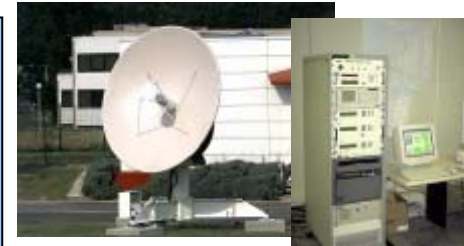

DATA AND PRODUCTS

In house

SPOT 1,3
(arch)
SPOT 2, 4
SPOT 5 HRG
SPOT 5 HRS
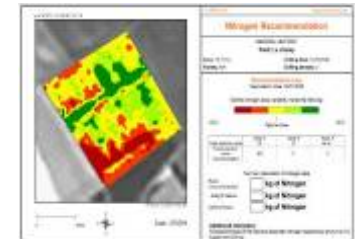DEMs
Reference3D

SPOT IMAGE
One Stop Shop

Distribution

FORMOSAT 2
KOMPSAT-2
(Exc)
VGT / Meris
ERS/ENVISAT
TERRASAR-X
Radarsat
IKONOS
QuickBird
ORBVIEW 3

TURNKEY SOLUTIONS

Satellite ground
Receiving stations

Thematic projects

Training
technical assistance

SPOT IMAGE

Spot Image strategy

A satellite operator

« for optical satellites »

- **Spot 5**
- **Spot 4 / 2**
- **Formosat-2**
- **Kompsat-2**
- **Pléiades**

A strategic partner

« for other satellites »

- **ENVISAT (with ESA)**
- **TERRASAR-X (with IFT GmbH)**
- **… and others !**

TM

data

I/S

S P O T
IMAGE

TM

data

I/S

solutions
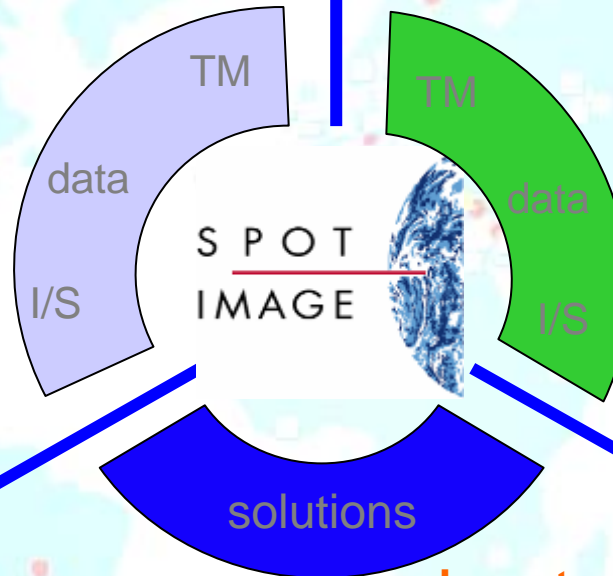
As a leader for

- **Defence & Security**
- **Institutional Agriculture**

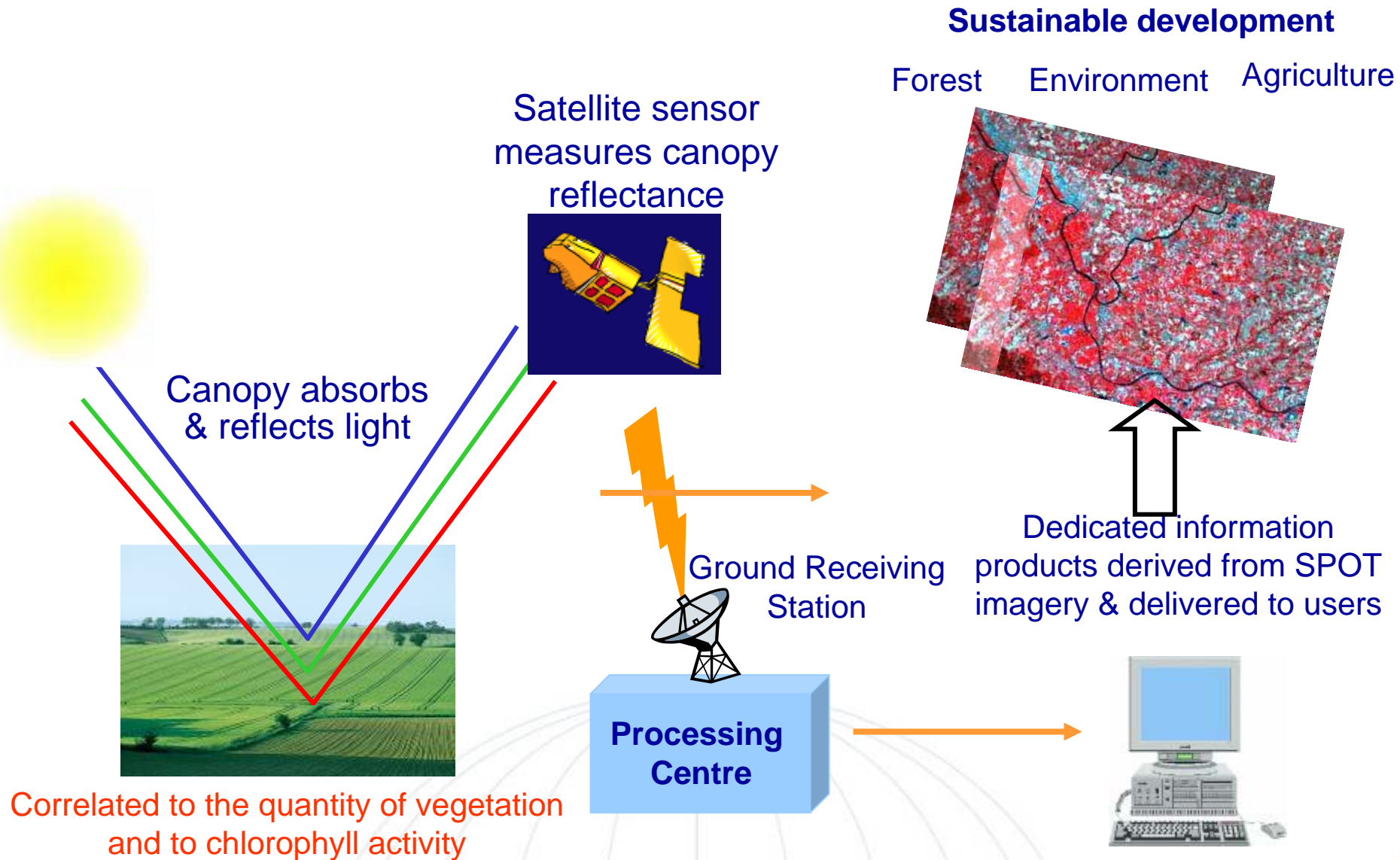**In partnership for**

- **Cartography**
- **Agro-industry**
- **Forestry, Environment**
- **Telecom**
- **Maritime, Risks, Oil & Gaz**

Spot Image   Filiales et bureaux   Partenaires exclusifs   Distributeurs   Stations de réception directe

10

Agenda

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■ **Satellite imagery and Spot Image solutions**

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☐ EcoValCarbon

☐ Imazon project: detection of deforestation and illegal logging

☐ Direct Receving Station

→ **Planet Action Initiative**

SPOT
IMAGE

Satellite imagery

Satellite sensor measures canopy reflectance

Sustainable development

Forest   Environment   Agriculture

Canopy absorbs & reflects light

Dedicated information products derived from SPOT imagery & delivered to users

Ground Receiving Station

Processing Centre

Correlated to the quantity of vegetation and to chlorophyll activity

SPOT IMAGE

Spot Image solutions

To optimize acquisitions

➜ **SPOT constellation with 3 satellites**
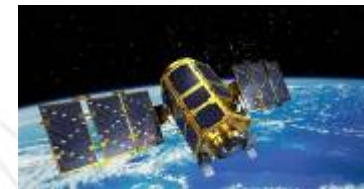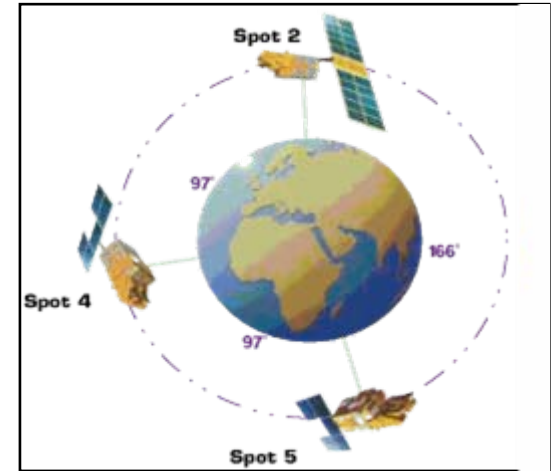 - **60 x 60 Km**
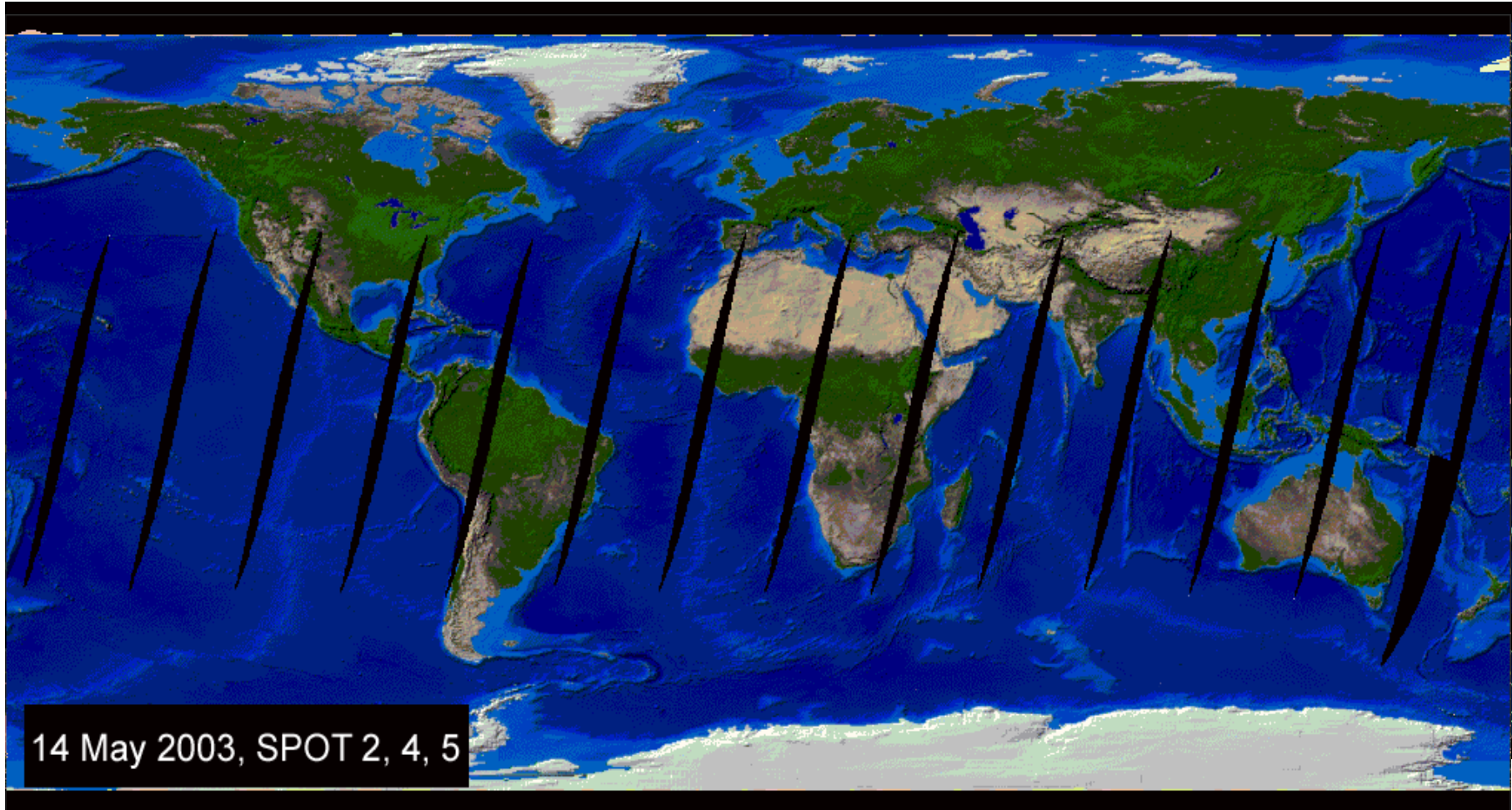 - **Spatial resolution : 2m50 -> 20m**
  - **Repetivity 3-5 days**

➜ **Formosat-2**
  - **24 x 24 Km**
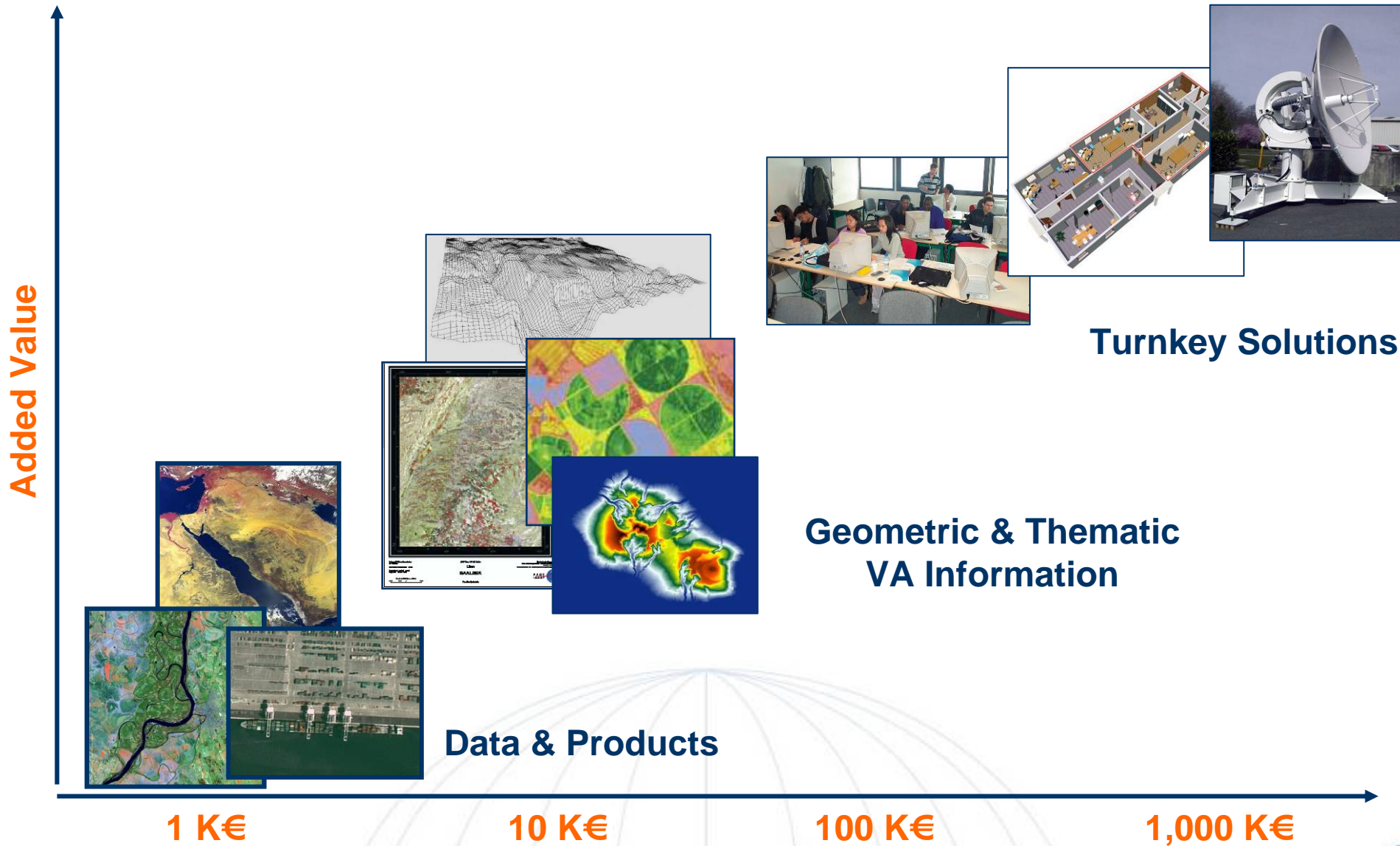 - **Spatial resolution : 2m - 8m**
  - **Daily repetitivity**

➜ **Kompsat-2**
  - **15 x15 km**
  - **Spatial resolution : 1m – 4m**

Spot Image solutions

→ **Ability acquisition of SPOT constellation**

14 May 2003, SPOT 2, 4, 5

SPOT
IMAGE

A wide range of services

Added Value

Turnkey Solutions

Geometric & Thematic VA Information

Data & Products

1 K€   10 K€   100 K€   1,000 K€

SPOT IMAGE

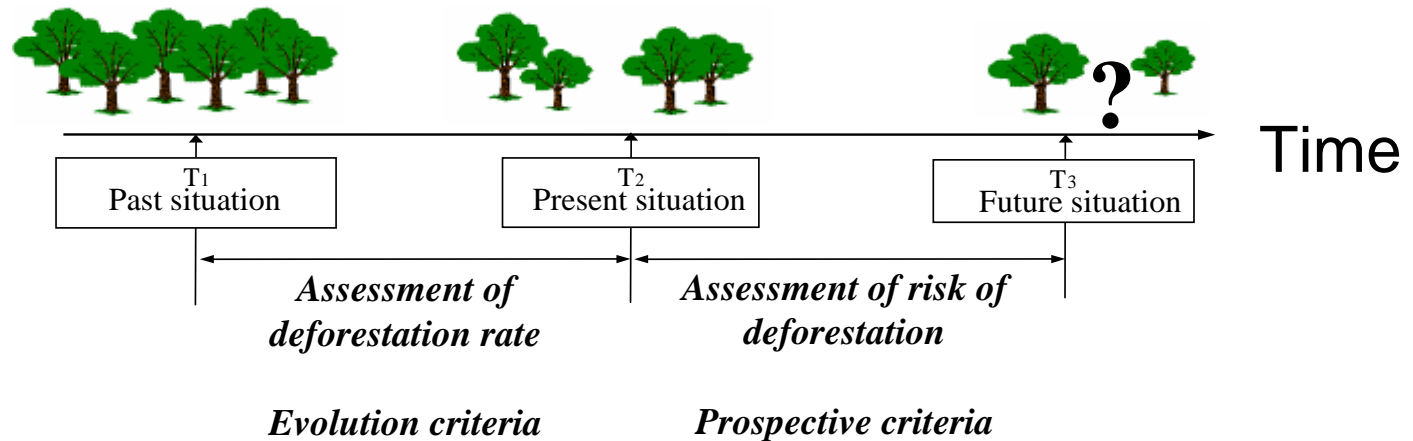# Agenda

→ **Who we are**

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→ **Planet Action Initiative**

SPOT
IMAGE

Forest Monitoring

➜ **Two major parameters**

- **Temporal scale**
  - inventory of resources, change assessment, modeling future evolutions
- **Geographic scale**
  - local level, regional and national levels, continental and global levels

T1 Past situation	T2 Present situation	T3 Future situation

Assessment of deforestation rate   *Assessment of risk of deforestation*

Evolution criteria   *Prospective criteria*

- **multi-scale** referential
- **optimal follow-up**
- **spatial analysis** in order to better understand the changes and develop alternative strategies

SPOT IMAGE

SPOT 5 image in Brazil
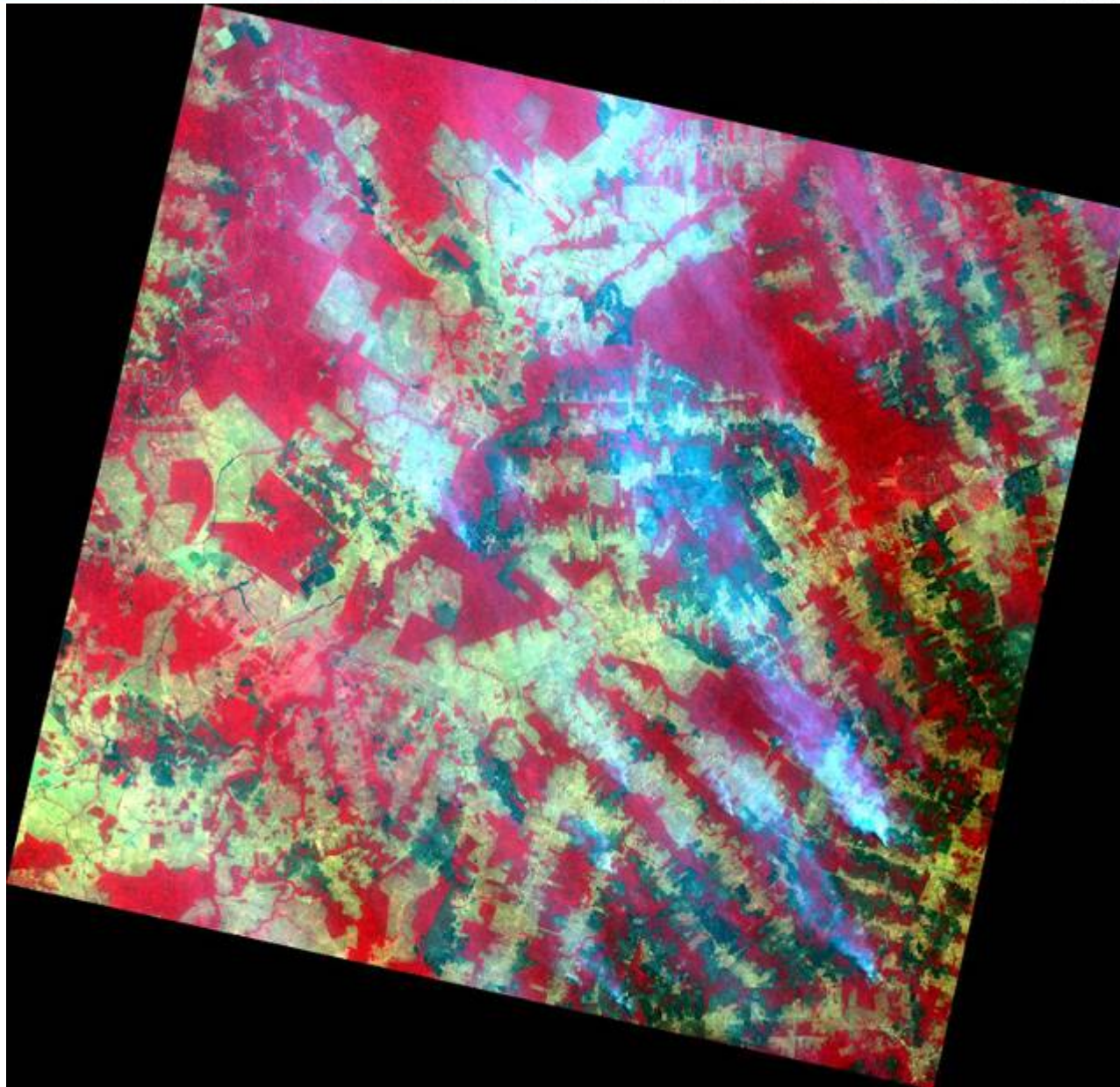
10 m / color

K=667-J=370

30-sept-2005

SPOT
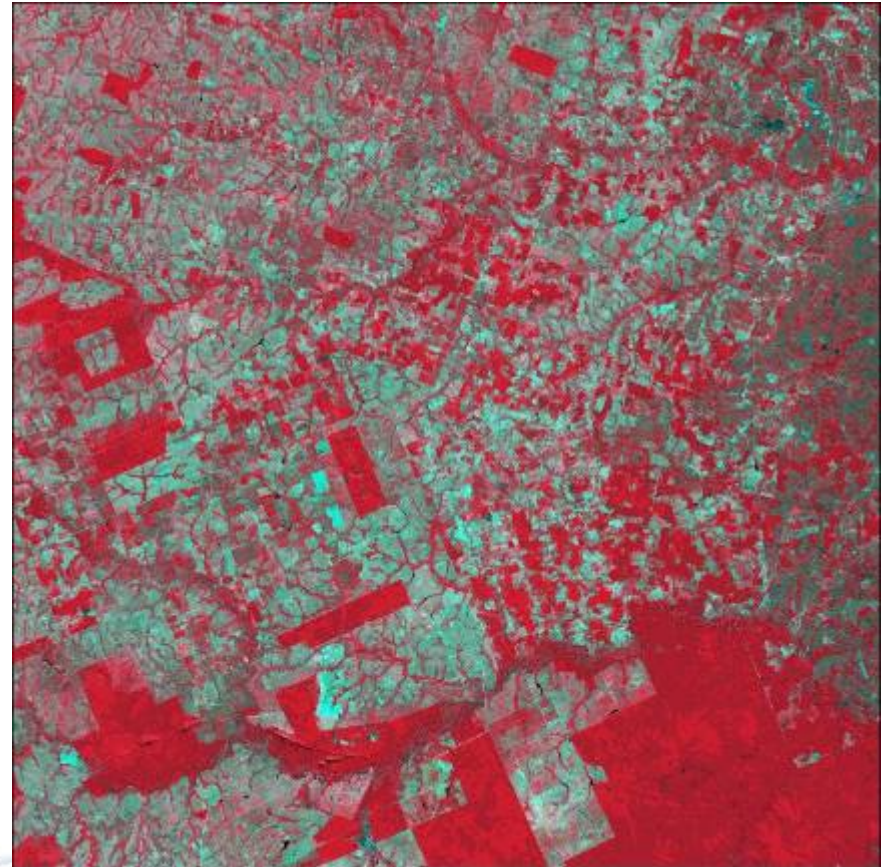IMAGE

SPOT
IMAGE

Deforestation / Clear cuts

SPOT
IMAGE
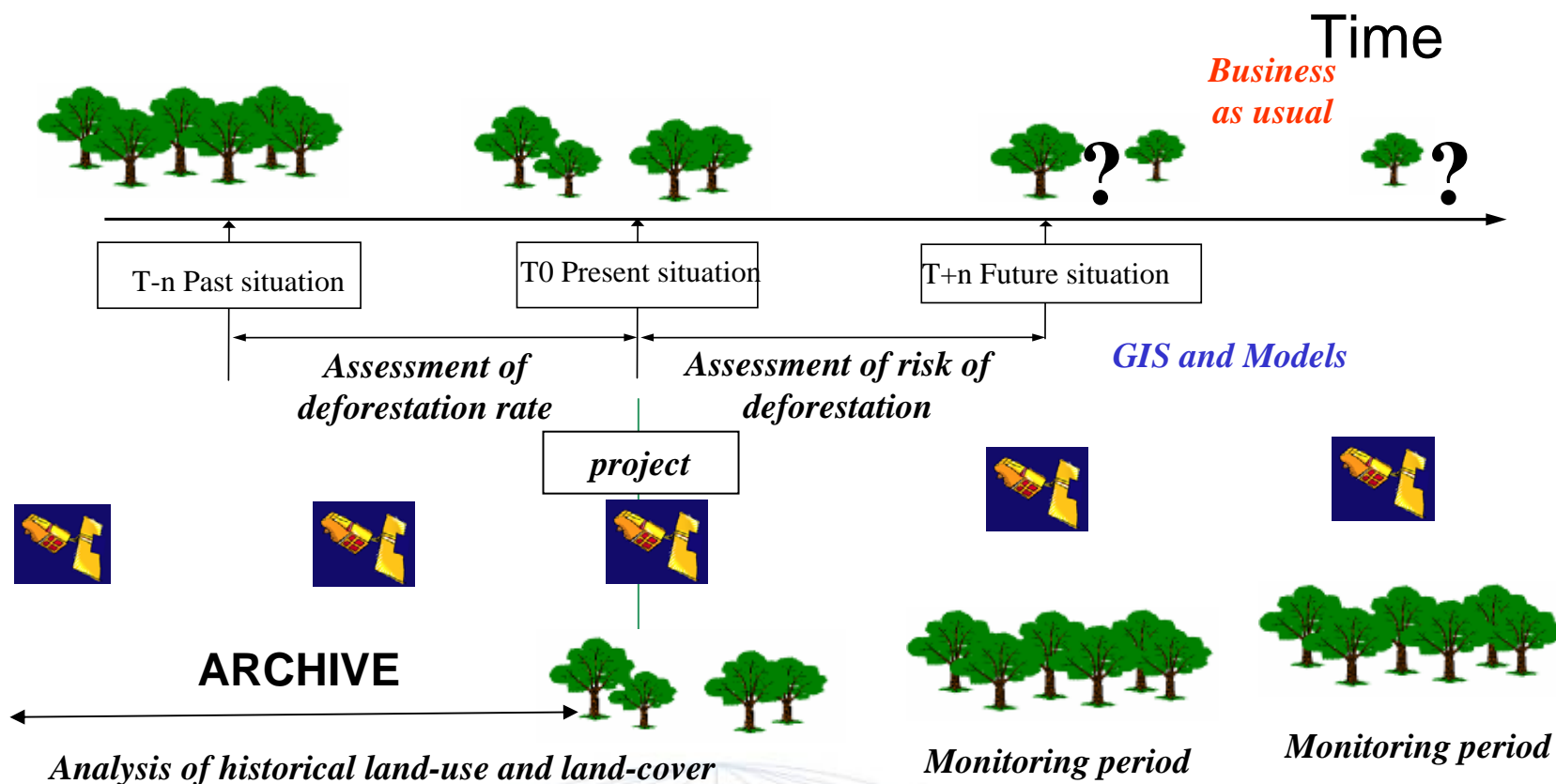
Witness of forest destruction

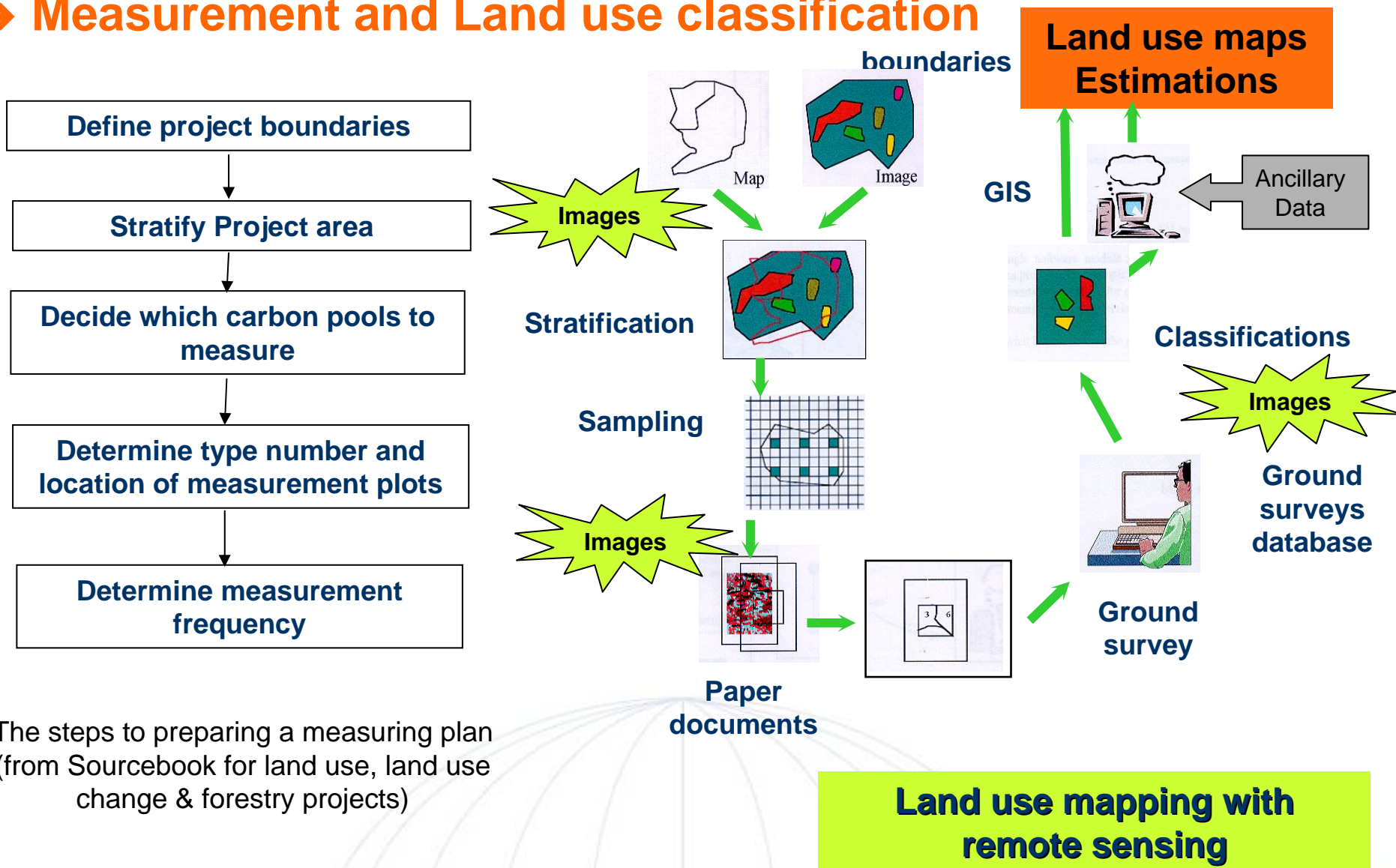**Brazil – State of Para
1986**

**Brazil – State of Para
2005**

SPOT
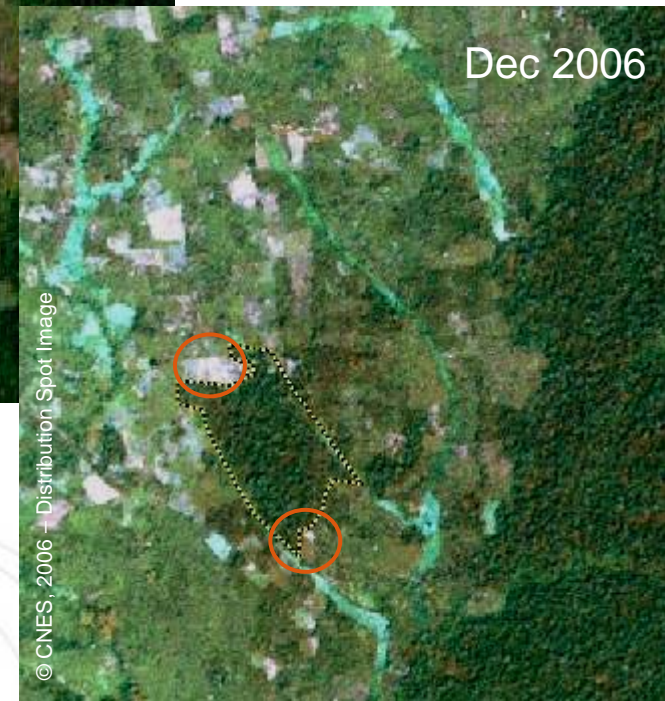IMAGE

Land use, Land Use Change and forestry (LULUCF)

Time

Business as usual

| T-n Past situation | T0 Present situation | T+n Future situation |

Assessment of deforestation rate

Assessment of risk of deforestation

GIS and Models

project

ARCHIVE

Analysis of historical land-use and land-cover

Monitoring period

Monitoring period

- **Baseline calculation**
- **Evolution and monitoring**
- **Control and management**

SPOT IMAGE

Measurement plan

→ Measurement and Land use classification

Define project boundaries

↓

Stratify Project area

↓

Decide which carbon pools to measure

↓

Determine type number and location of measurement plots

↓

Determine measurement frequency

boundaries

Land use maps Estimations

Images

Map

Image

Stratification

GIS

Ancillary Data

Classifications

Images

Sampling

Images

Ground surveys database

Ground survey

Paper documents

The steps to preparing a measuring plan (from Sourcebook for land use, land use change & forestry projects)

Land use mapping with remote sensing

SPOT IMAGE

Change detection

➔ SPOT Images to detect changes

© CNES, 2006 – Distribution Spot Image

Tai forest

© CNES, 2001 – Distribution Spot Image

Jan 2001

Dec 2006

© CNES, 2006 – Distribution Spot Image
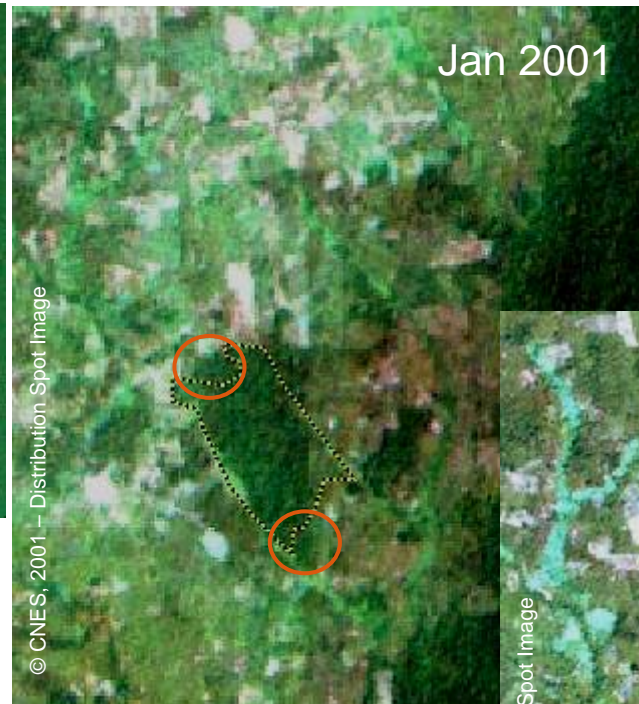
- ◉ **2001 & 2006 land use maps**
- ◉ **Evolution map**

Deforestation and fragmentation

SPOT IMAGE

Example of a map of land use changes

SPOT 2001

SPOT / F2 2007

Land use changes 2001-2007
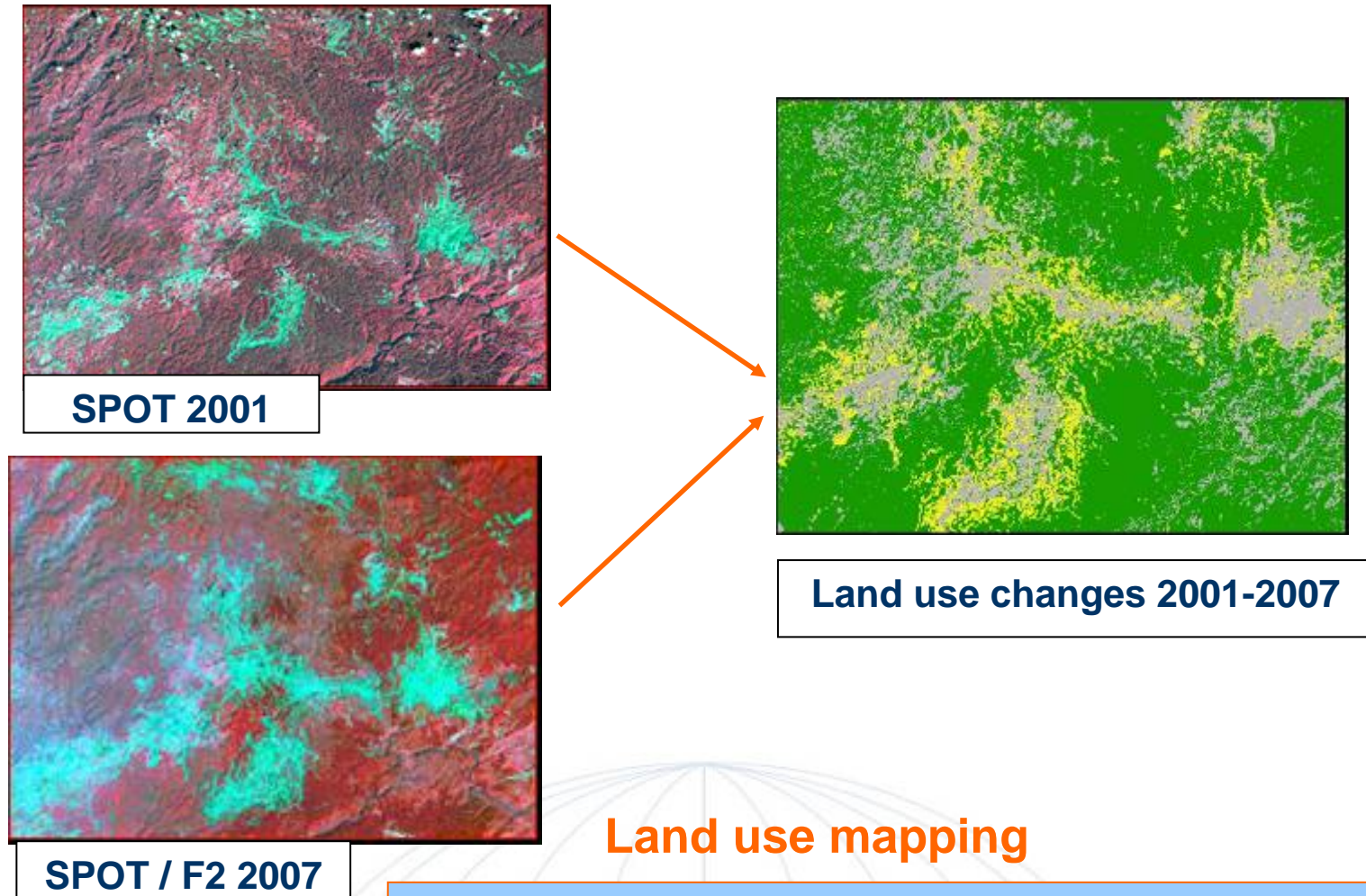
Land use mapping

- Archive data (1990): land use eligibility
- Recent data: deforestation rates for baseline calculation

SPOT IMAGE

➔ Partnership :

**Pilot project
(Taï park)**

Objective

Development of a methodology for measuring bio-carbon sequestration and avoided deforestation combining Ground survey and Satellite imagery
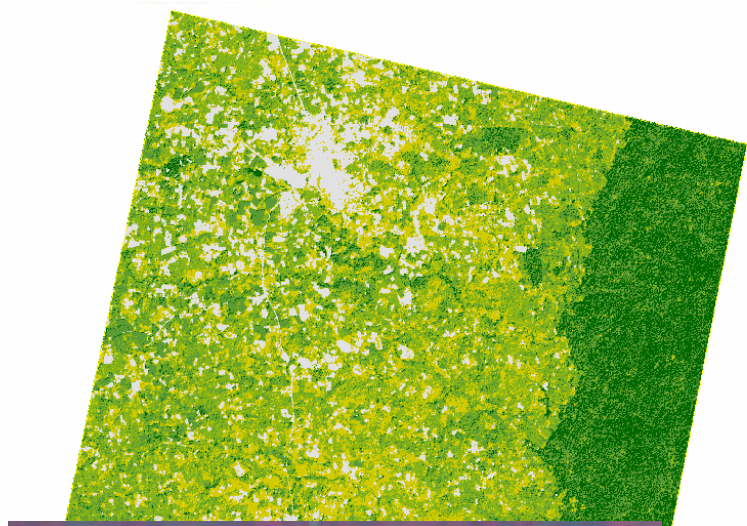
Expected results

an accurate and cost-effective methodology to determine the levels of Carbon sequestered in standing forests
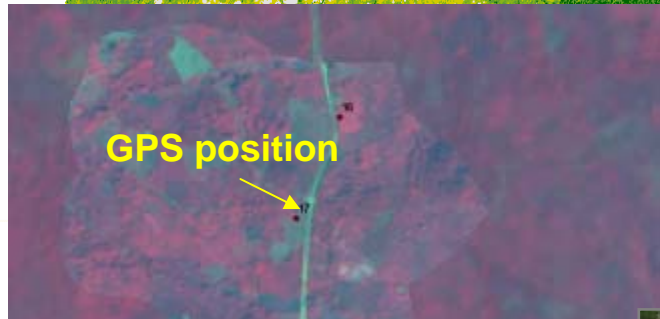
Landscape mapping

	C1
	C2
	C3
	C4
	C5

SPOT
IMAGE
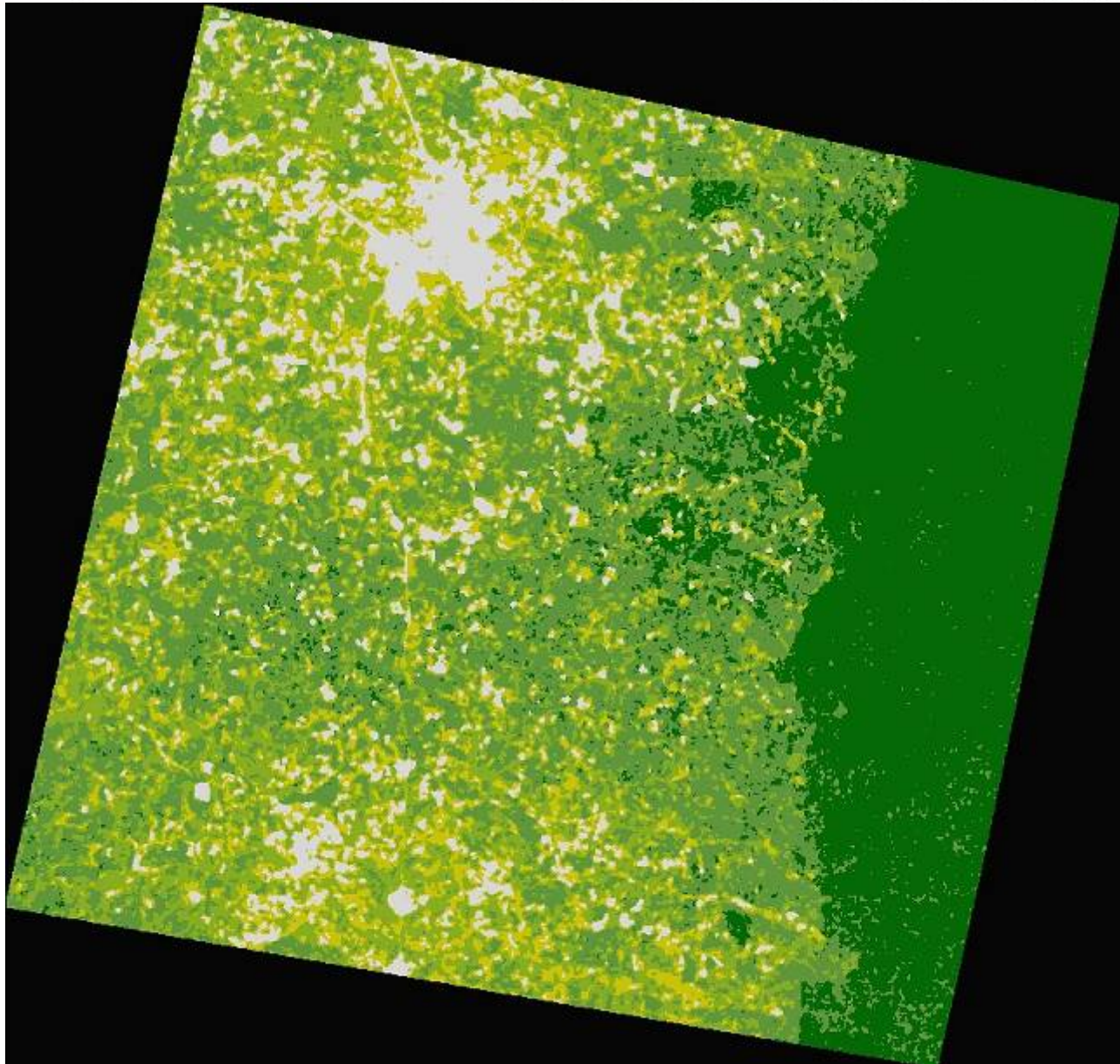
Carbon coef. **Total**

Colour	Class	Ha
	1	3626,46
	2	5368,18
	3	8703,58
	4	6099,19
	5	3227,12

200 | 725 K

X

0 | 0

Draft

Carbon Budget

GPS position

Field Data

Sample plots

- ▪Baseline calculation
- ▪Evolution and monitoring
- ▪Control and management

28

SPOT IMAGE

Landscape mapping

Ground survey segment
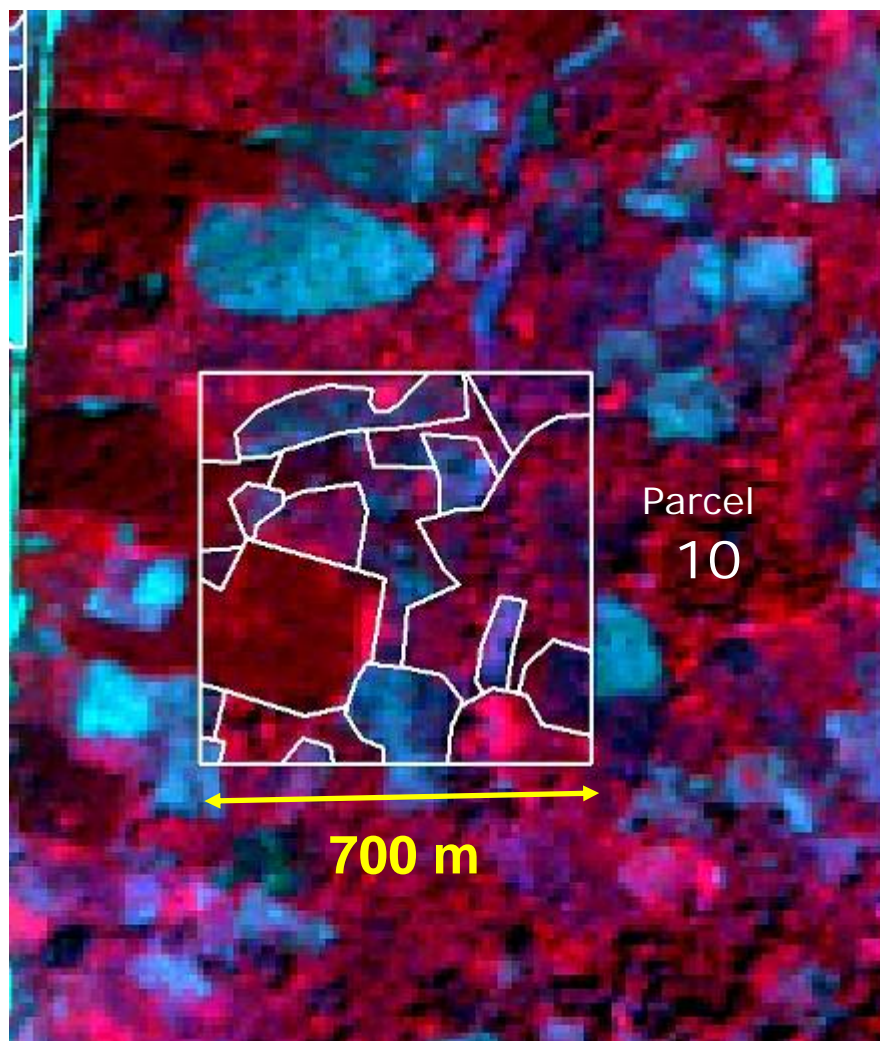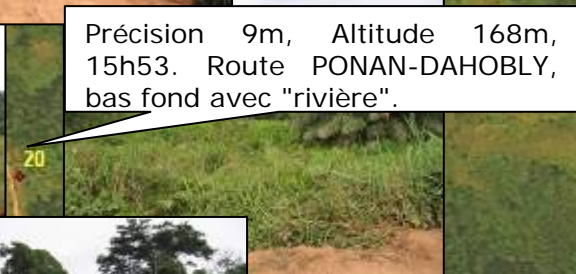
LANDSCAPE 3

LANDSCAPE 2

Parcel
10

700 m

LANDSCAPE 4

SPOT IMAGE

Précision 73m, Altitude 163m, 12h08
Début du PNT, forêt dense.

SPOT
IMAGE

Précision 9m, Altitude 168m, 15h53. Route PONAN-DAHOBLY, bas fond avec "rivière".

SPOT
IMAGE

Lessons learned from Park Taï

➔ **Remote-sensing constitutes a tool for the Carbon sequestration assessment to:**

- ■ **(a) help manage ground survey;**
- ■ **(b) allow for forest monitoring such as reforestation/deforestation (archive data/present time data) ;**
- ■ **(c) promote access to information regarding land use ;**
- ■ **(d) ensure technological follow-up of large forested/reforested areas through information system ;**

➔ **Several methods to be used depending on the landscape complexity**

- ■ **Supervised classifications, segmentation, biophysical parameters**

➔ **PNI / UNESCO-MAB / SI is a relevant partnership**

- ■ **Knowledge of the Park Taï and local contact**
- ■ **Access to information (Images, ground, etc)**
- ■ **Carbon reduction commitment**

SPOT IMAGE

→ **2007 IMAZON project: ACRES**

- Monitoring forests to detect deforestation and illegal logging

- Image several time the entire Alto and Baixo Acre zone within 3 months

- satellite tasked daily between August and October 2007

- acquisitions of 8 complete coverages of the AOI were attempted
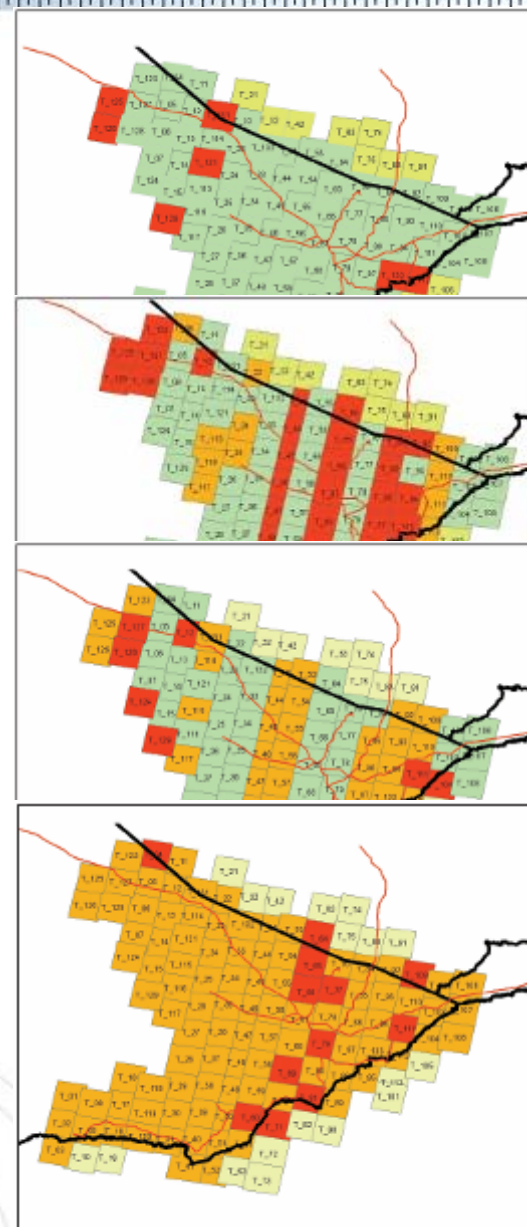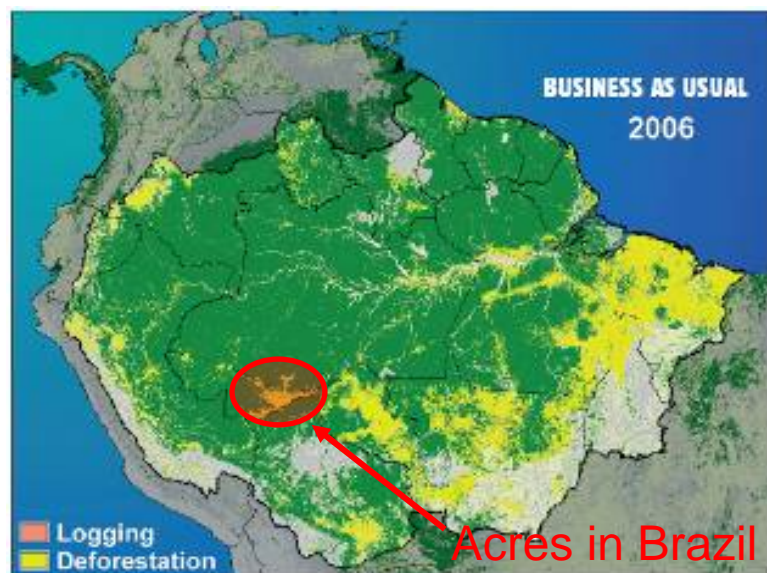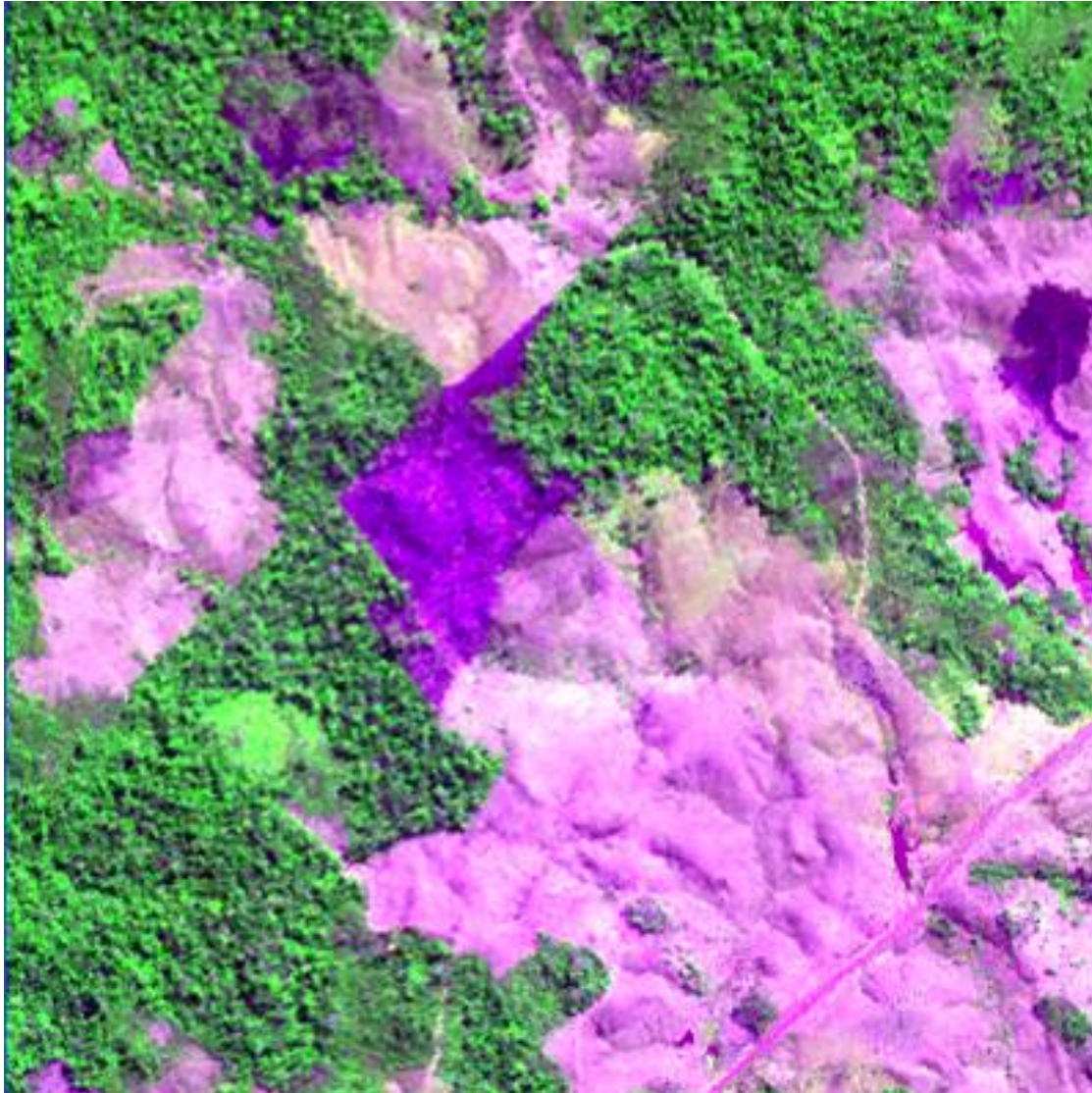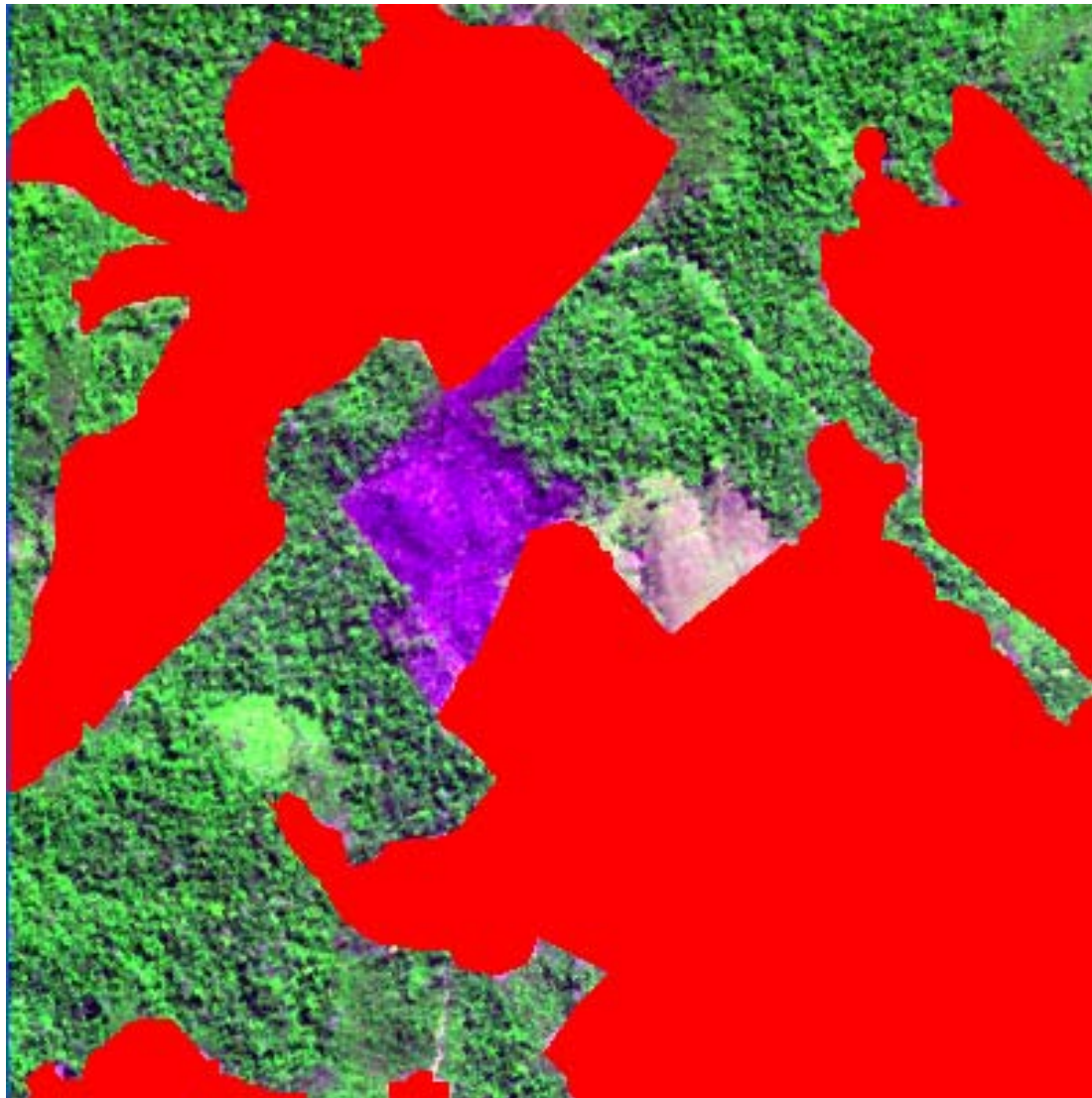
BUSINESS AS USUAL 2006

Logging
Deforestation

Acres in Brazil

SPOT IMAGE

FORMOSAT- 2 image / 8 m MS

2007-08-15

SPOT
IMAGE

FORMOSAT- 2 image / 8 m MS

2007-08-15

Deforestation area 2005 (Imazon/Imac)

SPOT IMAGE

FORMOSAT-2 Innovative solution – IMAZON Project

FORMOSAT- 2 image / 8 m MS
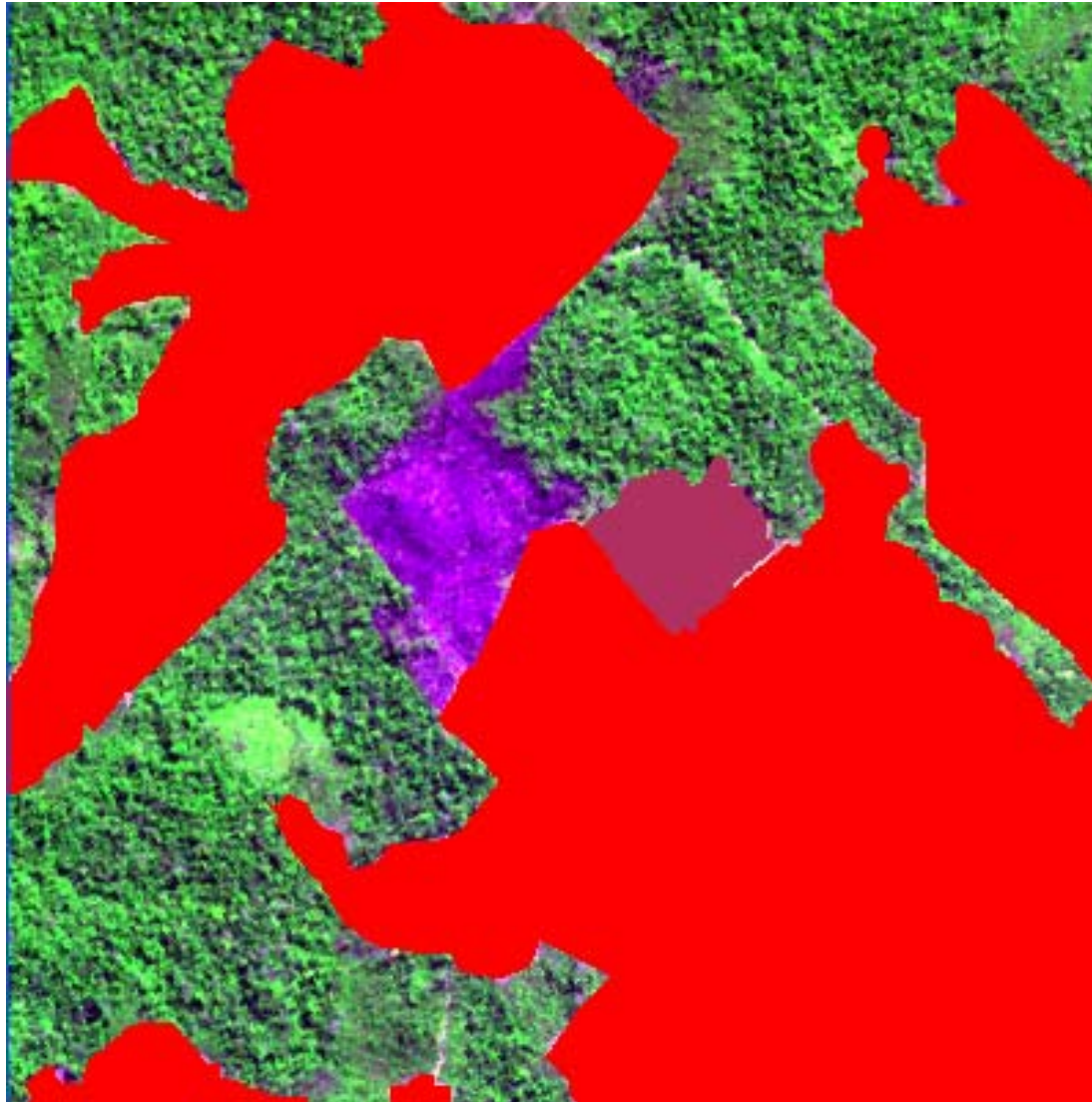
2007-08-15

Deforestation area 2005 (Imazon/Imac)

August 2006
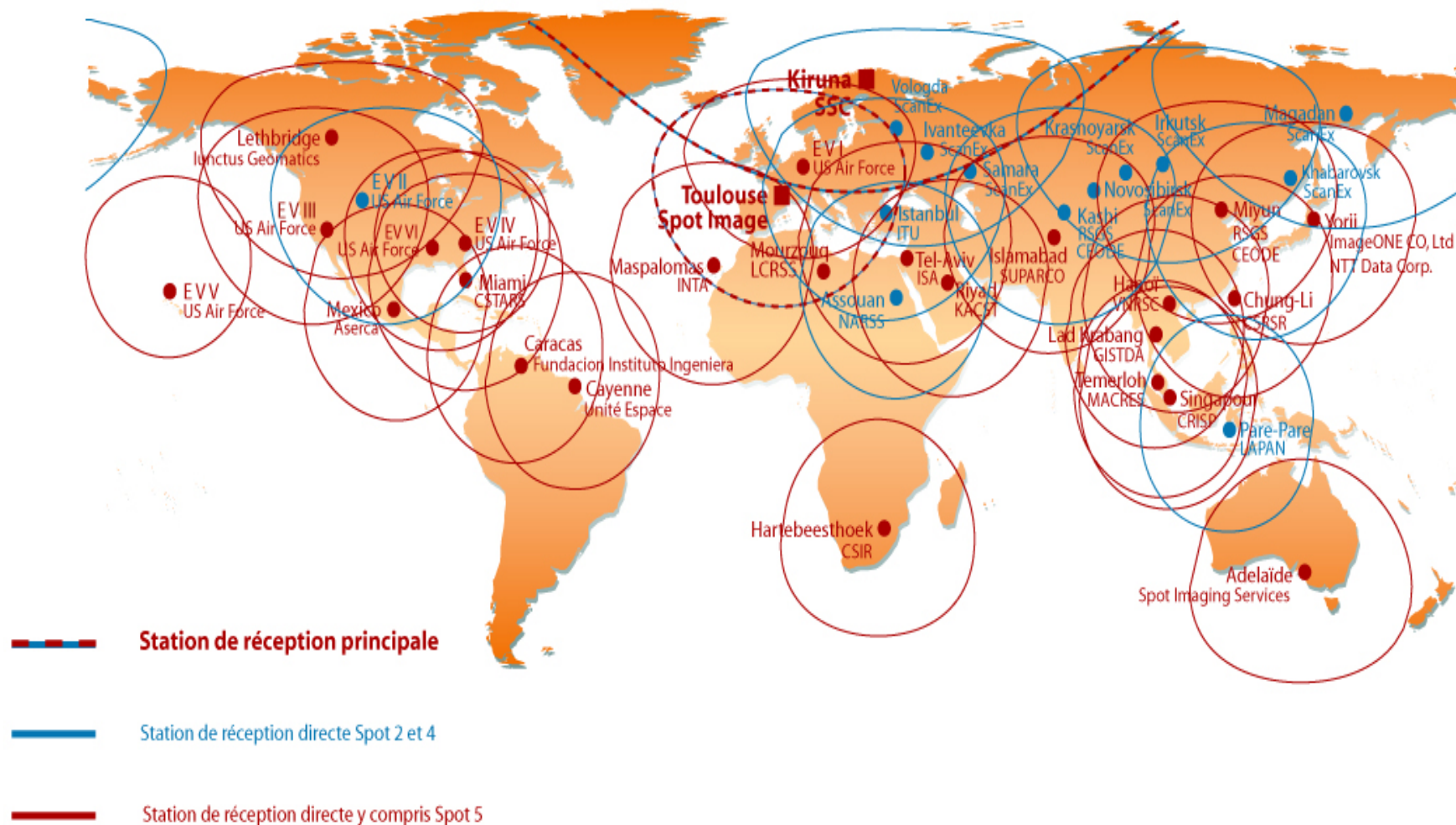
SPOT IMAGE

A wide range of services

Station de réception principale

Station de réception directe Spot 2 et 4

Station de réception directe y compris Spot 5

02/2008

A FIRST GLOBAL SPOT MOSAIC OF FRENCH GUIANA

Orthorectified mosaic of satellite images (Copyright CNES, 2006 – Distribution SPOT Image), without cloud screening, acquired in 2006 by SPOT constellation (SPOT2, SPOT4 & SPOT5) and received at SEAS- Guyane station.

Scale 1:1,000,000

seas GUYANE

Project manager

IRD
Institut de recherche pour le développement

Industrial and Space Agency

SPOT IMAGE

cnes

esa

Financial

cnes

Educational and Valorisation
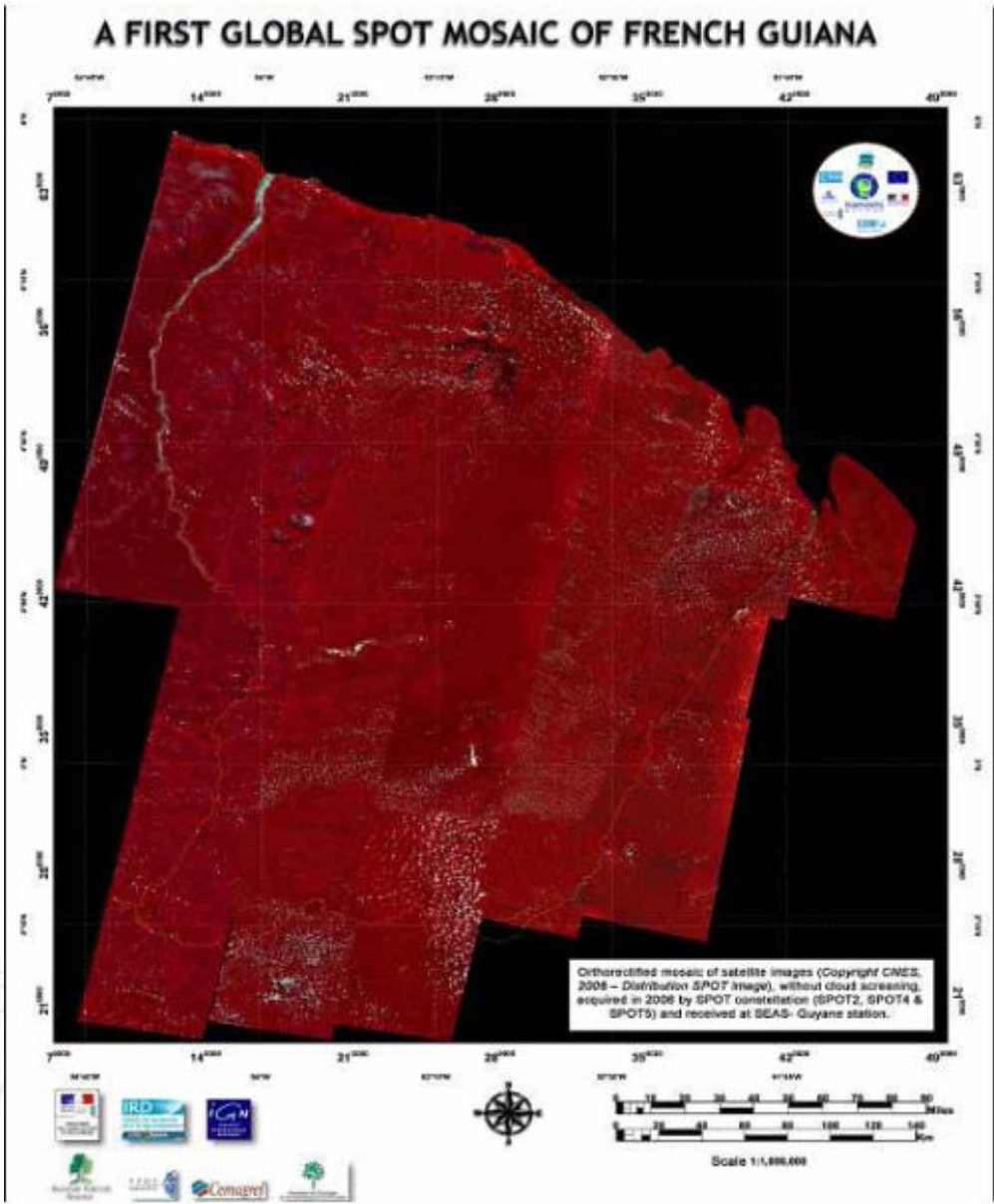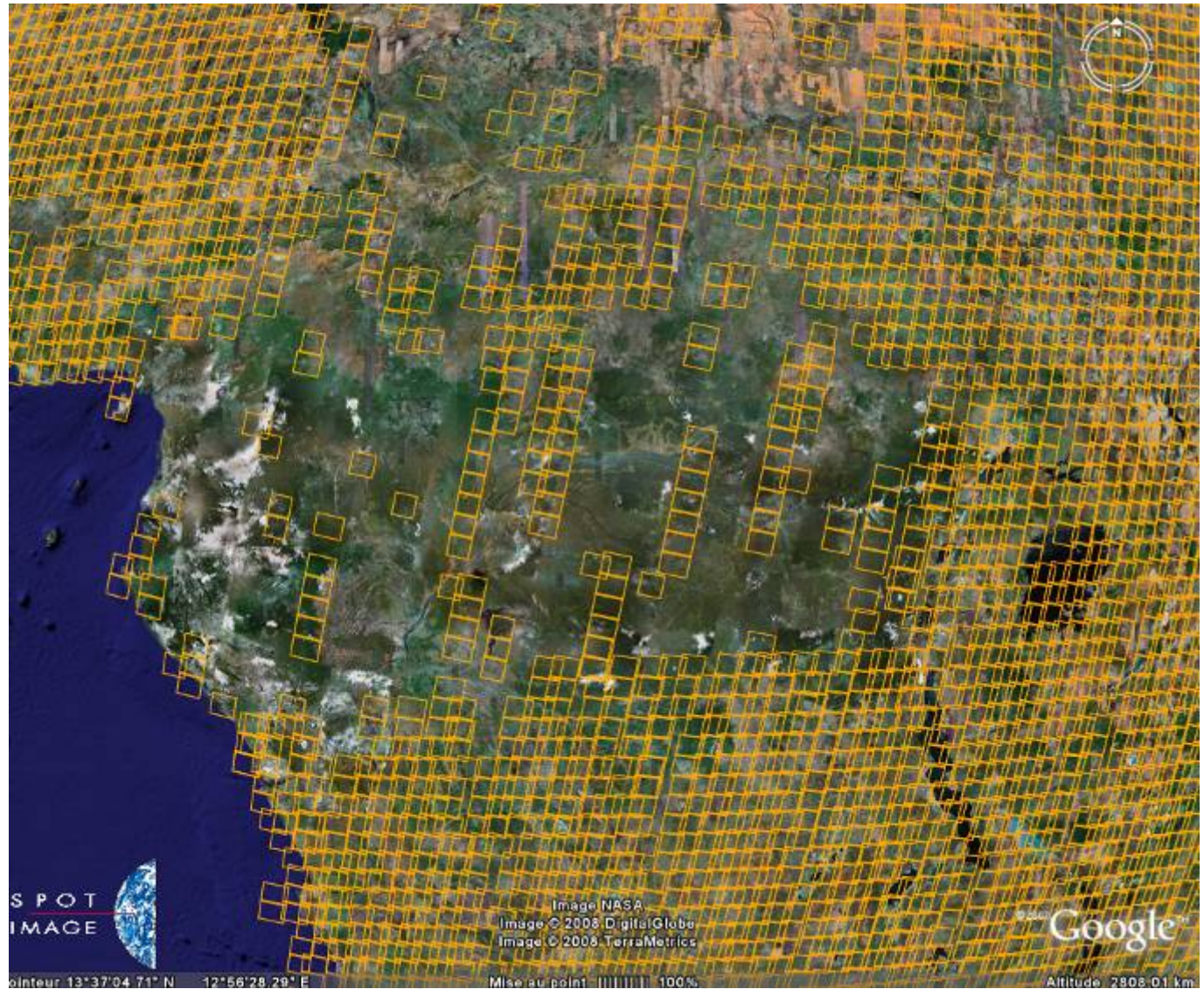
PUG

GUYANE TECHNOPOLE

SPOT IMAGE

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➔ **Planet Action Initiative**

SPOT IMAGE

The geo-information community can help

→ **Outstanding Earth observation capacities for several decades**

→ **Millions of images archived at Spot Image, DRS partners, USGS, other organizations**

→ **Extensive time series to substantiate changes**

→ **Huge expertise and knowledge accumulated on geo-information analysis**

→ **Large worldwide networks to work together (image, GIS, Geoweb, expertise, education,…)**

SPOT IMAGE

Our contribution to action

Provide geographic information and technology to support

local projects for action on climate change related issues

PLANET ACTION
Spot the impacts, engage in action

Human dimensions & habitation

Drought, desertification & water resources

Vegetation, biodiversity & ecosystems

Oceans

Ice & snow cover

SPOT IMAGE

1. Build capacity

- *to understand and act upon climate change environmental impacts*
  - ☐ **Built upon existing programs and communities**
    - → **Support projects with grants : imagery, GIS, training and expertise**
  - ☐ **Built upon GIS/Imagery web collaboration platform**
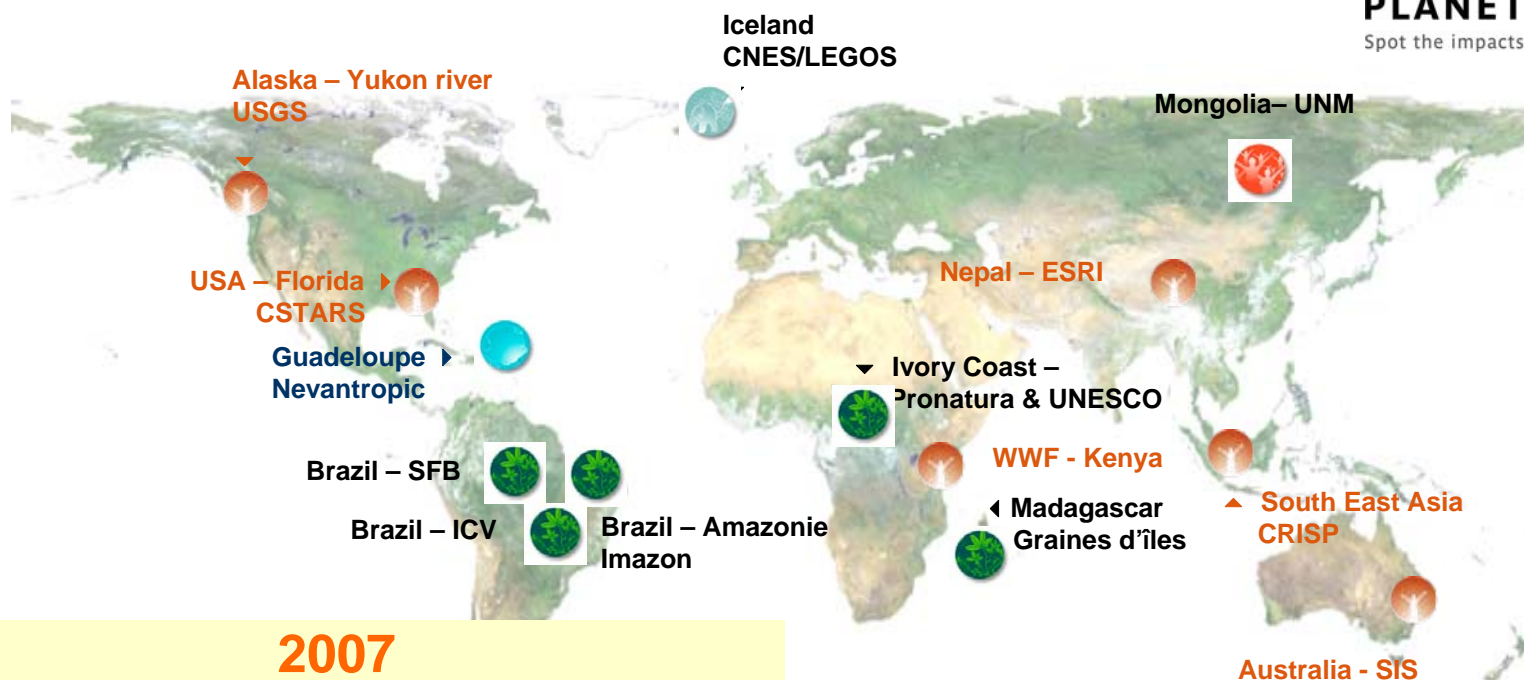
2. Educate the public

- *about climate change environmental impacts and the role of Imagery, GIS and local NGO's*
  - ☐ **Built upon GIS and Imagery press**
  - ☐ **Spread the message via networks of conference and events support**

SPOT IMAGE

Planet Action Roadmap

PLANET ACTION
Spot the impacts, engage in action

Iceland
CNES/LEGOS

Alaska – Yukon river
USGS

Mongolia– UNM

USA – Florida
CSTARS

Nepal – ESRI

Guadeloupe
Nevantropic

Ivory Coast –
Pronatura & UNESCO

Brazil – SFB

WWF - Kenya

Brazil – ICV

Brazil – Amazonie
Imazon

Madagascar
Graines d'îles

South East Asia
CRISP

Australia - SIS

2007

➔ **15 projects started by end 2007**
➔ **Donation >1Million Km2 with images from SPOT**
➔ **Setting up partnerships**
   - **UNESCO**
   - **ESRI**
   - **CNES**
   - **Other satellite operators (NSPO, Digital Globe…)**
   - **Corporate Partners (Infoterra, ...)**

2008

➔ **Target 150 to 200 projects**
➔ **Donation >3 Millions km2 images**
➔ **Creation of PA Foundation**
➔ **Setting up a Planet Action layer within Google Earth**

Project submissions

1. **planet-action@spotimage.com**, or

2. Web Application form in the PA web site **www.planet-action.org**

Main eligibility criteria

➔ Explicit link with Climate Change impacts and related issues
➔ Belong to one or more of the 5 PA subject areas
➔ Include engagement in actions
➔ Strong on-going presence or residency at the field locations
➔ Supported by a technical or scientific findings
➔ Project must be led by a non-commercial organisation

Selection process

1. **Eligible**
2. **Content and work feasible**
3. **Not in conflict with business activities**

Merci de votre attention

SPOT
IMAGE
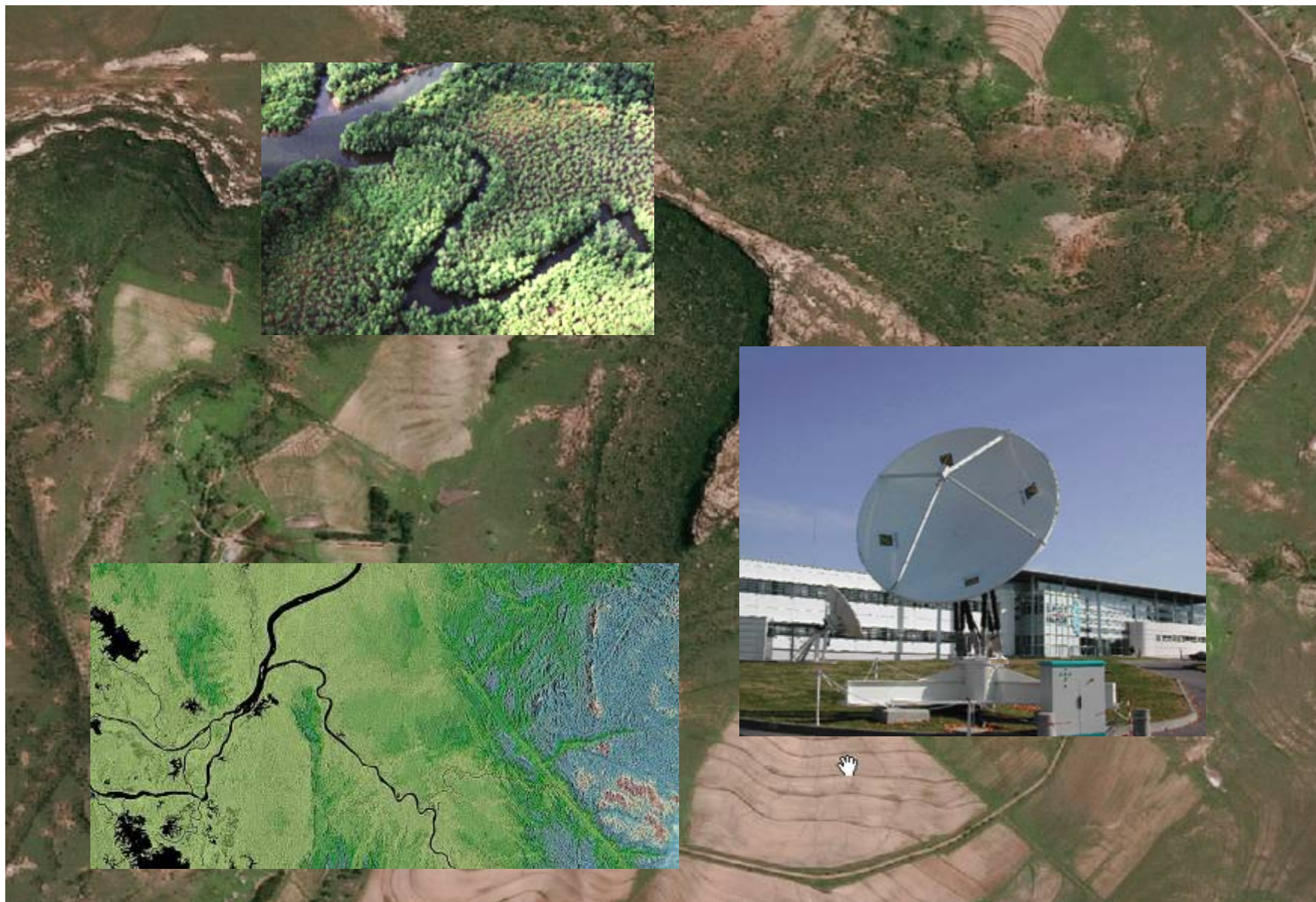
SPOT
IMAGE

Contact : ghislain.gonzales@spotimage.fr

www.spotimage.com

France, Australie, Brésil, Chine, Etats-Unis,
Japon, Mexique, Pérou, Singapour

AFAQ
ISO 9001
VERSION 2000
NQUAL/2001/16726b

sales@spotimage.com