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Montreal, Canada. 6-8 March 2012

Summary of Mission Capacity to meet FCT/ GFOI needs : Missions currently in operation

- **SPOT 4 (1998 - 2012)**
- **SPOT 5 (2002 - 2014)**
- ***Pléiades* (2011 -)**
 - Still in commissioning phase**
 - VHR – Level-3: Local-scale over FCT National Demonstrator sites**

■ VGT

- ◆ Swath width: 2,250 km
- ◆ Nadir viewing
- ◆ Daily coverage
- ◆ Multispectral images only
 - B0, B2, B3, SWIR sampled at 1 km

■ HRG

- ◆ Swath width: 60 km
- ◆ Nadir viewing $\pm 27^\circ$ across track
- ◆ Panchromatic images
 - Sampled at 5 m and 2.5 m
- ◆ Multispectral images
 - B1, B2, B3 sampled at 10 m and SWIR sampled at 20 m

■ HRS (for REF3D)

- ◆ Swath width: 120 km
- ◆ Fixed viewing: $\pm 20^\circ$ fore and back
- ◆ Panchromatic images only
 - Sampling: 5 x 10 m (5 m along the track)

SDCG-1

Montreal, Canada. March 6-8, 2012

SPOT Capacity to meet FCT/GFOI needs

- **Characteristics designed for Level 2 & 3**
 - ◆ Level-2: national/sub-national-scale wall-to-wall:
 - ◆ Level-3: Local-scale over FCT National Demonstrator sites
- **Can be a good “gap filler” in all levels**
- **Programming capacities and agility allows high revisit (necessity over cloudy areas)**
- **CNES – Astrium negotiations on archive data acquisitions for a wider use (sites still to be defined)**

SPOT Capacity to meet FCT/GFOI needs

Geographic priorities

- **French government project over Congo Basin**
<http://bassinducongo.reddspot.org/>
 - ◆ SPOT capacity hardly sufficient due to intense cloud cover
 - No ground station – limitation of on-board registration
 - ◆ Incoming ground station in Gabon

- **Regular SPOT acquisitions over French Guyana (Kyoto, Annex1)**
- **Cayenne ground station covers the Amazonian forest**
 - ◆ Pléiades reception, Sentinel 1&2 collaborative under discussion
 - ◆ Discussion with commercial data providers for station upgrading (SPOT6&7, CSK)

- **New SPOT + RADARSAT ground station in La Réunion Island, Indian Ocean**
 - ◆ Dedicated SPOT user license for institutions in Madagascar (free data)

Provision of earth observation data for REDD+ users in the Congo Basin

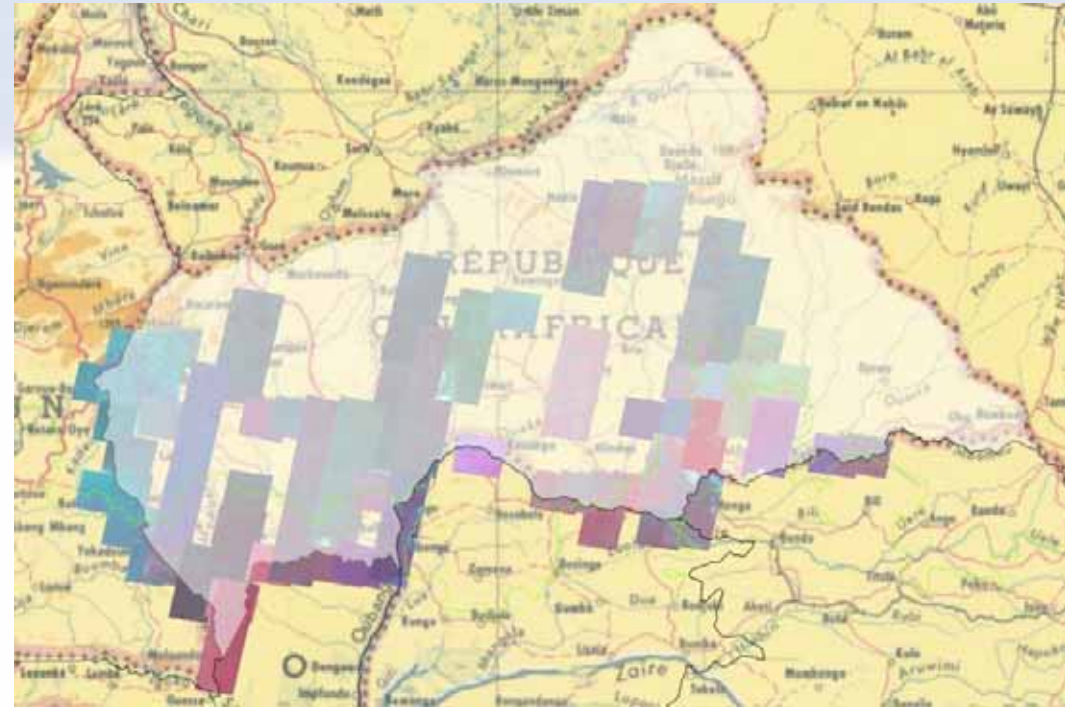
Objectives

- Provision of archive SPOT (2, 4 and 5) available on the tropical humid forests in Central Africa for the period 1990-2010
- Programmation for new SPOT acquisition aiming to obtain a full coverage of the area for the period 2008-2011
- Pursue acquisition for the period 2012-2015
- Production of thematic information forest/non-forest maps on pilot area (CAR) based on VHR SPOT data (2,5m)
- Baselines consisting on historical deforestation mapping and benchmark forest map at date over pilot regions, South CRA and DRC (partly)
- Support to the national entities in charge of forest monitoring in the Congo basin countries
- Coordination with ongoing or planned initiatives
- Promote open access to data for REDD+ users (public entities, research institution, universities, NGOs) upon approval of REDD+ licence
- Web portal for data download (REDD+ licences) : <http://bassinducongo.reddspot.org/>

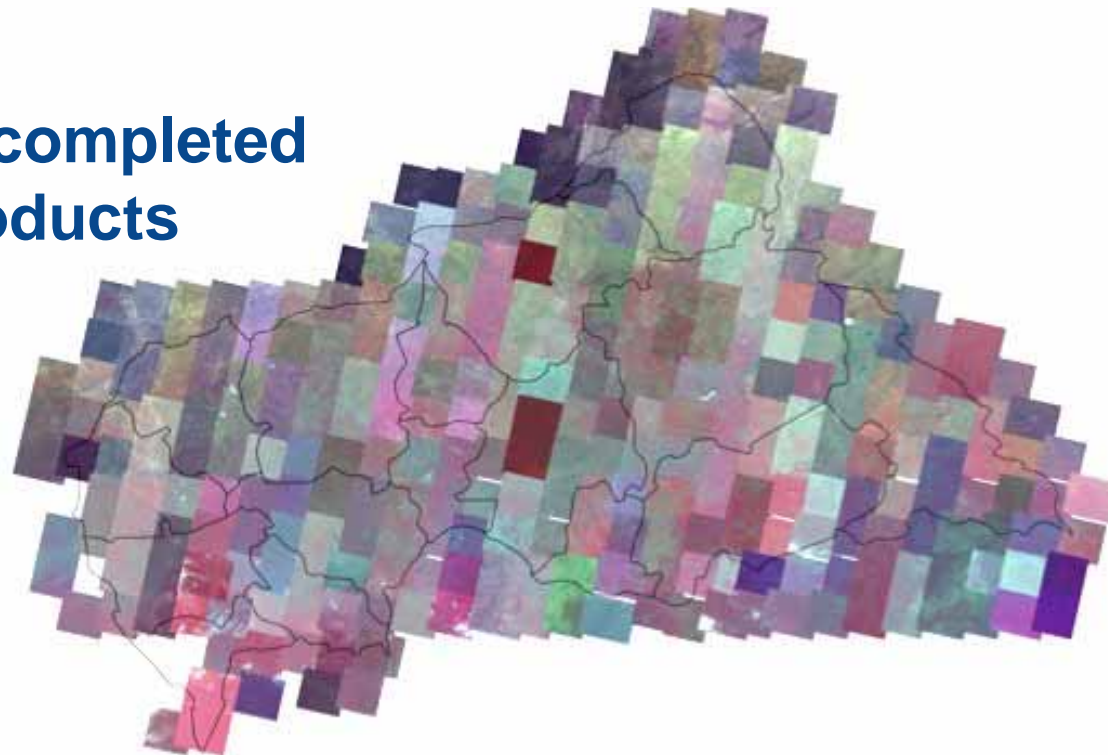




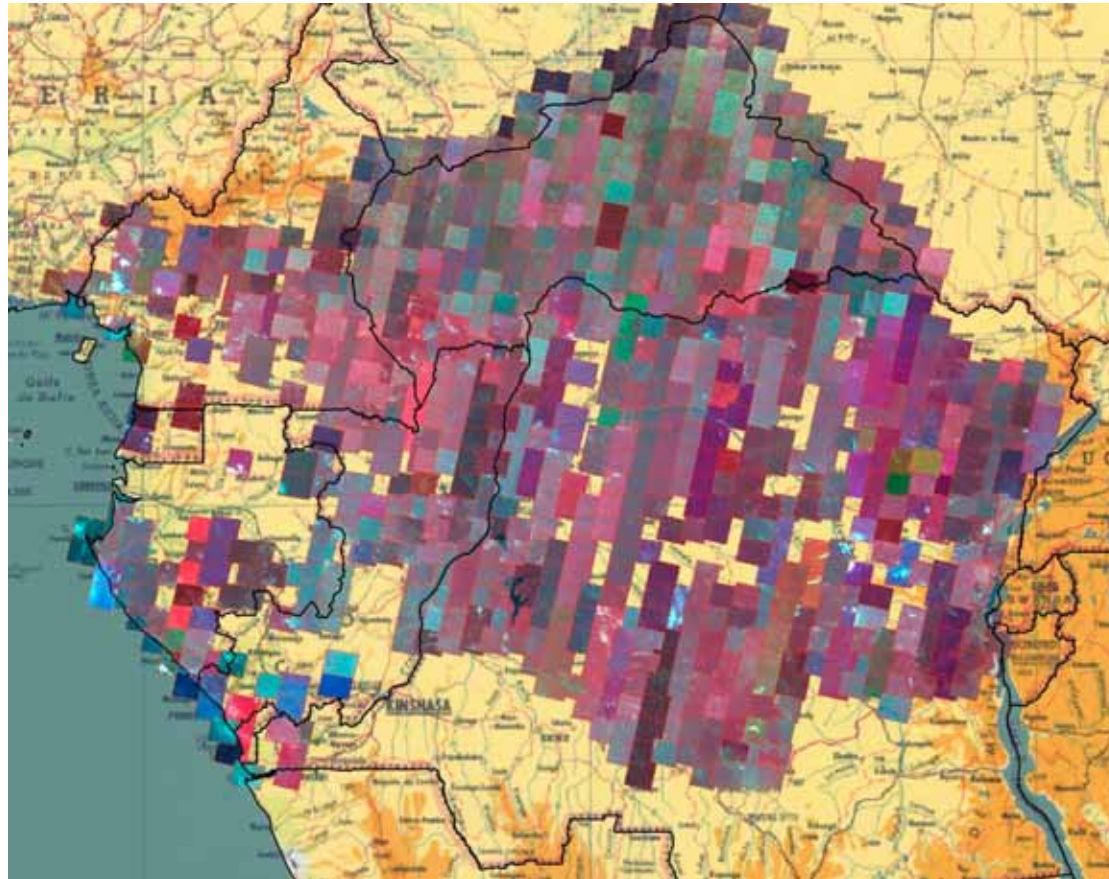
**Cover SPOT 2000 over
Centrafica (available
archive)**



**SPOT 2010, completed
10m, 315 products**



Cover SPOT “2010” (COP 16 update, Dec 2010)



SDCG-1
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SPOT1A & SPOTmaps (ortho 2.5m) over Congo Basin

Des images et des cartes pour votre projet

Accueil > Consultez le catalogue > La carte interactive

Marsat J. J. J.

Résultats

Résultats à la scène
Résultats trouvés: 42

Erreurs Images Vignettes

Produit	Résolution	Numéro	Date (dd/mm/yyyy)	Planer	Info
1A - Période 2008-2012 Spot4	20		03/08/10		
1A - Période 2008-2012 Spot4	20		29/07/10		
1A - Période 2008-2012 Spot4	20		24/07/10		
1A - Période 2008-2012 Spot4	20		24/07/10		
1A - Période 2008-2012 Spot4	20		18/07/10		
1A - Période 2008-2012 Spot4	20		20/06/10		
1A - Période 2008-2012 Spot5	10		08/06/10		
1A - Période 2008-2012 Spot5	10		08/06/10		
1A - Période 2008-2012 Spot5	10		30/05/10		
1A - Période 2008-2012 Spot5	10		30/05/10		
1A - Période 2008-2012 Spot5	10		18/05/10		

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1A - Période 2008-2012 Spot4 8/3 107/200 00 01/04/10

Résultats monétique
Résultats trouvés: 0

Paramètres de recherche

Résolution (10 - 20)

Date (24/05/08 - 03/08/10)

Couvert nuageux (0% - 0,4%)

X = 840818,9994, Y = 1138881,0287 - 82 109,3 km² Résolution 25m, Couvert nuageux -1%, Date 06/03/07 - 04/03/13

Contactez-nous

■ Image characteristics

- ◆ **0.7 m Pan** resolution at nadir
- ◆ **four XS bands** (blue, green, red, near IR) with 2.8 m resolution at nadir
- ◆ **20 km** swath at nadir

■ Revisit Capability with 2 satellites

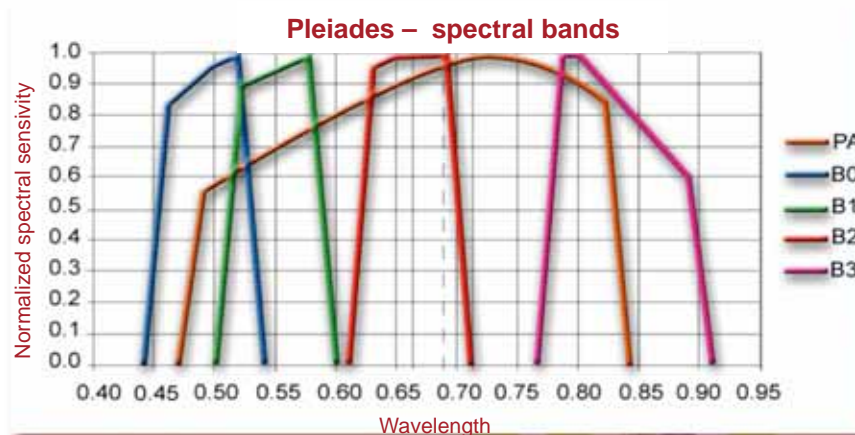
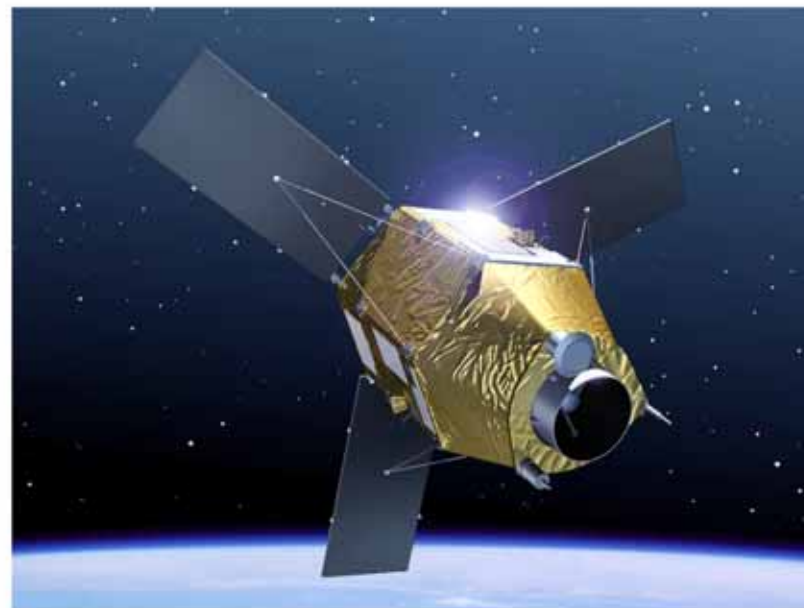
- ◆ **Daily accessibility** to any point on the globe

■ Improved access image delay

- ◆ **Better than 36 hours** between image request and image delivery in nominal mode
- ◆ **24 hours in very urgent mode**

■ Large coverage capability

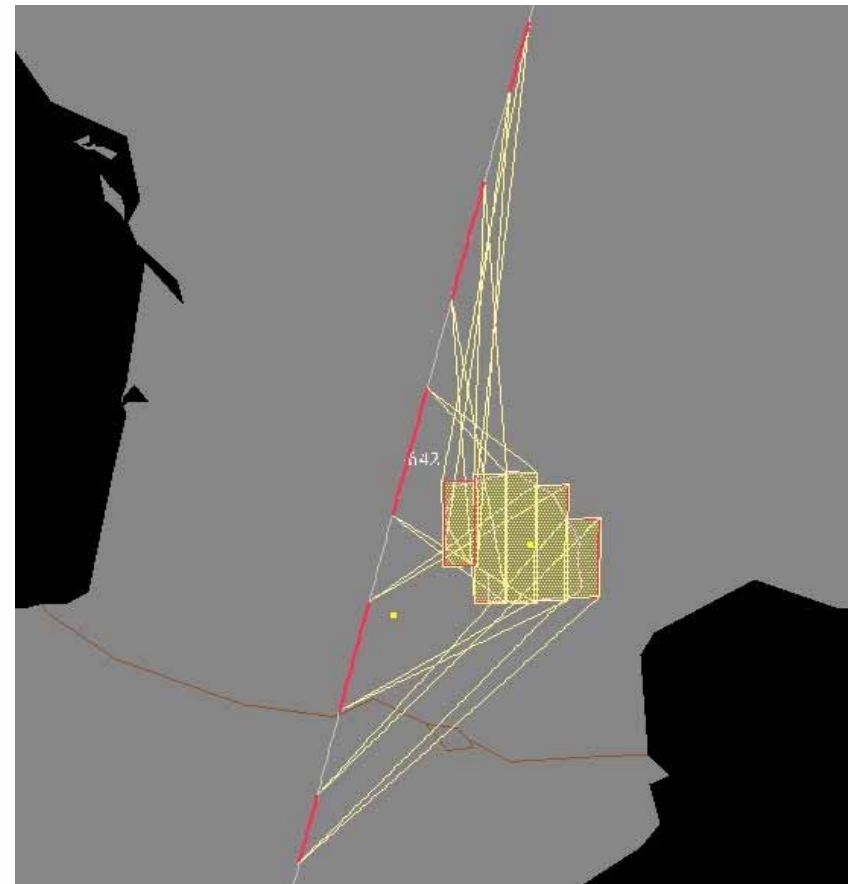
- ◆ In average 160 000 km² (400 images) per satellite and per day



■ **Cover capacity in one pass over a specific territory :**

Largeur de la couverture	Longueur maximum
Accès autorisé à 20°	
60 km (3 bandes)	185 km
80 km (4 bandes)	110 km
100 km (5 bandes)	70 km
120 km (6 bandes)	45 km
Accès autorisé à 30°	
60 km (3 bandes)	300 km
80 km (4 bandes)	205 km
100 km (5 bandes)	150 km
120 km (6 bandes)	110 km
140 km (7 bandes)	85 km

Exemple : Département du Tarn, visée autorisée à 30°, longueur du segment le plus long : 90 km



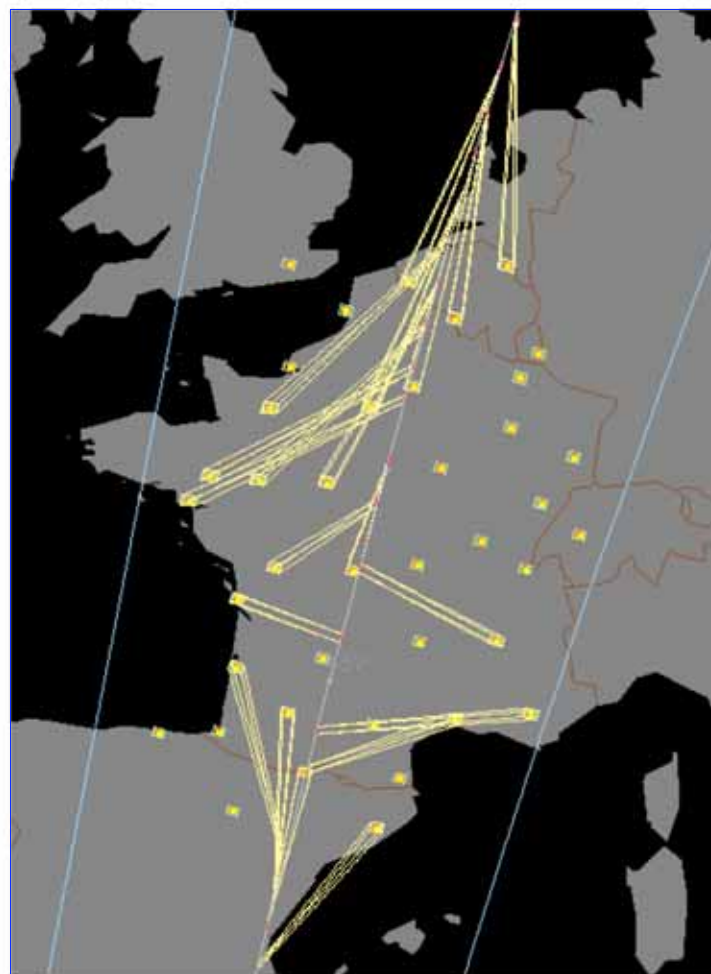
Acquisition in one pass for gap filling

■ Up to 450 images per day and per satellite

- ◆ In a 50° cone around vertical (30° with all performances)
- ◆ High agility permits to minimize conflicts between users

■ operational mission over Europe:

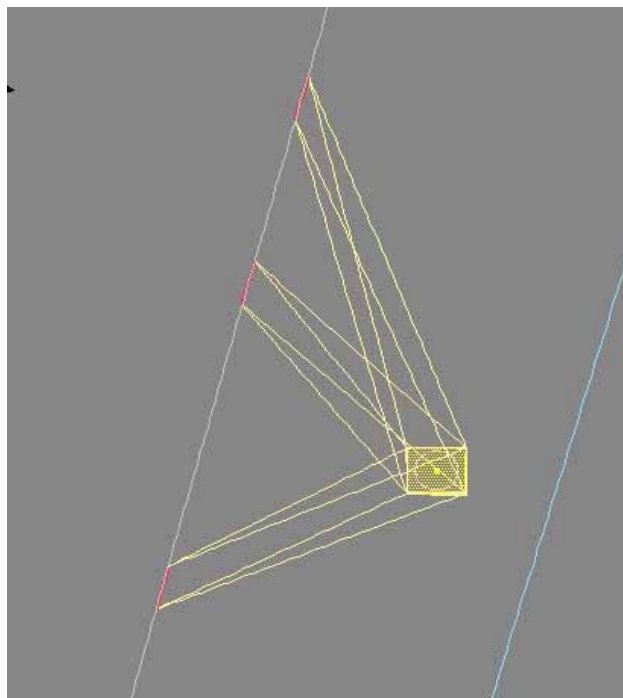
- ◆ 40 targets to acquire, each with a diameter of 15km, spread over an area of 1,000x1,000 km².
- ◆ 20 targets acquired in a single pass with a metric resolution (viewing angle of $\pm 30^\circ$) thanks to agility



■ Capacités Stéréo Simultanée

Stéréo

B/H	Length
0.15	20 km
0.2	60 km
0.3	120 km
0.4	175 km
0.5	225 km
0.6	280 km
0.7	300 km
0.8	300 km



Tri-Stéréo

B/H	Length
0.3	20 km
0.4	60 km
0.5	90 km
0.6	120 km
0.7	145 km
0.8	175 km
0.9	205 km
1	225 km

- ◆ Les tableaux donnent la longueur maximum du segment de prise de vue réalisable de manière simultanée en stéréo et tri-stéréo en fonction du rapport B/H.

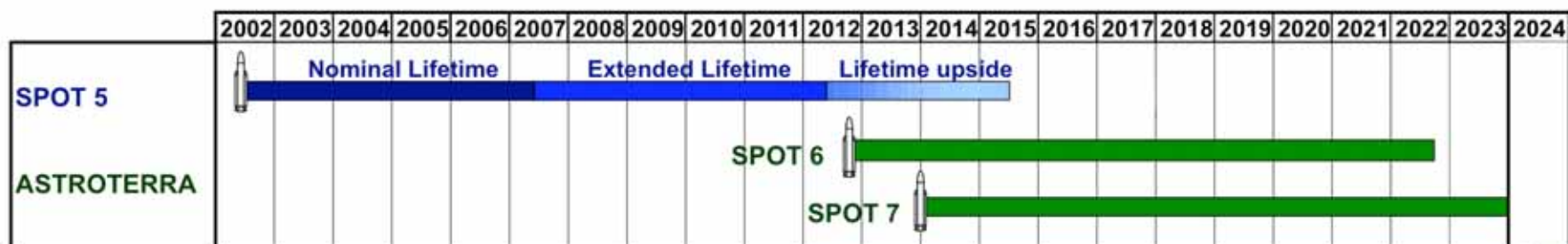
Pléiades data policies

- **Through a “Public Service Delegation”**
 - ◆ **40% of the civilian resource for Institutional bodies of cooperating countries for non commercial activities with preferential price (C1 + C2)**
- **Users using civil channels**
 - ◆ **« shareholders » : C1**
 - Agreed institutionnal users (End Users) of states funding the system developments
 - non merchant activities
 - Pléiades : France, Autriche, Belgique, Espagne et Suède
 - ◆ **« institutionnals european users » : C2**
 - European institutionnal users + CNES bilateral agreements
 - Non merchant public services activities
 - ◆ **« normal users »: C3**
 - All the other users
- **No systematic cover but possible acquisitions upon request on specific areas which may need VHR.**

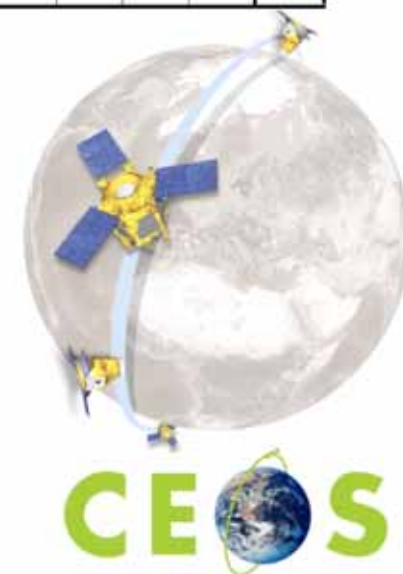
Summary of Mission Capacity to meet FCT/ GFOI needs : **Near future Missions**

- **SPOT 6 (2012 -) - SPOT 7 (2013 -)**
- **Venus (2014) for very small predefined sites**

- ♦ High resolution optical mission to take over from the SPOT5 HR mission with smooth transition, able to turn into commercial operations in autumn 2012
- ♦ A 2-satellite constellation, i.e. SPOT 6 and SPOT 7, each satellite being designed for a 10-year lifetime



- ♦ Assured mission continuity and improvements for users
- ♦ SPOT 6 will complement SPOT 5 before September 2012
- ♦ Secure availability of HR data up to 2024
- ♦ Large and optimized collection capabilities
- ♦ Improved reactivity and access to products



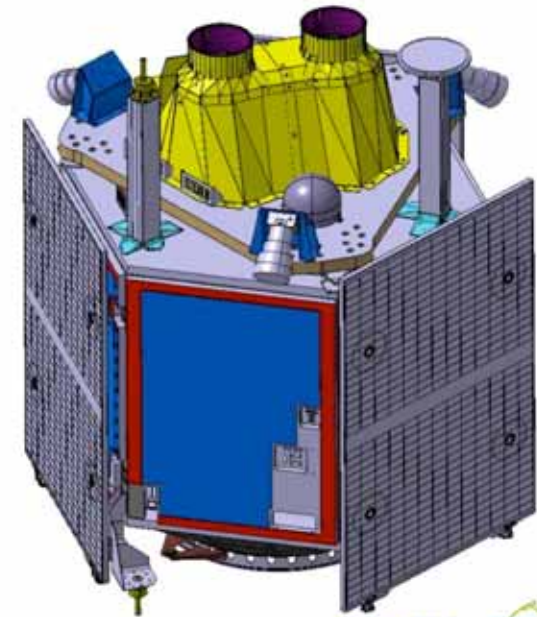
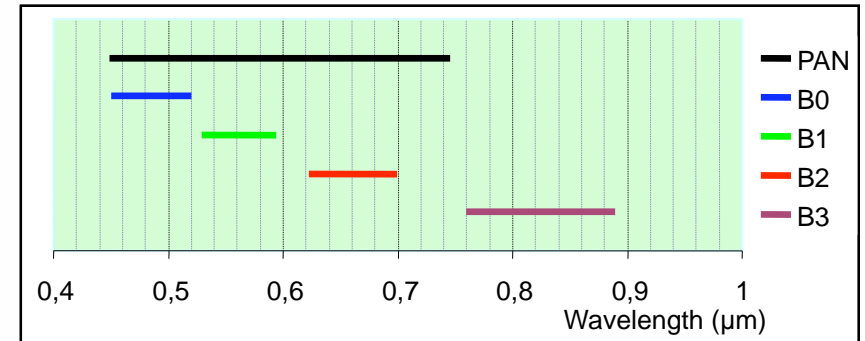
SPOT 6&7 Program overview: Enhanced design & operational choices

■ Image characteristics

- ◆ Swath: 60 km
- ◆ Systematic simultaneous Pan+4MS bands acquisition
- ◆ High location accuracy:
 - 10m CE90 for Ortho images with Ref3D

■ System characteristics

- ◆ Altitude: 694 km (same as Pleiades)
- ◆ Local Hour: 10h00 (Descending Node)
- ◆ Design life time: 10 years



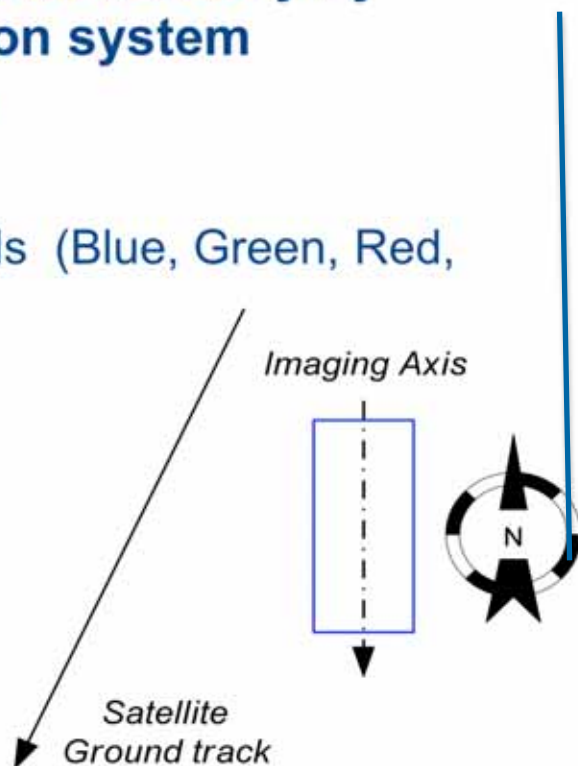
■ Imagery Products

generated in an automated way by the image production system

◆ Primary products

- 1,5m PAN,
- 6 m MS, 4 bands (Blue, Green, Red, NIR)

◆ Ortho products



delivered as:

■ Bundle PAN+XS

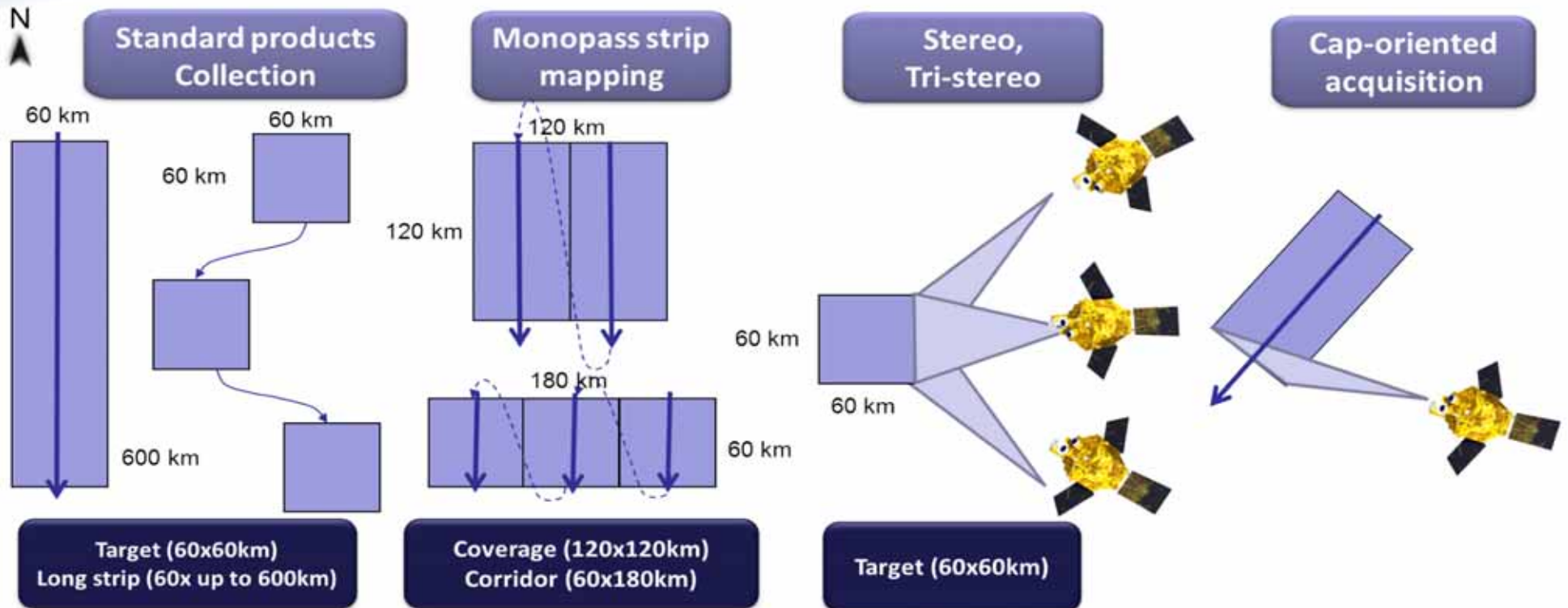
the gathering of the 2 above sets, PAN and XS, being coregistered

■ Pansharpened

combining the visual information of all four multispectral bands with the spatial information of the panchromatic band

1.5m colour ortho products, generated in an automated way by the image production system

Monopass collection scenarios



6M+ Sq.km per day with the 2 satellites

- **Expected capacity to contribute to the “CEOS Data Strategy in support to GFOI” : same as SPOT 4&5**
 - ◆ *Level-1: continental-scale wall-to-wall;*
 - ◆ **Level-2: national/sub-national-scale wall-to-wall:**
 - ◆ **Level-3: Local-scale over FCT National Demonstrator sites)**

 - ◆ **Capabilities : 6M+ Sq.km per day with the 2 satellites**
 - ◆ **System constraints : cost & licence rules**
 - ◆ **Fully private system : EADS/Astrium funds (no public participation)**
 - ◆ **Acquisition Scheduling Procedure**

Venus Scientific mission - features



- The scientific mission goal is to acquire frequent, high resolution, multi-spectral images of predefined sites of interest all around the world
- Orbit: near polar, sun-synchronous (Altitude: 720 km Inclination: 98.27°)
- Revisit time: two days
- Swath: 27.5 km
- Spatial resolution: 5.3 m
- Number of spectral bands: 12 (VIS-NIR)
- Tilting capability: +/-30° across and along track
- Radiometric resolution: 10 bits
- Equator crossing time: 10-12 AM
- 50 sites to cover, maximum of 15 images per orbit, 80 images per day

A new call for sites selection planned for early 2013

Image products



Product level	Temporal characteristic	Content
Level 0	single date acquisition	Raw data + ancillary information
Level 1	single date acquisition	Top of the Atmosphere reflectances, map projected (ortho-image)
Level 2	single date acquisition	Surface reflectances, map projected (ortho-image)
Level 3	time composites	Surface reflectances, map projected (ortho-image)

For more information, <http://smc.cnes.fr/VENUS>



■ Expected capacity to contribute to the “CEOS Data Strategy in support to GFOI”

- ◆ Level-3: Local-scale over FCT National Demonstrator sites

“To foster the capability of the scientific community to use such new datasets (high repetitivity, high resolution remotely sensed measurements acquired by a super spectral imaging radiometer) and to develop innovative methods (to retrieve biophysical parameters over land) and applications”

- ◆ System constraints : Very small sites not fully determined
- ◆ Acquisition : Launch planned in 2014 for a 2 year mission
- ◆ Geographical Priorities not an tropical forests but some sites to be selected