SPOT IMAGE

PLEIADES

➜ **Products & Services**
June 2008 update

C.HUTIN
SI/DC/BD

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www.spotimage.com
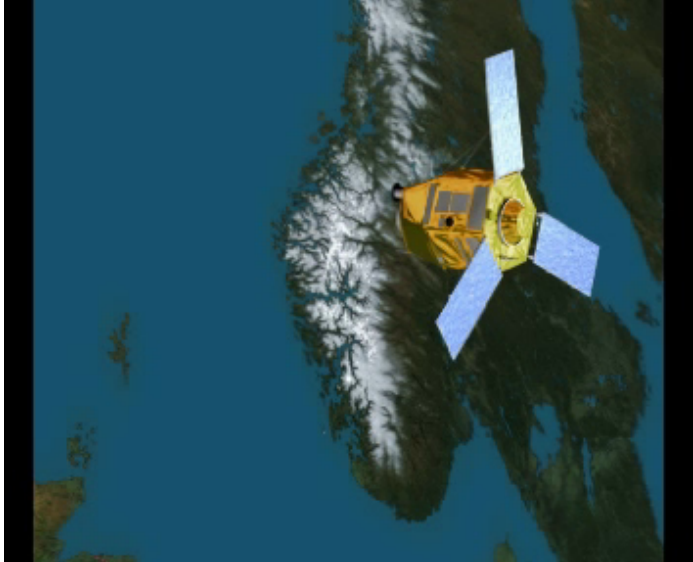
10 June 2008

Summary

1. **Image products overview**

2. **Catalogue and Programming services**

3. **Pleiades for the ground stations: extended services**

4. **Pleiades data policy**

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Image products overview: All the sensor can do…

Target acquisition
and strip mapping
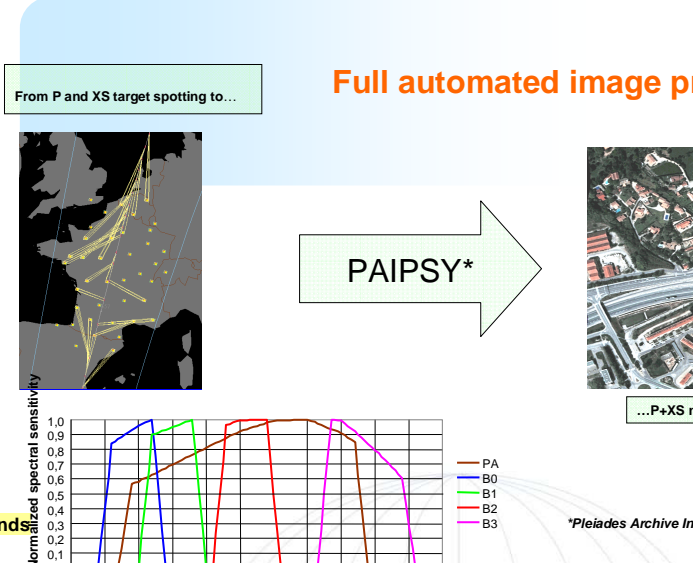
Tri-stereo

Stereo

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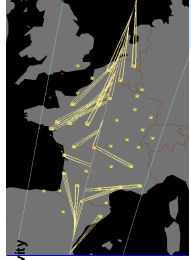
Image products overview: All the sensor can do…

From P and XS target spotting to…
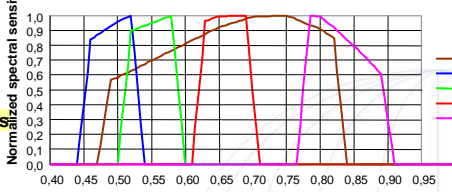
Full automated image processing

PAIPSY*

…P+XS natural colour image

Normalized spectral sensitivity

1,0
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0,0

0,40 0,45 0,50 0,55 0,60 0,65 0,70 0,75 0,80 0,85 0,90 0,95

PA
B0
B1
B2
B3

bands

Pleiades Archive Inventory and Production SYstem

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Image products overview: All the sensor can do…

Image mosaicking

From single pass strip
mapping to…

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…Orthorectified seamless
mosaic of images

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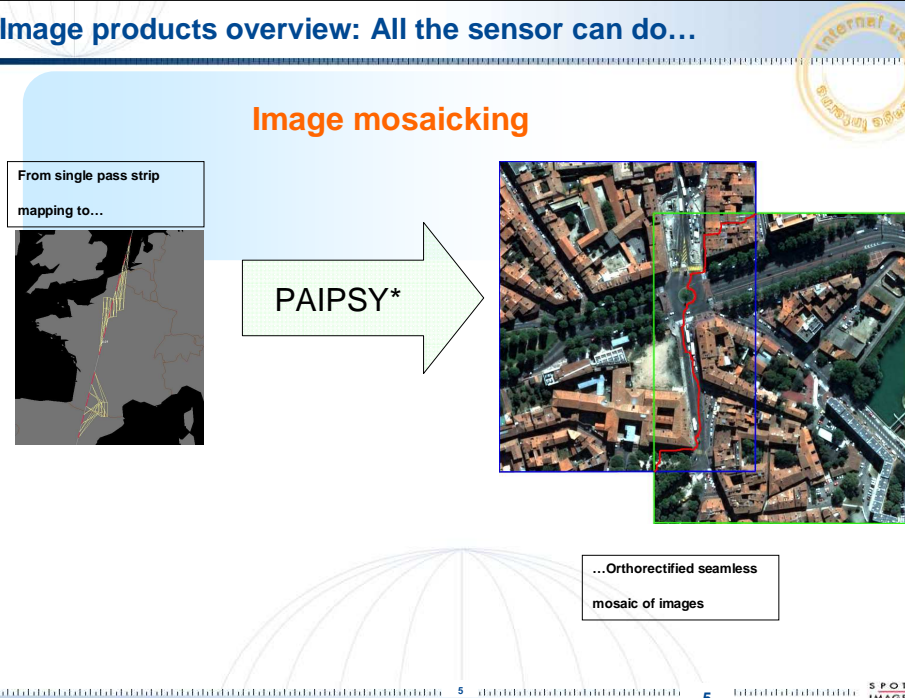
Image products overview: All the sensor can do…

Stereo and Tri-stereo mapping
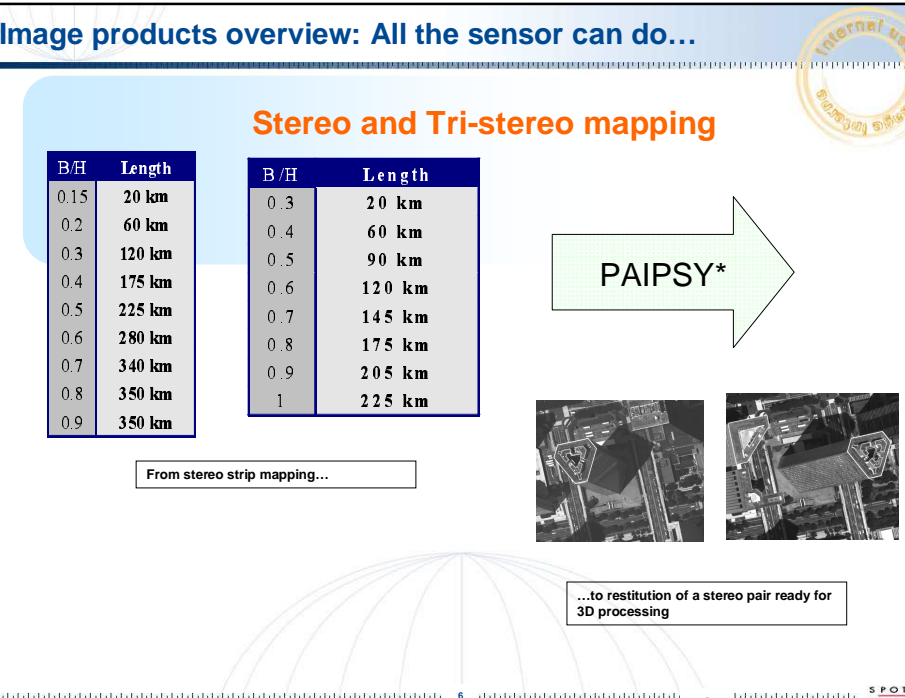
B/H	Length
0.15	20 km
0.2	60 km
0.3	120 km
0.4	175 km
0.5	225 km
0.6	280 km
0.7	340 km
0.8	350 km
0.9	350 km

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

PAIPSY*

From stereo strip mapping…

…to restitution of a stereo pair ready for
3D processing

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A full range of VHR image products

➔ **Basic Image products delivered according to user's AOI**
- **Polygonal AOI inside a 20km scene or across single-pass adjacent strips**
  - Mimimum size 100 km²
  - *Capacity to deliver PHR Scene ou sub-scene*
- **Products invoiced per km²**

➔ **Standard image products**
- **All System products (PAIPSY)**
- **Fast automated data processing inc. on-line delivery**
- **Includes single-pass ortho mosaics**

➔ *Potential Value-added products*
- *Multi-date mosaics, DTM from stereo, Very High location accuracy*
- *Upon specific quotation & user's demand*

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Standard image products

➔ **50 cm B&W**
- **8 or 16 bits**

➔ **2 m colour**
- **4 bands : B, R, G, NIR**
- **8 or 16 bits**

➔ **Pan Sharpened 50 cm colour**
- **4 bands : B, R, G, NIR**
- **3 bands in True or False colours**
- **8 or 16 bits**

➔ **Bundle : 50 cm B&W + 2 m colour bands**
- **8 ou 16 bits**

Simulated extracts

Simulated extracts

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Example 1: Pan-sharpening, false colours

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Example 2: Pan-sharpening, true colours

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Example 3: Pan-sharpening, True colours

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Standard products: Stereo pairs

➔ **Definition of PHR Stereo pairs :**

■ **A pair of <u>2 sensor level image products</u> obtained from along track stereo imaging mode (*Off track stereo is also possible*) on the same orbit**

■ **50 cm N&B or colour**

■ **And/or 2 m colour**
   ▫ Maximal length of segment for stereo pairs depends on B/H ratio as follows:

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
0.9	300 km

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Standard products: Stereo triplets

➔ **Stereo triplet :**

- **A set of 3 sensor level image products obtained from 3 along track views on the same orbit**

- **50 cm N&B or colour**

- **And/or 2 m colour**
  - Maximal length of segment for stereo triplets depends on B/H ratio as follows:

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

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Processing levels

➔ **SENSOR**
- **Corresponds to usual 1A level , "push-broom like" image**
  - radiometric corrections
  - Perfect P and XS registration
- **50 cm B&W and colour , 2 m colour, bundle, stereo and tri-stereo**

➔ **ORTHO**
- **Orthorectification using DTED2 DTM (Ref 3D or external DTED2)**
- **Location accurracy: better than 10m (CE90)**
- **50 cm B&W and/ or colour, 2 m colour, stereo and tri-stereo, single-pass mosaic**

MNT PHR

Swath width	Maximum length
Max Viewing Angle 20°	
60 km (3 bands)	185 km
80 km (4 bands)	110 km
100 km (5 bands)	70 km
120 km (6 bands)	45 km
Max Viewing Angle 30°	
60 km (3 bands)	315 km
80 km (4 bands)	205 km
100 km (5 bands)	150 km
120 km (6 bands)	110 km
140 km (7 bands)	85 km

Single pass mosaic capability.

Image quality is guaranteed for 3 strips (60km x60km).

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Product formats and volumes

→ **Format**
- **DIMAP**
  - ☐ JPEG 2000 for the image
    - → nominal compression (~3.5 bits/ pixel) or Reversible compression (8 bits/ pixel)
  - ☐ GeoTIFF
  - ☐ GML (vector masks)
  - ☐ Includes RPC
- **ISO/OGC**
  - ☐ ISO 19139

→ **Sensor-level scene volume**
- ☐ scene (20 km x 20 km)

	Nominal	Reversible
PAN (50 cm)	**0.7 Gbytes**	**1.5**
XS (2 m) 4 bands	**0.2 Gbytes**	**0.4**
PA+XS (50 cm) 4 bands	**2.9 Gbytes**	**5.9**

Ortho-level scene volume
- **Close to Sensor-level volume**

→ **Delivery: Media or FTP**

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Value-Added Products

→ **Goal: to elaborate user-oriented specific products from system products**

→ **Three types of products are achievable in a project-oriented approach between Spot Image and the end-user**

- **Multi-date Mosaic: Patchwork of PHR strips acquired at different dates**

- **Image product with improved location accuracy: requires appropriate DTM and relevant collection of GCP (<1m CE90 is the target).GCP and DTM can be customer-furnished items**

- **DEM from PHR stereo**

- ***Vector extraction ?***

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Summary

1. **Image products overview**

2. **Catalog and Programming services**

3. **Pleiades for the ground stations: extended services**

4. **Pleiades data policy**

Catalog services (1/2)

➔ **Access to a world-wide catalogue, updated permanently**
  - **describes world-wide archived civilian source data**
➔ **Internet portal (SIRIUS On Line), enabling :**
  - **Pleiades catalogue browsing**
  - **Request for quotation service**
    □ Direct Customer ROI input or selection of scenes/ segments/ mosaics
  - **Ordering activation for registered clients**
  - **Product progress follow-up**
  - **Subscription services**
➔ **Extended services :**
  - **Automatic optimal data search for AOI coverage**
    □ based on user criteria
    □ useful to prepare mapping projects

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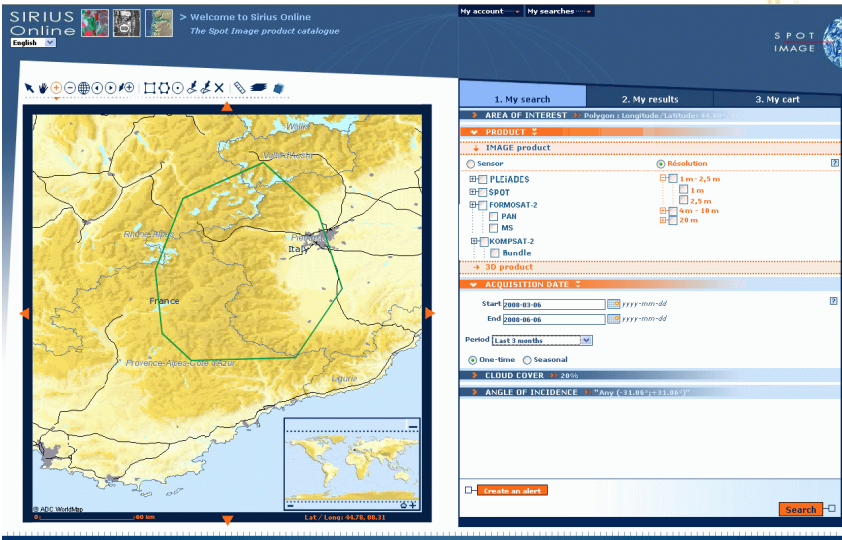
Catalog services (2/2)

➔ **Catalogue contents**
- **metadata (ISO standards)**
- **image album (20m resolution) or quick-looks**
  - ☐ 4-band colour images
  - ☐ JP2000 standard for album : used for validation loop or for specific customers
  - ☐ quick-look images for Internet access
- **different masks**
  - ☐ image quality
  - ☐ cloud cover
- **specific descriptors for browsing and production**
  - ☐ stereo/ tri-stereo criteria
  - ☐ monopass criteria

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Pleiades in SIRIUS On-Line
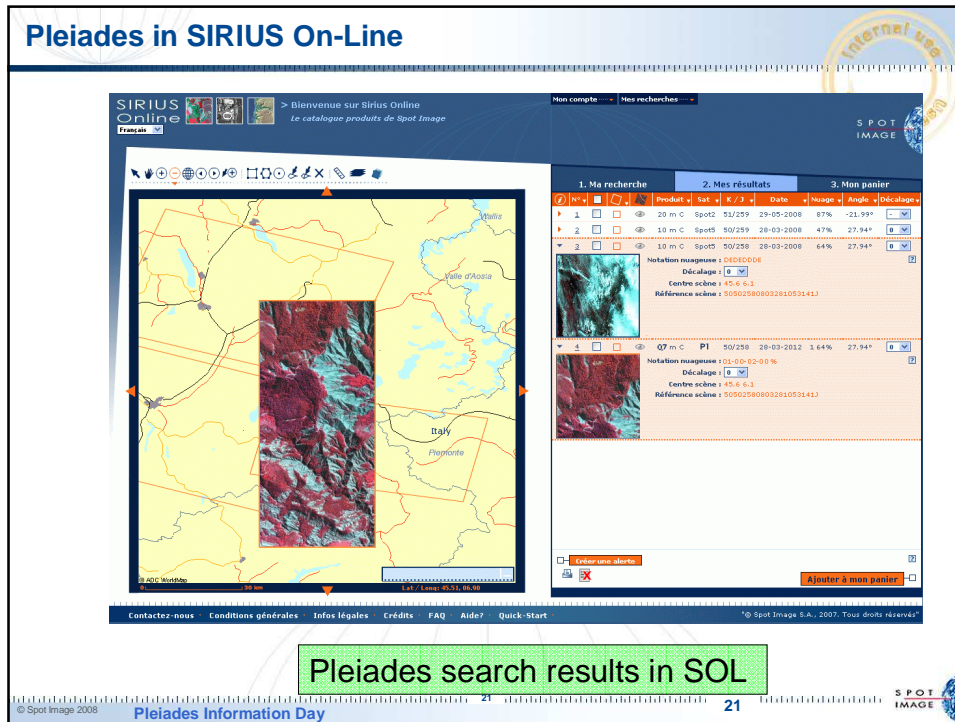
Pleiades data request in SOL

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Pleiades in SIRIUS On-Line

Pleiades search results in SOL

Pleiades concept of operations: a centralized approach

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Pleiades nominal chronology : 3 Plans/ day

→ **3 Mission Plans over 24h**
  - ■ **Morning Plan, Afternoon Plan & Evening plan**
  - ■ **Example: Evening Mission Plan before flying over Asia inc. Japan**
    - □ to improve reactivity over this region

→ **3 Programming periods**

UT Time >	24	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Programming Periods							6:00							13:40									23:20	
Prepa. of Acq.Requests																								
Census of Acq.Requests																								
Mission Plan ready																								
Uplink to PHR satellite																								
Observed Geographical Areas	Australia			India		M-East		Europe						North America									N Zealand	
	Japan			China			Africa				South America													
Japan local time >	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	1	2	3	4	5	6	7	8

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Programming services (1)

→ **Routine data collection**
  - ■ **The User deposits an Image Customer Request (ICR) at Spot Image programming desk**
  - ■ **Spot Image returns a data collection proposal meeting at best the user's timeline and data requirements without specific priority (*best efforts*)**
  - ■ **Routine collection service invoiced as extra charge when related products are delivered**

→ **Priority data collection**
  - ■ **Same process as for Routine**
  - ■ **To be activated by the user for important or time-critical data (also upon Spot Image advice for de-confliction procedures)**
  - ■ **Priority selection will rank the ICR higher in the list (*First in, First served*)**
  - ■ **Priority collection invoiced as an extra charge on products**

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Programming services (2)

➔ **Emergency data collection**
- ICR accepted between 24h and 6h before actual pass
- Deposits can be handled by time zone (Europe/Spot Image, US/SICORP, Asia/Spot Asia)
- Emergency Programming fee is due as soon as corresponding data is effectively tasked

➔ **Dual programming**
- Highest level of Priority, to be activated in case of crisis
- 48h notice required
- Limited quota of data daily
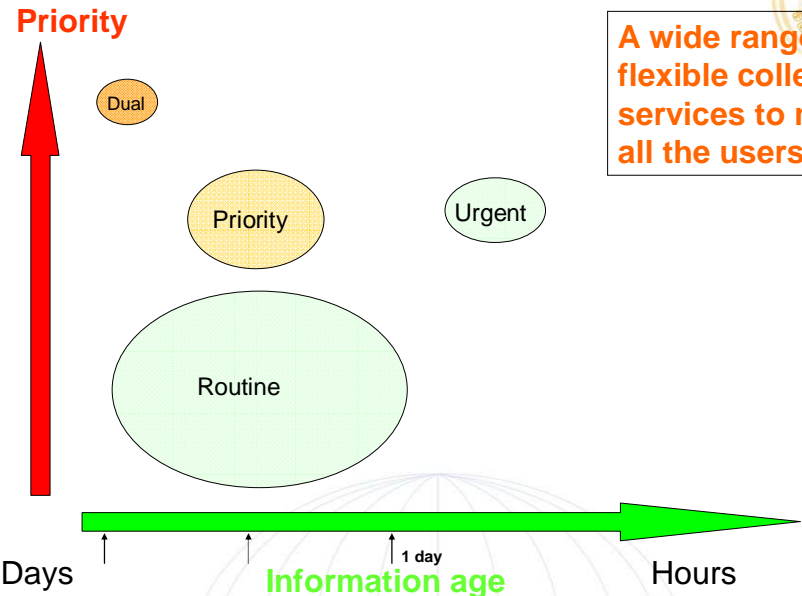- Dual programming fee is due in any case

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Programming services (3)

Priority

Dual

Priority

Urgent

Routine

A wide range of flexible collection services to meet all the users needs

Days   **Information age**   1 day   Hours
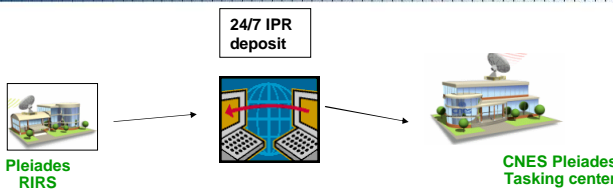
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Summary

1. **Image products overview**

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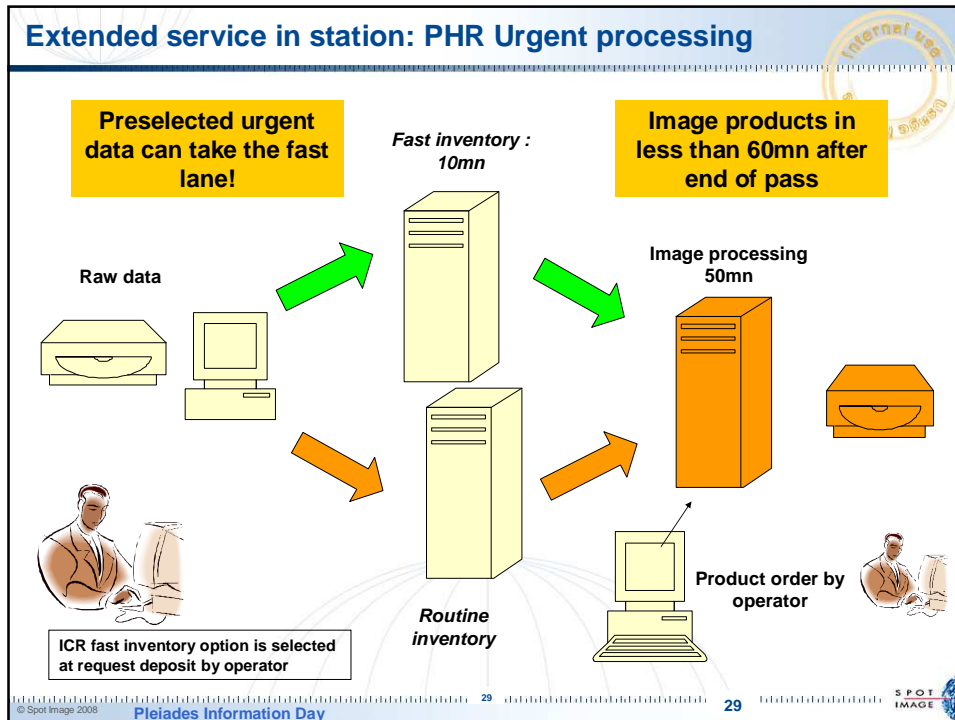© Spot Image 2008   **Pleiades Information Day**   27   27

Extended service in station: 24/7 programming

24/7 IPR deposit

Pleiades RIRS

CNES Pleiades Tasking center

➔ **Through specific IHM, the Pleiades RIRS can deposit the ICR directly on the civilian collection list**
- **ICR accepted up to 4h before actual pass in Priority mode**
- **Limited by daily quota**

➔ **RIRS programming access services available through PRM tool upgrade or Access Unit**
- **Will include collection planning aid tool**

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Extended service in station: PHR Urgent processing

Summary

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Pleiades data policy

➔ **SPOT IMAGE selected as exclusive WW PHR 1A and PHR 1B distributor as of 18 January 2008:**

  ■ **Committed to enforce CNES agreements & partnerships with respect to:**
    □ Image acquisition
    □ Image production
    □ Image dissemination and distribution
  ■ **3 classes of users:**
    □ Class 1: PHR Programme Partners
    □ Class 2 : European partners having specific agreements with CNES
    □ Class 3: others
  ■ **CNES keeps intellectual property of data**

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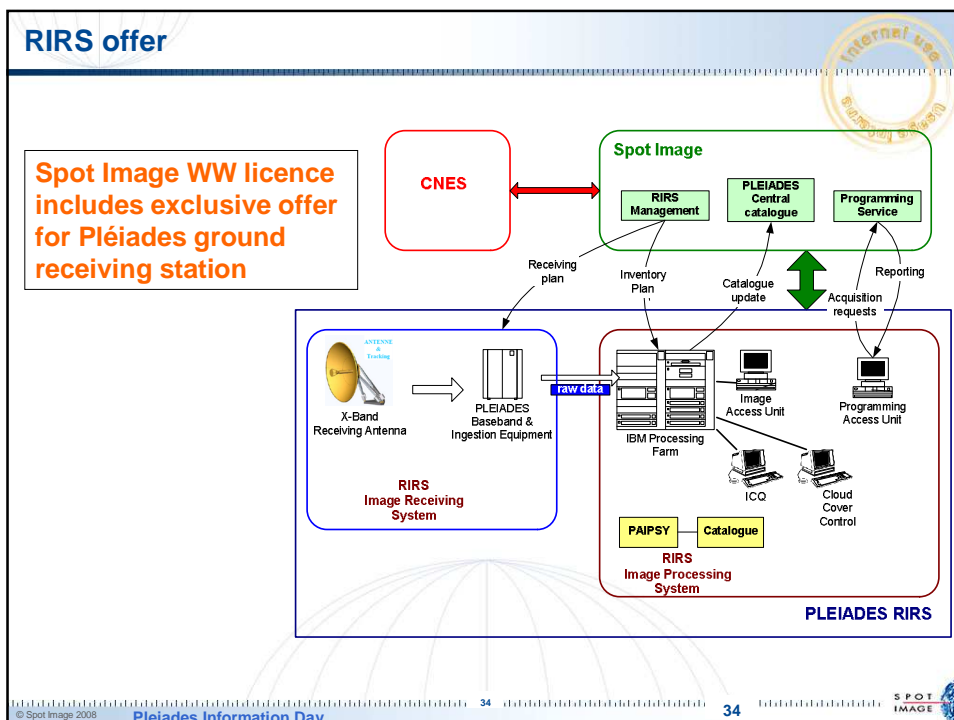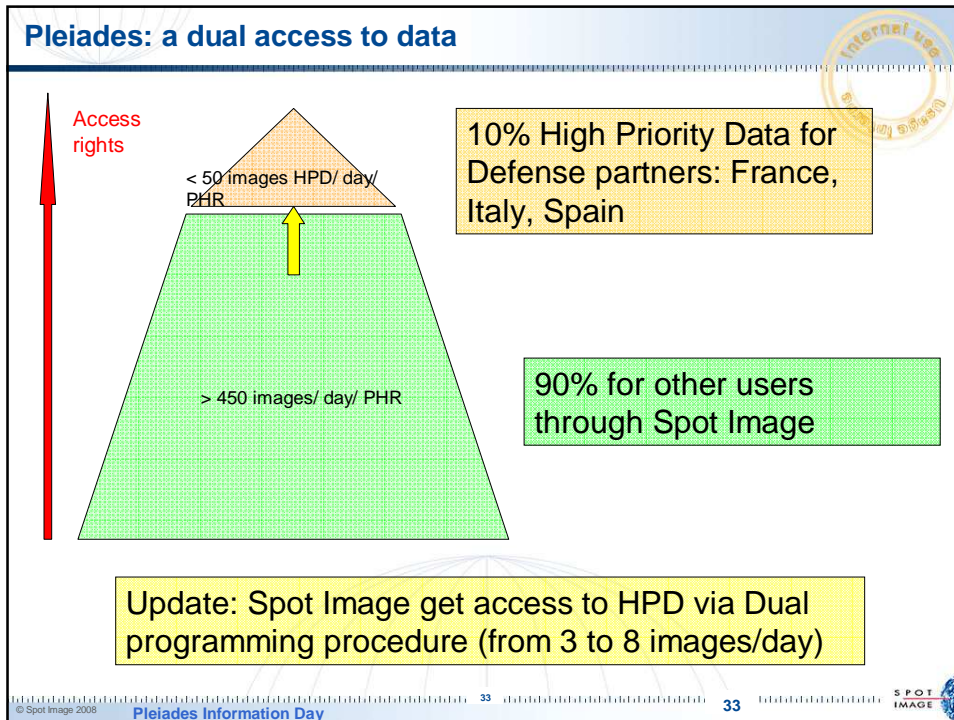**Pleiades data policy**

➔ **Spot Image committed to serve all users on equal footing in terms of Services & Products:**

  ■ **Specific non-profit price policy applicable to Class 1 & 2 users**
  ■ **Class 1 & 2 users will use data for own internal purpose (*no sale or re-sale permitted*)**
  ■ **Class 1 & 2 users authorized to make or have made Derived Products from data**
  ■ ***40% of PHR data are for Class1 & 2 users, 60% for Class3***

➔ **No restriction foreseen for data dissemination WW except usual UN regulations**

➔ **Full resolution data (50cm products) available without delay from data reception for all users through Spot Image or ground station archive**

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Pleiades: a dual access to data

Access rights

< 50 images HPD/ day/ PHR

10% High Priority Data for Defense partners: France, Italy, Spain

> 450 images/ day/ PHR

90% for other users through Spot Image

Update: Spot Image get access to HPD via Dual programming procedure (from 3 to 8 images/day)

RIRS offer

Spot Image WW licence includes exclusive offer for Pléiades ground receiving station

CNES

Spot Image

RIRS Management | PLEIADES Central catalogue | Programming Service

Receiving plan
Inventory Plan
Catalogue update
Reporting
Acquisition requests

ANTENNE et Tracking

X-Band Receiving Antenna

PLEIADES Baseband & Ingestion Equipment

raw data

IBM Processing Farm

Image Access Unit

Programming Access Unit

ICQ
Cloud Cover Control

PAIPSY | Catalogue

RIRS Image Receiving System

RIRS Image Processing System

PLEIADES RIRS

RIRS offer: Services

➔ **Spot Image turn-key offer includes the following services:**

- **Site visit**
- **Solution design/customization (engineering)**
- **FAT (TBC)**
- **Packing/insurance/DDU delivery**
- **Installation/OSAT**
- **On Site Training**
- **Warranty**
- **Multi-year Maintenance Programme (Hotline, Problem reports, Trouble-shooting, Depot spares, Emergency recovery, S/W updates)**
- **Overall RIRS project management**

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Pleiades main antenna already installed at Spot Image facilities

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