



Satellite control centre

Operated by CNES, the Spot control centre is responsible for in-orbit control of the satellites. Its main tasks are the following:

- to monitor the satellites functioning by exploiting the housekeeping telemetry,
- to maintain the satellites on the required orbit by performing periodical maneuvers,
- to take all necessary actions regarding the functioning of the satellites by sending telecommands,
- to upload the daily imaging work plan of the satellites which has been prepared by Spot Image.

The control of the satellites is performed through the CNES tracking, telemetry and command (TT&C) stations network working in 2 GHz (S-band). The main station used for this purpose is located at Issus-Aussagel near Toulouse, and Kiruna, in Sweden. 2 GHz station in Pretoria (South Africa) is also used when needed.

The QIS system image quality centre

The CNES-run QIS image quality centre monitors the quality of imagery acquired by all the SPOT instruments. It determines and regularly updates the processing parameters used by the CAP archiving and preprocessing centre (see below) and the direct receiving stations to correct imagery for instrument-related distortion.

Spot Image programming centre (CPR)

This entity, operated by Spot Image, processes the imaging requests from the clients, the distributors or the Direct Receiving Stations; It performs feasibility studies, taking into account possible conflicts and the specific climatic conditions of the area to be imaged. The plan for the global use of the 3 satellites resources is prepared 2 years in advance.

On a daily basis, the programming centre generates the imaging work plan of the satellites for the coming 24 hours: this process takes into account the client's imaging requests, those of the Direct Receiving Stations for direct transmission to their antenna, the technical constraints of the satellites (on-board recorder capacity etc...) as well as a 24 hours worldwide cloud coverage forecast provided by the French meteorological office (Météo France). The result is on a daily basis an optimized use of the resources of the 3 Spot satellites.

After the images have been acquired and referenced in the Spot Image DALI catalogue, the programming centre team assesses the quality of the acquired scenes in order to stop or resume the acquisition.

SMM : Toulouse multimission



The Toulouse MultiMission station is located at Spot Image, Toulouse. It can receive image telemetry whenever the satellite is within a 2 500 km radius. For one given satellite, this occurs five times a day (two south-bound passes during the night and three north-bound passes during the day, or vice versa). The average pass duration is 10 minutes, the longest 15.

SMM-Toulouse comprises:

1. A 5.40 m diameter, Cassegrain-type, parabolic antenna driving a parametric amplifier. Signal acquisition is by automatic tracking as soon as the satellite rises above the horizon.
2. For SPOT 2 and 4, the receiver equipment as such includes a step-down converter (8 GHz to 720 MHz), an antenna multicoupler, a demodulator and a bit synchronizer. The complete receiving system operates at 2 x 25 million bits/second when receiving SPOT data. For SPOT 5, there are two sets of equipment as the signal is transmitted at two separate frequencies (both within the 8 GHz bandwidth). Each frequency carries a bit stream of 50 Mbits/s.

The Toulouse Multimission station—built by French firms under contract to SMP—is a fully automated station monitored by CNES.

The data generated by the spacecraft are not suitable for direct use by users. It is the job of the Spot Image Archiving and Processing Centre (CAP) to process the raw image data to yield products of commercial quality. A 10-minute pass allows the transmission of about 150 Spot scenes of 60 km x 60 km each.

Spot Image archiving and processing centre (CAP)



The CAP archiving and preprocessing centre, run by Spot Image, processes data from the receiving system. There is a similar CAP in Kiruna, Sweden. Smaller-scale derivatives, known as "SPOT 5 Terminals" are also operated in direct receiving stations able to receive SPOT 5 telemetry.

The main functions performed by the CAP Centre are: systematic archiving and image production to commercial quality standards.

Systematic archiving

Systematic archiving begins with the automatic "locating" of the raw image data. Next, the 60-km-wide strip (for vertical viewing) acquired by each HRV instrument is divided into scenes. Each scene is assessed to determine cloud cover, snow cover and image quality. The scene descriptors and quick looks are then transferred to the DALI catalogue, available on the Internet through SIRIUS. Received data are stored as computer files in automated silos from which they can be withdrawn for later processing. Some 130,000 Giga bytes of data have been accumulated from early 1986 to late 2003.

Image production

The aim is to convert archived raw data data into standard Spot products.

Processing consists of the radiometric and geometric correction of raw image data. Several preprocessing levels are offered to correct imagery for instrument-related distortion. The CAP archiving and preprocessing centre processes SPOT 5 imagery to produce 2.5-metre resolution imagery from two images taken at a resolution of 5 metres. Products are corrected to different degrees and available on various media or sent to the end customer directly over the Internet.

The catalogues DALI and SIRIUS

Late 2003, **DALI** contains meta-data of over 5,5 million scenes acquired since February 1986, it contains also quick looks (subsampling images). This catalogue contains data from the direct receiving stations scattered throughout the world in addition to data from the main Toulouse and Kiruna stations. It may be consulted on our website using the SIRIUS application with which you can find and access "off-the-shelf" products

Image map production facilities

Spot Image has completed its new integrated SPOTView production facility to guarantee short deadlines after image acquisition for applications requiring map-standard products. The same workshop can also process images to produce "B&W+Colour" merges or SPOT 5 colour imagery with a 2.5 metre resolution. Current developments will lead to the automation of orthorectified SPOTView products by late 2004 using HRS instrument data as the reference.

The screenshot displays the SPOTView application interface. At the top, it shows the full scene number: "Full scene N° 50402510304091106471J0". The main area is divided into three sections: a large satellite image on the left, a map on the right, and a data table at the bottom. The satellite image shows a dense forest with a mix of red, blue, and green colors. The map shows the same area with geographical features and labels. The data table provides detailed information about the scene, including commercial and technical characteristics.

Commercial informations		Technical characteristics	
Display Mode	Color Spot image	SPOT color number	5
Price	2700.00 Euro	SPS reference (ECS)	040251
Geographic location		Scene	50402510304091106471J0
Center latitude	48°42' N	SPOTView acquisition number	1
Center longitude	2°20' E	SPOTView mode	16 m Color
NE corner latitude	48°50' N	Cloud cover number	ANANANAN
NE corner longitude	2°30' E	Number of cloud pixels	0
NW corner latitude	48°34' N	Image source number	00000000
NW corner longitude	2°12' E	SPOTView frame number	0
SW corner latitude	48°30' N	Name	0504
SW corner longitude	1°54' E	Angle of incidence	47.50
SE corner latitude	48°38' N	Image resolution	

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