ORBITING AN EARTH OBSERVATION SPACECRAFT

On its fourth Soyuz launch from the Guiana Space Center in French Guiana, Arianespace will orbit the Pléiades 1B satellite for French space agency CNES. Pléiades 1B was built by Astrium as prime contractor.

With Soyuz, Ariane 5 and Vega all operating at the Guiana Space Center, Arianespace is now the only launch services provider in the world capable of launching all types of payloads to all orbits, from the smallest to the largest geostationary satellites, along with clusters of satellites for constellations and missions to support the International Space Station.

This launch continues Arianespace's partnership with the French Ministry of Defense, and will help validate innovative satellite concepts in orbit.

Arianespace continues to set the standard in launch Service & Solutions for all civil and military operators, and guarantees access to space for military missions.

French space agency CNES (Centre National d'Etudes Spatiales) chose Arianespace to launch its two Earth observation satellites, Pléiades 1A and 1B.

The French Ministry of Defense will be a preferred Pléiades customer, with priority programming rights to about 50 images/day. Pléiades rounds out the current array of military space observation systems, and helps meet the growing requirement for space imaging for both defense and civilian applications. Astrium Services is the exclusive distributor of Pléiades products for the civil market.

Pléiades 1B is a 1-ton class satellite built by Astrium at its plant in Toulouse. Thales Alenia Space supplied the high-resolution imaging instruments and image telemetry system. The Pléiades satellites offer a significant improvement in technology over previous generation satellites, based on their size, resolution, high degree of agility in orbit, and ground transmission capacity. Arianespace previously orbited the Pléiades 1A satellite on December 16, 2011.

Pléiades 1B will join its twin, Pléiades 1A, which has provided fully satisfactory service since its launch last December. Placed in a quasi-polar, sun-synchronous orbit at an altitude of 695 km, Pléiades 1B will provide satellite imaging products with a resolution of 70 cm over a swath 20 km wide, to the French and Spanish ministries of defense, civil agencies and private users, through Astrium Services, the exclusive distributor of Pléiades products for the civil market. For the first time, two very-high-resolution satellites will operate as a constellation, offering daily revisit capability to all users.

MISSION DESCRIPTION

The fourth Soyuz launch from the Guiana Space Center (CSG) will place into circular orbit, at an altitude of about 700 km, the Pléiades 1B Earth observation satellite.

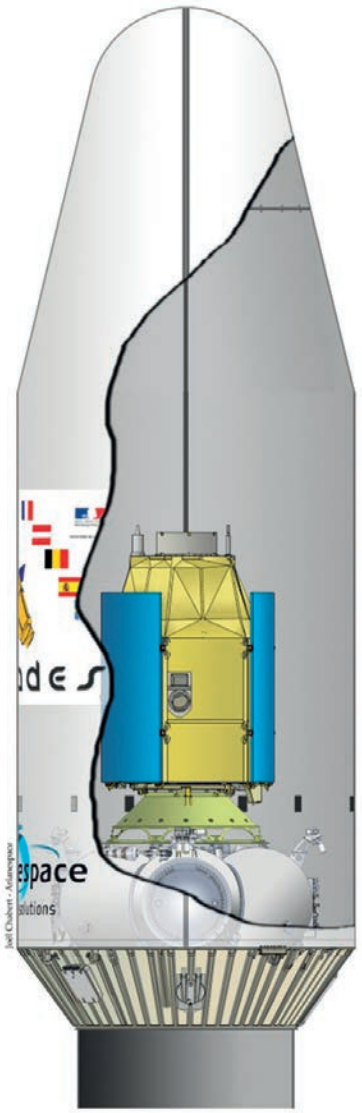
The launcher will be carrying a total payload of 1,070 kg, including about 970 kg for the Pléiades 1B satellite, to be released into its targeted orbit at an inclination of 98 degrees

The launch will be from the Soyuz Launch Complex (ELS) in Sinnamary, French Guiana.

Orbit : circular
Altitude : 695 km
Inclination : 98.2°

Liftoff is scheduled for **Friday, November 30, 2012** at exactly:

11:02:50 pm	(Local Time in French Guiana)
9:02:50 pm	(in Washington, DC)
2:02:50 am	(UTC) on Saturday, December 1, 2012
3:02:50 am	(in Paris)
6:02:50 am	(in Moscow)



The launch at a glance

Following liftoff from the Guiana Space Center, the powered phase of the lower three Soyuz stages will last about nine minutes. The third stage of the launcher will then be separated from the upper composite, comprising the Fregat upper stage and the Pléiades 1B satellite. The three lower stages will fall back into the sea.

The Fregat upper stage will ignite its engine a first time, operating for about four minutes, followed by a ballistic phase lasting about 27 minutes. It will then restart its engine, for another four-minute burn.

The Pléiades 1B satellite will be released 55 minutes after liftoff.
The Fregat stage will then fire its engine a third time to deorbit and fall back into the sea.

Mission length

The nominal length of the mission, from liftoff to separation of the satellite, is 55 minutes.

Soyuz payload Configurtion

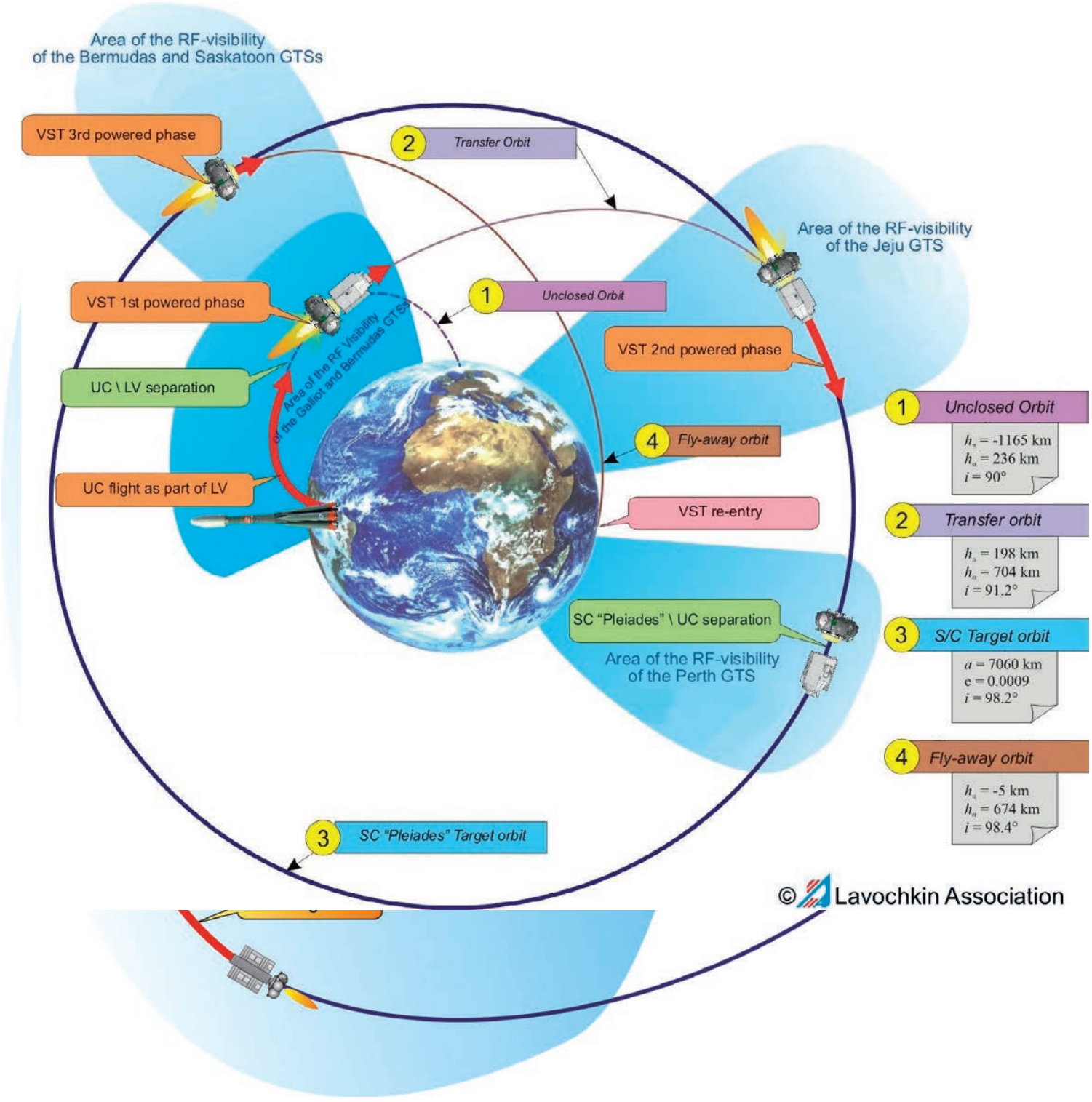
The CNES Pléiades 1B Earth observation satellite was built by Astrium as prime contractor, with Thales Alenia Space as main supplier, for the French Ministry of Defense.

LAUNCH COUNTDOWN AND FLIGHT EVENTS

The countdown comprises all final preparation steps for the launcher, the satellite and the launch site. If it proceeds as planned, the countdown leads to the ignition of the core stage engine and the four boosters.

Events	Time (h:min:s)
Beginning of the State Commission meeting for launcher fueling authorization	-04:20:00
Beginning of Launch Vehicle fuelling with propellant components.	-04:00:00
Launch Vehicle is fuelled with all propellant components	-01:45:00
Mobile gantry withdrawal	-01:00:00
Key on start (beginning of Soyuz synchronised sequence)	-00:06:10
Fregat transfer to onboard power supply	-00:05:00
Upper Composite umbilical drop off command.	-00:02:25
Ground-board	-00:00:40
Lower stage mast retraction	-00:00:20
Ignition	-00:00:17
Preliminary thrust level	-00:00:15
Full thrust level	-00:00:03
Lift-off	**00:00:00**
Jettisoning of boosters	+00:01:58
Jettisoning of fairing	+00:03:29
Separation of main stage	+00:04:47
Separation of 3rd stage	+00:08:47
Fregat 1st burn	+00:09:47
Fregat shut-down et beginning of ballistic phase	+00:13:26
Fregat 2nd burn	+00:41:56
Fregat shut-down	+00:46:05
Separation of PLÉIADES 1B	**+00:54:55**

PROFILE OF THE PLÉIADES 1B MISSION

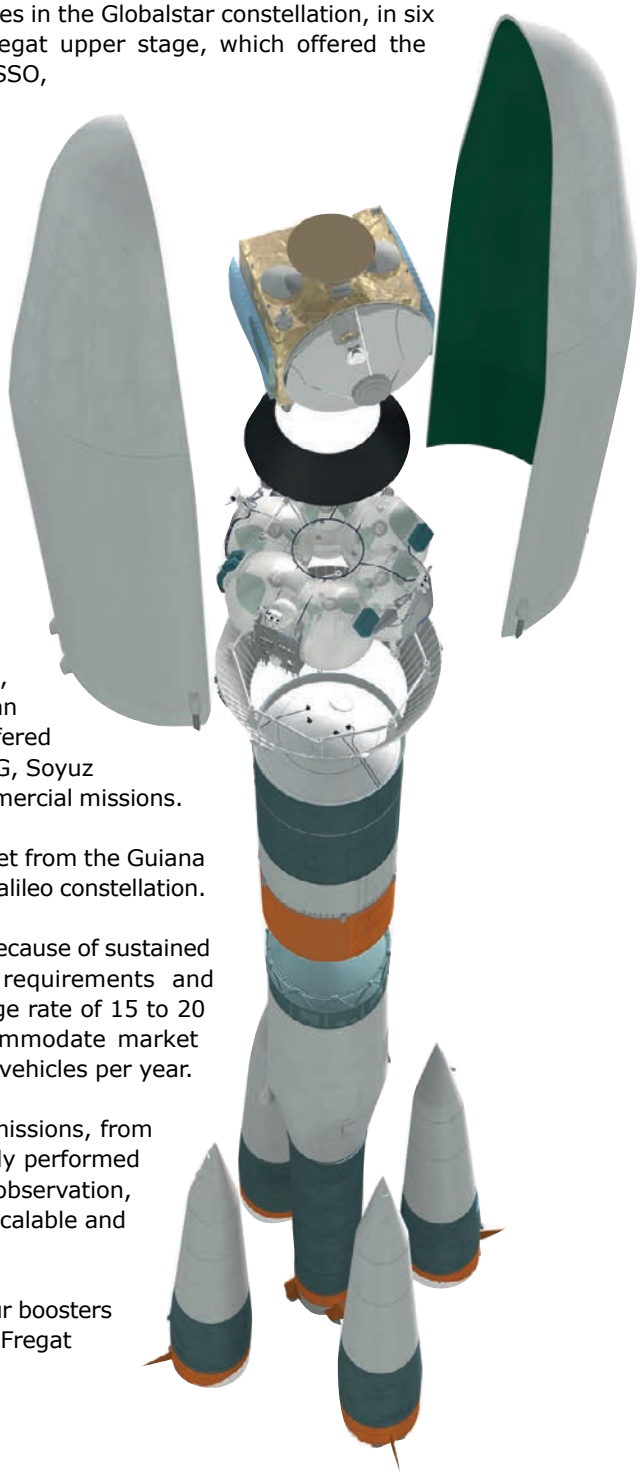


SOYUZ LAUNCH VEHICLE

The Soyuz launch vehicle family has provided reliable and efficient launch services since the birth of the space program. Vehicles in this family, which launched both the first satellite and first man into space, have been credited with more than 1,795 launches to date. Today, Soyuz is used for manned and unmanned flights to the International Space Station, as well as commercial launches.

The Soyuz configuration introduced in 1966 has been the workhorse of the Soviet/Russian space program. As the only manned launch vehicle in Russia and in the former Soviet Union, Soyuz meets very high standards of reliability and robustness.

In 1999, Arianespace's affiliate Starsem used Soyuz to launch the 24 satellites in the Globalstar constellation, in six launches. Following this success, Starsem introduced the restartable Fregat upper stage, which offered the operational flexibility that paved the way for a full range of missions (LEO, SSO, MEO, GTO, GEO and escape).



The first launch of the Soyuz 2-1a on November 8, 2004 from the Plessetsk Cosmodrome represented a major step in the launch vehicle development program. This modernized version of Soyuz, also used to successfully launch MetOp-A on October 19, 2006, features a digital control system providing additional mission flexibility; it also enables control of the launch vehicle fitted with the 4.1 m ST fairing. This was a necessary milestone towards the next-generation Soyuz 2-1b launcher, the culmination of a joint European/Russian upgrade program. In addition to the 2-1a version's features, it utilizes a more powerful third-stage engine, significantly increasing the launch vehicle's overall performance.

The inaugural flight of the upgraded Soyuz 2-1b launch vehicle was successfully performed on December 27, 2006, launching the Corotscientific spacecraft for the French space agency CNES.

The decision of the European Space Agency to introduce Soyuz launch capability at the Guiana Space Center (CSG) marked a major step forward in expanding the range of missions. With the introduction of Soyuz at CSG, this famed Russian launch vehicle is now an integral part of the European launcher fleet, together with the heavy-lift Ariane 5 and the light Vega. Offered exclusively by Arianespace to the commercial market, for launches from CSG, Soyuz becomes Europe's standard medium launcher for both government and commercial missions.

On October 21, 2011 Arianespace successfully launched the first Soyuz rocket from the Guiana Space Center (CSG) in French Guiana, orbiting the first two satellites in the Galileo constellation.

The Samara Space Center in Russia continues to produce Soyuz launchers. Because of sustained demand from the Russian government, International Space Station requirements and Arianespace's commercial orders, the Soyuz is being produced at an average rate of 15 to 20 launchers per year. The manufacturer can also rapidly scale up to accommodate market demand. In fact, annual Soyuz production peaked in the early 1980's at 60 vehicles per year.

Soyuz is a reliable, efficient, and cost-effective solution for a full range of missions, from LEO to Mars or Venus. Offering an unrivaled flight history, Soyuz has already performed almost every type of mission, including orbiting telecommunications, Earth observation, weather and scientific satellites, as well as manned spacecraft. It is a very scalable and flexible launch vehicle.

The Soyuz currently offered by Arianespace is a four-stage launch vehicle: four boosters (first stage), a central core (second stage), a third stage, and the restartable Fregat upper stage (fourth stage).
It also includes a payload adapter/dispenser and fairing.

THE BOOSTERS (FIRST STAGE)

The four cylindrical-conical boosters are assembled around the central core. The booster's RD-107A engines are powered by liquid oxygen and kerosene, the same propellants used on each of the lower three stages. The kerosene tanks are located in the cylindrical part and the liquid oxygen tanks in the conical section. Each engine has four combustion chambers and four nozzles. Three-axis flight control is provided by aerofins (one per booster) and steerable vernier thrusters (two per booster). Following liftoff, the boosters burn for approximately 118 seconds and are then jettisoned. Thrust is transferred to the vehicle through a ball joint located at the top of the conical structure of the booster, which is attached to the central core by two rear struts.

THE CENTRAL CORE (SECOND STAGE)

The central core is similar in construction to the four boosters, with a special shape to accommodate the boosters. A stiffening ring is located at the interface between the boosters and the core. This stage is fitted with an RD-108A engine, also comprising four combustion chambers and four nozzles. It also has four vernier thrusters, used for three-axis flight control once the boosters have separated. The core stage has a nominal burn time of 286 seconds. The core and boosters are ignited simultaneously on the launch pad, 20 seconds before liftoff. Thrust is first adjusted to an intermediate level to check engine readings. The engines are then gradually throttled up, until the launcher develops sufficient thrust for liftoff.

THE THIRD STAGE

The third stage is linked to the central core by a latticework structure. Ignition of the third stage's engine occurs approximately two seconds before shutdown of the central core engine. The third stage engine's thrust enables the stage to separate directly from the central core. Between the oxidizer and fuel tanks is a dry section where the launcher's avionics systems are located. The third stage uses the powerful RD-0110 engine with four combustion chambers and four nozzles. The RD-0110 is a staged combustion engine with a turbopump driven by gases from combustion of the main propellants in a gas generator. These combustion gases are tapped to feed the four nozzles providing stage flight control. Attitude control is provided by activating the four nozzles using gases from the gas generator. The liquid oxygen (LOX) tank is pressurized by the heating and evaporation of oxygen taken from the tank. The kerosene tank is pressurized by gases taken from the gas generator, after being cooled.

THE FREGAT UPPER STAGE (FOURTH STAGE)

Flight qualified in 2000, the Fregat upper stage is an autonomous and flexible upper stage that is designed to operate as an orbital vehicle. It extends the capability of the Soyuz launcher, now covering a full range of orbits (LEO, SSO, MEO, GTO, GEO and escape). To ensure high reliability for the Fregat stage right from the outset, various flight-proven subsystems and components from previous spacecraft and rockets are used. The upper stage consists of six spherical tanks (four for propellants, two for avionics) arrayed in a circle and welded together. A set of eight struts through the tanks provide an attachment point for the payload, and also transfer thrust loads to the launcher. The upper stage is independent from the lower three stages, since Fregat has its own guidance, navigation, attitude control, tracking, and telemetry systems. The stage's engine uses storable propellants – UDMH (unsymmetrical dimethyl hydrazine) and NTO (nitrogen tetroxide) – and can be restarted up to 20 times in flight, thus enabling it to carry out complex missions. It can provide the customer with 3-axis or spin stabilization of their spacecraft.

PAYLOAD ACCOMMODATION

Soyuz launchers operated by Arianespace use the ST-type fairing in standard configuration, with an external diameter of 4.1 meters and a length of 11.4 meters.

The Fregat upper stage is encapsulated in a fairing with the payload and a payload adapter/dispenser.

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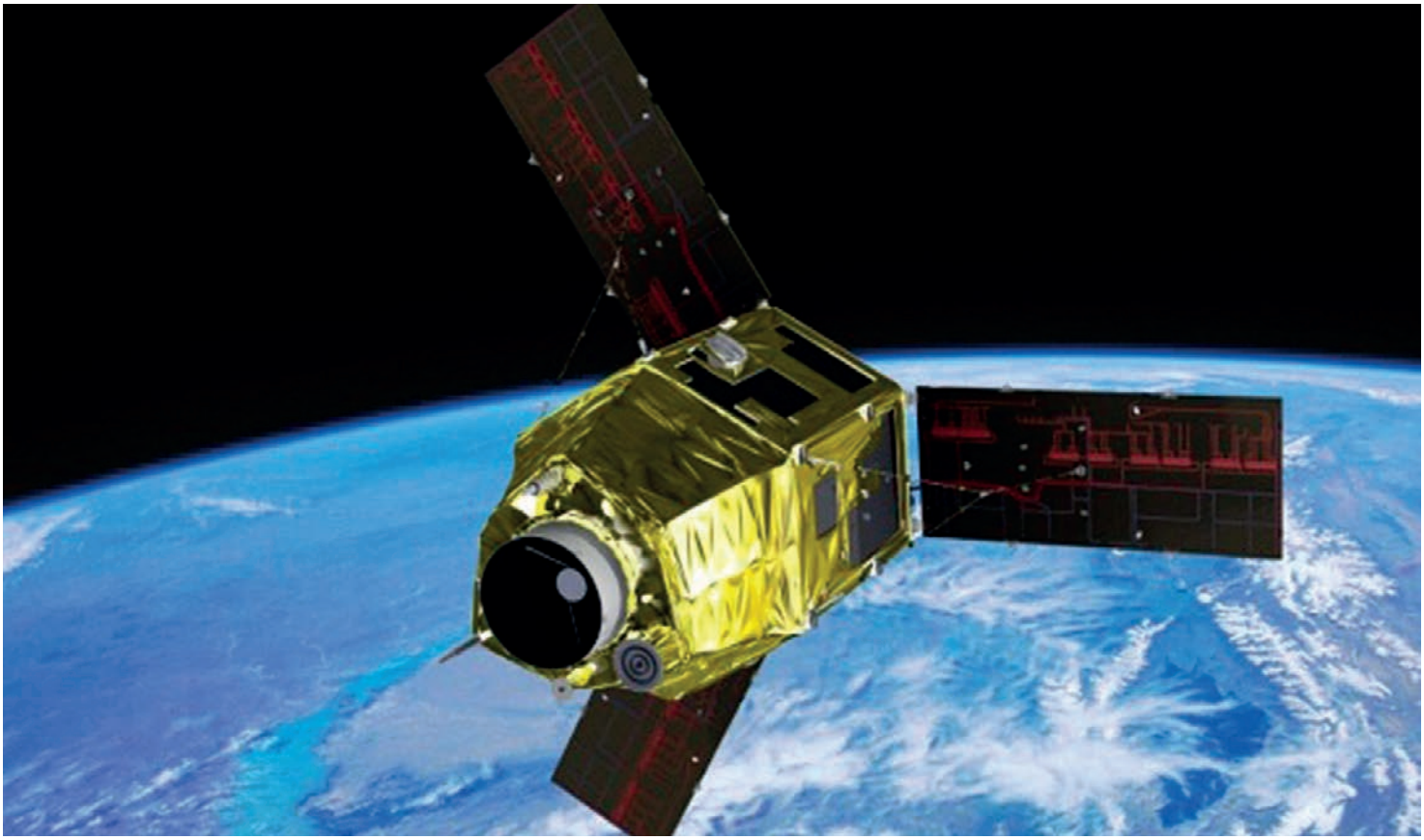
THE PLÉIADES 1B SATELLITE



Customer	**CNES**
Manufacturer	**Astrium**
Orbit	**Sun-synchronous, 695 km altitude**
Cycle	**26 days**
Local time	**10:15 at descending node**
Angular shift	**180° between the two satellites**
Weight	**970 kg total weight at launch**
Design life	**5 years**
Electrical power	**1500 W**
Image acquisition capacity	**Up to 450 images/day**
Panchromatic resolution	**0.7 m at nadir**
Swath	**20 km at nadir**
Onboard memory capacity	**600 Gbits**

Pour plus d'informations rendez-vous sur
www.arianespace.com

ARIANESPACE AND THE GUIANA SPACE CENTER

Arianespace was founded in 1980 as the world's first launch service & solutions company. Today, Arianespace has 21 shareholders from ten European countries (including French space agency CNES with 34%, Astrium with 30%, and all European companies participating in the construction of Ariane launchers).

Since the outset, Arianespace has signed more than 350 launch contracts and launched over 300 satellites using Ariane launchers. It has also successfully carried out three Soyuz launches from the Guiana Space Center, and the first Vega launch. Nearly two-thirds of the commercial satellites now in service worldwide were launched by Arianespace.

The company posted sales of 1.013 billion euros in 2011.

Arianespace offers launch Service & Solutions to satellite operators from around the world, including private companies and government agencies. These services call on three launch vehicles:
- The Ariane 5 heavy launcher, operated from the Guiana Space Center.
- The Soyuz medium launcher, operated from the Baikonur Cosmodrome in Kazakhstan by Starsem, a Euro-Russian subsidiary of Arianespace, and from the Guiana Space Center.
- The Vega light launcher, launched from the Guiana Space Center since February 2012.

With this complete family of launchers, Arianespace has won nearly half of the commercial launch contracts open to competition worldwide in the last two years. Arianespace now has a backlog of more than 40 satellites to be launched.

The Guiana Space Center: Europe's Spaceport

For over 30 years, the Guiana Space Center (CSG), Europe's Spaceport in French Guiana, has offered a complete array of facilities for rocket launches.

Europe's commitment to independent access to space is based on actions by three key players: the European Space Agency (ESA), the French space agency CNES, and Arianespace.

ESA has helped change the role of the Guiana Space Center, in particular by funding the construction of the launch complexes, payload processing buildings and associated facilities. Initially used for the French space program, the Guiana Space Center has gradually become Europe's own spaceport, according to the terms of an agreement between ESA and the French government.

To ensure that the Spaceport is available for its programs, ESA takes charge of the lion's share of CNES/CSG fixed expenses, and also helps finance the fixed costs for the Ariane, Soyuz and Vega launch complexes.

French space agency CNES plays several roles at the Guiana Space Center:
- It designs all infrastructures and is responsible, on behalf of the French government, for safety and security.
- It provides the resources needed to prepare the satellites and launcher for their missions.

Whether during tests or actual launches, CNES is also responsible for overall coordination of operations. It collects and processes all data transmitted from the launcher via a network of receiving stations, to track Ariane and Soyuz rockets throughout their trajectory.

In French Guiana, Arianespace is the contracting authority in charge of operating the family of three launchers, Ariane, Soyuz and Vega.

Roscosmos and the Russian companies

Roscosmos, the Russian space agency, is responsible for license allocations and intergovernmental relations. it is the launch authority in charge of range operations.

TsSKB-Progress (Samara Space Center) is responsible for the design, development, and manufacture of launch vehicles, including the Soyuz launch vehicle's first, second and third stages and fairing. It also integrates vehicle stages and performs flight operations.

NPO Lavochkin manufactures and integrates the Fregat upper stage, and is responsible for launch operations.

TsENKI is the launch authority in charge of launch planning and the provision of associated services, including systems engineering, and the design, and technical and operational management of the launch pad and associated facilities dedicated to the Soyuz launcher.