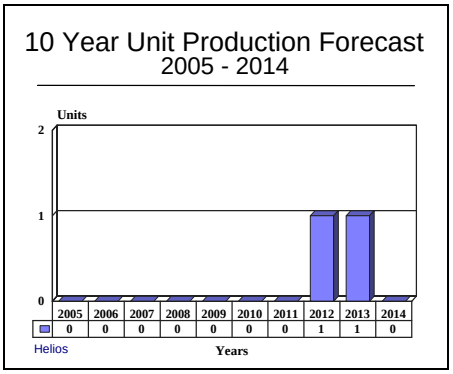
Helios - Archived 08/2006



Outlook

- Full technical participation from Germany and Italy expected to commence in 2007
- Helios 2B, produced in 2004, planned for launch in 2008
- Thermal imaging and faster information turn-around time to add greatly to system's capabilities

Orientation

Description. Military imaging reconnaissance satellite.

Sponsor

DGA Communication
Delegation Generale pour l'Armement
14 Rue Saint Dominique
F-00457 Armees
France

Centre National d'Etudes Spatiales (CNES)
2 Place Maurice Quentin
F-75039 Paris Cedex 01
France

Status. Helios 1A in service. Helios 1B launched in December 1999, but stopped functioning in 2004. Helios 2A was launched in late 2004. Helios 2B is planned to be launched in 2008.

Total Produced. One full-scale Helios, one engineering test model, and two production models.

Application. Helios satellites provide military optical reconnaissance data from low-Earth polar orbits. They use the basic platform of the Spot 4 Earth resources satellite, but the former has a resolution of 1 to 5 meters, considerably sharper than the current Spot's 10-meter resolution.

Helios 1B is nearly identical in design to Helios 1A. The system was produced to serve as a backup for Helios 1A in the event of malfunction. Both systems are designed to remain functional until the completion of the Helios 2 production and launch.

Price Range. The Helios 2 program, including two satellites, ground support equipment, Earth receiving stations, and launch fees, is estimated to cost $2.43 billion.

Contractors

Alcatel Space, http://www.alcatel.com/space, 26 avenue JF Champollion, BP 1187, Toulouse, 31037 France,

Tel: + 33 05 34 35 36 37, Fax: + 33 05 61 44 49 90, Co-producer

EADS Astrium, Subdivision HQ, http://www.astrium-space.com, BP 1, 37, Avenue Louis Breguet, Velizy-Villacoublay, F-78146 France, Tel: + 33 1 34 88 30 00, Prime

Alenia Spazio, http://www.alespazio.it, Via Saccomuro, 24, Rome, 00131 Italy, Tel: + 39 06 41511, Fax: + 39 06 4190675, Email: communications@roma.alespazio.it, Co-producer

Technical Data

	Metric	U.S.
Characteristics		
In-orbit weight	2,750 kg	6,062 lb
Power		2,100 W
Performance		
Altitude (90º Polar orbit)	675 km	419 mi
Design life		5 yr

Design Features. Helios 1 features improved instruments, including new magnetic data recorders from France's Enertic. The designs for the Helios 1 and Spot 4 satellite control centers are identical. Helios 1, however, features high resolution visible (HRV) charge-coupled devices (CCDs) supplied by Thomson-CSF, which Spot 4 did not have.

Operational Characteristics. Helios 1 uses the basic platform of the Spot 4 Earth resources satellite, but the former has a resolution of 1 to 2 meters, considerably sharper than the current Spot's 10-meter and Landsat's 15-meter resolution. The Aerospatiale optical imager (EPV) uses 4,096-pixel and 2,048-pixel linear charge-coupled device arrays.

Helios 1 resolution is capable of spotting tanks on a battlefield during daylight hours only. In addition to its optical capabilities, Helios 1 is equipped with a system for detecting enemy radar frequencies. This eavesdropping ability provides information on hostile air defenses, which in turn improves the ability of French strategic air forces to penetrate enemy territory.

Variants/Upgrades

Helios 2 capabilities are discussed below.

Program Review

Background. In the past, space-based military reconnaissance was an exclusive asset of Russia and the United States. Both countries operate satellite systems that perform electronic eavesdropping and electro-optical reconnaissance, and presumably both share their information with their respective allied partners. Such an arrangement has its pros and cons.

Among allied Western nations, only the United States has had the resources to develop and launch half-billion-dollar satellites weighing 15 tons or more. While it is certainly convenient when a European nation can receive data from these spy satellites without having to pay the tremendous cost of putting one into orbit, the U.S. ultimately decides who gets the data and how much they get.

To develop its own indigenous military reconnaissance capability, France initiated a program that borrows many features from the Spot 4 Earth resources satellite and applies them to the Helios military reconnaissance spacecraft.

Helios 1A was launched in 1995. From an orbital altitude of some 400 kilometers, Helios 1 can resolve objects of only 1 or 2 meters. The primary purpose of collecting this optical imagery is to conduct military reconnaissance over Europe, although from its polar orbit, Helios 1 can see the entire surface of Earth pass beneath it during an approximate one-month period. In addition, Helios 1 comes equipped with electromagnetic sensors capable of monitoring enemy radar signals, which help determine the location of anti-aircraft installations.

Helios 1B was completed by Matra Marconi Space (now Astrium) in 1996. The twin satellite was designed to serve as an emergency replacement in the event of a Helios 1A system failure. The satellite was launched and placed into orbit in December 1999, but ceased to function in 2004.

Helios 2. Proposals for a Helios 2 program were in the works almost since the start of the Helios program. Given the shortcomings of the Helios optical imagery system (it is capable only of daylight surveillance), development of a farther seeing system was inevitable.

Helios 2 employs infrared sensors, providing the satellite with the ability to observe areas at night, though the spacecraft will be unable to make observations over areas obscured by clouds. Helios 2 was the topic of conversation during much of 1994, with France lobbying hard to round up partners for the expensive (approximately $2.2 billion) endeavor. When French Defense Minister François Leotard gave the satellite program the official go-ahead in April 1995, Germany indicated that it wanted to join the effort, with the understanding that the two countries might later proceed with development of the Osiris (since renamed Horus) synthetic aperture radar satellite.

In July 1995, however, Germany decided to delay any decision on Helios 2 participation until 1996 at the earliest. It was thought that this delay could have severe consequences. Without Germany, the French would be left to build Helios 2 entirely alone, something France could ill afford to do, no matter how determined it was to create a surveillance network that could free France and the Western Europe Union (WEU) from dependence on the U.S. far-reaching system.

While considering whether to commit funds to Helios 2, and thereby get a larger stake in the follow-on SAR satellite (Horus) program, Germany received an enticing offer from Lockheed Martin Missiles and Space Company. Lockheed would design, build to German specifications, and even launch a surveillance satellite for a cost of about $5 million, far lower than the amount the Germans would have to invest in the Helios 2 and Horus projects.

In December 1995, Germany decided to collaborate on the French program. Germany reportedly agreed to pay approximately 20 percent of the estimated FRF11 billion ($2.2 billion) bill, in return for 10 to 15 percent of the work on Helios 2. France would continue to head this project. For the Horus satellite, German companies would be prime contractors. This deal cleared the way for Aerospatiale and Daimler-Benz Aerospace to merge their respective satellite and missile businesses into a new company called European Satellite Industries (ESI).

The French government announced in July 1996 that it planned to reduce spending on the Helios 2 program by 15 to 20 percent compared to the original estimate of FRF1.5 billion ($290 million). One cost-cutting measure would be reuse of the terrestrial-systems part of Helios 1 for Helios 2.

A Franco-German summit held in December 1996 plunged the Helios 2/Horus project back into uncertainty. Germany would join France in developing Helios 2 eventually, but could not pay its share until 1998 at the earliest. Then in fall 1997, Germany once again reversed course and decided not to join the Helios project, which caused increased pressure for more program cuts.

During Operation Allied Force in 1999, Helios became the only non-American observation satellite in use by the 19 NATO allies. Images from the system were used to identify targets in Serbia and Kosovo and to determine the success rate of the air campaign. This deployment had revived discussion in Europe about building a European radar imaging satellite.

The Helios program took a major step forward in November 1999 when the French armament procurement agency, DGA, selected Matra Marconi Space (now Astrium) to design and build the ground segment of Helios 2. This User Ground Segment (UGS) would enter service for operation of Helios 2 by the end of 2003. The UGS was made compatible with Helios 1 by 2002. In December 1999, the Helios 1B was successfully launched aboard an Ariane 4 rocket and placed in orbit.

The prospect of French and German military space cooperation was revived in late 2000. At that time, an agreement was made to pool resources from Germany's developing SAR Lupe military reconnaissance satellite program and the Helios program. To help offset the cost of these efforts, France would increase its budget for such programs from $294 million in 2000 to approximately $448 million for 2001.

On August 15, 2002, the French DGA and the CNES signed a contract with Astrium for the launch of Helios 2A, which occurred in the second quarter of 2003.

A failure of the Ariane 5 ECA booster in December 2002 led to some serious stock-taking by the French space industry. In the spring of 2003 it appeared that a major restructuring of resources would be undertaken.

In January 2003, Alcatel Space delivered high-resolution imaging instrumentation to the Helios program. This technology is seen as crucial to the satellite's ability to deliver on its promised, expanded capability of nighttime surveillance.

Helios 2A was launched aboard an Ariane 5 rocket in December 2004. The High Resolution Zoom (HRZ) produced by Alcatel Space was formally identified as the very high-resolution camera for the system. The satellite became fully operational in March 2005.

It was announced in April 2005 that the Helios 2A had been handed over for operational service to the military commanders of the system's participant countries; Belgium and Spain.

Funding

Funding for the Helios program (Helios 1 portion) has been provided by France, Spain, and Italy. France is responsible for 79 percent of the program, or about $1.3 billion. Italian contributions make up 14 percent or about $238 million. Spain's 7 percent comes to about $119 million. For Helios 2, it is estimated that the cost will be $1.6 billion. Belgium is contributing 3 percent.

Recent Contracts

A breakdown of the extensive work performed by the contractors and consortium members is not provided because of the scope and nature of the program.

Timetable

Month	Year	Major Development
	1986	France begins Helios program
	1987	Italy joins Helios program
	1988	Spain joins Helios program
Jun	1990	Arianespace receives launch contract for Helios (Ariane 40)
Jul	1995	Helios 1A launched
	1995	Germany announced it will join Helios program
	1997	Germany decided to leave Helios program
Apr	1998	Horus program canceled
Dec	1999	Helios 1B launched
	1999	Helios used in operation Allied Force
	2000	France and Germany renew discussions for joint military satellite development
	2003	User Ground Segment (UGS) for Helios 2 to enter service
Late	2004	Helios 2A launched
	2007	Planned participation of Germany and Italy
Late	2008	Helios 2B available for launch
	2012/2013	Possible launch of Helios 3A and 3B

Worldwide Distribution

Helios 1 and 2 are **French** systems funded to a lesser extent by **Belgium**, **Italy**, **Germany**, and **Spain**.

Forecast Rationale

With Helios 2A now safely in orbit after its successful late 2004 launch, the predominately French satellite surveillance system will offer not only increased image quality, but also a faster information turnaround time. The next major step in the program will be the activation of the system's all-weather capability, which will come about with the scheduled 2007 participation of Germany's SAR-Lupe radar satellite and Italy's COSMO-Skymed radar satellite. In return for this participation, the two countries will receive access to Helios 2's exclusive imagery. Helios 2B, produced in 2004, is scheduled for launching in 2008.

Helios 3A and 3B are on track for launching in the 2012/13 timeframe. The production and deployment of these follow-on systems will, of course, depend on the success of the current systems. With the benefits of thermal imaging and all-weather surveillance being fully realized by the major European players, it is likely that the desire to go on with further advancements will keep the program alive well into the next decade.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level				Good Confidence Level			Speculative			
Designation	**Application**	**Thru 04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**Total 05-14**
HELIOS	HELIOS 2 (FRANCE)	2	0	0	0	0	0	0	0	1	1	0	2
HELIOS	Prior Prod'n:	2	0	0	0	0	0	0	0	0	0	0	0
Total Production		4	0	0	0	0	0	0	0	1	1	0	2