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LAUNCH KIT

July 2019

VV15

FalconEye1

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esa AIRBUS FALCON EYE 1 ThalesAlenia Space a Thales / Leonardo company cnes CENTRE NATIONAL D'ÉTUDES SPATIALES

FLIGHT VV15: ARIANESPACE AT THE SERVICE OF AN EARTH OBSERVATION PROGRAM FOR THE BENEFIT OF THE UNITED ARAB EMIRATES

For its sixth launch of the year, and the 15th Vega mission since this launcher began its career at the Guiana Space Center in 2012, Arianespace will orbit the FalconEye1 satellite.

This Earth observation satellite for the United Arab Emirates was developed by Airbus Defence and Space as prime contractor and Thales Alenia Space as co-prime.

Flight VV15 marks the 12th Earth observation mission for Vega, a versatile light launcher.

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FalconEye1 satellite

The FalconEye satellite is a high performance optical Earth-observation satellite system for the Armed Forces of the United Arab Emirates (UAEAF) manufactured by Airbus Defence and Space as prime contractor and Thales Alenia Space as co-prime.

The overall system is based on two identical satellites, FalconEye1 and FalconEye2, in Sun-synchronous orbit (SSO). Each satellite features an Earth observation payload, with very-high-resolution optical capabilities. It is equipped with a ground system for monitoring, receiving and processing the images.

Upon the system delivery, Emirati engineers will control and operate the spacecraft.

The FalconEye1 satellite, to be orbited by Flight VV15, will be the first space component of the system, and will have a dual use purpose: support the needs of UAE Armed Forces, and provide the commercial market with images.

It will weigh approximately 1,197 kg. at launch and will be raised to a heliosynchronous orbit at 611 kilometers.

FalconEye2 will be launched later this year, also utilizing a Vega vehicle.

As satellite prime contractor, Airbus Defence and Space was in charge of the satellite design, integration and tests, and supplied the platform.

FalconEye1 is the 131th Airbus Defence and Space satellite to be launched by Arianespace. There currently are 20 Airbus Defence and Space satellites in Arianespace's backlog.

Thales Alenia Space, as co-prime, designed and supplied the Optical Instrument and the image chain. Arianespace had launched 159 satellites for the co-prime of this program, and there are seven additional Thales Alenia Space satellites in Arianespace's order book.

The FalconEye program relies on a heritage from previous French national satellite programs, such as Pleiades.

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MISSION DESCRIPTION

The 15th Arianespace Vega launch from the Guiana Space Center (CSG) will place the FalconEye1 satellite into a Sun-synchronous orbit (SSO).
The launcher will be carrying a total payload of approximately 1,279 kg.

The launch will be performed from the Vega Launch Complex (ZLV) in Kourou, French Guiana.

DATE AND TIME

Lift-off is scheduled for **Friday, July 5, 2019**, at exactly:

> 9:53:03 p.m., Washington D.C., USA time
> 10:53:03 p.m., Kourou, French Guiana time
> 1:53:03 Universal Time (UTC) on July 6
> 3:53:03 a.m., Paris, France time, on July 6
> 5:53:03 a.m., Abu Dhabi, United Arab Emirates (UAE) time, on July 6.

MISSION DURATION

The nominal mission duration (from lift-off to separation of the satellite) is:

57 minutes, 09 seconds.

TARGETED ORBIT FOR FALCONEYE1

Sun-synchronous orbit at 611 km.

THE LAUNCH AT A GLANCE

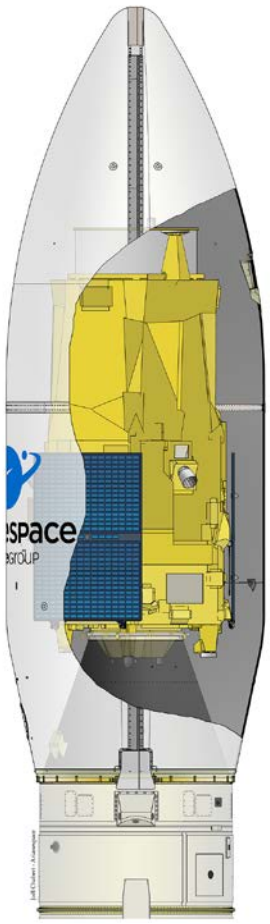
Following lif-toff from the Guiana Space Center, the powered phase of Vega's first three stages will last 6 minutes and 32 seconds. After this first phase, the launcher's third stage will separate from the upper composite, which includes the AVUM upper stage, a payload adapter and the satellite. The lower three stages will fall back into the sea.

The AVUM upper stage will ignite its engine for the first time, operating for about 8 minutes, followed by a ballistic phase lasting approximately 38 minutes and 35 seconds. The AVUM stage will then reignite its engine for about 1 minute and 9 seconds, prior to releasing the FalconEye1 satellite about one minute after the engine is shut down.

The FalconEye1 satellite will be released 57 minutes and 09 seconds after lift-off.

VEGA PAYLOAD CONFIGURATION

> Payload: FalconEye1
> Weight at liftoff: 1,197 kg.
> Vega Payload Adaptor (PLA)



THE VEGA LAUNCHER

AVIO, the production prime contractor, delivers the Vega launcher to Arianespace.

Payload fairing
(RUAG Space)

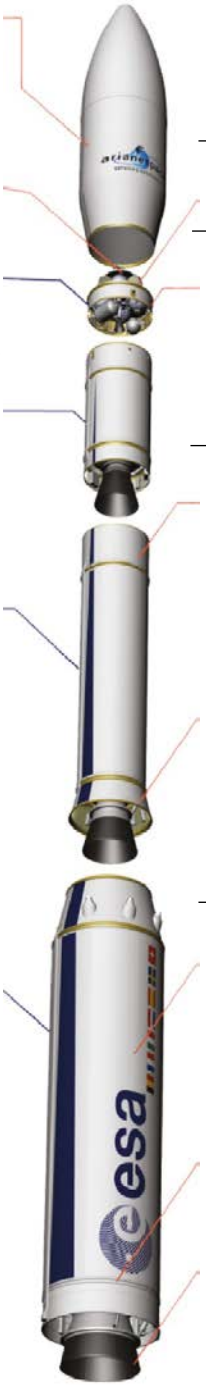
Payload adaptor
(Airbus Spain)

Integration & testing
(Avio)
AVUM

Production, integration & testing
(Avio)
ZEFIRO-9

Production, integration & testing
(Avio)
ZEFIRO-23

Integration & testing
(Avio)
P80



AVUM structure
(Airbus)

AVUM engine
(KB Yuzhnoye)

Interstage - 2/3
(Rheinmetall)

Interstage - 1/2
(Airbus Netherlands)

P80 engine
(Europropulsion)

Interstage - 0/1
(S.A.B.C.A)

P80 nozzle
(ArianeGroup)

Thrust vector control system (P80, Zefiro 9, Zefiro-23 & AVUM)
S.A.B.C.A

Igniters (P80, Zefiro-9 & Zefiro-23)
APP

Avionics
Thales, IN-SNEC, Selex Avionica, CRISA, RUAG Space, SAFT

LAUNCH CAMPAIGN: VEGA – FalconEye1

SATELLITE AND LAUNCH VEHICLE CAMPAIGN TIMETABLE

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
May 13,2019		Campaign start review - Transfer of P80 stage
May 23, 2019		Interstage 1/2 integration
May 24, 2019		Z23 integration
May 28, 2019		Z9 integration
June 1, 2019	Arrival in French Guiana of the **FalconEye1** satellite at Félix Eboué Airport (Cayenne)	
June 1, 2019	Transfer of the **FalconEye1** satellite to the S1A payload preparation facility	
June 3, 2019		AVUM integration
June 6, 2019	Fitcheck of the **FalconEye1** with the payload adaptor	
June 6, 2019	Start of electrical checks	
June 18, 2019		Synthesis control test
June 22, 2019	Fueling operations of the **FalconEye1** satellite	
June 25, 2019	Integration of the **FalconEye1** satellite on the payload adaptor	
June 26, 2019	Encapsulation of the assembled payload in Vega's payload fairing	

SATELLITE AND LAUNCH VEHICLE CAMPAIGN FINAL TIMETABLE

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
Friday, June 28, 2019	Transfer of upper composite from the S3B facility to the ZLV (Vega Launch Zone)	
From Tuesday June 25 to Thursday June 27, 2019		Fueling operations for AVUM and RACS (Roll and Attitude Control Subsystem)
Saturday, June 29, 2019	Upper composite integration on the launcher	
Wednesday, July 3, 2019		Arming of launch vehicle and fairing
Thursday, July 4,2019		Launch readiness review (RAL), final preparation of launcher and final inspection of the fairing
Friday, July 5, 2019		Final launch countdown

COUNTDOWN AND FLIGHT SEQUENCE

The countdown comprises all final preparation steps for the launcher, the satellite and the launch site, including the steps leading up to authorization of P80 first-stage ignition.

TIME	EVENT
- 09 h 35 min	Start of final countdown
- 06 h 25 min	Activation of Multi-Functional Unit (MFU)
- 06 h 05 min	Activation of Inertial Reference System (IRS)
- 06 h 05 min	Activation of telemetry
- 05 h 35 min	Activation of Safeguard Master Unit (SMU)
- 05 h 05 min	Activation of onboard computer and loading of flight program
- 04 h 55 min	IRS alignment and checks
04 h 50 min	Removal of safety devices
- 03 h 40 min	Mobile gantry withdrawal (45 min.)
- 02 h 50 min	IRS alignment and checks after withdrawal of gantry
- 01 h 15 min	Activation of the telemetry transmitter after withdrawal of gantry
- 01 h 15 min	Activation of transponders and receptors
- 00 h 50 min	Launcher system ready
- 00 h 10 min	Final weather report prior to launch
- 00 h 04 min	Start of synchronized sequence
T-O	**00 s LIFTOFF**
+ 00 h 01 min	54 s 1st stage (P80) separation
+ 00 h 01 min	55 s 2nd stage (Zefiro-23) ignition
+ 00 h 03 min	38 s 2nd stage (Zefiro-23) separation
+ 00 h 03 min	51 s 3rd stage (Zefiro-9) ignition
+ 00 h 03 min	56 s Fairing separation
+ 00 h 06 min	32 s 3rd stage (Zefiro-9) separation
+ 00 h 08 min	28 s 1st ignition of AVUM
+ 00 h 16 min	23 s 1st cut-off of AVUM
+ 00 h 54 min	58 s 2nd ignition of AVUM
+ 00 h 56 min	07 s 2nd cut-off of AVUM
+ 00 h 57 min	09 s **Separation of FalconEye1**
+ 01 h 51 min	10 s 3rd ignition of AVUM
+ 01 h 52 min	06 s 3rd cut-off of AVUM

ARIANESPACE AND THE GUIANA SPACE CENTER

ARIANESPACE, THE WORLD'S FIRST LAUNCH SERVICES COMPANY

Arianespace was founded in 1980 as the world's first launch services & solutions company. Arianespace is a subsidiary of ArianeGroup, which holds 74% of its share capital; the balance is held by 15 other shareholders from the European launcher industry. Since the outset, Arianespace has signed over 580 launch contracts and launched more than 600 satellites. More than half of the commercial satellites now in service around the globe were launched by Arianespace.

The company posted sales of approximately 1.3 billion euros in 2018.

The company's activities are worldwide, with the headquarters in Evry, France (near Paris); the Guiana Space Center in French Guiana, where the Ariane, Soyuz and Vega launch pads are located; and offices in Washington, D.C., Tokyo and Singapore. Arianespace offers launch services to satellite operators from around the world, including private companies and government agencies. These services call on three launch vehicles:

> The Ariane 5 heavy-lift launcher, operated from the Guiana Space Center in French Guiana.

> The Soyuz medium-lift launcher, currently in operation at the Guiana Space Center and the Baikonur Cosmodrome in Kazakhstan.

> The Vega light-lift launcher, also operated from the Guiana Space Center.

Building on its complete family of launchers, Arianespace has won over half of the commercial launch contracts up for bid worldwide in the past two years. Arianespace now has a backlog of more than 710 satellites to be launched.

THE GUIANA SPACE CENTER: EUROPE'S SPACEPORT

For more than 50 years, the Guiana Space Center (CSG), Europe's Spaceport in French Guiana, has offered a complete array of facilities for rocket launches. It comprises primarily the following:

> The CNES/CSG technical center, including various resources and facilities that are critical to launch base operations, such as radars, the telecom network, weather station, receiving sites for launcher telemetry, etc.

> Payload processing facilities (ECPU), in particular, the S5 facility.

> Ariane, Soyuz and Vega launch complexes, comprising the launch zones and launcher integration buildings.

> Various industrial facilities, including those operated by Regulus, Europropulsion, Air Liquide Spatial Guyane and ArianeGroup – all participating in the production of Ariane 5 components. A total of 40 European manufacturers and local companies are involved in launcher operations.

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 (Centre National d'Etudes Spatiales) and Arianespace. ESA is responsible for the Ariane, Soyuz and Vega development programs. Once these launch systems are qualified, ESA transfers responsibility to Arianespace as the operator. 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 France's space program, the Guiana Space Center has evolved into 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 the CNES/CSG fixed expenses, and also helps finance the fixed costs for the ELA launch complexes.

CNES has several main responsibilities at the Guiana Space Center. It designs all infrastructure and, on behalf of the French government, is responsible for safety and security. It provides the resources needed to prepare the satellites and launchers for missions. Whether during tests or actual launches, CNES is also responsible for overall coordination of operations and it collects and processes all data transmitted from the launcher via a network of receiving stations to track Ariane, Soyuz and Vega rockets throughout their trajectories.

ARIANESPACE IN FRENCH GUIANA

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

For Vega, Arianespace supervises the integration and inspection of the launcher constructed by ELV/Avio, the production prime contractor. At the same time, Arianespace coordinates the preparation of satellites in the payload preparation facility (EPCU) operated by CNES/CSG, handles the integration of satellites and preparation of the payload composite up to its transfer on the launcher to the Vega launch zone (ZLV), and also works with ELV/Avio teams in charge of the launcher to conduct the final countdown and launch from Launch Control Center No. 3 (CDL3).

Arianespace deploys a top-flight team and technical facilities to get launchers and satellites ready for launch. Building on this unrivalled expertise and outstanding facilities in French Guiana, Arianespace is the undisputed benchmark in the global launch services market.