

VV09

Sentinel-2B



# FLIGHT VV09: A NEW VEGA MISSION AT THE SERVICE OF EARTH OBSERVATION WITH EUROPE'S COPERNICUS PROGRAM

For its third launch of the year - and the ninth to be performed by the Vega launcher since its first liftoff from the Guiana Space Center in 2012 - Arianespace will orbit the Sentinel-2B satellite, a part of Europe's Copernicus Earth observation program, on behalf of the European Commission within the scope of a contract with the European Space Agency (ESA).

As a multi-purpose launch vehicle that already has demonstrated its capabilities during the eight previous successful missions, Vega is now fully operational in commercial service – and will be performing its sixth flight for Earth observation.

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### Sentinel-2B

Copernicus is the European Commission's Earth observation program. Its aim is to give Europe continuous, independent and reliable access to Earth observation data. It covers a vast spectrum of missions that will enable this continent to better control and protect the environment, enhance understanding of the underlying phenomena in climate change, as well as improve security for European citizens.

Sentinel-2B is the fourth satellite in the Copernicus program to be orbited by Arianespace, following the successful launches of Sentinel-1A by a Soyuz rocket in April 2014, Sentinel-2A by a Vega rocket in June 2015, and Sentinel-1B by a Soyuz in April 2016 – all performed from the Guiana Space Center in French Guiana.

The Sentinel-2B Earth observation satellite primarily focuses on monitoring land masses and coastal zones around the world. Its data will be used for applications concerning the monitoring of vegetation, soil types and habitats. The spacecraft features a multispectral, wide-swath, high-resolution optical imaging instrument.

Sentinel-2B will be positioned in an orbit opposite that of Sentinel-2A to ensure optimum coverage and data delivery. The pair of Sentinel-2 satellites will cover the Earth's entire surface in five days. This high frequency means they will capture brand-new views of the Earth, driving considerable progress in monitoring and predicting changes in vegetation and aquatic pollution.

Sentinel-2B was built by a consortium led by Airbus.

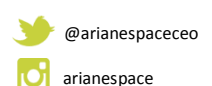
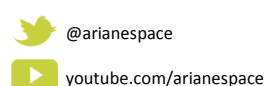
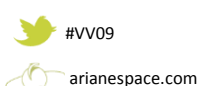
### The Sentinel fleet

ESA's Sentinel program comprises six satellite families:

- Sentinel-1 will ensure data continuity for the ERS and Envisat radar satellites;
- Sentinel-2 and Sentinel-3 are dedicated to the observation of the Earth and its oceans, as well as understanding how climate change impacts our daily lives;
- Sentinel-4 and Sentinel-5 are dedicated to meteorology and climatology, with a focus on studying the composition of the Earth's atmosphere.
- Sentinel 6 will measure the global sea-surface height, primarily for operational oceanography and for climate studies.

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## MISSION DESCRIPTION

The ninth Arianespace Vega launch from the Guiana Space Center (CSG) will place its satellite passenger into a Sun-synchronous orbit (SSO).

The launcher will be carrying a total payload of approximately 1,208 kg.

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

### DATE AND TIME



Liftoff is scheduled for **Monday, March 6, 2017**, at exactly:

- > **08:49:24 p.m.**, Washington D.C. time
- > **10:49:24 p.m.**, local time in French Guiana
- > **1:49:24**, Universal Time (UTC), on March 7th
- > **2:49:24 a.m.**, Paris and Brussels time, on March 7th

### MISSION DURATION



The nominal mission duration (from liftoff to separation of the satellite) is:  
**57 minutes, 57 seconds.**

### TARGETED ORBIT



**Orbit**  
**SSO**  
 (Sun-synchronous orbit)



**Altitude at separation**  
**Approx. 786 km.**  
 Semi major axis: 7,160 km.



**Inclination**  
**98.57 degrees**

### THE LAUNCH AT A GLANCE

Following liftoff from the Guiana Space Center, the powered phase of Vega's first three stages will last 6 minutes, 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 into the sea.

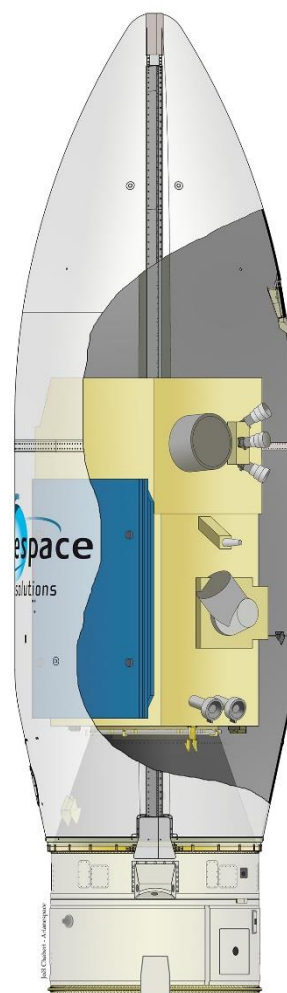
The AVUM upper stage will ignite its engine for the first time, operating for about 7 minutes, followed by a ballistic phase lasting approximately 40 minutes.

The AVUM stage will then reignite its engine for approximately 2 minutes, prior to releasing the Sentinel-2B satellite about 1 minute after the engine is shut down.

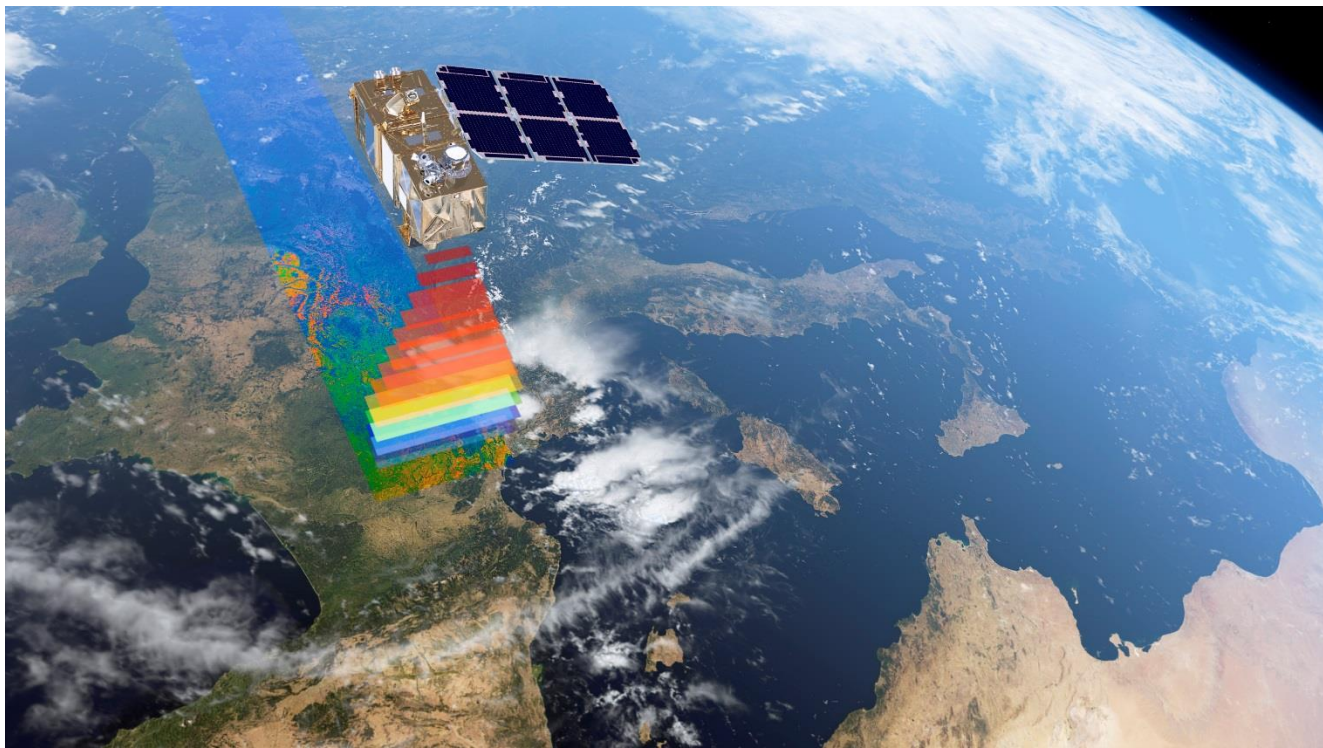
The Sentinel-2B satellite will be released 57 minutes, 57 seconds after liftoff.

### VEGA PAYLOAD CONFIGURATION

- > **Payload:** **Sentinel-2B**
- > **Mass at liftoff:** 1,130 kg.
- > **PLA - Vega Payload Adaptor**



## Sentinel-2B SATELLITE



<b>CUSTOMER</b>	ESA
<b>PRIME CONTRACTOR</b>	Airbus
<b>MISSION</b>	Earth observation
<b>PLATFORM</b>	Dedicated platform
<b>MASS</b>	Total mass at launch: 1,130 kg.
<b>STABILIZATION</b>	3 axis
<b>DIMENSIONS</b>	3.3 m x 2.3 m 1.7 m
<b>TARGETED ORBIT</b>	Sun-synchronous orbit at an altitude of approximately 786 km.
<b>DESIGN LIFE</b>	7 years and 3 months

### CONTACT PRESSE

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## THE VEGA LAUNCHER

ELV – the production prime contractor – delivers the Vega launcher to Arianespace.

### Payload faring

(RUAG Space)

### Payload adapter

(Airbus Spain)

### Integration & testing

(Avio)  
AVUM

### Production, integration & testing

(Avio)  
ZEFIRO-9

### Production, integration and testing

(Avio)  
ZEFIRO-23

### Integration and testing

(Avio)  
P80

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

### AVUM structure

(Airbus)

### AVUM engine

(KB Yuzhnoye)

### Interstage - 2/3

(Rheinmetall)

### Interstage - 1/2

(Airbus Netherlands)

### P80 engine

(Europropulsion)

### Interstage - 0/1

(SABCA)

### P80 Nozzle

(ASL)



## LAUNCH CAMPAIGN: VEGA – Sentinel-2B

### SATELLITE AND LAUNCH VEHICLE CAMPAIGN CALENDAR

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
January 6, 2017	Arrival in French Guiana of Sentinel-2B; beginning of preparation in the S1B hall	
January 16, 2017		Campaign start review - Transfer of P80 stage
January 20, 2017		Interstage 1/2 integration
January 23, 2017		Z23 integration
January 26, 2017		Z9 integration
January 30, 2017		AVUM integration
February 7, 2017	Sentinel-2B fueling operations in the S5B hall	
February 9, 2017		Synthesis control test
February 13, 2017	Sentinel-2B integration on payload adapter	
February 14, 2017		Launch vehicle final inspection
February 15, 2017	Sentinel-2B encapsulation	
February 16, 2017		Completion of fairing
February 17, 2017		Preparation of upper composite for transfer

### SATELLITE AND LAUNCH VEHICLE CAMPAIGN FINAL CALENDAR

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
Saturday, February 18, 2017	Transfer of upper composite from S5B to SLV (Vega Launch Site) Composite integration on the launcher	
From Tuesday, February 21 to Friday February 24, 2017		Fueling operations for RACS (Roll and Attitude Control Subsystem) and fueling operations AVUM (N2O4)
Thursday, March 2, 2017		AVUM final preparation and rehearsal
Friday, March 3, 2017		Arming of launch vehicle and fairing
Saturday, March 4, 2017		Launch readiness review (RAL), final preparation of launcher and final inspection of the fairing
Monday, March 6, 2017		Final launch countdown



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Sentinel-2B

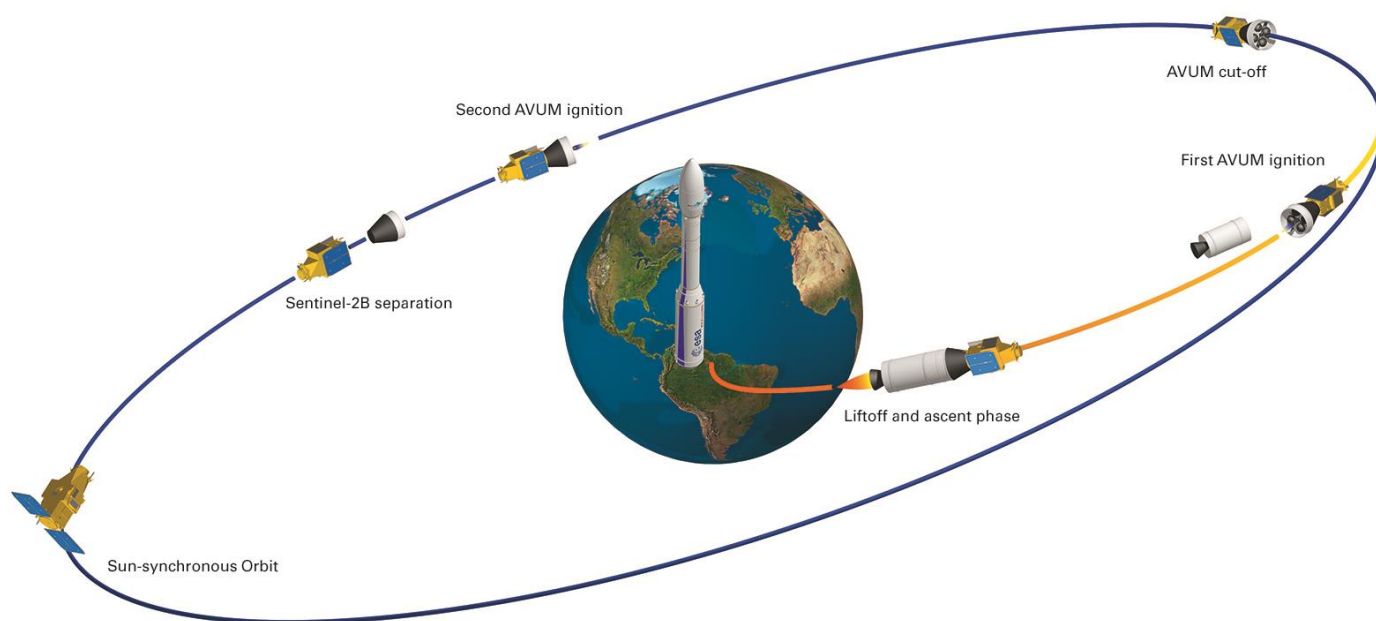
## COUNTDOWN AND FLIGHT SEQUENCE

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	10 min	Start of final countdown
- 06 h	00 min	Activation of Multi-Functional Unit (MFU)
- 05 h	40 min	Activation of Inertial Reference System (IRS)
- 05 h	40 min	Activation of telemetry
- 05 h	10 min	Activation of Safeguard Master Unit (SMU)
- 04 h	50 min	Removal of safety devices
- 04 h	40 min	Activation of onboard computer and loading of flight program
- 04 h	30 min	IRS alignment and checks
- 03 h	15 min	Mobile gantry withdrawal (45 min.)
- 02 h	25 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	55 s	1 <sup>st</sup> stage (P80) separation
+ 00 h	01 min	56 s	2 <sup>nd</sup> stage (Zefiro-23) ignition
+ 00 h	03 min	39 s	2 <sup>nd</sup> stage (Zefiro-23) separation
+ 00 h	03 min	51 s	3 <sup>rd</sup> stage (Zefiro-9) ignition
+ 00 h	03 min	56 s	Fairing separation
+ 00 h	06 min	32 s	3 <sup>rd</sup> stage (Zefiro-9) separation
+ 00 h	08 min	23 s	1 <sup>st</sup> ignition of AVUM
+ 00 h	15 min	27 s	1 <sup>st</sup> cut-off of AVUM
+ 00 h	55 min	07 s	2 <sup>nd</sup> ignition of AVUM
+ 00 h	57 min	07 s	2 <sup>nd</sup> cut-off of AVUM
+ 00 h	57 min	57 s	Separation of Sentinel-2B
+ 01 h	48 min	27 s	3 <sup>rd</sup> ignition of AVUM
+ 01 h	50 min	00 s	3 <sup>rd</sup> cut-off of AVUM
+ 01 h	57 min	30 s	End of the Arianespace mission

## MISSION PROFILE



**Trajectoire Vega pour l'orbite opérationnelle Sentinel-2B**  
*Vega trajectory for Sentinel-2B operational orbit*



# 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 Airbus Safran Launchers, which holds 74% of its share capital; the balance is held by 17 other shareholders from the European launcher industry. Since the outset, Arianespace has signed over 530 launch contracts and launched 550-plus satellites. More than half of the commercial satellites now in service around the globe were launched by Arianespace.

The company posted sales of more than 1.4 billion euros in 2016.

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 70 satellites to be launched.

## THE GUIANA SPACE CENTER: EUROPE'S SPACEPORT

For more than 40 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, telecom network, weather station, receiving sites for launcher telemetry, etc.
- > Payload processing facilities (EPCU), 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 Airbus Safran Launchers - all participating in the production of Ariane 5 components. A total of 40 European manufacturers and local companies are involved in the 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 CNES space agency 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 the 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.

The French CNES space agency 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 also is 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 built by ELV, which is the production prime contractor. Before taking official delivery of the launcher, Arianespace coordinates the preparation of satellites in the payload preparation facility (EPCU) operated by CNES/CSG, handles the final assembly of the launcher and integrates satellites on the launcher, and oversees the final countdown and launch with personnel in the Launch Control Center 3 (CDL3).

Arianespace deploys a top-flight team and technical facilities to ensure the launchers and their satellites payloads are ready for their missions. Building on this unrivalled expertise and outstanding local facilities, Arianespace is now the undisputed benchmark in the global launch services market.