

LAUNCH KIT

March 2019

VV14

PRISMA



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FLIGHT VV14: WITH VEGA, ARIANESPACE TO LAUNCH PRISMA, AN ITALIAN EARTH OBSERVATION SATELLITE

For its third mission of the year, and the 14th Vega flight since this launcher began operations at the Guiana Space Center in 2012, Arianespace will orbit the PRISMA Earth observation satellite on behalf of the ASI Italian space agency within the scope of a contract with OHB ITALIA.

In conducting this mission for Italy, Arianespace once again proves that Vega is a multi-purpose launch vehicle, perfectly tailored to address the growing Earth observation satellite market.

Flight VV14 will mark the 12th Vega mission dedicated to Earth observation, with PRISMA to become the 70th Earth observation satellite launched by Arianespace overall.

CONTENTS

> THE LAUNCH

VV14 mission
Pages 2-4

The PRISMA Satellite
Page 5

> FURTHER INFORMATION

Vega launch vehicle
Page 6

VV14 launch campaign
Page 7

Countdown and flight sequence
Page 8

Vega mission profile
Page 9

Arianespace and the Guiana Space Center
Page 10

The PRISMA satellite

PRISMA (*PR*ecursore *I*perSpettrale della *M*issione *A*pplicativa) was built for the ASI Italian space agency by OHB ITALIA as prime contractor, with LEONARDO responsible for the payload. Vega will deliver the satellite into a Sun-synchronous Low Earth Orbit (SSO) for its Earth observation mission.

PRISMA will provide major applications to protect both our planet and Italy's national environmental safety. Equipped with a state-of-the-art electro-optical instrument, made by a medium resolution photo camera sensitive to all the visible range (panchromatic) and by an innovative hyperspectral sensor, it will employ these capabilities for environmental monitoring, resources management, identification and classification of crops, fight against pollution, etc.

PRISMA will be the third satellite launched at the service of ASI by Arianespace, whose backlog comprises two other spacecraft for the Italian space agency: a pair of COSMO-SkyMed Second-Generation satellites on Soyuz and Vega C, for Thales Alenia Space on behalf of ASI and the Italian Ministry of Defence.

The PRISMA satellite was designed and manufactured by a consortium of Italian companies led by OHB ITALIA SpA and LEONARDO SpA. OHB ITALIA is responsible for overall program management, planning, systems engineering, development and integration of the platform and all validation activities. LEONARDO is responsible for the design, development, integration, testing and calibration of hyperspectral sensor and panchromatic camera.

PRISMA will be the 25th OHB satellite orbited by Arianespace, with the total comprised of three dedicated satellites and 22 constellation satellites. Eight OHB satellites remain in Arianespace's backlog, including four Galileo satellites to be launched on the next-generation Ariane 62 version.

Arianespace at the service of Italian and European institutional needs

So far, Arianespace has lofted seven institutional satellites and five auxiliary payloads for Italian customers and institutions, such as ASI, the Italian Ministry of Defense and Telespazio, a joint-venture between LEONARDO and Thales.

PRISMA also will be the 126th mission, as well as the 155th satellite, launched by Arianespace on behalf of European institutions using its family of launchers.

With 20 additional missions currently comprised in its backlog (representing 24 satellites), Arianespace continues to serve the strong, strategic interests of European institutions by providing them with an independent access to space.

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Vega, a commercial and operational success

Arianespace's family of launchers was expanded in 2012 with the addition of Vega, a new-generation vehicle for flights carrying small to medium-sized satellite payloads. The industrial prime contractor for Vega is Avio, based in Colleferro, Italy.

Since its entry into service, Vega has performed 13 successful missions, orbited 28 satellites and delivered a combined payload mass of 13,816.5 kg to orbit.

Offering a payload capacity of 1.5 metric tons into low Earth orbit (LEO), Vega was purpose-built for launching small scientific or Earth observation satellites. Consequently, 11 of Vega's 13 successfully completed missions were dedicated to Earth observation, when more than half of its on-board satellites were designed for Earth observation missions (15 out of 28 spacecraft).

10 Vega/Vega C launches are currently included in Arianespace's backlog, which has a total of 52 launches overall. One-third of these are for European institutions, while two-thirds are for export customers.



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MISSION DESCRIPTION

The 14th Vega launch from the Guiana Space Center (CSG) will place the PRISMA satellite into a Sun-synchronous orbit (SSO).

The launcher will be carrying a total payload of approximately 953.5 kg.

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

DATE AND TIME



Liftoff is scheduled for **Thursday, March 21, 2019**, at exactly:

- > **9:50:35 p.m.**, in Washington, D.C.
- > **10:50:35 p.m.**, local time in French Guiana
- > **01:50:35**, Universal Time (UTC), on March 22, 2019
- > **2:50:35 a.m.**, in Paris and Rome, on March 22, 2019
- > **10:50:35 a.m.**, in Tokyo, on March 22, 2019.

MISSION DURATION



The nominal mission duration (from liftoff to separation of the satellite) is:

54 minutes, 8 seconds.

TARGETED ORBIT



Orbit
SSO



Altitude at separation
Approx. 615 km.
Semi major axis: 6,993 km.



Inclination
97.88 degrees

THE LAUNCH AT A GLANCE

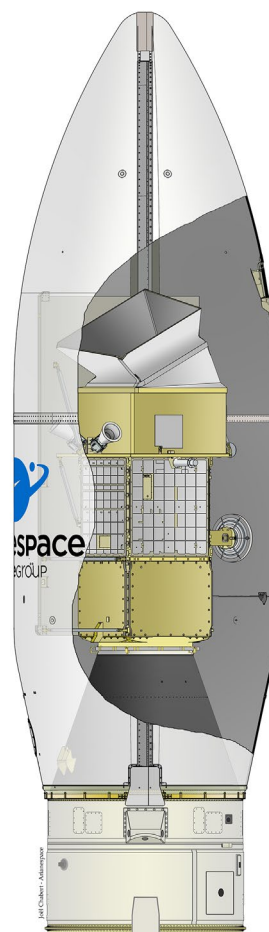
Following liftoff from the Guiana Space Center, the powered phase of Vega's first three stages will last six minutes and 26 seconds. After this first phase, the launcher's third stage will separate from the upper composite, which includes the AVUM upper stage, a payload adapter and the satellite. The lower three stages will fall back into the sea.

The AVUM upper stage will ignite its engine for the first time, operating for about four minutes and 30 seconds, followed by a ballistic phase lasting approximately 39 minutes. The AVUM stage will then reignite its engine for about one minute and 12 seconds, prior to releasing PRISMA about one minute and 36 seconds after the engine is shut down.

PRISMA will be released 54 minutes and 8 seconds after liftoff.

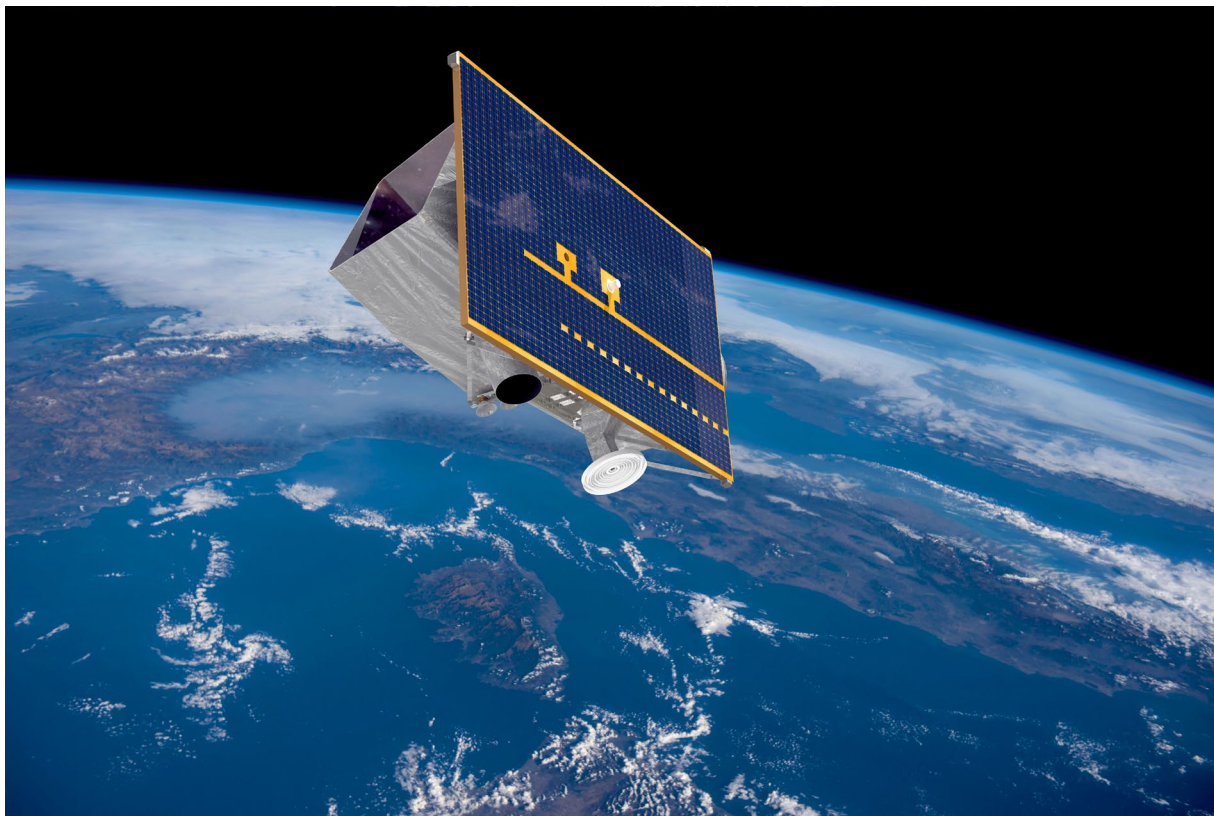
VEGA PAYLOAD CONFIGURATION

- > Payload: **PRISMA**
- > Weight at liftoff: **879 kg.**
- > Vega Payload Adaptor (PLA)



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THE PRISMA SATELLITE



CUSTOMERS	OHB ITALIA on behalf of the Italian space agency ASI
SYSTEM PRIME CONTRACTOR	OHB ITALIA
PAYLOAD PRIME CONTRACTOR	LEONARDO
MISSION	Earth observation
PLATFORM	Specific
MASS AT LAUNCH	879 kg.
STABILIZATION	3 axis
PROPULSION	Chemical (hydrazine)
BATTERIES	Li-Ion
TARGETED ORBIT	Sun-synchronous orbit at 615 km.
DESIGN LIFE	5 years after commissioning phase

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THE VEGA LAUNCH VEHICLE

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

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

(S.A.B.C.A)

P80 nozzle

(ArianeGroup)





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LAUNCH CAMPAIGN: VEGA - PRISMA

SATELLITE AND LAUNCH VEHICLE CAMPAIGN TIMETABLE

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
January 11, 2019	Arrival in French Guiana of PRISMA at Felix Eboué Airport (Cayenne)	Campaign start review - Transfer of P80 stage
January 17, 2019	Short functional test (SFT) on the PRISMA satellite	
January 28, 2019		Z9 integration
January 29, 2018	Transfer of PRISMA to the EPCU Payload Preparation Complex	
January 30, 2019		Interstage 1/2 integration
January 31, 2019	Fitchek of PRISMA on his adaptor	
February 1, 2019		Z23 integration
February 7 to 8, 2019		AVUM integration
February 8, 2019	Start of electrical checks	
February 13, 2019	Fueling operations of PRISMA	
February 19, 2019	Integration of PRISMA on the payload adaptor	
February 22, 2019		Synthesis control test
February 26, 2019	Encapsulation in Vega's payload fairing	

SATELLITE AND LAUNCH VEHICLE CAMPAIGN FINAL TIMETABLE

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
Thursday, February 28, 2019	Transfer of upper composite from EPCU to SLV (Vega Launch Site)	
Friday, March 1, 2019	Upper composite integration on the launcher	
Monday, March 4 to Saturday, March 9, 2019		Fueling operations for AVUM and RACS (Roll and Attitude Control Subsystem)
Monday, March 11, 2019		Rehearsal
Tuesday March 12 to Friday, March 15, 2019		Additional checks
Monday, March 18, 2019		Arming of Z23/Z9, AVUM and fairing
Tuesday, March 19, 2019		Arming of P80
Wednesday, March 20, 2019		Launch readiness review (RAL), final preparation of launcher and final inspections of the fairing
Thursday, March 21, 2019		Final launch countdown



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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

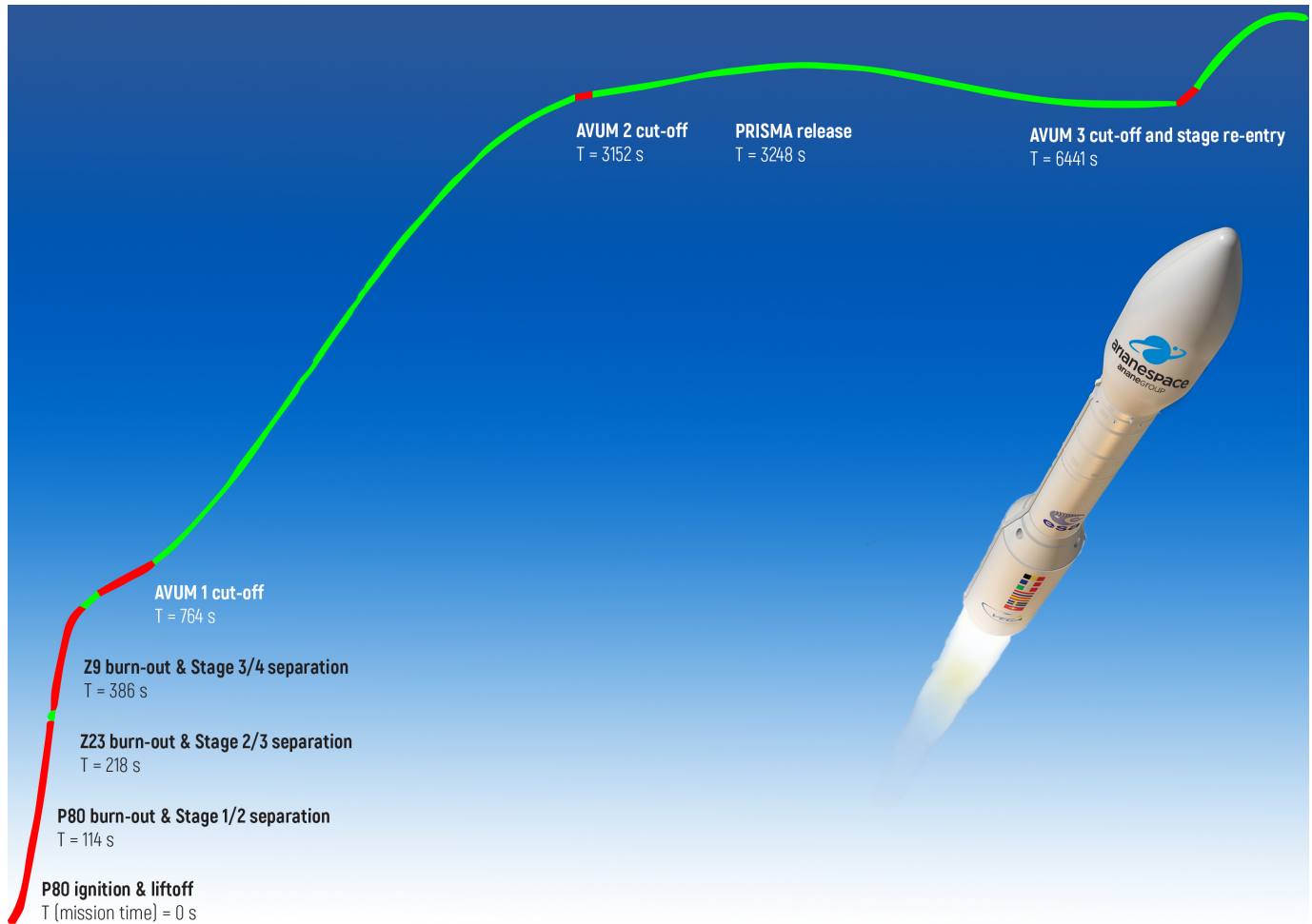
T-O	00 s	LIFTOFF
+ 00 h 01 min	54 s	1 st stage (P80) separation
+ 00 h 01 min	55 s	2 nd stage (Zefiro-23) ignition
+ 00 h 03 min	38 s	2 nd stage (Zefiro-23) separation
+ 00 h 03 min	51 s	3 rd stage (Zefiro-9) ignition
+ 00 h 03 min	56 s	Fairing separation
+ 00 h 06 min	26 s	3 rd stage (Zefiro-9) separation
+ 00 h 08 min	06 s	1 st ignition of AVUM
+ 00 h 12 min	44 s	1 st cut-off of AVUM
+ 00 h 51 min	20 s	2 nd ignition of AVUM
+ 00 h 52 min	32s	2 nd cut-off of AVUM
+ 00 h 54 min	08 s	Separation of the PRISMA satellite
+ 01 h 43 min	52 s	3 rd ignition of AVUM
+ 01 h 47 min	22 s	3 rd cut-off of AVUM



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MISSION PROFIL





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 540 launch contracts and launched approx. 600 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 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, the Baikonur Cosmodrome in Kazakhstan and shortly the Vostochny Cosmodrome in Russia.
- > 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 700 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, the 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 Regulux, 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.