

vega-c

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MEDIA KIT

Inaugural launch Flight VV21





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VV21 KEY FACTS

ESA's 21st Vega launch will be the first flight of the enhanced Vega-C configuration: more powerful, more versatile, more competitive. Flight VV21 will qualify this new Vega-C launch system and orbit a scientific payload for the Italian Space Agency, ASI, along with six research CubeSats from Italy, Slovenia and France.



(•) ORBIT

70° inclination, circular 5,893 km altitude

7:13 Washington DC 8:13 Kourou 11:13 UTC 13:13 Rome 20:13 Tokyo

Date and time of launch subject to change; for the latest schedule see https://www.esa.int/vega. Video transmission begins 30 minutes before launch at esa TV https://www.esa.int/ESA Multimedia/ESA Web TV



PLACE

Europe's Spaceport, Kourou, French Guiana



FLIGHT DURATION



PAYLOADS

LARES-2 (ASI scientific mission) Six Cubesats



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NEW ERA IN EUROPEAN SPACEFLIGHT WITH VEGA-C



ESA's Vega-C succeeds Vega, which operates from Europe's Spaceport in French Guiana. Vega-C delivers increased performance, greater payload volume and improved competitiveness. This rocket heralds a new era in European spaceflight by supporting new mission possibilities, including return-to-Earth capability with Space Rider.

Flight VV21 demonstrates Vega-C's versatility, by placing a main scientific payload (LARES-2) and a group of secondary CubeSats into different orbits on a single launch. This will contribute to the qualification of the Vega-C launch system as part of the transition from its successful predecessor, Vega.

As with any inaugural launch, this is a challenging mission. Vega-C features major enhancements from Vega, with two new solid propulsion stages, a new fairing and an enhanced upper stage (AVUM+), along with new ground infrastructure.

This medium-lift Vega-C perfectly complements the larger Ariane launch system at Europe's Spaceport to enhance Europe's independent capability to access space by meeting institutional, scientific, commercial and small satellite market needs.









Vega-C features three solid-fuel stages and a liquid-fuelled fourth stage.

Solid fuel motors provide exceptional liftoff thrust without the fuel handling infrastructure needed for liquid propellants. They can be manufactured in advance and safely stored.

Vega-C's **P120C first stage** will do double service, with either two or four of these acting as strap-on boosters for ESA's upcoming Ariane 6 launch vehicle.

The second stage powered by the new **Zefiro-40** motor contains about 36 t of solid propellant, providing an average thrust of 1100 kN. The third stage **Zefiro-9**, derived from Vega, burns 10 t of solid propellant.

The **upper stage AVUM+** module is restartable, for precise positioning of multiple payloads and end-of-mission deorbiting to leave no debris in space.

With a larger **fairing** than Vega, Vega-C improves flexibility in carrying main and secondary payloads as well as the Small Spacecraft Mission Service (SSMS) dispenser.

Together, launch vehicle modifications give Vega-C about 800 kg more payload performance than Vega.



PAYLOADS





Payload	Mission	Customer
LARES-2	https://bit.ly/LARES-2	ASI (Italy)
AstroBio	https://bit.ly/AstroBio	INAF, ASI (Italy)
Greencube	https://bit.ly/Greencube	Sapienza Univ. of Rome, ASI (Italy)
Trisat-R	https://bit.ly/Trisat-R	Univ. of Maribor (Slovenia)
MTCube-2	https://bit.ly/MTCube-2	Univ. of Montpellier (France)
Celesta	https://bit.ly/CelestaCubeSat	Univ. of Montpellier (France)
Alpha	https://bit.ly/Alpha-NPC	ARCA Dynamics (Italy)

LARES-2 (LAser RElativity Satellite-2) was built for ASI by Italy's National Institute for Nuclear Physics; other scientific partners are Centro Fermi and UniRoma La Sapienza, and OHB Italia supplied the restraint and release mechanism also seen here. VV21's main payload is a 42 cm sphere covered in reflectors; its orbit will be carefully monitored by ground station lasers to measure the so-called frame-dragging – or Lense-Thirring – effect, a distortion of space-time caused by the rotation of a massive body such as Earth, as predicted by Einstein's General Theory of Relativity. Its great mass, nearly 295 kg, ensures it will be disturbed as little as possible by solar wind or even photons, which cause a conventional spacecraft to wobble. Its predecessor, LARES, was the main payload on the 2012 inaugural flight of Vega.

AstroBio will test a solution for detecting biomolecules, a technology which could help monitor astronauts' health and search for signs of life during planetary exploration missions. Greencube carries an experiment to grow plants in microgravity, along with sensors and an internal camera to monitor the health of these "microgreens". With instruments to measure the harsh radiation environment of the inner Van Allen belt. Trisat-R aims to improve space radiation modelling and demonstrate techniques for protecting high-performance electronic components. Built by the University of Montpellier on its 1U Robusta platform, MTCube-2 will expose different types of flash memory to the space radiation environment while monitoring errors and broadcasting messages to the Ham radio community. Also built on a Robusta platform, Celesta will study electronic system short-circuits caused by energetic particles and compare the radiation environment in orbit with that produced at CERN's CHARM radiation chamber. Experiments on board ALPHA will explore phenomena related to Earth's magnetosphere, such as the Northern and Southern Lights, and demonstrate technologies designed to mitigate the effects of radiation.

MISSION TIMELINE





EUROPEAN COOPERATION

eesa

Vega-C is the result of longstanding collaboration between ESA and Europe's space industry, which are proud of their ability to harness strengths across national boundaries. ESA manages the programme, working with Avio (IT), prime contractor for both launch vehicle and interfacing ground infrastructure.

The P120C solid rocket motor shared by Ariane 6 and Vega-C is developed by Europropulsion, a 50/50 joint venture between ArianeGroup and Avio.

France's space agency, CNES, oversees Europe's Spaceport in French Guiana. Once Vega-C is operational, Arianespace will become its launch service provider.

Vega is above all a human adventure for a great European team, built on competence, cooperation and vision. Vega-C will build on this legacy. Further gains will come with Vega-E, which will feature two solid propulsion stages and a new, cryogenic upper stage; Vega-E is now in development to fly as soon as 2026.

Participating States in the Vega-C programme are: Austria, Belgium, the Czech Republic, France, Germany, Ireland, Italy, the Netherlands, Norway, Romania, Spain, Sweden and Switzerland.



PARTICIPATING STATES CONTRIBUTION







FIT FOR THE FUTURE



Since 2012, Vega has played a fundamental role in the space transportation sector. Its ongoing development and future evolutions, together with Ariane 6, will further increase competitiveness beyond 2025. This is a response to the rapid growth of worldwide competition and offers a family of configurations based on common building blocks.

An extra performance increase will be also added with the development of P120C+ (an improved version of P120C) on Vega-C as well as on Vega-E.





Europe's Spaceport in French Guiana is one of the world's ideal launch sites. Its location near the equator gives rockets launched eastward extra speed from the Earth's rotation, significantly increasing payload capability compared to more northerly or southerly sites.

Open ocean to the north and east offers launch trajectories which don't overfly populated areas. And, this region is threatened by neither cyclones nor earthquakes.

The existing Vega launch complex has been modified to accommodate this new launch system. The Vega mobile gantry now has a more powerful travelling crane, new cantilever reinforcements, platform shutters, a new mast sector and pallets, while modified fluid services have been installed on the launch pad.

These modifications make the pad and gantry compatible with both vehicles during the transition period when launches of Vega will be alternated with Vega-C.





AVTO

Avio is a key player in ensuring an independent and cost-effective European access to space, an increasingly important factor to allow private customers and institutions to continue to use spacebased services and applications. Vega, the European medium-lift launcher developed by the company and its international partners under an ESA contract. has been also an important asset to meet the growing market demand. The new Vega-C is more powerful than Vega, with increased versatility including the capability to fully exploit the new SSMS payload dispenser, developed to carry dozens of microsatellites to orbit with a single launch.

The company is focused on improving the technology of new materials and manufacturing to lower the costs of access to space. Thanks to extensive collaboration with universities, research centres and technology partners, Avio operates significant research and development activities in order to create cutting-edge technologies and products that will shape the future of space exploration.

Furthermore, environmental sustainability is a key factor of Avio's activities, culminating in development of the new M10 engine, the first of its kind in Europe to exploit greener propellants such as liquid oxygen and liquid methane.

www.avio.com Media contact: Francesco De Lorenzo Francesco.DeLorenzo@avio.com

AST

Established in 1988, the Italian space agency. Agenzia Spaziale Italiana (ASI), implements Italian space policy and supports its definition by public authorities. ASI is a major player in all space sectors including space science, Earth observation, human and robotic exploration, telecommunications, navigation and space transportation.

Through ASI, Italy is one of the top three contributing countries to the ESA Space Transportation programme and has a leading role in the Vega family of launchers (Vega, Vega-C, Vega-E and future evolutions) and ESA's Space Rider reusable vehicle, where ASI contributes to the development, exploitation planning and flight reviews with the integrated project team located at ESA-ESRIN. Italy is the main contributor to Vega-C, funding nearly 50% of the programme envelope.

Finally, ASI is providing the main payload for the inaugural flight of Vega-C, the LARES-2 satellite, developed by Italian industry and the national research community, with the aim of reinforcing Italian leadership in the investigation of the fundamental physics related to general relativity and space geodesy.

ARIANESPACE

Arianespace uses space to make life better on Earth by providing launch services for all types of satellites into all orbits. It has orbited over 1.100 satellites since 1980, using its family of launchers.

Arianespace will operate the new-generation Ariane 6 and Vega-C launchers, developed by ESA.

Arianespace is headquartered in Evry, near Paris, and has a technical facility at Europe's Spaceport in French Guiana, plus local offices in Washington, D.C., Tokyo and Singapore. Arianespace is a subsidiary of ArianeGroup, which holds 74% of its share capital, with the balance held by 15 other shareholders from the European launcher industry.

ESA and CNES are advisory board members.

CNES

French space agency CNES (Centre National d'Etudes Spatiales) defines national space policy and proposes it to public authorities.

CNES oversees the application of this policy in five main areas: space trasnsportation, science, observation, telecommunications and defense. ESA chose CNES as prime contractor for the Ariane 6 launch base in French Guiana, including the construction of a new launch pad. CNES also supports ESA, as the contracting authority, and ArianeGroup, as prime contractor for launcher development, and is responsible for applying French law on space operations.

As the owner of Europe's Spaceport in French Guiana, CNES has a dual mission: maintaining the operational condition of the spaceport and modernizing its facilities in anticipation of the arrival of Ariane 6, Vega-C and other future vehicles. At the spaceport, CNES manages operations, the reception of satellites, launch vehicle monitoring and tracking, range security and environmental protection.

www.arianespace.com Media contact: Gregory Gavroy q.qavroy@arianespace.com



www.asi.it

Media contact: Giuseppina Piccirilli qiuseppina.piccirilli@asi.it





EUROPEAN SPACE AGENCY

The European Space Agency (ESA) is tasked with guiding the development of Europe's space capabilities and making sure that its investments in space benefit the citizens of Europe. An international organization with 22 member states, ESA coordinates its members' financial and intellectual resources to conduct programs and activities that largely surpass the scope of action of a single European state.

ESA manages the development of Europe's future space transportation programmes, including Ariane 6 and Vega-C. On Vega, ESA manages the overall programme, while European industry builds the launch system, with AVIO as prime contractor. ESA Member States fund almost two thirds of the total cost of running and maintaining Europe's Spaceport. ESA owns the Ariane 5 and Vega launch complexes, which are operated by Arianespace.

www.esa.int Media contact: media@esa.int Tel: +31 71 5656409









Launch vehicles



Team Europe



Fit for the future



Europe's Spaceport



P120C first stage

Clean footage and interviews: https://www.esa.int/esatv/Videos/2021/12/Vega-C_B-Rolls





THE EUROPEAN SPACE AGENCY

Established in 1975, ESA now has 22 Member States and cooperates with many others. These countries are home to more than 500 million European citizens. If you're one of them, then we're working for you.

Our mission is the peaceful exploration and use of space for the benefit of everyone. We watch over Earth, develop and launch inspiring and unique space projects, fly astronauts and push the boundaries of science and technology, seeking answers to the big questions about the Universe.

We are a family of scientists, engineers and business professionals from all over Europe, working together in a diverse and multinational environment.

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