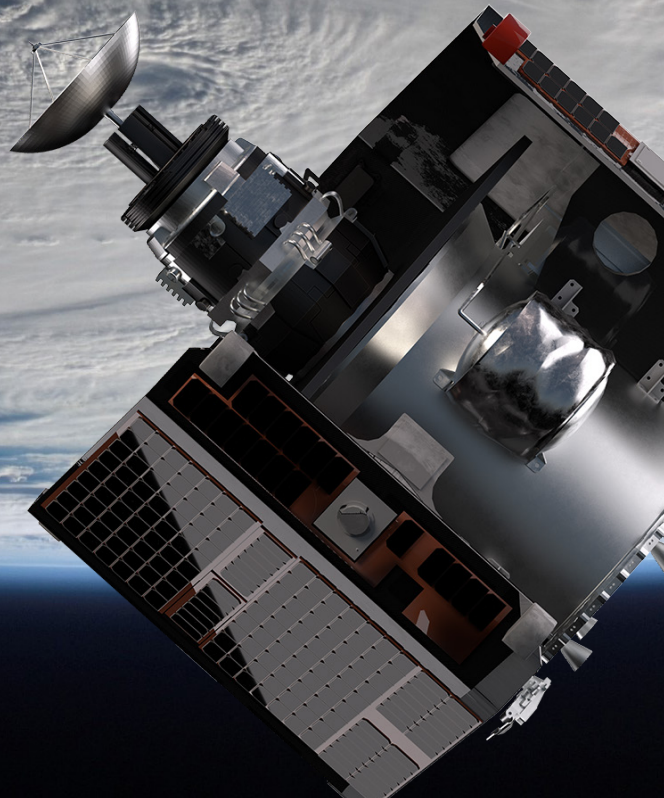




COSMIC WANDER

MISSION BOOKLET



Mission name: Cosmic Wander
Carrier names: ION SCV Ultimate Hugo

Fino Mornasco, Italy, November 11, 2023 — D-Orbit, an industry leader in space logistics and orbital transportation, successfully **launched its 12th commercial mission** today, named **Cosmic Wander**, using its cutting-edge Orbital Transfer Vehicle (OTV) **ION Satellite Carrier (ION)**.

Cosmic Wander lifted off at **10:49 AM (PT) (6:49 PM UTC)** from **Space Launch Complex 4 (SLC-4)** at **Vandenberg Space Force Base in California**. ION Satellite Carrier was subsequently deployed into a **sun-synchronous orbit at an altitude of 525 kilometers**.

Designed to revolutionize satellite deployment, **ION Satellite Carrier** can individually place satellites into specific orbital slots. Additionally, ION can host a variety of third-party payloads, including innovative technologies from startups, research experiments from academic institutions, and test instruments from established space enterprises.

Since its first commercial mission in September 2020, D-Orbit has successfully completed 11 missions.

D-Orbit's mission control team is now conducting the Launch and Early Orbit Phase (LEOP), setting the stage for the upcoming operational phase.



Photo credit: SpaceX

A note about the name of the satellite carrier

The name of the satellite carrier is "ION Ultimate Hugo", a combination of the acronym "ION", which stands for "InOrbit NOW", and the satellite's first name. This format follows the naming conventions of naval vessels used in navies around the World. The name "Hugo" was drawn at random from a bowl containing the names of all D-Orbit's employees. The company will continue to follow this procedure in the future to honor the skills, energy, passion, and commitment to its people.



ION SCV Ultimate Hugo and team



Name of payload: Intuition-1

Form factor: 6U

POC: Derek Bennet
derek.bennet@aac-clydespace.com

Intuition-1, based on AAC Clyde Space 6U EPIC VIEW Earth observation satellite, carries a cutting-edge hyperspectral instrument developed by KP Labs that will enable the satellite to deliver high-resolution, multi-band, hyperspectral data, providing much more information than the three main colour bands that the human eye detects. Its novel data processing unit, Leopard, is capable of processing data using neural networks (artificial intelligence) in orbit. KP Labs envisages future use of its technology in applications ranging from agriculture, forestry and mining to environmental protection and defence. The intended end user for this data is the agriculture sector. The space data generated from these satellites can be used to optimise yields and detect invasive plants, pests, and changes in soil make-up.

COMPANY PROFILE Website: www.kplabs.space

KP Labs is an innovative New Space company based in Poland. In 2016, a group of engineers and scientists associated with the Silesian University of Technology in Gliwice decided to turn their passion into reality and start a company that would combine science with business. The company is a team of new technology enthusiasts who do not think that the sky is the limit.

Photo credits: KP Labs



Name of payload: Ymir-1

Form factor: 3U

POC: Derek Bennet
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Ymir-1 is an AAC Clyde Space designed and built EPIC LINK communications satellite carrying a Saab VDES (VHF Data Exchange System) payload for two-way communications between satellite and ground. The Swedish built satellite is part of the collaborative AOS project, a project that is developing the next generation of space based VDES, bringing together AAC Clyde Space, ORBCOMM and Saab. The satellite, the first of its kind built in Sweden, is part of the AOS project, a collaboration between AAC Clyde Space, ORBCOMM, and Saab. The use of VDES provides much needed improvements to current AIS-based Vessel Traffic Services (VTS). With up to 32 times more bandwidth than AIS, VDES will enable a broader array of applications in maritime surveillance, encrypted communications, fishery, logistics, search and rescue and marine integrated applications. By adding space-based capability to VDES, the use of the system is extended from the shoreline to anywhere in the ocean.

COMPANY PROFILE Website: www.orbcomm.com

ORBCOMM is a pioneer in IoT technology, empowering customers with insight to make data-driven decisions that help them optimize their operations, maximize profitability, and build a more sustainable future. With 30 years of experience and the most comprehensive solution portfolio in the industry, ORBCOMM enables the management of over a million assets worldwide for a diverse customer base spanning transportation, supply chain, heavy equipment, maritime, natural resources, and government.

COMPANY PROFILE Website: www.saab.com

Saab is a leading defence and security company with a mission to help nations protect their populations and contribute to the safety of people and communities. With more than 20,000 skilled employees, Saab develops technology and solutions for a safer, more sustainable, and fairer world. Saab develops, manufactures, and maintains advanced aeronautics systems, weapons, command and control systems, sensors, and underwater systems. Saab is headquartered in Sweden but with global operations where Saab is a part of many nations' defence capabilities. Saab TransponderTech, a leading manufacturer of AIS, is providing all parts of the VDES system for this service, such as, shipborne VDES, shore based VDES and satellite VDES transponders, all based on their 5th generation Software Defined Radio platform. The new radio platform provides easy upgrade using existing antenna installations.

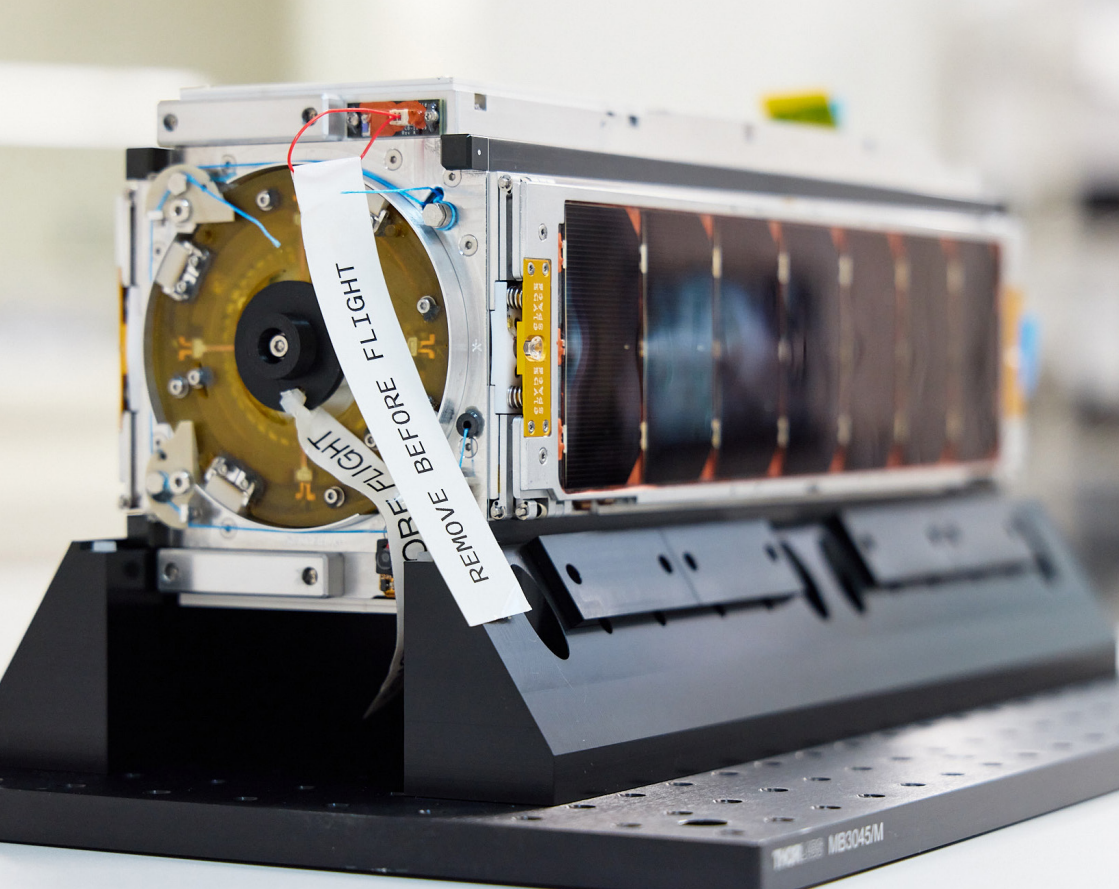


Photo credits: Orbcomm/Saab



Photo credits: Wyvern



Name of payload: EPICHYper-3

Form factor: 6U

POC: Derek Bennet
derek.bennet@aac-clydespace.com



The satellite is the third in the EpicHyper series and follows EPICHYper-1 and EPICHYper-2, both launched earlier in 2023. Under the SDaaS agreement AAC Clyde Space owns and operates the three satellites, while Wyvern owns the hyperspectral data delivered by the satellite.

EPICHYper-3 is an AAC Clyde Space EPIC VIEW satellite designed specifically to take hyperspectral images of Earth's surface using the cutting-edge onboard imagers. High quality hyperspectral data will power breakthroughs across industries and applications, from climate change to forestry, mining, energy, and defence — to name just a few. When you know the geochemical reality of what's happening on the ground, you can identify opportunities to address planetary-scale problems.

COMPANY PROFILE Website: www.wyvern.space

Wyvern is the way decision makers address the world's biggest challenges. Our hyperspectral data reveals the hidden reality of planet Earth. The first satellites in our constellation are currently in orbit and providing data scientists and analysts with reliable access to hyperspectral data. Our next generation of satellites is currently in development and will leverage cutting-edge deployable optics to capture ultra-high resolution imagery. Wyvern is based in Edmonton, Canada and proudly building on a long tradition of Canadian aerospace engineering and innovation.

COMPANY PROFILE Website: www.aac-clyde.space

AAC Clyde Space, a leading New Space company, specialises in small satellite technologies and services that enable businesses, governments, and educational organisations to access high-quality, timely data from space. This data has a vast range of applications, from weather forecasting to precision farming to environmental monitoring, and is essential to improving our quality of life on Earth. Our growing capabilities bring together three divisions:

Space Data as a Service – delivering data from space directly to customers

Space missions – turnkey solutions that empower customers to streamline their space missions

Space products and components – a full range of off-the-shelf and tailor-made subsystems, components, and sensors



C R Y P T O S A T

Name of payloads: Crypto3

Form factor: 3U

POC: Daniel Bar
daniel.bar@cryptosat.io

Cryptosat satellites are used for cryptographic technologies serving blockchain applications such as privacy preserving schemes, key management, data security and other security technologies. Crypto3 will serve a multitude of blockchain applications, including MPC, key management, and data security, as well as a prototype platform for edge computing in space.

COMPANY PROFILE Website: www.cryptosat.io

Cryptosat's mission is to build satellites that power cryptographic, blockchain, and ledger applications. By placing a root-of-trust in space, Cryptosat guarantees ultimate trust and transparency. According to Cryptosat, space is perfectly suited for hosting secure applications by virtue of its being physically inaccessible. Cryptosat's technology powers a wide range of applications from blockchain to electronic voting and offers to revolutionize the cyber security industry by harnessing the unique properties of space that are literally out of this world.

Photo credits: Cryptosat



Photo credits: Apogeo Space



Name of payload: PiCo-IoT

Form factor: 0.3U

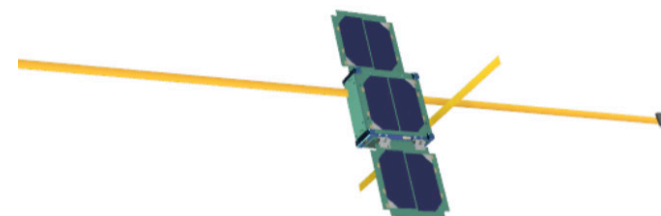
POC: Alberto Guglielmo
a.guglielmo@apogeo.space

Apogeo Space constellation will be composed of approximately 100 picosatellites (satellites that weight less than 1 kg) designed to be deployed rapidly and effectively with subsequent launches. Each Apogeo Space's picosatellite is based on a proprietary platform with a form factor of 10x10x3cm in stowed configuration (equivalent to a 0.3U of the cubesat standard). In each launch a batch of 9 picosatellites, equivalent to a 3U cubesat, are placed into orbit. Our mission is to enable a future where everyone can benefit from the endless possibilities offered by these advanced technologies, driving positive change in quality of life. The ambition of PiCo IoT is not limited to a technology demonstration. PiCo IoT represents the will to realize the first building block of a scalable infrastructure which will allow the expansion of the current opportunities for developing IoT connectivity in Europe and the rest of world on one hand, and to consciously face the problems related to space debris proliferation, potentially associated with the launch of hundreds of satellites for such constellations, on the other.

COMPANY PROFILE Website: www.apogeo.space

Apogeo Space is an innovative Italian SME which aims to fill the aforementioned gap by building a constellation of satellites to provide a global telecommunication service for the Internet of Things (IoT), connecting low power and low data rate devices located in remote or poorly connected areas. Sectors of applications are agritech, smart cities, in infrastructures monitoring (e.g.: water, oil & gas, electrical), maritime transportation and transport/logistic in general, environmental monitoring (e.g.: wildfires, contaminant spillage), cattle management, research and many more. The company is also involved in other R&D activities in the space sector, particularly on nanosatellites and cubesats. Active since 2015, it has contributed to the development of major projects by ESA (European Space Agency), ASI (Italian Space Agency) and NASA, often in collaboration with major research institutions including INAF (National Institute of Astrophysics), INFN (National Institute of Nuclear Physics), Brera Astronomical Observatory, Bologna Astronomical Observatory and Milan Polytechnic University. Once in space the picosatellites deploy solar panels and antennas beginning the provision of the IoT telecommunication service. Apogeo Space's plans foresee a constellation comprised of about 100 operative satellites which will be completed by 2027. To reach this goal three to four launches per year are expected. Apogeo Space constellation will be composed of approximately 100 picosatellites (satellites that weight less than 1 kg) designed to be deployed rapidly and effectively with subsequent launches.

Photo credits: Apogeo Space



**PiCo-IoT
DEPLOYED**



Name of payload: OSW Cazorla

Form factor: 3U

POC: Shishir Bankapur
shishir@odysseyspaceworks.com

OSW Cazorla will house an internal imaging sensor to record and monitor the results of experiments within the confines of an enclosed lab module and an external imaging sensor for orientation and mission assurance purposes. The satellite will also carry two fully contained lab modules with each running a separate scientific experiment while in low-Earth orbit ("LEO").

Lab module 1 experiment - Tufts University

Goal: The goal is to monitor and measure the growth and effectiveness of insect protein cells in LEO gravity compared to an Earth-based identical experiment. It will help determine cell culture production feasibility in space and could serve as a proof point for off-world pharmaceutical R&D and commercialization.

Lab module 2 experiment - Physical Synthesis - www.physical-synthesis.com

Goal: This demonstration is focused on driving awareness and making space more accessible, and fun, with music. The goal is to test the efficacy of electronic components in space (in-orbit demonstration) and ability to transfer data back to servers on-planet. This lab module will house a digital synthesizer that will react to and convert LEO physical conditions into digitally produced sounds that the satellite can transmit to Earth. The data packets can then become audible sounds or music that the satellite originally produced in space.

COMPANY PROFILE

Website: odysseyspaceworks.com

Odyssey SpaceWorks is a quick, iterative in-orbit demonstration and experimentation satellite company. OSW builds and operates satellites with programmable scientific labs accessible in real time for biological, pharmaceutical, and research-based companies. The company's satellites will operate as follows – multiple programmable, fully contained laboratory modules will fly aboard each satellite. The labs offer near real-time, un-crewed control of in-space scientific experiments by Earth-based researchers. Scientists can securely login on the Odyssey Spaceworks website to directly interact with their experiments in orbit. Data and experiment results are then relayed to the researchers, who can interpret results and iterate on the experiment in near real time.

Photo credits: Odyssey SpaceWorks



We want to make research in space easier, cheaper and more accessible.

Shishir Bankapur, Odyssey Spaceworks CEO



Name of payload: LEMUR 2 NANAZ

Form factor: 3U

POC: Kristina Spychalski
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Sarah Freeman
sarah.freeman@spire.com

The primary objective of LEMUR 2 NANAZ is to demonstrate the ability to detect and collect data from ground-based (gateway, user terminal) and space-based (satellites) signals from NGSO constellations that offer broadband internet connection services. The data collected can be used to analyze the usage of Ku and Ka-band spectrum across multiple applications, regions, and markets to identify specific activities and patterns of life.

COMPANY PROFILE

Website: spire.com

Spire is a global provider of space-based data, analytics and space services, offering unique datasets and powerful insights about Earth so that organizations can make decisions with confidence in a rapidly changing world. Spire builds, owns, and operates a fully deployed satellite constellation that observes the Earth in real time using radio frequency technology. The data acquired by Spire's satellites provides global weather intelligence, ship and plane movements, and spoofing and jamming detection. Spire also offers Space as a Service solutions that empower customers to leverage its established infrastructure to put their business in space.

Photo credits: Spire





Name of payload: Antelope OBC+DPU

Type of payload: PC104 board

POC: Julia Wiśniowska
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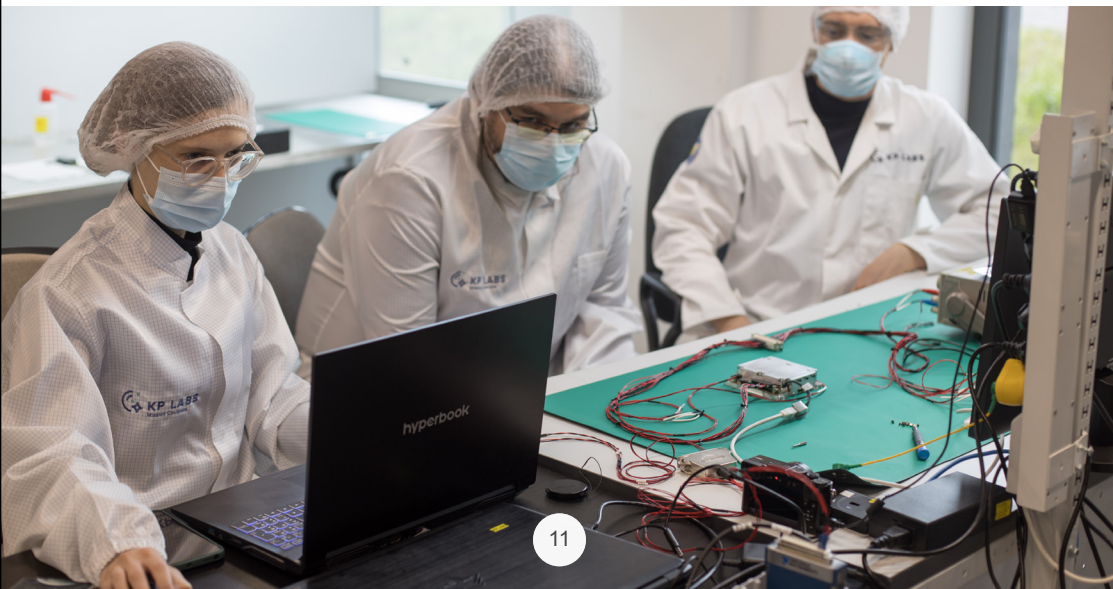
Antelope is designed to perform an array of crucial functions within a satellite. It serves as an on-board computer for satellite management, monitoring all on-board components to ensure optimal performance and overall satellite functionality. It boasts a small yet powerful Data Processing Unit that can be augmented with AI-based algorithms for detecting satellite anomalies or processing imagery data from external sensors. Thanks to its robust FPGA capabilities, Antelope is well-suited for handling complex on-board information processing tasks, making it particularly suitable for data-intensive applications such as Earth Observation (EO) and telecommunications. During its in-orbit demonstration, Antelope's primary mission will focus on detecting on-board anomalies using AI/ML techniques. Continuous analysis of telemetry data will help identify potential system irregularities, including those caused by factors like radiation.

COMPANY PROFILE

Website: www.kplabs.space

KP Labs is a leading Polish NewSpace company specializing in the development and provision of advanced AI computers and software for demanding space missions. Its expertise lies in creating solutions such as Data Processing Units (DPU, OBC with DPU), machine learning algorithms, and edge processing software tailored for satellite applications. With a primary focus on Earth Observation and hyperspectral data processing, KP Labs strives to deliver reliable and professional services to meet the needs of the evolving space industry. KP Labs team consists of more than 80 space enthusiasts who do not think that the sky is the limit.

Photo credits: KP Labs



Name of payload: Radiosat&Beamasat

Type of payload: KA Band Transponder and Horn Antenna

POC: Arianna Cagliari
ariannacagliari@picosats.eu

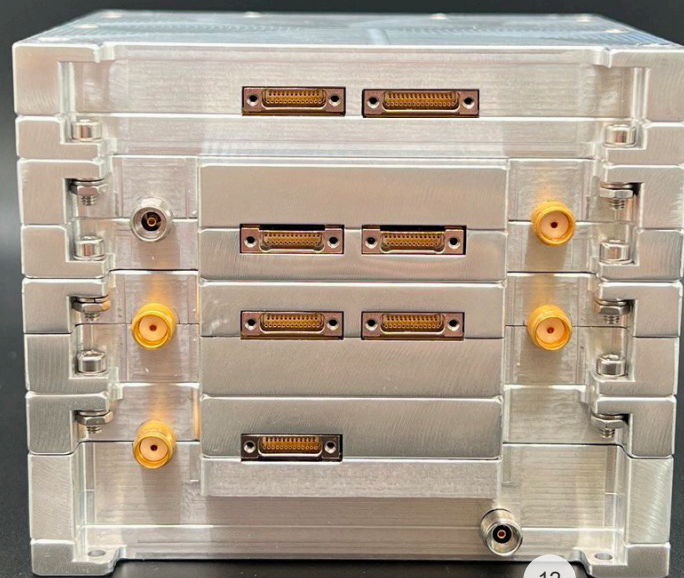
The technologies that will be validated in orbit are a Ka-band transponder and a Ka-band horn antenna for small satellites. The payload occupies less than 3U and weighs 1.7 kg. These products will be used in the field of satellite telecommunications and Earth observation, offering, due to their operation frequencies, high communication speeds and the possibility of transferring a considerable amount of data in a short time.

COMPANY PROFILE

Website: picosats.eu

Founded in 2014 as a spin-off from the University of Trieste, PICOSATS is a company engaged in the research, development, and commercialization of state-of-the-art telecommunications systems for the small satellite market and beyond. The increasing use of small satellites in low orbits for satellite communications and the spectrum congestion have demanded the development of miniaturized high-frequency telecommunication systems, and PICOSATS seized the opportunity to enter this rapidly expanding market. In addition to Ka-band, to remain at the forefront of satellite communications, the company is also working on other frequencies, such as Ku and Q/V band.

Photo credits: Picosats





Name of payload: AlbaPod 6P PocketQube satellite deployers

Type of payload: Deployers and PocketQubes

POC: Caius Reza
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Albapods are satellite deployers specifically designed by Alba Orbital for PocketQube satellites, supporting various formats from 1p to 3p. Onboard this mission, the AlbaPods are hosting the following PocketQube satellites:

UNICORN-2J and **UNICORN-2K** are part of Alba Orbital's flagship Earth Observation pico-satellite constellation dedicated to monitoring artificial light at night (ALAN) across the globe. The 3P PocketQube satellites will provide high resolution imagery of the earth at night, enabling tracking of applications such as light pollution, urbanization, greenhouse gas emissions and energy usage from space.

SPACEANT-D is a 1p PocketQube (5x5x5cm) technology demonstration satellite that aims to teach university students and amateur radio communities about the development of small and low-cost satellites. SpaceANT-D will promote the usage of satellites to the amateur radio community and is the first Malaysian PocketQube satellite. The satellite has been developed by Universiti Sains Malaysia in collaboration with the Malaysia Amateur Radio Transmitter Society (MARTS) and engineering support from SpaceIn.

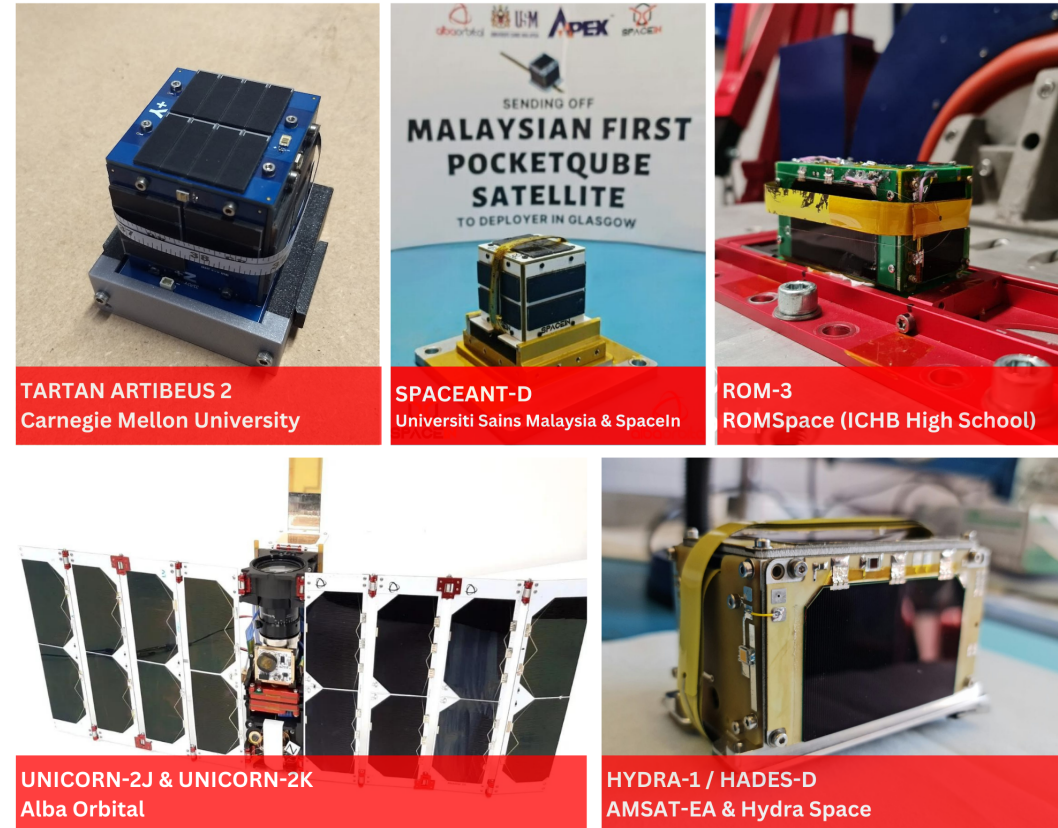
TARTAN-ARTIBEUS 2 is a 1P PocketQube satellite developed by Carnegie Mellon University. The sensor-equipped, 5 cm cube (1/8 the size of a CubeSat) can sense its environment and perform orbital edge computing to process sensor data in a way that is robust to intermittent operation. This design is the university's latest picosatellite building from the CMU's open-sourced Tartan-Artibeus-1 project, that was the world's first batteryless, computational pocketcube satellite.

ROM-3 (Romanian Orbital Mission 3) is a 1.5p PocketQube developed by ROMSpace, a team of high school students from the International Computer High School of Bucharest (ICHB). ROMSpace launched Romania's first PocketQube (ROM-2) to orbit earlier this year with D-Orbit and Alba Orbital on SpaceX's Transporter-8 mission in June 2023. Building on the space heritage from their previous mission (ROM-2), ROM-3 will carry out an amateur radio mission and will also send low resolution images from Low Earth Orbit in SSDV modulation. ROM-3 is the latest pico-satellite developed by ROMSpace and features higher efficiency solar panels and an improved camera resolution from their previous design.

HYDRA-1/HADES-D is the latest iteration of the GENESIS pico-satellite platform used by AMSAT-EA missions with the engineering support from Hydra Space, a company also based in Madrid. HADES-D will offer licensed radio-amateur around the world the opportunity to relay FM voice and AX.25 / APRS 300 / 1200 bps communications. The satellite will also transmit telemetry with its status and voice and CW messages.

COMPANY PROFILE Website: www.albaorbital.com

Founded in 2012, Alba Orbital from Glasgow, Scotland, is the world's leading PocketQube satellite manufacturer and launch broker. To date, Alba launch has successfully deployed 25 PocketQube satellites into orbit including the Unicorn-2 platform. Unicorn-2 is the world's most capable Picosat by specification. Alba also offers ground station services via their Albaconnect platform enabling an end-to-end service to newspace users and operators. Alba has over 20 customers on 3 continents.



TARTAN ARTIBEUS 2
Carnegie Mellon University

SPACEANT-D
Universiti Sains Malaysia & SpaceIn

ROM-3
ROMSpace (ICHB High School)

UNICORN-2J & UNICORN-2K
Alba Orbital

HYDRA-1 / HADES-D
AMSAT-EA & Hydra Space



Name of payload: Gen-03

Type of payload: Propulsion System

POC: Luca Iaboni
luca.iaboni@genergo.energy

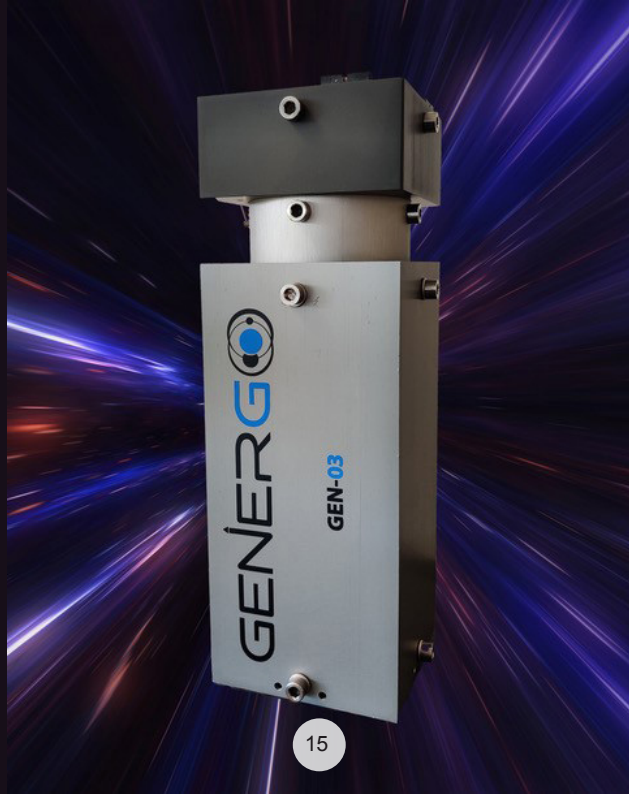
Genergo's payload consists in a completely new type of in-space propulsion system developed to further push the boundaries of what is possible in space travel.

Building on the achievements of Genergo's ongoing two space missions, which launched on 25 May 2022 and 3 January 2023, respectively, Genergo's third generation space propulsion system (Gen-03) will be used to test new configurations and technical specifications.

COMPANY PROFILE Website: www.genergo.space

Genergo's mission is to develop a new type of in-space propulsion system aimed at introducing several game changing factors in space propulsion, including complexity reduction, weight and size savings, low energy consumption, longer duration, non-polluting and eco-friendly components.

Photo credits: Genergo



Name of payload: StardustMe SD-2

Type of payload: Emotional Payload

POC: Geoff Lamb
geoff@stardustme.com

Stu Potter
stu@stardustme.com

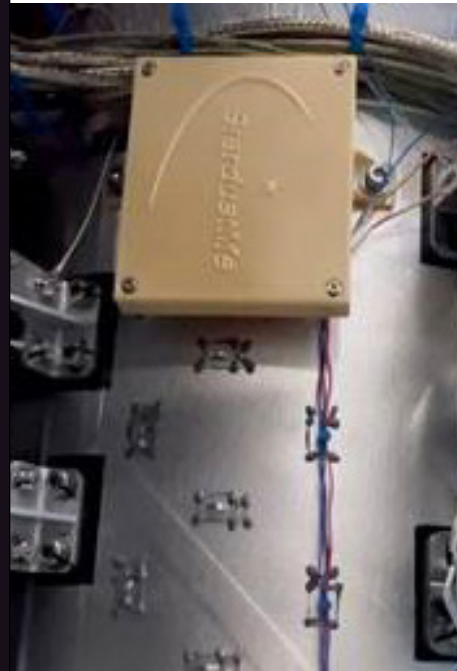
The SD-2 payload is a memorial payload, consisting of a number of aluminium machined capsules (called "tokens" by StardustMe), each carrying 1g of human cremated ashes, contained in an additive-manufactured frame and enclosure. This assembly is in turn mounted to the main core of the host ION vehicle.

There is no deployment or other release of StardustMe hardware or items at any point in the mission. The StardustMe hardware is permanently affixed to the ION host vehicle, and will de-orbit and re-enter the atmosphere with the host vehicle.

COMPANY PROFILE Website: www.stardustme.com

StardustMe is a new business, based in Auckland and Gisborne, New Zealand. StardustMe provides space memorial flights to celebrate life. Ashes are launched into orbit onboard SpaceX rockets to be placed amongst the stars to look back down on loved ones. These memorial flights are the perfect tribute to honouring life and provide a means to interact and honour loved ones in a novel and meaningful way.

Photo credit: StardustMe



"Every atom in your body came from a star that exploded. And, the atoms in your left hand probably came from a different star than the atoms in your right hand. It really is the most poetic thing I know about the universe: you are all stardust."

Physicist Lawrence Krauss

