



# SECOND STAR TO THE RIGHT

## MISSION BOOKLET



**Mission name:** Second Star to the Right  
**Carrier names:** ION SCV007 Glorious Gratia  
ION SCV008 Fierce Franciscus

D-Orbit, the space logistics and orbital transportation company, launched **Second Star to the Right**, the seventh commercial mission of **ION Satellite Carrier (ION)**, D-Orbit's proprietary orbital transfer vehicle (OTV), and the first mission carrying to space **two IONs on a single launch**.

The Falcon 9 rocket lifted off on January 3, 2023, at **9:26 a.m. ET (14:56 UTC)** from the **Space Launch Complex 40 (SLC-40)** at Cape Canaveral Space Force Station (CCSFS), Florida. The two IONs, **were successfully deployed 01h24m and 01h26m after lift-off into a 525-kilometer Sun Synchronous Orbit (SSO)**.

With the launch successfully completed, D-Orbit's mission control team is executing the mission's **Launch and Early Orbit phase (LEOP)**, performing a series of health check procedures in preparation for the operational phase.

During the mission, ION SCV007 and SCV008 will deploy a total of nine satellites from NPS Spacemind, Astrocast, Sharjah Academy for Astronomy, Space Sciences and the Tel Aviv University (both onboard through a contract with ISIS Space), and AAC Clyde Space (for Orbcomm).

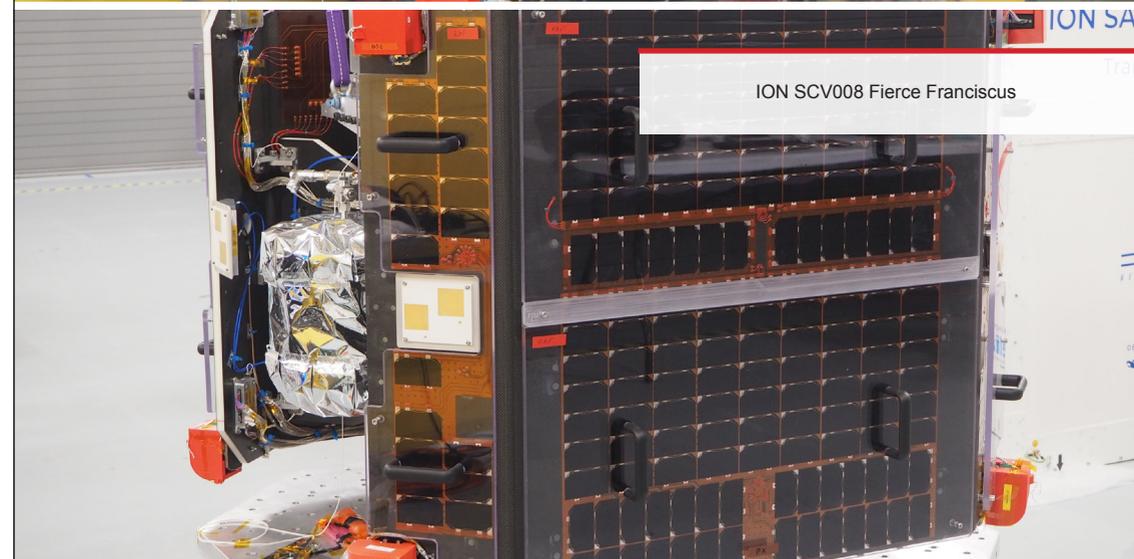
This mission will also include the in-orbit demonstration of third-party hosted payloads: DRAGO-2, a compact SWIR camera developed by Instituto de Astrofisica de Canarias for Earth observation from space; Genergo-2, a new type of space propulsion system developed by Genergo; Cryptosat-2, the enhanced version of a prototype nanosatellite developed by Cryptosat for secure cryptographic applications; and a hosted payload from an undisclosed customer.



Photo credit: SpaceX

**A note about the name of the satellite carrier**

The name of the satellite carriers are "ION SCV007 Glorious Gratia" and "ION SCV008 Fierce Franciscus", a combination of the acronym "ION", which stands for "InOrbit NOW", the acronym "SCV," which stands for "Space Carrier Vessel," and the satellites' first name. This format follows the naming conventions of naval vessels used in navies around the World. The names "Gratia" and "Franciscus" were 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.





Name of payload: Kelpie 1

Form factor: 3U

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

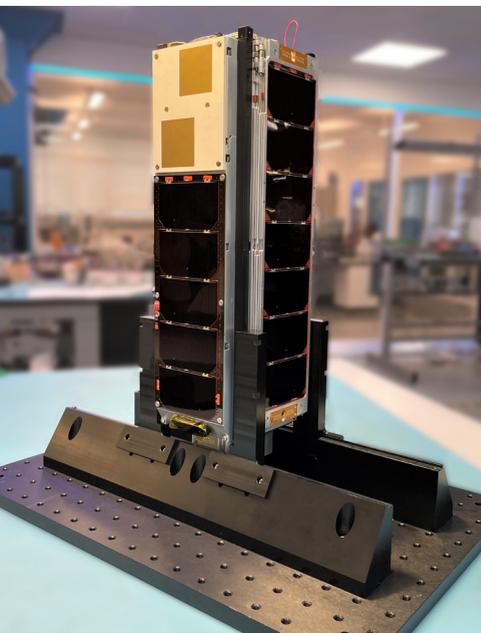
The first Kelpie satellite is a 3U EPIC CubeSat, designed and built by AAC Clyde Space. The Kelpie 1 spacecraft shall deliver Automatic Identification System (AIS) data exclusively to ORBCOMM and its government and commercial customers, under an exclusive Space Data as a Service deal. The state-of-the-art satellite weighs just 4 kg and features a proprietary low-noise bus architecture, multiple SDR payload, and an advanced antenna concept developed by Oxford Space Systems, to maximize AIS detections of all message types.

**COMPANY PROFILE** Website: [www.aac-clyde.space](http://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

Photo credits: AAC Clyde



**“The Kelpie satellite is one of the most innovative satellites AAC Clyde Space has ever built. It hosts advanced low-noise core avionics for reliable, high-performance space data handling as well as the company’s first payload development.”**

Luis Gomes, AAC Clyde CEO



Name of payloads: FUTURA-SM1, FUTURA-SM3, SMPOD12XL-3X

Form factor: 3U, 6U

POC: Nicolò Benini  
nicolo.benini@npcitaly.com

**FUTURA-SM1**

The satellite FUTURA-SM1 is based on a 3U CubeSat platform designed to operate in low-earth orbit. Its main purpose is to in-orbit demonstrate NPC SPACEMIND 3U platform along with ARTICA, an innovative deorbiting sail device whose aim is to highly accelerate the orbital decaying time, offering a solution to the problem of space debris.

**FUTURA-SM3**

The satellite FUTURA-SM3 is based on a 6U CubeSat platform designed to operate in low-earth orbit. Its main purpose is to in-orbit demonstrate NPC SPACEMIND 6U compatible deorbiting sail device.

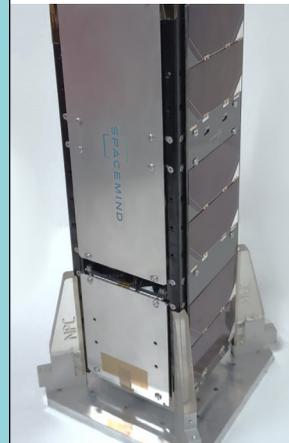
**SMPOD12XL-3X**

Derived from the experience in nanosatellite missions, SMPOD12XL-3X belongs to the family of NPC Spacemind CubeSat deployers. Designed to provide outstanding quality and performances, together with the maximum handling flexibility that allows mechanism reset and rearming in a few seconds, SMPOD aims to shift the paradigm in commercial space sector ensuring reduced lead time and strong economic competitiveness. The provided system is in a 3 doors and XL configuration suitable for 366mm long CubeSats.

**COMPANY PROFILE** Website: [www.npcspacemind.com](http://www.npcspacemind.com)

NPC SPACEMIND, a leader in the productions of CubeSat platforms, operates in the New Space Economy, focusing on flexibility and short lead time, providing solutions tailored to user payload requirements. Thanks to the time spent as a forefront in several satellite missions, the Company developed a portfolio of reliable subsystems based on hands-on experience. The most recent and relevant add-on to the product lineup is the SMPOD, a High performance Deployer that comes in 3U, 12U, 16U suitable for all CubeSat configurations.

Photo credits: Spacemind





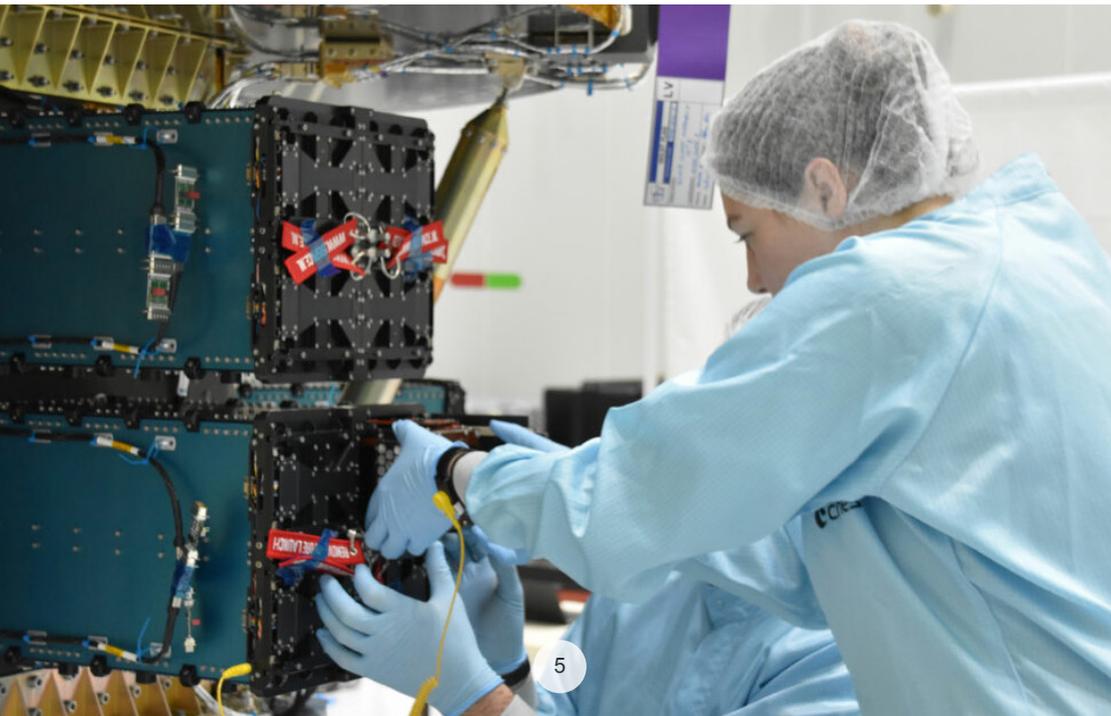
POC: Andreia Pinto Leite  
a.pintoleite@isispace.nl

Also onboard this mission are SHARJA-SAT-1 e TAUSAT2, respectively from the Sharjah Academy for Astronomy, Space Sciences (SAASST) and the Tel Aviv University (TAU), onboard through a contract with ISIS Space.

**COMPANY PROFILE** Website: [www.isispace.nl](http://www.isispace.nl)

ISISPACE is a vertically integrated small satellite company, focused on providing high value, cost-effective space solutions by making use of the latest innovative technologies. The company specializes in satellites ranging from 1 to 30 kilograms, providing contract research, innovative small satellite parts, sub-systems, platforms, and turnkey space solutions to a broad range of customers. Based in Delft, Netherlands - ISISPACE employs over 125 specialists and maintains a development branch office in Somerset West, South Africa. The vertical integration of nanosatellite activities within ISISPACE ensures that customer specific requirements can be accommodated, and flight hardware delivered quickly when customers are faced with a short delivery schedule. A large multi-disciplinary team enables the company to provide hands-on training for its customers, often in cooperation with educational partners in small satellite engineering. Through ISILAUNCH, its launch services subsidiary, it launches all sizes of small satellites.

Photo credits: ISISpace



Name of payload: Sharjahsat-1

Form factor: 3U+

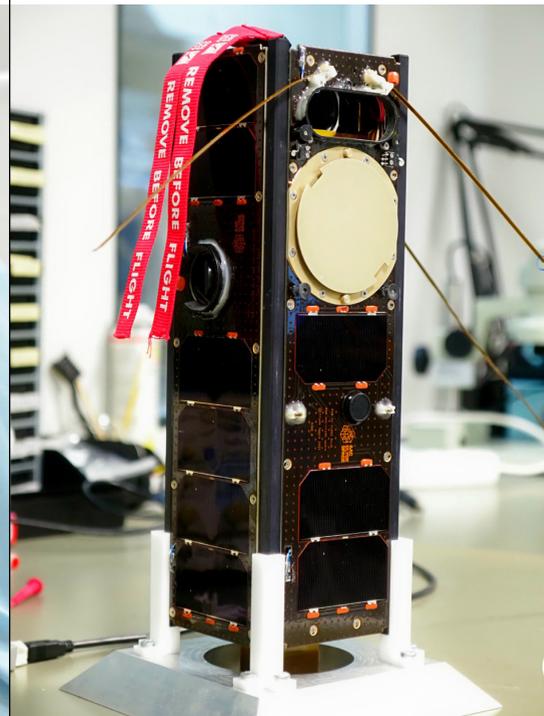
POC: Andreia Pinto Leite  
a.pintoleite@isispace.nl

Sharjah-Sat-1 is the first CubeSat mission of the Sharjah Academy for Astronomy, Space Sciences, and Technology (SAASST), in collaboration with Istanbul Technical University Space Systems Design and Test Laboratory (ITU-SSDTL) and Sabanci University (SU). The 3U+ CubeSat's primary payload is an improved X-Ray detector (iXRD), with the objectives of detecting hard X-rays from very bright X-ray sources. The secondary payload is a dual-camera system for Earth imaging. A dual-camera system will be used to image the SAASST building with a size of about 100m. The mass of Sharjahsat is max 4kg.

**UNIVERSITY PROFILE** Website: [www.sasst.ae](http://www.sasst.ae)

The Sharjah Academy of Astronomy, Space sciences & Technology was inaugurated on Wednesday of May 2015 under the patronage of His Highness Sheikh Dr. Sultan Bin Mohammed Al Qasimi, Member of the Supreme Council, Ruler of Sharjah, and President of the University of Sharjah, to crown the celebrations of Sharjah as the Capital of Islamic Culture.

Photo credits: SAASST



**SAASST aims to develop, promote, and contribute to education in astronomy and space sciences in the world in general, and the UAE in particular. It is a destination for science, research, culture, and education.**



Name of payload: Tausat2

Form factor: 2U

POC: Andreia Pinto Leite  
a.pintoleite@isispace.nl

TAUSAT2 is a 2U CubeSat developed by Tel Aviv University (TAU) using commercial off-the-shelf (COTS) components. The satellite has a 3-axis attitude control system and a VHF-UHF transceiver and will be commanded and controlled from the TAU's RF Ground Station. The satellite carries a science payload of Light Emitting Diodes that will be used to conduct a peaceful scientific experiment by TAU in optical tracking of miniature objects in space. In addition, the satellite includes an S-band transmitter aimed at demonstrating a novel communication protocol suggested by TAU in various signal-to-noise regimes.

#### UNIVERSITY PROFILE

Website: english.tau.ac.il

Tel Aviv University (TAU) is the largest, most comprehensive and most dynamic research and teaching institution in Israel, offering the country's most diversified range of study and research fields. Located at the heart of Israel's economic, technological and cultural center, TAU is proud of its liberal and pluralistic spirit. The vision of the University is to become a world-leading research university and the top one in Israel. TAU's mission is similar to that of other leading universities: To promote research of the highest level and to equip tens of thousands of students annually with academic knowledge and critical thinking skills. The University also aims to influence society in Israel and globally in spheres including industry, culture and education.

Photo credits: TAU



"We know that that there are high-energy particles moving through space that originate from cosmic radiation. Our scientific task is to monitor this radiation, and to measure the flux of these particles and their products."

Dr. Meir Ariel, director of the university's Nanosatellite Center



Name of payload: Guardian

Form factor: 4x3U

POC: Gisela Pesarrodona  
gpsarrodona@astrocast.com

Fatima Vigil-Perez  
fvigil@astrocast.com

Astrocast offers a cost-effective, bidirectional, and comprehensive Satellite IoT Service to tackle global connectivity challenges in remote areas for industries such as Maritime, Agriculture & Livestock, Environmental & Utilities, Land Transport, Mining, and Oil & Gas. With this launch, Astrocast will deploy four more satellites to complete the global coverage for its IoT Service. The four Swiss-made satellites are five kg-CubeSats and will orbit at LEO, sun-synchronous orbits. They have onboard ADCS and propulsion capabilities for precise pointing and orbit maneuvering. The satellites are operated by Astrocast full-time to guarantee continuous global coverage.

#### COMPANY PROFILE

Website: www.astrocast.com

Astrocast SA operates a leading global nanosatellite IoT network, offering services in industries such as Agriculture & Livestock, Maritime, Environment & Utilities to name a few. The Astrocast network enables companies to monitor, track, and communicate with remote assets from anywhere in the world. It relies on superior L-band spectrum through a strategic alliance with Thuraya. In partnership with Airbus, CEA/LETI and ESA, Astrocast developed Astronode S, an ultra-low power and miniaturised module compatible with inexpensive L-band patch antennas. Founded in 2014 by a renowned team of experts, Astrocast develops and tests all its products in-house, from the satellites to the modules.

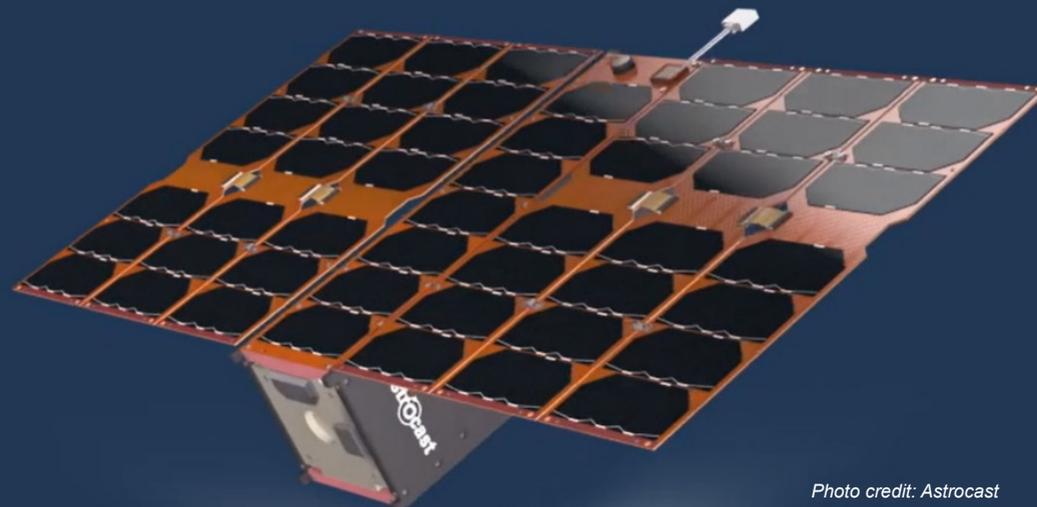


Photo credit: Astrocast



Name of payload: Cryptosat-2

Form factor: N/A

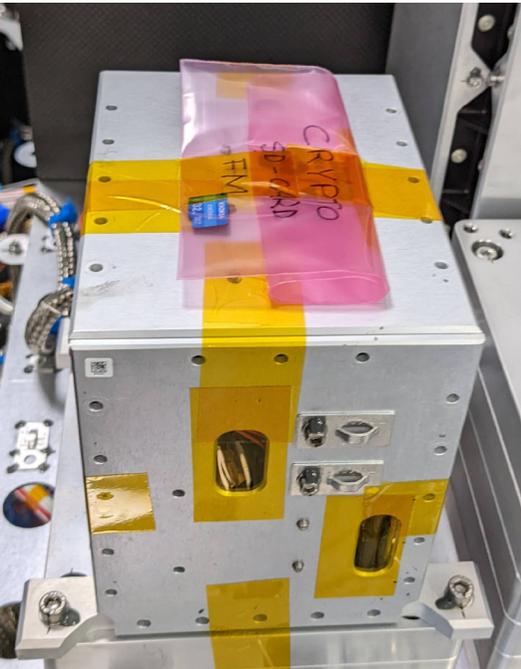
POC: Yonatan Winetraub  
yonatan@cryptosat.io

The idea behind Cryptosat, which was first outlined in a November 2017 paper, is to build a prototype nanosatellite the size of a coffee mug and launch it into outer space, where it can act as a perfectly isolated and secure cryptographic module. Cryptosat can act as a trusted party for a whole host of cryptographic applications, such as electronic voting, a trusted random beacon, verifiable delay enforcement for smart contracts and many more. The satellite could be used as a trusted validator or timestamping authority for copyright purposes. The infrastructure can also interact with other blockchains and validate them in the same way that some private chains sync occasional blocks with public chains like Ethereum to prove that the ledger is trustworthy. Cryptosat can launch to orbit the Earth, providing blockchain infrastructure that can be used for everything from mining to timestamping documents.

**COMPANY PROFILE** Website: [www.cryptosat.io](http://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*



**"We at Cryptosat see this launching opportunity with D-Orbit as a perfect opportunity to demonstrate our first cryptographic capabilities in space on a strong and qualified platform such as the ION. We want to thank D-Orbit for their quick response and excellent engineering, which allowed this opportunity to occur."**

**Elad Sagi, Space System Lead  
Cryptosat**



Name of payload: Gen-2

Form factor: 2U

POC: Luca Iaboni  
luca.iaboni@genergo.energy

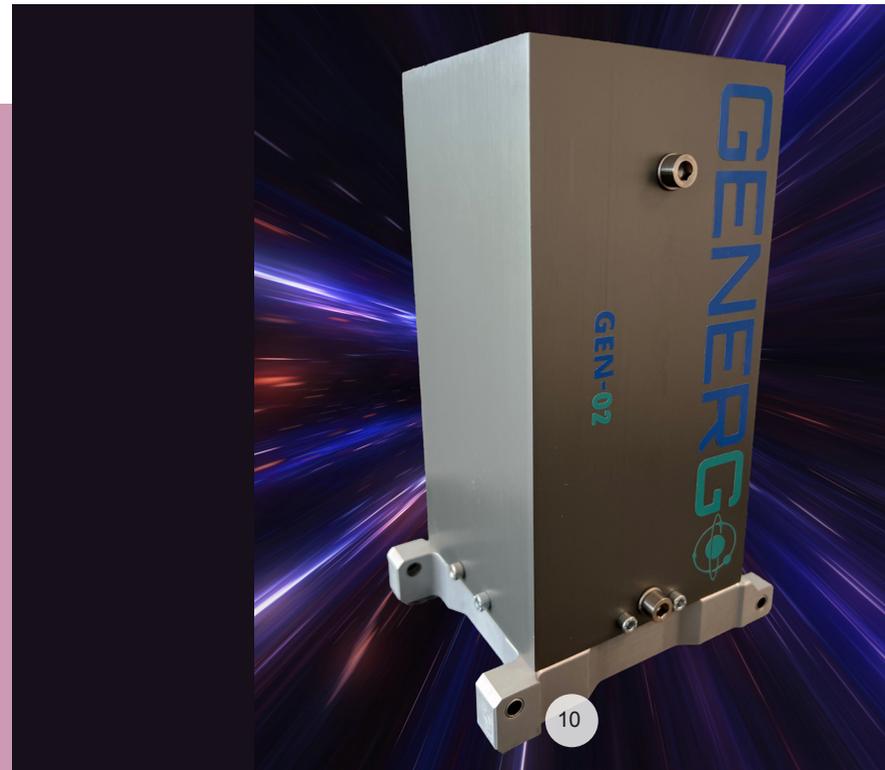
Genergo's payload consists in a completely new type of in-space propulsion system developed to further push the boundaries of what is possible in space travel. After the promising results of its first ever space mission launched on May 25th, 2022 (still ongoing), Genergo's second generation innovative space propulsion system (Gen-02) will venture into space to test new technical specifications that will also serve for future developments.

The modelling and definition of the on-orbit experiments continue to be carried out in conjunction with the Department of Aerospace Science and Technology of the Milan Polytechnic.

**COMPANY PROFILE** Website: [genergo.space](http://genergo.space)

Genergo's engine is aimed at introducing several game changing factors in the space propulsion market, including full sustainability, low energy consumption, complexity reduction, substantial weight and size savings, longer duration, non-polluting components.

*Photo credits: Genergo*





Name of payload: DRAGO-2

Form factor: 2U

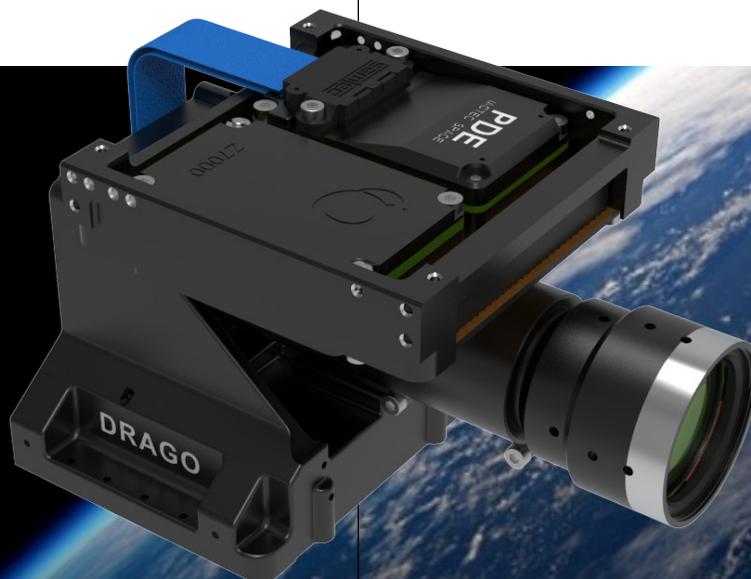
POC: Álex Oscoz  
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Patricia Chinchilla  
pcg@iac.es

DRAGO-2 (Demonstrator for Remote Analysis of Ground Observations) is a compact SWIR camera developed for Earth observation from space. It is the successor of DRAGO-1, which was successfully launched and commissioned as part of the ION SCV Laurentius mission in 2021. With a resolution of 50 m per pixel and a swath of 32 km in an orbit of 500 km, DRAGO-2 is capable of obtaining high-quality multispectral images in the short-wave infrared, in two observation bands: 1.1 and 1.6 microns. It uses uncooled InGaAs sensor technology, with an average power requirement of less than 5.5 W. The camera boasts an on-board image processing unit, which allows it to compress, encrypt and even apply complex image processing algorithms, such as super-resolution, to the acquired images.

The DRAGO cameras' compact design follows the SWaP (small Size, Weight and Power) concept and makes them a perfect payload for CubeSat nanosatellites. These two cameras have been designed specifically for Earth observations in the infrared, providing information that may not be available from observations at other wavelengths, such as the visible range. Some examples of their applications are the mapping and monitoring of crops and vegetation and the assessment of soil moisture, the monitoring of fires and volcanic eruptions, the detection and monitoring of large oil spills or the tracing of inefficient anthropogenic lighting.

Photo credit: IATEC



## COMPANY PROFILE - INSTITUTO DE ASTROFÍSICA DE CANARIAS

Website: [www.iac.es/en](http://www.iac.es/en)

The Instituto de Astrofísica de Canarias (IAC) is a Spanish public research organization focused on Astronomy research, outreach and technological development. It is located on the Canary Islands (Spain). It manages two of the best international observatories in the world: the Observatorio del Teide (OT) on the island of Tenerife and the Observatorio del Roque de los Muchachos (ORM) on the island of La Palma. The IAC is a public consortium composed by the General Administration of the Spanish State, the Public Administration of the Autonomous Community of the Canary Islands, the University of La Laguna (ULL) and the Consejo Superior de Investigaciones Científicas (CSIC).

## COMPANY PROFILE - IATEC SPACE

Website: [www.iac.es/en/projects/iactec-space](http://www.iac.es/en/projects/iactec-space)

IACTEC is a space for technological and business collaboration associated with the IAC located on the island of Tenerife (Spain). It was founded in 2017 to promote the collaboration between the public and private sectors, boosting the transfer of cutting-edge technological developments and the technological experience accumulated during more than 40 years at the IAC to various projects that include medical technology, space technology and large telescope projects. IACTEC-Space is the specific area of IACTEC focused on the design and manufacture of space instrumentation. IACTEC-Space is currently composed of a growing multidisciplinary team of engineers and physicists, whose expertise covers optical, electronic, mechanical, software and systems engineering, and who work as part of the "IACTEC capacitation program", strongly supported by the Cabildo de Tenerife.

In its first years of operations, its main goal has been the design and production of high-performance optical payloads for small-size Earth observation satellites, with the successful development of the DRAGO-1 and DRAGO-2 space cameras. The team's ongoing projects include the design, development and launch of ALISIO-1, an Earth observing satellite that will house a DRAGO-2 camera and an optical communications module for laser communications with the ground; the development of VINIS, a high resolution camera for Earth observation that combines visible, near-infrared and SWIR wavelength observations; and IACSAT-1, a space astronomical observatory designed for the confirmation and characterization of exoplanet candidates and the study of near-Earth primitive asteroids.

