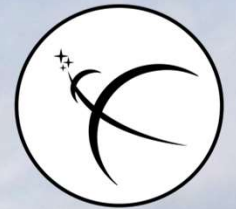


SIDEREUS SPACE DYNAMICS

Overview



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COMPANY'S STORY



Sidereus Space Dynamics is a new space company aimed to develop next-generation space transportation vehicles for deep space exploration.

The company, opened in 2019 by Mattia Barbarossa and currently located in Amalfi's coast (Italy) and Turin (Italy), is pursuing the development of EOS, the personal launch vehicle.

The name comes from the "Sidereus Nuncius" by Galileo Galileo, one of the most important scientific operas of all time, a heritage of the Italian culture.

In the era in which humankind is finally about to step out of the Earth to expand in the cosmos, the main obstacle is the difficulty associated with space access.

Sidereus is aiming to make spaceflight just as easy as air flight, allowing finally to step out and expand into near space.

TEAM

OP. TEAM



ADVISORS

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Roberto Battiston
Former President at ASI



Laura Crabtree
Senior Mission Operations
Engineer at SpaceX



José Achache
Former Director of
Earth Observation at ESA



Giuseppe Cataldo
Head of Planetary Protection at
NASA

INVESTORS



Management Innovation
Pre-seed round

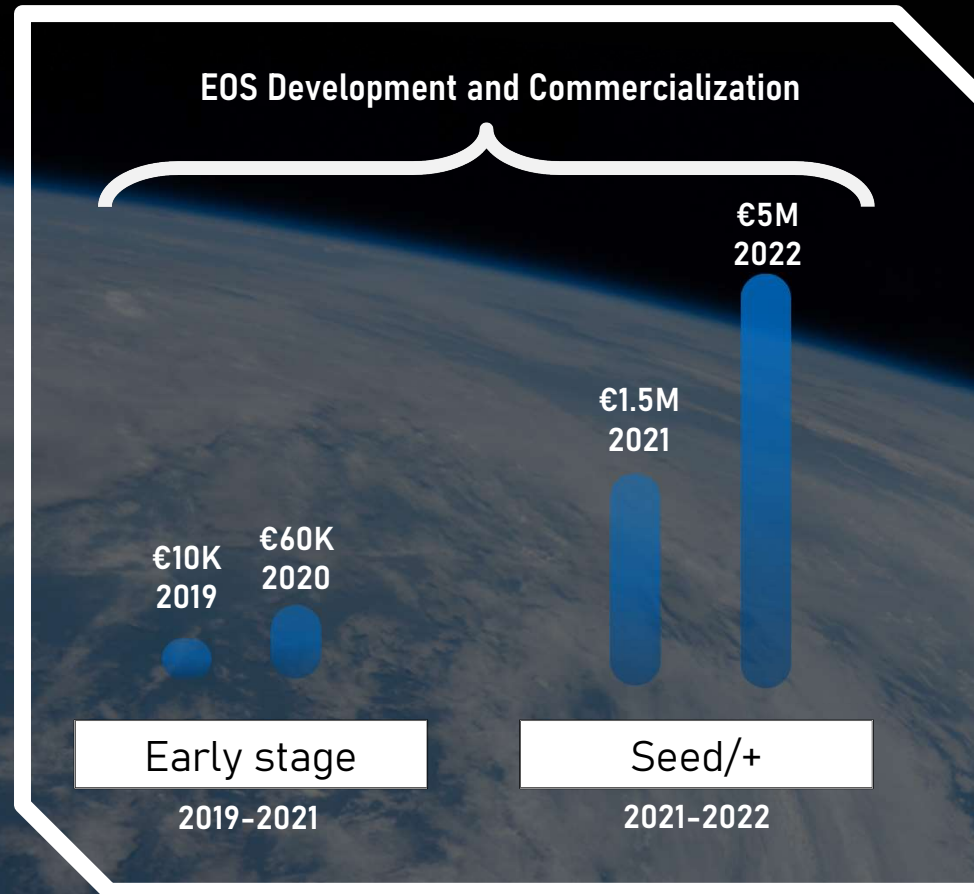


Primo Ventures
Lead investor seed round



CDP Ventures
Co-investor seed round

ENSURED INVESTMENTS



TIMELINE

Early stage

Prototypes, modus operandi and key technologies demonstration.

Seed and Seed+

Technological demonstration and commercialization.

Series A

New technologies and expanded vehicles development from 2024.



What is “Cosmicization”

Cosmicization

Derived from “Globalization”, this neologism describes the process that we are starting to experience and that is going to represent the next evolutive step of our species.

The process in which a new form of interconnected manufacturing, commerce, exchange of goods and transportation is about to be created in space.

Impact

The influences of this radical change are going to be spread over every aspect of society. From social to economics, to commerce and strategy, the “cosmicization” truly represents an evolutive step forward.

When

With the right key technologies, this process, which already started in recent years, is going to be just a few decades away. Our chance is now.





Airflight-like space transportation

Globalization started with worldwide naval transportation and truly exploded when air flight became accessible to every user.

Current spaceflight is still much closer to scientific research than a daily transportation system, such a transformation is the key enable the “cosmicization”

The Key Step:
a “Space-liner”

EOS REQUIREMENTS



- 10 kg to SSO 550 km, enough to carry the heavies CubeSat (6U);
- Design to liftoff in the worst condition possible (equator 0° to retrograde 97,7°), with transportation capabilities to anywhere in a standard container;
- Fully reusable at least 10 time through guided parafoil (low terminal velocity, low pressures for material stress, radiative heat shield);
- Launch&recovery with no mandatory infrastructures (no pads, in situ tanks, ground segments, etc.) and with 1 day of notification time for a launch (6 hours of preparation);
- Fully autonomous operations launch/in-orbit/return, with minimal human touch;
- Payload reentry capability from 12 hours to 1 month for commercial applications, commercial fast R&D;
- Integrated safe in-flight abort system and termination integrated (to be launched even from in land launch sites).

EOS

EOS-Virgilio-100

Current Vehicle

FIRST FLIGHT

Q4 2022

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Specifications

295 s ISP (AVERAGE)

KEROSENE (Carbon Neutral)

AND LIQUID OXYGEN

3:1 O/F RATIO

SSTO

REUSABLE (APPROXIMATELY 10 TIMES)

10KG LEO CONFIG.

1700 KG GLOW

HEIGHT 3.55 M

BASE DIAMETER 1 M

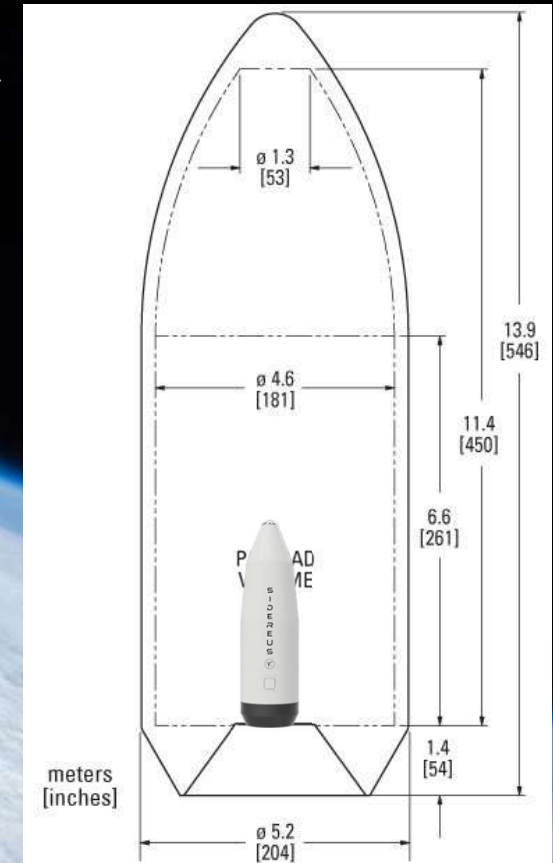
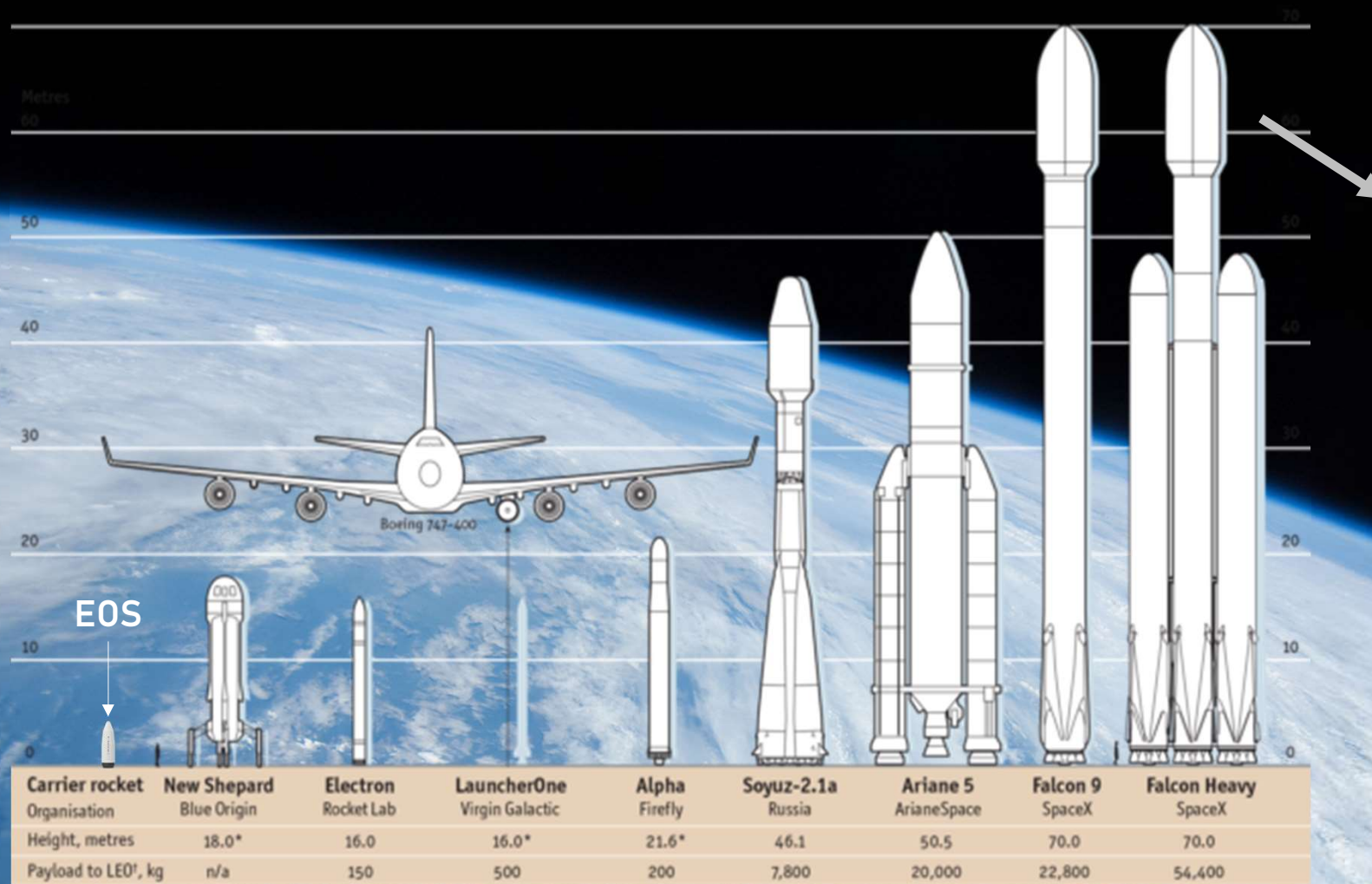
SEA LEVEL THRUST 25 kN

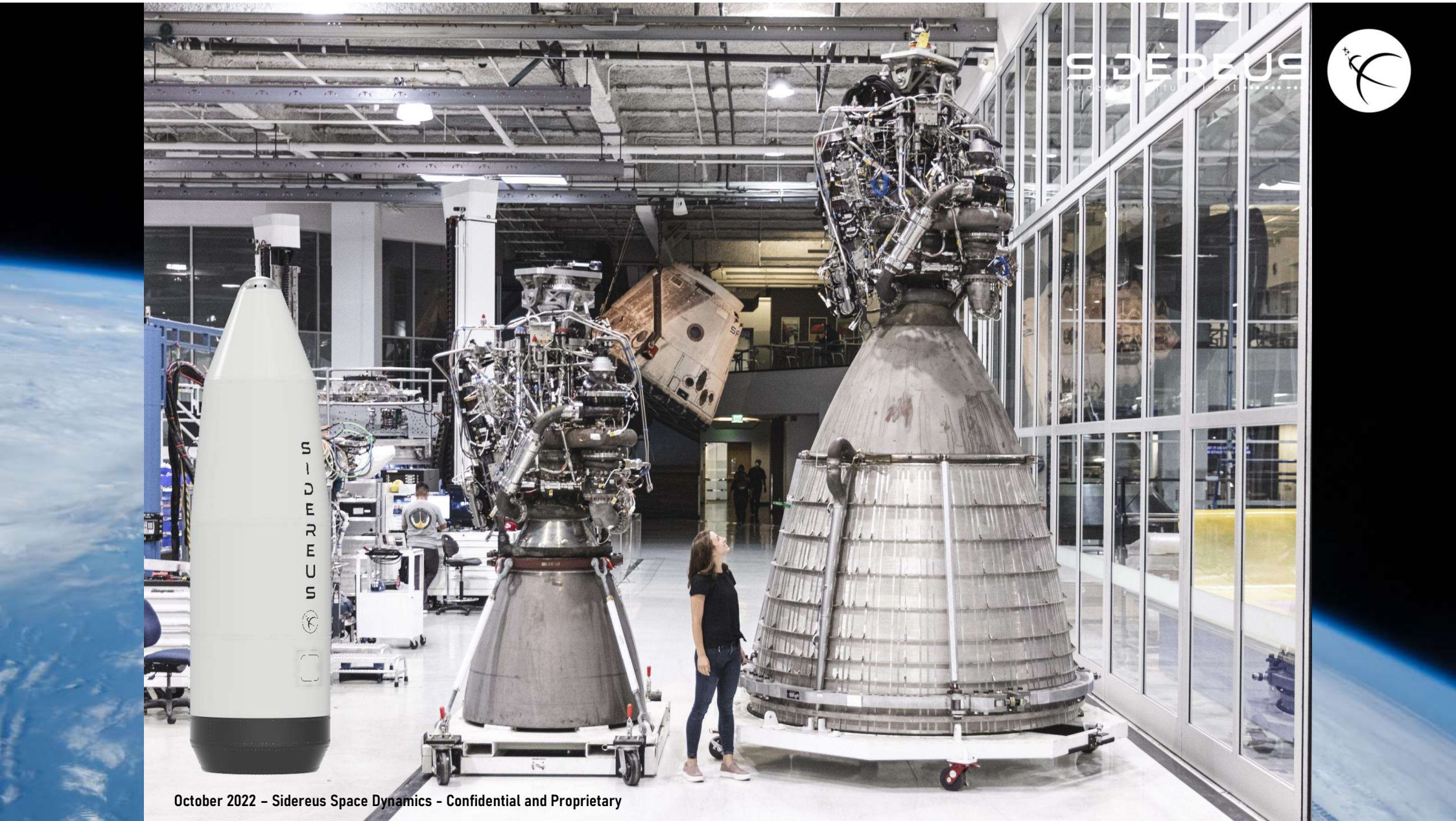
1 ENGINE CONFIG WITH GIMBAL

ISP AT SL 250 s AND VAC 310 s

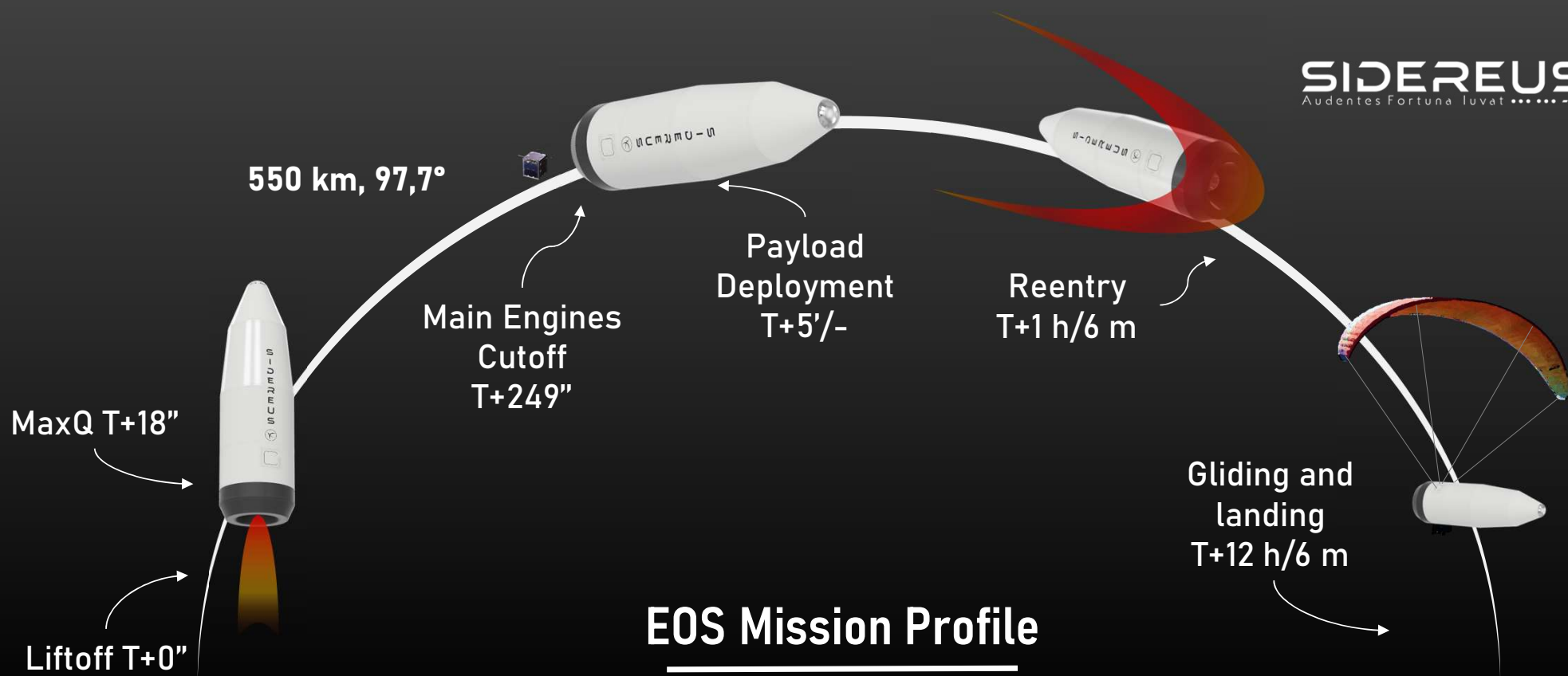


EOS dimensions compared to modern vehicles





October 2022 – Sidereus Space Dynamics – Confidential and Proprietary



EOS Mission Profile

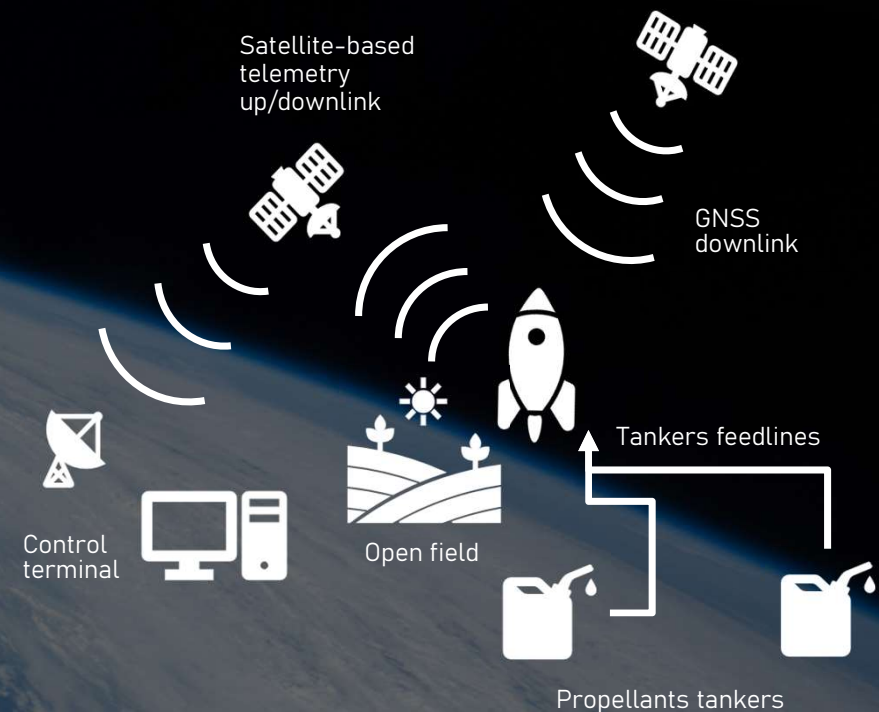
Possible mission profiles

Orbits are not limited to SSO or LEO, very low earth orbit (VLEO) is also feasible, allowing much higher resolution/power communication/observations. Very high orbits are also possible, a 1U cubesat can achieve a 185 km X 12.000 km. With the integration of ATI even 10 kg to TLI becomes a possibility.

Mission Profile EOS vehicle

Laptop-and-Launch configuration

- The L&L concept allow for extremely flexible operations everywhere in the world, within just one hour;
- It is meant to get rid of one of the major time-consuming and expensive elements: launch infrastructures.
- Propellants are directly loaded onboard using the tankers trucks that carry them with their feedlines.
- The vehicle can be launched from any flat land surface or barge thanks to its engine positioning.
- Ground stations are not needed, telemetry up/downlink is provided by the local network on the ground and satellite internet communication during the flight.
- The flight is completely autonomous, positioning is provided using onboard sensors and GNSS
- Microsat const. 5G Ku-band omnidirectional 0.5 W, 10 Mbps telemetry (vehicle+payload) transmission;
- Custom CGA to fast-detach adapters for LOX/Kero. Fast-detach DPT (data power telemetry) with drag-and-detach approach



SIDEREUS COMMERCIAL OFFER

ORBITAL MISSIONS

RIDESHARE & CUSTOM

The “Rideshare Missions” will collect various payloads with the same destination orbit and launch them in one mission.

The custom mission will be completely customized (orbit specs & timing) by the client. The custom option allows also the “reentry of the payload” option.

ADVANCED MISSIONS

ADVANCED MISSIONS

The “Advanced Missions” will include unique and highly customized services like:

- Constellation positioning & replenishment.
- Vehicle as a platform.
- Iterative R&D.
- Drive it yourself.



PAYLOAD CAPACITY

PAYLOAD VOLUME 25 cm X 25 cm,

40 cm (h) 25 L

10 KG PAYLOAD TO LEO (550 KM SSO) up to 13 kg

ADVANCED MISSIONS

FULLY CUSTOMIZABLE MISSION

Position your CubeSat with extreme precision without using a space tug.

LAUNCH ANYTIME YOU WANT

Just few days of mission preparation needed & a high launch frequency.

NO DEPLOYER DEPENDENCY

No need of an external deployer. The payload bay is built on fit.

PAYLOAD REENTRY

Recover your payload from orbit safely.

CONSTELLATION POSITIONING & REPLENISHMENT

Accurate constellation positioning and fast replenishment in case of satellite failure.

VEHICLE AS A TESTPLATFORM

On board payload integration to eliminate satellite bus costs.

YOUR ITERATIVE R&D

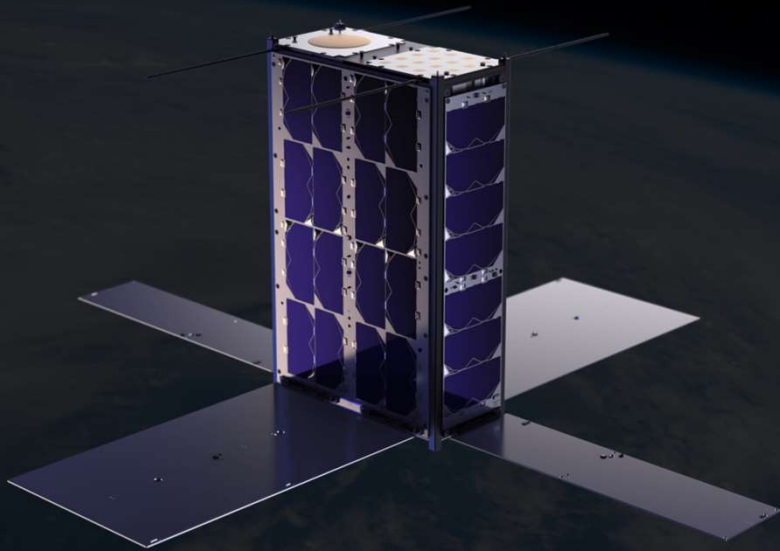
Test your R&D on board of our vehicle with quick and customized launch campaigns.

DRIVE-IT-YOURSELF

The vehicle can potentially be operated autonomously by the client.

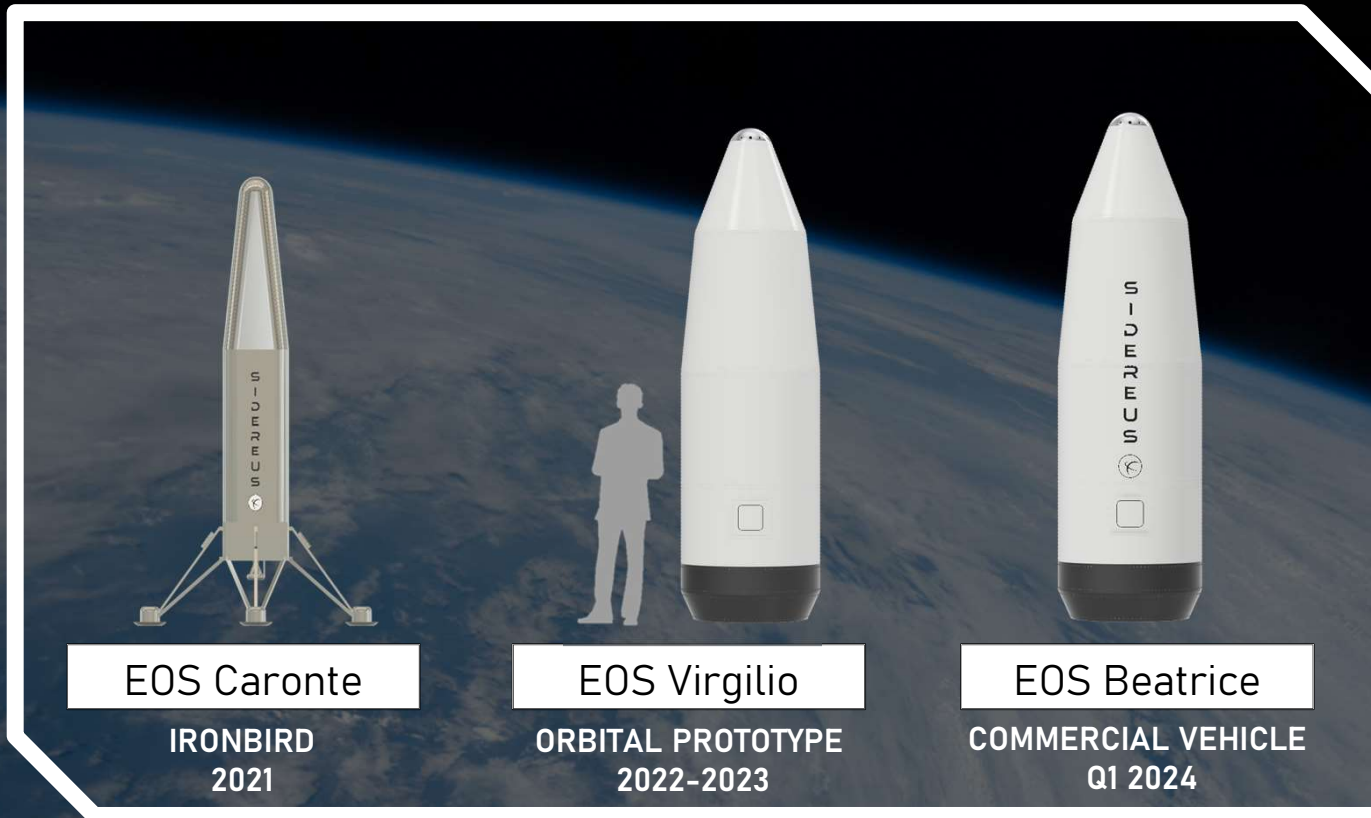
Fast Response Platforms

FEATURES



- **SHORTER DEVELOPMENT TIME, REDUCED COST**
(nanosats can be developed in 1/10 the time needed for a microsat, between 2 weeks and a year, with a cost one order of magnitude lower, increasing the number of projects and mission possible)
- **CUTTING EDGE TECHNOLOGY**
(more advanced hardware and technologies can be employed thanks to the risk-cost tradeoff, providing a significant strategical advantage)
- **INFRASTRUCTURES UPFRONT INVESTMENTS**
(the cost and time for the production, test and operations infrastructures as lower)
- **TECHNOLOGICAL DEMONSTRATION AND QUALIFICATION**
(new technologies for bigger satellites can be tested and qualified in space)
- **CONSTELLATION RESILIENCE, RESPONSIVITY, DETECTABILITY, UPDATE RATE**
(constellations are more resilient to a loss of a satellite, can be deployed quickly in space, they are harder to detect and faster to update)
- **TRAINING AND FORMATION**
- **SCALEUP**

EOS DEVELOPMENT



R&D TIMELINE

2021/2022

STATIC TEST FIRES & FLIGHTS

2022/2023

VEHICLE VALIDATION
SUBORBITAL & ORBITAL TEST FLIGHTS

2024

COMMERCIALIZATION IN Q1

EOS Caronte

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MR-200

Test bench Integration, 31st May 2022

July 2022 – Sidereus Space Dynamics - Confidential and Proprietary



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MR-200

**STF-C2-Alpha, 3rd June 2022,
19 sec burn**

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MR-200

**STF-C2-Bravo, 7th June 2022,
15 sec burn**

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EOS Vehicle MY-0422
Structural test vehicle, 4th May 2022

October 2022 – Sidereus Space Dynamics – Confidential and Proprietary



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EOS Vehicle OC-2522

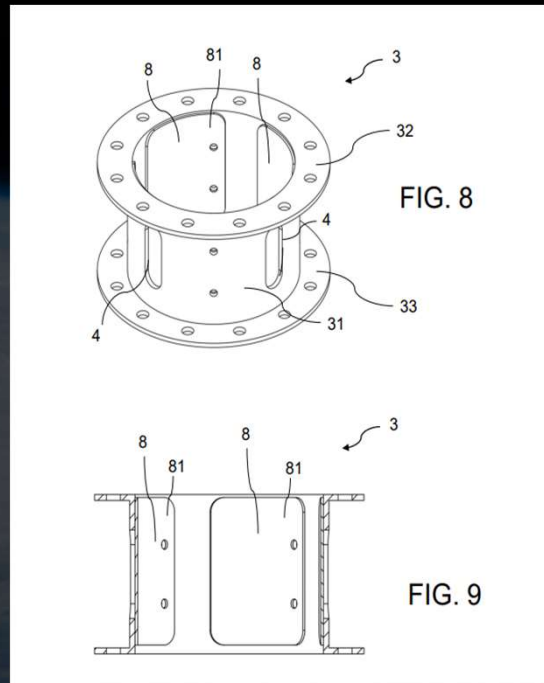
First test vehicle, 25th October 2022,
potentially the first flying

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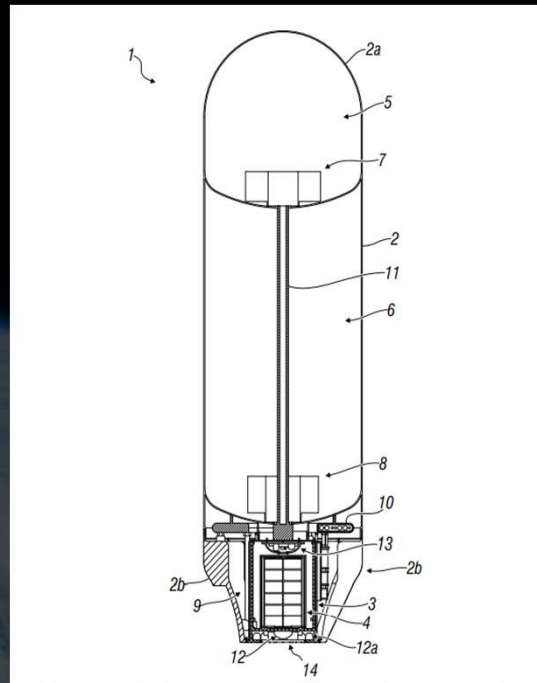
COMPANY'S OTHER PATENTS

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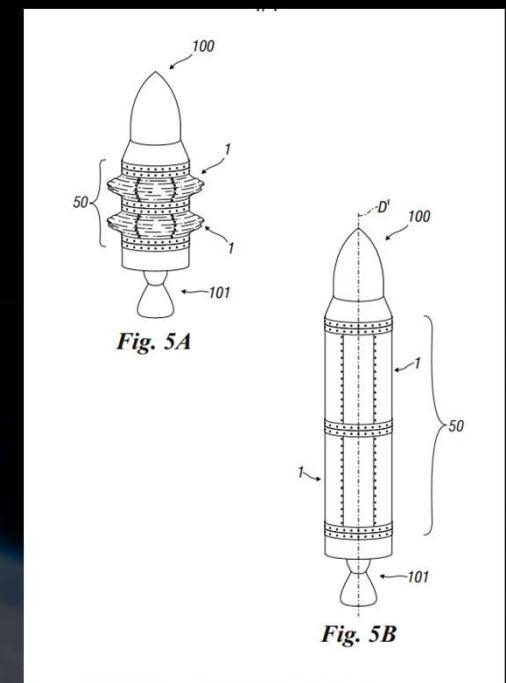
BIPHASIC ROCKET ENGINE

Innovative technology to allow the reuse of launch vehicles in a much more efficient and safe way.



MINIATURIZED DUMB BOOSTER

System architecture in its major elements.



INFLATABLE TANKS

Ultra-high propellant-to-dry mass ratio tanks are capable of deflation for simpler transportation logistics.

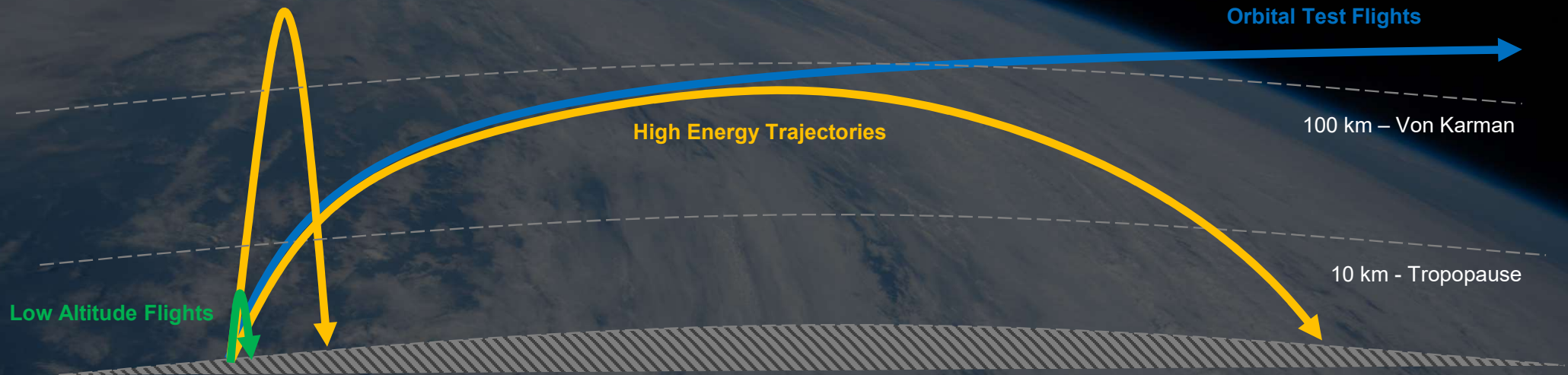
EOS Virgilio Development Program

DEVELOPMENT
OPTIMIZATION
QUALIFICATION



EOS Virgilio – Flights

	Q1 2023	Q2	Q2	Q3	Q4	Q1 2024	Q2
EXPERIMENTAL FLIGHTS	LOW ALTITUDE FLIGHTS		0.5 km test flights, 1 per month, five tests				
	HIGH ENERGY TRAJECTORIES		Suborbital high speed flights, two tests				
	ORBITAL TEST FLIGHTS		Orbital-aimed test flights, 1 per month, five tests?				
COMMERCIAL TESTFLIGHTS	HIGH RISK		First 10 flights, high failure rate				
	LOW RISK		Later 10 flights, lower commercial risk				
	REUSABILITY DEMONSTRATION		Commercial flights with reusability demonstration				



Upcoming activities

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GROUND TESTS

Sidereus test approaches heavily rely on daily test campaigns of aerostructures, engines, and avionics. Establishing this test place for this activity on national territory is currently the company's main focus. From 2022 a daily test campaign activity is expected to start.

LOW ALTITUDE FLIGHTS TEST FLIGHTS CAMPAIGN

A 1000 ft altitude would allow testing of a nearly orbital-ready vehicle in the worst possible condition (even worse than the final orbital flights). With a targeted frequency of one per month in the first part of 2023, this will allow the vehicle to be qualified.

COMMERCIAL ORBITAL FLIGHTS CAMPAIGN

From the second half of 2023, the vehicle will attempt orbital flight with the same cadence of LAFs until success is accomplished. That would sign the end of Virgilio's developments to later focus on Beatrice for commercial optimization.



Low Altitude Flights (LAF)

SEA LAUNCH

EOS represents the simplest and safest vehicle to create Italian orbital launch capability from national territory. Given the notorious scarcity of nonpopulated land on Italy's mainland, the sea represents the best ground for this kind of activity.

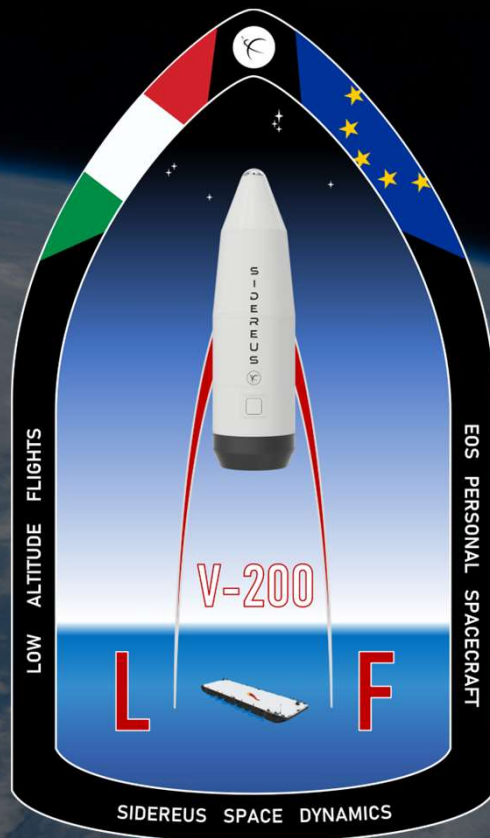
LOW ALTITUDE FLIGHTS TEST FLIGHT CAMPAIGN

The LAFs represent the best compromise between airspace/ground occupation and demonstration capability. With these tests, we will be able of qualifying for an orbital flight of the vehicle across the span of 6 months, perform postflight analysis and demonstrate safe abort capabilities.



Orbital Test Flights

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ORBITAL TEST FLIGHTS

Once demonstrated with LAFs the vehicle will be equipped with all the needed propulsion systems to perform the first orbital test flight in the second half of 2023.

Thanks to the safe abort architecture, the expected low success rate for the first tests is going to be compensated by the recoverability.

COMMERCIALIZATION

By 2024 the first commercial flights from the sea are expected to take place. In the first year, up to 30 launches are expected, with the target of increasing the frequency of up to a launch per day by 2026.



Scaling up the Miniaturized Dumb Booster



The next target scale

If EOS and the MDB/ATI approaches demonstrate their expected potential in 2024, the next step forward would be to move from the current payload capability to a multi-ton to orbit vehicle, retaining all the same features of EOS and more.

Possibilities

This vehicle would therefore be able of launching into space a multi-ton payload with a frequency of a launch per day, completely reusable, integrating air-breathing propulsion to liftoff from close to the coastline. All of this with a cost two orders of magnitudes lower than the cheapest one currently available in the market.

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**CREATING THE EASY WAY
FROM EARTH TO THE STARS**