ArkEdge Space Inc.
Company Overview

July 2024

株式会社アークエッジスペース
https://arkedgespace.com/

Company Profile

Company Name	ArkEdge Space Inc.
Establishment	18 July 2018
Location	DOME ARIAKE HEADQUATER, 1-3-33 Ariake, Koto-ku, Tokyo, Japan
Capital Stock	2.7 billion yen (including capital reserves) *Total amount of orders received is over 15 billion yen in total.
Main Business	■ Provision of comprehensive solutions for nano-satellite constellations, from planning and designing to mass production and operation. ■ Component and software development, ground station operation, education and consulting services, etc. related to the above.
Main Shareholders	• Incubate Fund • Real Tech Fund • Pavilion Capital • Mitsui Sumitomo Insurance Capital • Space Frontier Fund (Sparx Group) • founding members
Main clients/ partners	• Ministry of Economy, Trade and Industry (METI) • New Energy and Industrial Technology Development Organization (NEDO) • Japan Aerospace Exploration Agency（JAXA） • University of Tokyo and University of Fukui • SEIREN Co., LTD • I H I Corporation

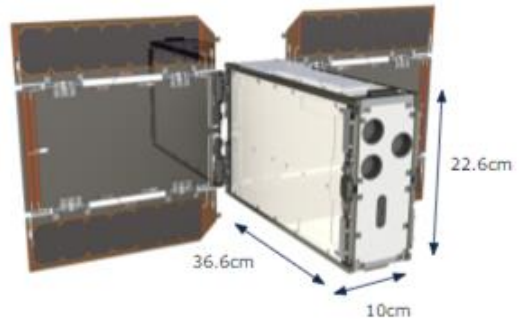
<Main Business Areas>

✓ Mass production of nano-satellites and construction of constellations

- Ownership of core technologies for 3U and 6U size domestic nano-satellite buses and domestic AOCS (Attitude and Orbit Control System).
- Full-scale mass production of dozens of satellites per year in Japan, starting with the launch of seven 6U satellites in 2024 and beyond.

✓ Supports a wide range of missions not limited to specific applications

1. IoT sensor data collection (disaster alert, remote information collection)
2. Satellite remote sensing (detection of disasters, GHG monitoring, etc.)
3. Satellite VDES (satellite communications and broadcasting for ships, ship routing, etc.)
4. Radio observation and positioning (detection of suspicious vessels, GPS replacement in emergencies, etc.)
5. Lunar infrastructure and deep space exploration



6U Satellite by ArkEdge Space Inc.

Micro satellite that can fit on a desk

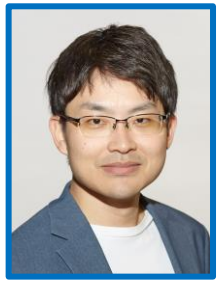
Management team

A management team composed of experts from various fields, with a majority consisting of engineers specializing in satellite and software development.

Director

* Blue frame indicates founding engineering members.

Takayoshi Fukuyo
Founder, CEO
Master's Degree,
The University of Tokyo
Engaged in JICA expert, Ministry of Foreign Affairs, and Cabinet Office Space Secretariat



Ryohei Takahashi
CTO
Ph.D., Aerospace Engineering,
The University of Tokyo

Kanta Yanagida
Director, CIO
Ph.D. Candidate, Aerospace Engineering,
The University of Tokyo

Kojiro Hatada
External Director
CEO, Innovative Space Carrier
Former Ministry of Economy, Trade and Industry

Shingo Yoshimura
External Director
CEO, Work Happiness
Former President and Representative Director of S-POOL

Executive Officers

Tomoaki Yasuda
Corporate Planning Manager
Master, UC San Diego
Engaged in industrial promotion at the Ministry of Economy, Trade and Industry and the Space Secretariat of the Cabinet Office

Seigo Morita
CFO
Bachelor, Law, Keio University
Engaged in auditing and M&A finance in KPMG Tokyo and the U.S.

Takeshi Matsumoto
Radio Infrastructure Manager
Ph.D., Aerospace Engineering,
Tokyo Denki University

Nobuhiro Funabiki
Production Manager
Ph.D., Aerospace Engineering,
The University of Tokyo

Kota Kakihara
Advanced Project Manager
Ph.D., Aerospace Engineering,
The University of Tokyo

Ryo Suzumoto
SW, Remote Sensing Lead
Ph.D., Aerospace Engineering,
The University of Tokyo

Shuhei Matsushita
Deputy CTO
Ph.D., Aerospace Engineering,
The University of Tokyo

Employee Composition

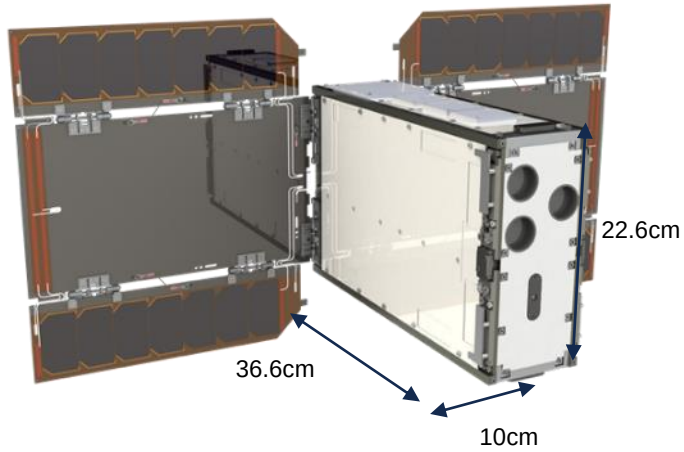
Full-time employees: 78
(approx. 137 including interns)

In addition to satellite development engineers, the team consists of members from related software, telecommunications and wireless, business development and management, etc.

What is Micro Satellite

Less than 1/100th the size of conventional large satellites,
but equipped with communications equipment and advanced cameras.

It is expected to **contribute to solving global issues** such as
monitoring greenhouse gases and securing biodiversity, expanding the IoT economy,
and improving the efficiency of marine logistics.



6U Satellite by ArkEdge Space Inc.
Micro satellite that can fit on a desk

Diverse Missions		
Earth Observation	Communication	Positioning And Navigation
		

Advantages of Micro satellites

1. **Low cost**: **Less than 1/100 of the cost of** conventional large satellites
2. **High frequency**: **High frequency data collection and communication is possible** by deploying a large number of satellites, it means “constellation”.
3. **Mobility**: **Satellites can be launched quickly and flexibly** according to needs.

Comparison of Large and Micro Satellites

	Large Satellite	Micro Satellite
Weight	**500kg ~ couple of tons**	**10kg ~ 200kg**
Price	**Hundreds of millions of USD**	**Less than million of USD**
Lead time to launch	**5 – 10 years**	**1 – 3 years**
Orbital arrangement	**Several satellites**	**Thousands of satellites**
Components	**Mainly expensive specialized parts**	**Mainly converted from consumer parts** (automotive parts, home PCs, etc.)
Launch opportunity	**Large rocket, low frequency**	**Large & Small rocket, low frequency**

Source: Prepared by ArkEdge Inc. based on materials prepared by the Office of Space Industry, Ministry of Economy, Trade and Industry.

Satellite bus design and development capabilities

- ✓ Based on the advanced technology of Nakasuka, Funase, and Ikari Laboratories at the University of Tokyo (which was the first in the world to successfully develop and operate a Micro Satellite)
- ✓ Deployment in both earth business and lunar/deep space exploration, **realizing high performance despite its ultra-compact size for a variety of missions**

Advanced Technologies for Lunar and Deep Space

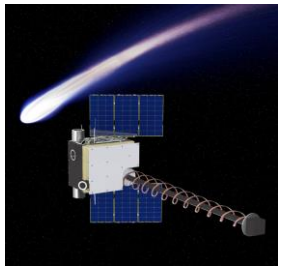
Complex and sophisticated orbit control | **Lightweight and compact** | **Handling of harsh thermal and radiological environments**

Ultra-small spacecraft EQUULEUS

- A spacecraft jointly developed by JAXA and the University of Tokyo to demonstrate orbit control technology in the Earth-Moon orbit.
- AE participated in the operation of this spacecraft.
- The 6th Space Development and Utilization Grand Prize Selection Committee Special Award

Long-period comet explorer Comet Interceptor

- A joint mission of the European Space Agency and JAXA, in which MHI was in charge of the development of one spacecraft
- Advanced mission to stand by at the Lagrangian point of the Sun-Earth system and, upon detection of a comet to be observed, to approach the comet and observe it.



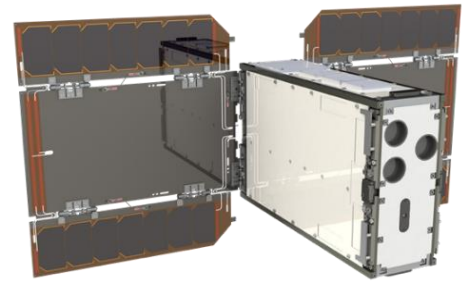
Source: Nakasuka-Funase-Ikari Laboratory, The University of Tokyo

Mutual use Of results

Business applications on the ground

Compact and High Performance | **Support Variety missions**

6U General-purpose satellite by ArkEdge Inc.



Future expansion to the following classes

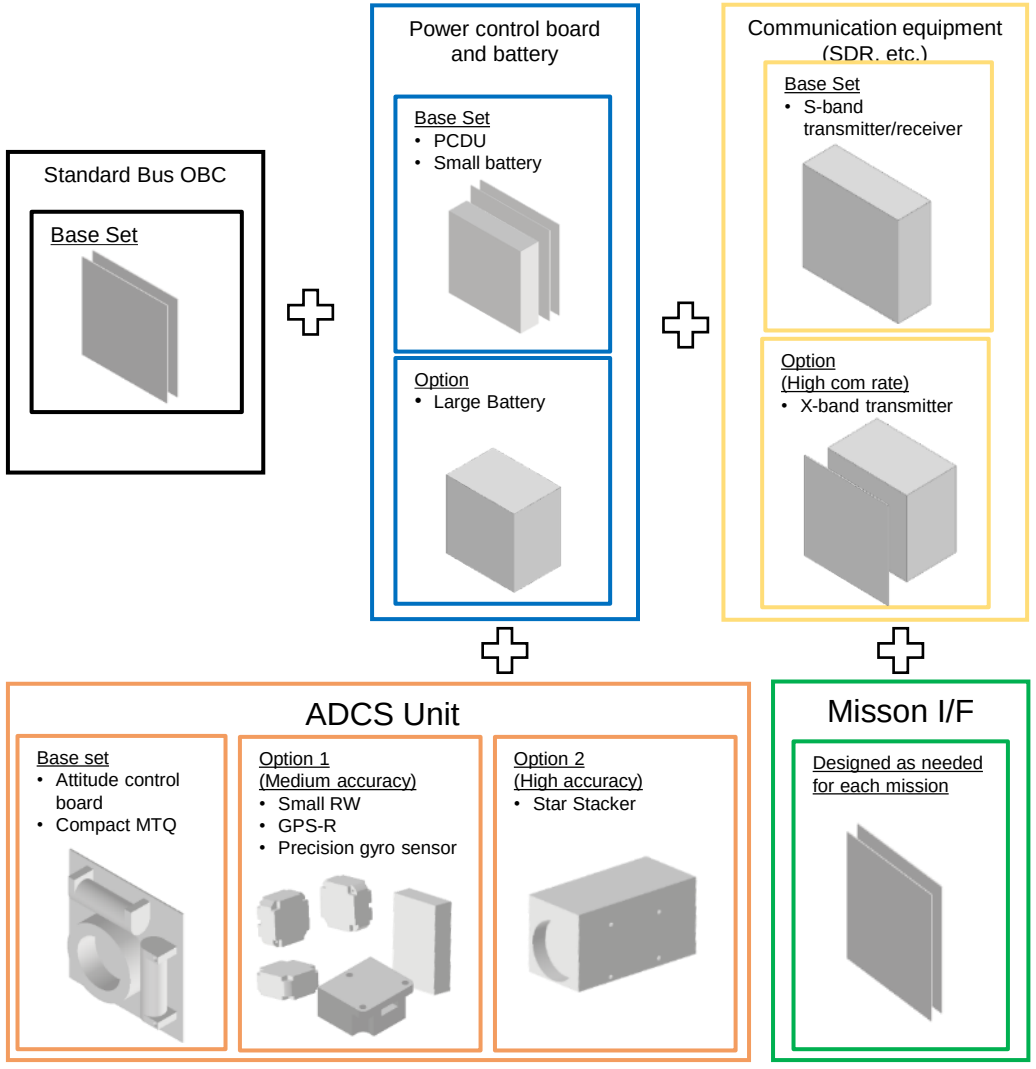
- 16U size micro satellite
- 50kg class micro satellite
- 100kg class small satellite

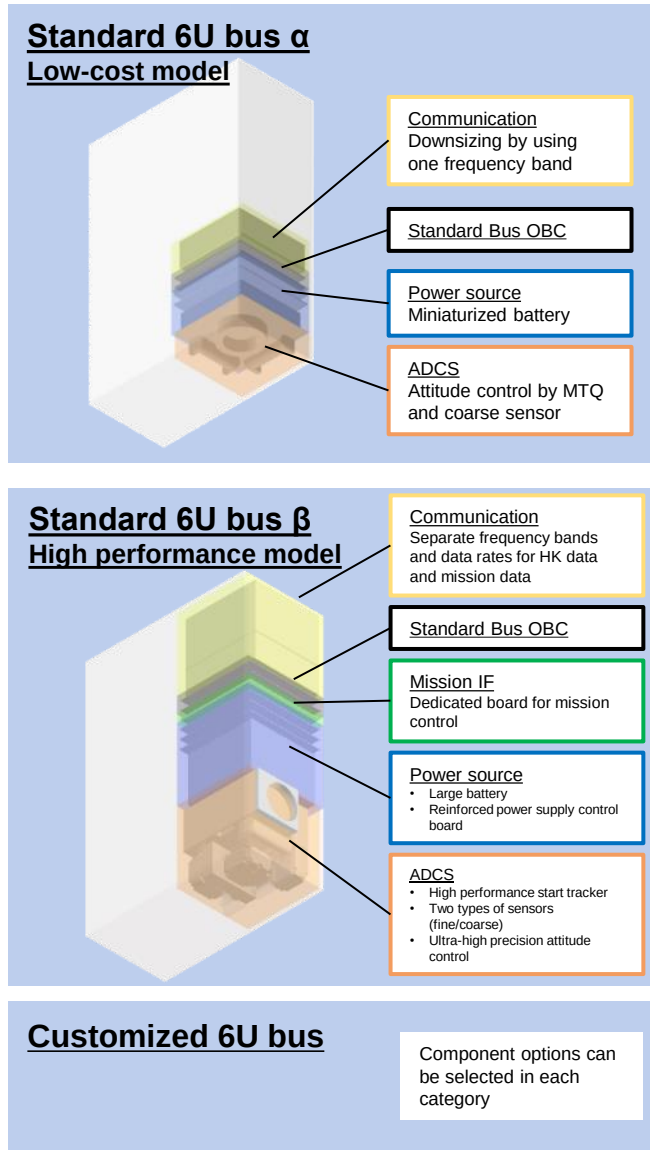
6U Satellite Bus by ArkEdge Space Inc.

Modularized and standardized satellite bus

✓ Variety of missions

✓ Low cost and short delivery time



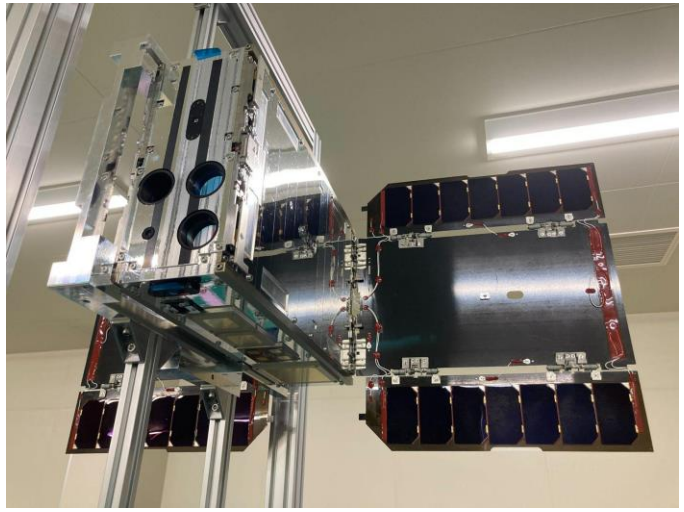


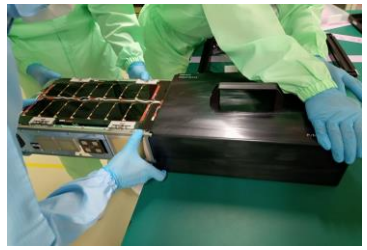
Establishment of mass production system for micro satellite buses

The only company in Japan capable of planning and designing diverse micro satellite constellations, mass producing them, and operating them.

- ✓ Collaborating with domestic non-space manufacturers, we have already established a supply chain of micro satellites for mass production.
- ✓ Starting with multiple satellite launches in 2024, gradually expand the number of mass-produced satellites, aiming to have more than 100 satellites per year around 2026.
- ✓ In addition to domestic production of attitude control unit (AOCS), in-house production and domestic production of core components will be developed sequentially.

Domestic mass production system

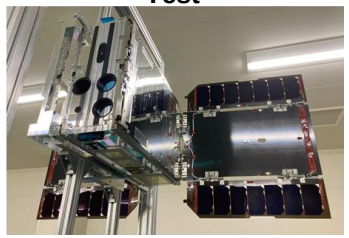




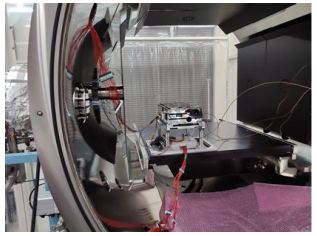
Testing system for mass production

Antenna Pattern Measurement Test

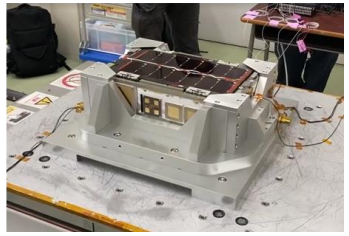
Paddle Deployment Test



Vacuum Test



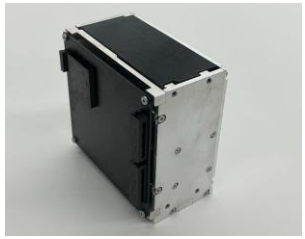
Vibration Test



Domestic production of core components

High precision AOCS Unit (Attitude control)

Low-cost AOCS unit



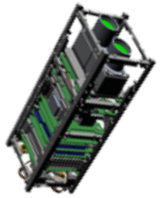
Development results (including those under development)

- ✓ We have been promoting development and mass production of micro satellites, and now we will move to the phase of full-scale launch and utilization of these satellites.
- ✓ Promote development of a wide variety of micro satellites that can provide services such as earth observation and positioning information, and develop new markets.

3U Sat

Operation

Launched in 2019



RWASAT-1
IoT sat in 3U

Operation

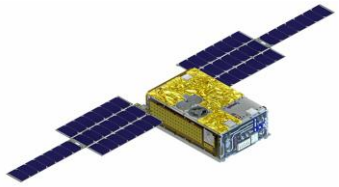
Launched in 2023

OPTIMAL-1
3U-class demonstration platform

6U Sat

Operational Support

Launched in 2022



EQUULEUS©
6U-class lunar infrastructure demonstrator
©The university of Tokyo

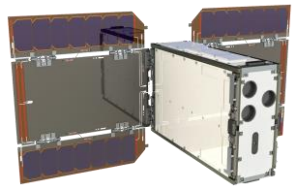
Operational Support

Launched in 2023

SPHERE-1 EYE
Support operation of 6U-class earth observation

Under Development

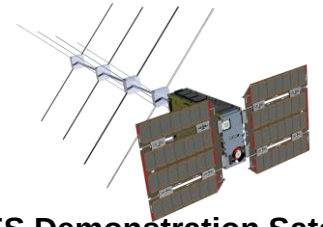
7 launches planned after 2024



6U General-Purpose Bus
Mass production model of 6U satellite
(Adopted as a subsidized project by METI/NEDO)

Under Development

Several launches planned after 2024



VDES Demonstration Satellite
6U-class satellite for monitoring oceanographic conditions
(Adopted by METI/NEDO K-Project)

30~100kg class sat

Under Development

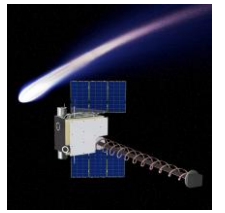
Aiming for launch around 2026

Under Design

VDES/Ocean Observation Satellite
Satellite for locating radio wave sources
(Adopted by K-Project of METI/NEDO)

Under Development

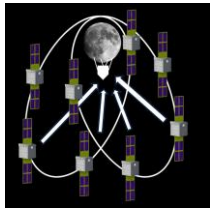
Aiming for launch around 2029



Comet Interceptor
Comet Exploration Satellite
(Adopted as a joint project by JAXA/ESA)

100kg~ class sat

Under Development



Lunar positioning satellites
Positioning Satellite for Lunar Infrastructure

Under Development

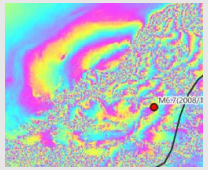
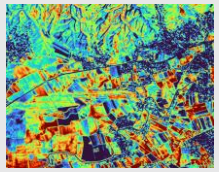
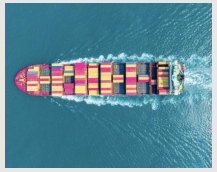
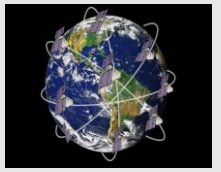
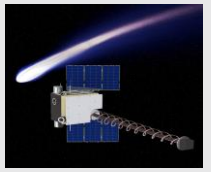
Under Design

Multifrequency Observation Remote Sensing Satellite
Optical remote-sensing satellite
(Adopted by SBIR project of METI)

Ability to respond to diverse missions

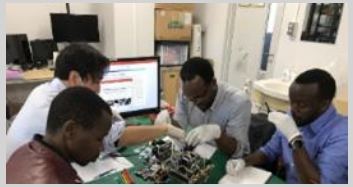
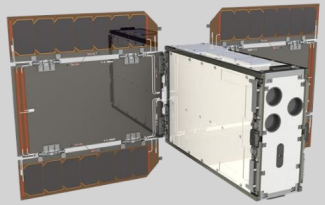
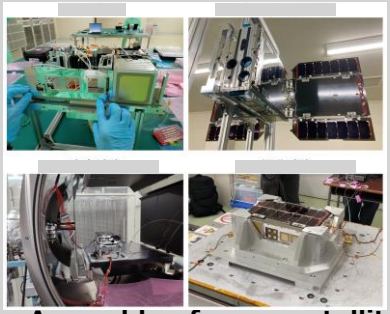
- ✓ Experienced in developing satellites for communications and VDES, radio observation, remote sensing, lunar infrastructure and deep space exploration
- ✓ **Aiming to provide comprehensive satellite solutions across fields** by utilizing satellites.

Our Business Domain

	Remote Sensing			Communication		Positioning		Moon Deep Space Exploration	
Domain	**SAR**	**Optical**	**Multi-Wavelength**	**IoT**	**VDES**	**Light-wave Communication**	**Earth Positioning** (LEO PNT)	**Radio wave observation** (Detection of suspicious vessels)	**Lunar Infrastructure** (Positioning and communications)
Image									
Satellite Manufacturing		ArkEdgeSpace					Future Business Area		ArkEdgeSpace
Service		Future Business Area							

Business Flow and Partners

Our main business is to provide comprehensive solutions for nano-satellites, from constellation planning and design to operation.

Flow	Planning and design	Development	Manufacturing	Launch Prep for Operation	Operation
Function Of ArkEdge	 • Micro satellite bus design • Component design • Orbit and operational method design • Constellation design	 • Development of nano-satellite bus • Interface coordination with onboard mission	 • Assembly of nano-satellite • Various tests and evaluations • Original mass production management system *Mass production is outsourced	 • Launch interface adjustment • Adjustments (frequency, etc.) *Satellite launch itself is outsourced to domestic and overseas launch vehicle operators	 • Satellite initial checkup • Satellite constellation operation • Ground station operation • Service provision (communications, etc.)
Partners	Governments Space Agencies Universities and Research Institutes Communication Company mapping and surveying company Electrical and machinery manufacturers	Universities and Research Institutes On-board mission equipment manufacturer Equipped component manufacturer	Manufacturers of electronics, machinery, etc. (OEM Partner)	Launch Provider	Governments Space Agencies Universities and Research Institutes Communication Company mapping and surveying company Electrical and machinery manufacturers

Project Formation Capabilities in Global Market

✓ While working with domestic and foreign government agencies, embassies, and other organizations, the company has a proven track record in a number of overseas projects and has several projects in the pipeline.

Result

Rwanda Space Agency
- Order for one 3U satellite
- Space Policy
- Appointed Advisor

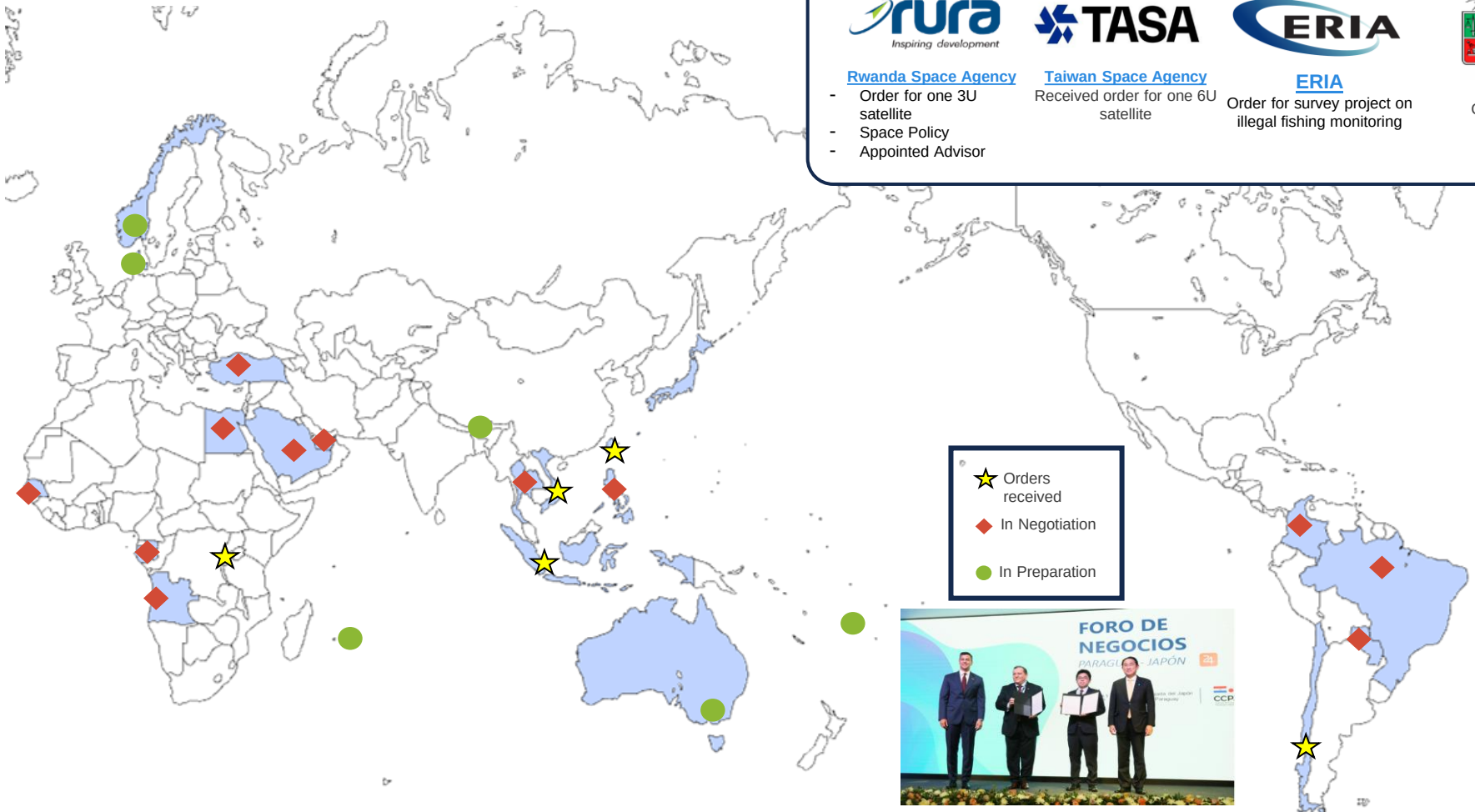
Taiwan Space Agency
Received order for one 6U satellite

ERIA
Order for survey project on illegal fishing monitoring

Chile Univ.
Order for Satellite Communication Conponents

Smart Africa
MoU has been signed for African Satellite Network

Vietnam
Operation and human resource development implementation (JICA project)



Accompanied Prime Minister Kishida on his visit to South America (Paraguay)

In Preparations
(Major cases)

Saudi Arabian Investment Authority and Space Agency
Negotiations underway for collaboration in the Middle East and Africa

Egyptian Space Agency
Negotiations underway to build an African satellite network

Brazilian Space Agency
Negotiations on satellite applications for forest monitoring, etc.

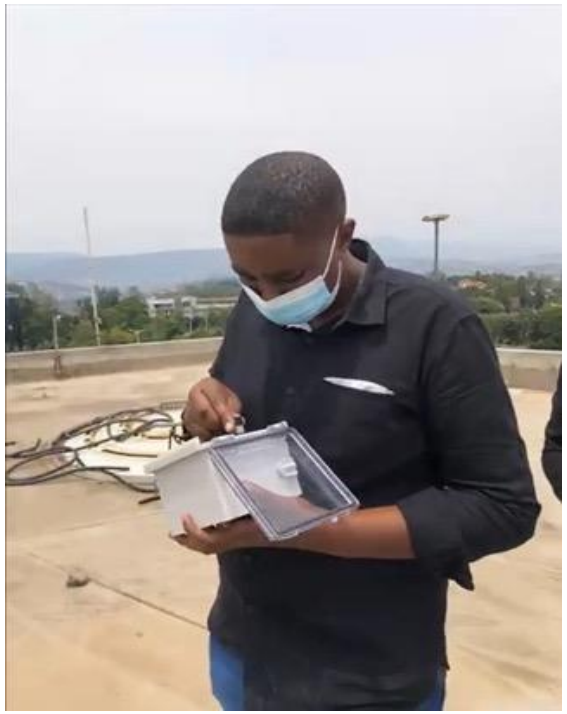
Australia
Negotiations underway for VDES demonstration and satellite IoT demonstration

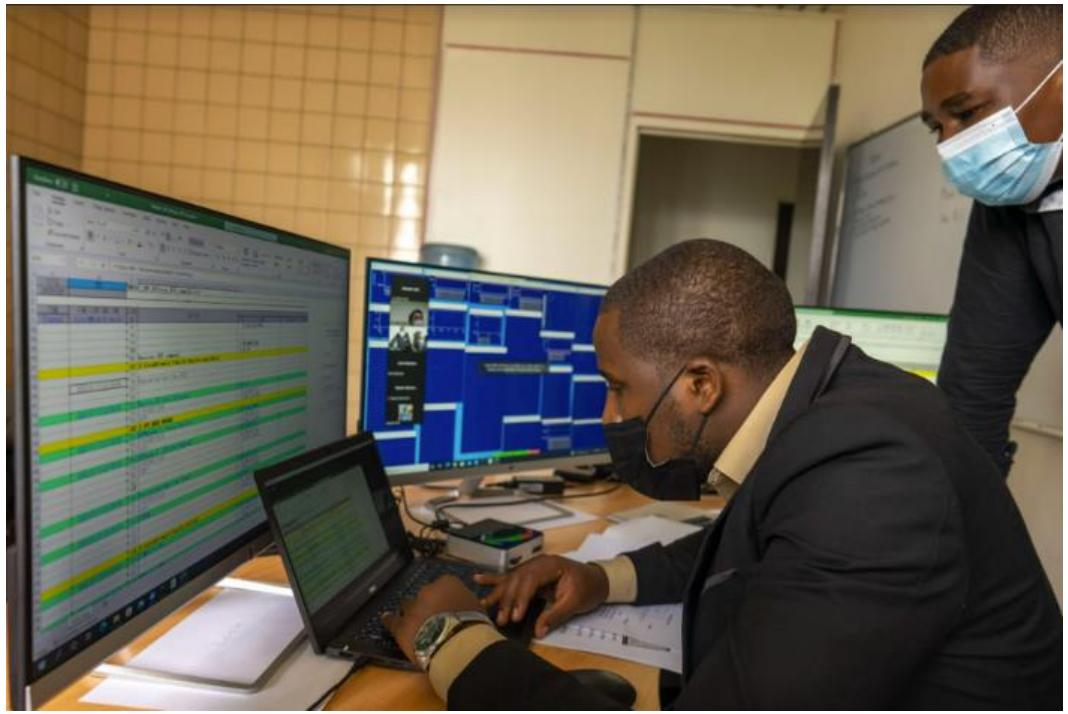
Denmark and Norway
Collaboration in VDES demonstration and ground stations under consideration

Angola
Preparing MoU for satellite constellation

Result: RWASAT-1 Satellite Operation Demonstration in Rwanda

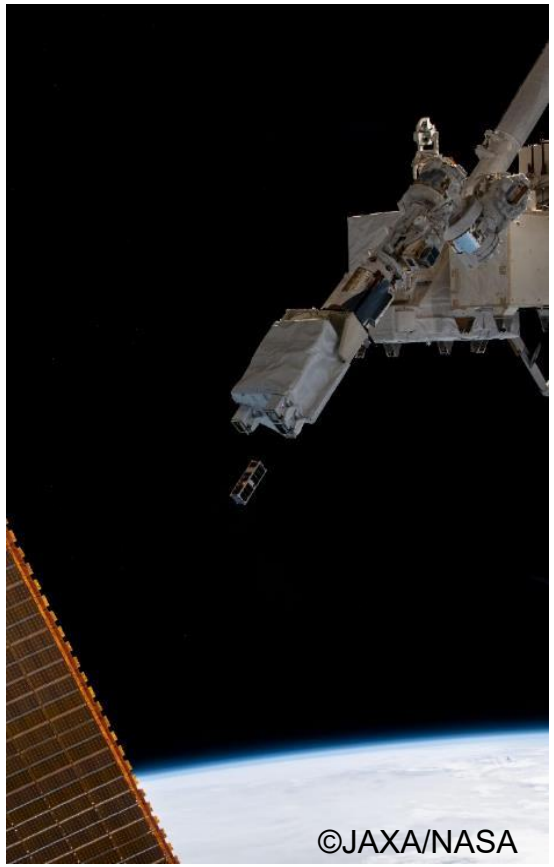
- ✓ RWASAT-1 Store & Forward Demonstration was conduct and mission data received over Rwanda was successfully received by the ground station in Japan.
- ✓ This demonstration successfully transmitted CO2 data linked with GPS location information via satellite.
- ✓ Nyiragongo volcano had a major eruption in May 2021, which swept away hundreds of houses with lava and caused extensive damage. We are studying a mechanism to call for evacuation in advance by early detection of signs of an eruption using CO2 data obtained from a satellite.

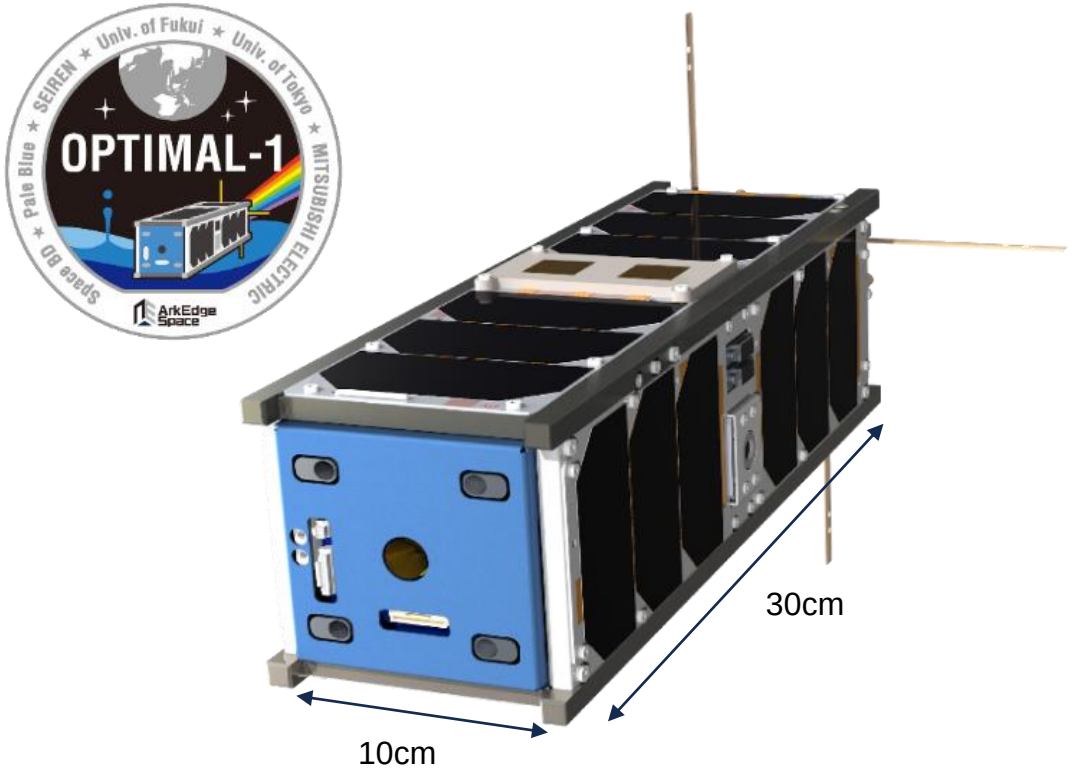




Result: IoT Communications - Successful Launch and Release of OPTIMAL-1

- ✓ Optimal-1 was launched on November 27, 2022 by the Dragon spacecraft aboard SpaceX's Falcon 9 rocket and transported to the International Space Station.
- ✓ OPTIMAL-1 was released into space from the Small Satellite Release Mechanism on the International Space Station on January 6, 2023. After the release, OPTIMAL-1 will be operated initially for about one month, and then various demonstration experiments will be carried out, such as a micro-propulsion system, communication devices, and in-orbit advanced information processing technology.



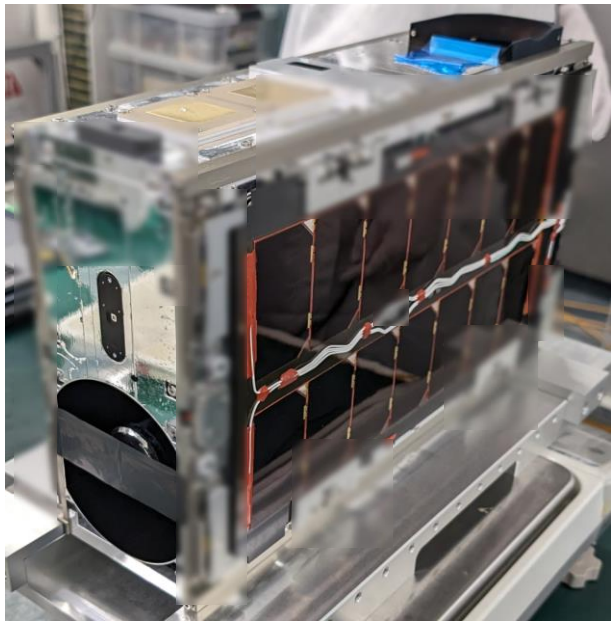


OPTIMAL-1

Ongoing Mission: ONGLAISAT

The telescope developed by the Taiwan Space Administration (TASA) will be combined with the 6U bus that we developed in collaboration with the University of Tokyo, and the mission will be to capture high signal-to-noise ratio images using TDI (Time Delay Integration) technology.

- ✓ Completion of the scheduled manufacturing and inspection process and shipment from AE on June 6, 2024
- ✓ Satellite Operation License issued by Cabinet Office obtained in accordance with the Japanese Space Activities Act.
- ✓ Following Schedule planned
  - 2024/8 Pre-launch Review by TASA
  - 2024/9 Scheduled for launch to ISS
  - 2024/10E-11 Release from ISS, orbit insertion, and start of operations
  - 2024/12 Final Review by TASA



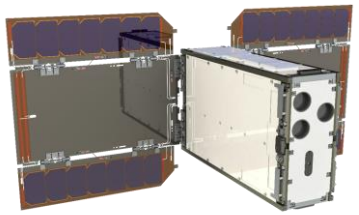
ONGLAISAT before shipping out

2023/11 Pre-Shipment Review Meeting
with TASA members in Taiwan

Development and launch of 6U general-purpose bus series

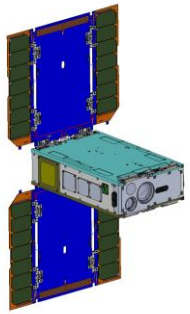
- ✓ Develop the following four series of satellites as a general-purpose satellite bus system that can flexibly support four missions: IoT communications/hosted payloads (HP), remote sensing (optical, infrared, etc.), VDES, and optical communications.
- ✓ Satellites will be launched sequentially from 2024 onward for on-orbit demonstrations.

AE1x Series
IoT Communications and Hosted Payload



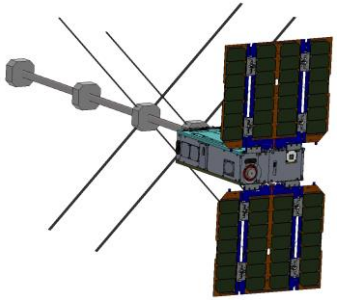
- Demonstration of the use of a general-purpose bus for IoT data collection missions
- Demonstration of the use of general-purpose buses for multi-platforms that can be used for in-orbit demonstration of space components (Hosted payloads)

AE2x Series
Optical/Infrared/IoT Communications



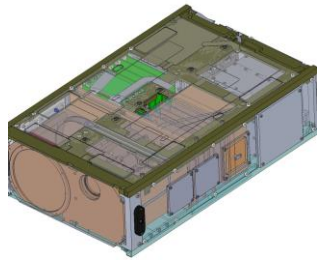
- Demonstration of the use of a general-purpose bus for remote sensing missions such as optical, infrared, etc.
- High-precision attitude control unit for Micro Satellite

AE3Vx Series
Large VHF Antenna



- Demonstration of large VHF antenna deployment structure using standard general-purpose bus
- Demonstration of VDES communication and ship monitoring

AE4Lx Series
Optical communication



- Demonstration of pointing control and other technologies for optical communication using a standard general-purpose bus
- Demonstration of the possibility of using standard general-purpose buses for future lunar infrastructure, etc.

Business Overview

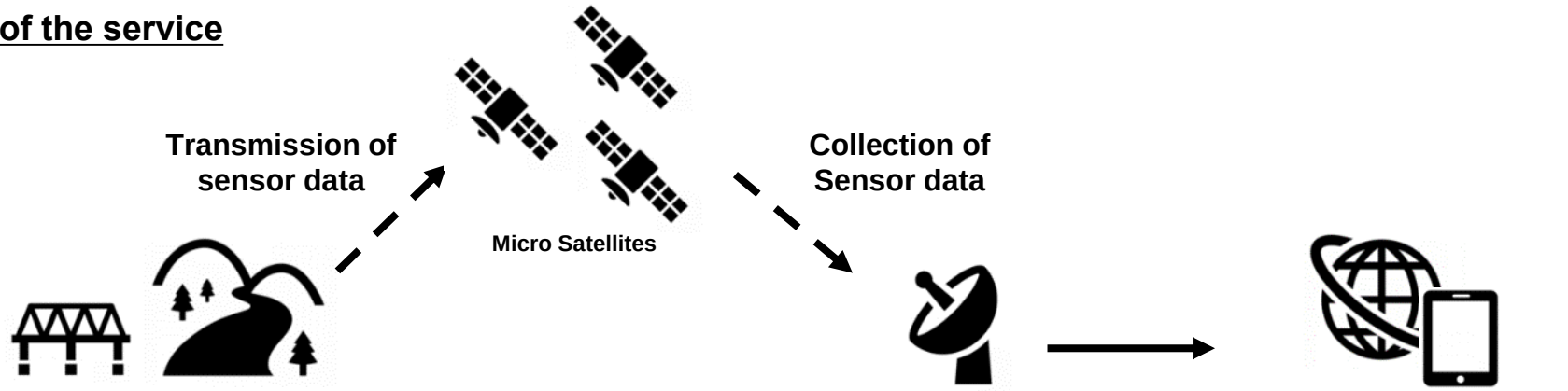
Micro Satellite IoT Data Collection Service

- ✓ A brand new IoT network service that **efficiently collects data from space** using ArkEdge Space's nano-satellite technology
- ✓ Our standard is equipped with a unique LoRa communication payload, **aiming at providing IoT access in places where terrestrial internet connection is not available**

Service Features

1. **Accessibility**: **Supports locations that are inaccessible to humans .**
   (e.g., mountains, forests, oceans, remote islands, etc.)
2. **Wide-area** coverage: Data is collected from space, so **large areas can be easily monitored**.
3. **Easy management**: Devices installed on the ground have **low power consumption and are easy to manage**.

Image of the service



Micro Satellite IoT Data Collection Service ~Use Case~

✓ Data collection in remote areas without communication infrastructure can be easily achieved from space.

Agriculture, forestry and fisheries

- Soil analysis data for agricultural use
- Water resource information
- Environmental data acquisition for fishing grounds
- Fishing gear management


Disaster prevention and emergency communication

- Warnings of river flooding, landslides, forest fires, tsunamis, etc.
- SOS transmission in the event of distress or drifting, and monitoring of the situation at evacuation centers


Environmental and Infrastructure Management

- Collection of various data for forest management
- Management of bridges and water intake facilities in mountainous areas


Logistics and mobile monitoring

- Container tracking by land, sea, and across borders
- Centralized management of vehicles to prevent theft and provide security


Application of Nano-Satellite to Marine DX (Satellite VDES)

*VDES : VHF Data Exchange System

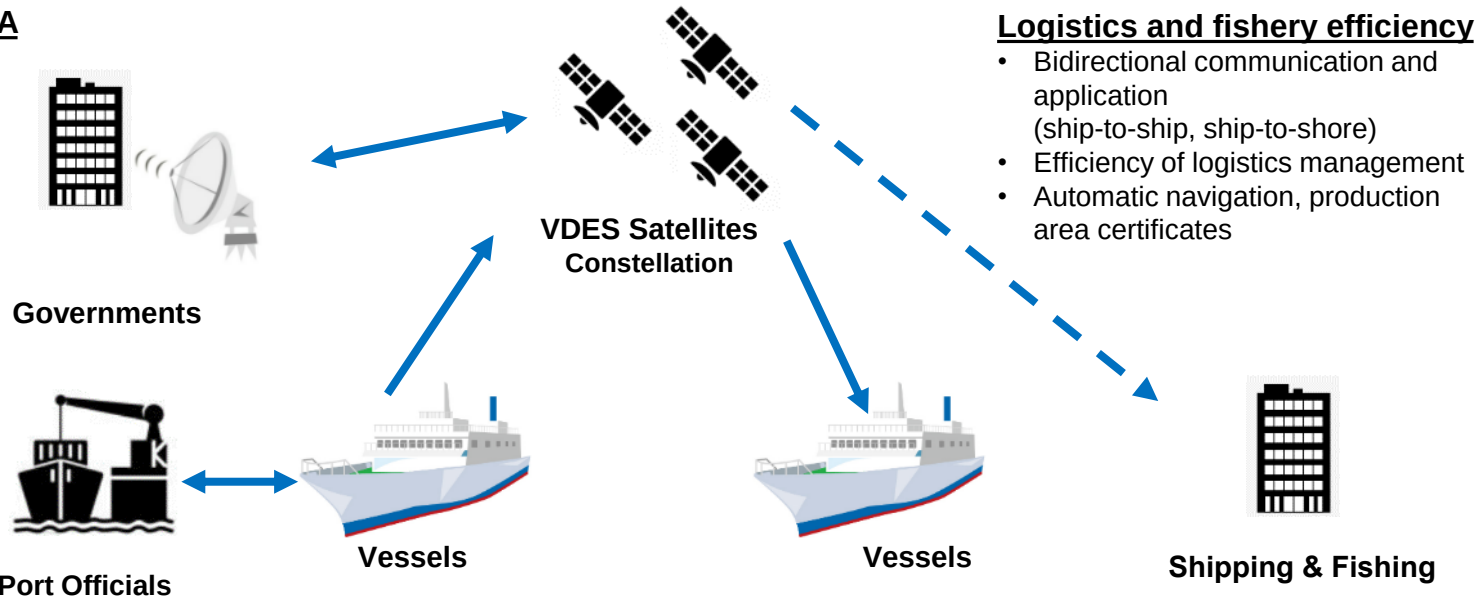
- ✓ **VDES is the next generation of AIS, a generic term for a system that adds three additional functions to conventional AIS**.
- ✓ **Medium-speed, robust communications** characterized by low weather susceptibility, **contributing to maritime safety and MDA, more efficient port, logistics and fisheries management, and marine digital transformation**.

VDES = AIS + ASM + VDE-TER + VDE-SAT

AIS (Automatic Identification System): Transmits (broadcasts) information such as vessel ID, position, and speed to surrounding vessels (9.6 kbps)
+ASM (Application Specific Messages): One-way message transmission to specific vessels (19.2 kbps)
+VDE-TER (Terrestrial): Two-way communication between vessels **(max. 307.2 kbps; 32 times faster than AIS; limit of about 20 km)**
+VDE-SAT (Satellite): Two-way communication via low earth orbit satellite **(max. 307.2 kbps; 32 times faster than AIS, overcoming distance limitation)**

Maritime Safety and MDA
- Search and Rescue Information
- Distribution of maritime safety information
- Management of route markings
- Detection of suspicious vessels

Facilitation of Port Entry and Departure
- Designation of shipping routes
- Support for ship operation
- Digitalization of entry/exit procedures, etc.



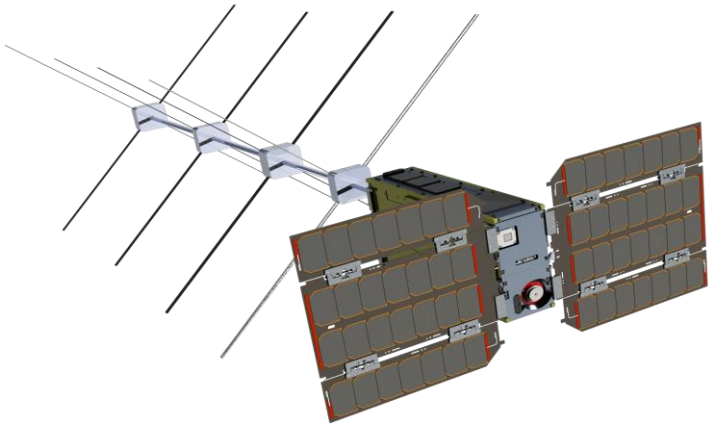
Logistics and fishery efficiency
- Bidirectional communication and application (ship-to-ship, ship-to-shore)
- Efficiency of logistics management
- Automatic navigation, production area certificates

VDES Satellite Development Status

Satellite system design is almost complete and will gradually move to the demonstration phase from 2024 onward.

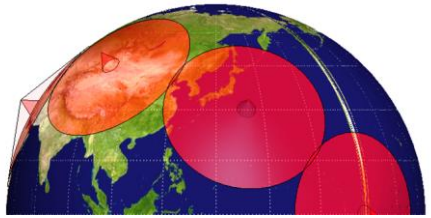
VDES Demonstration Satellite (Image)

Size: W6U (100x226.3x366mm)
Orbit Altitude: 550km
Orbital plane: Low to medium inclination



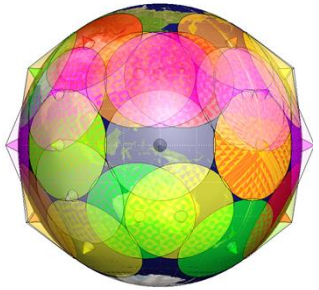
- ✓ **Functionality will be updated in stages from the 0th generation to the 3rd generation**
- ✓ **Demonstrate satellite VDES application in actual sea areas by launching multiple satellites between 2024 and 2027**

Coverage per satellite (Image)

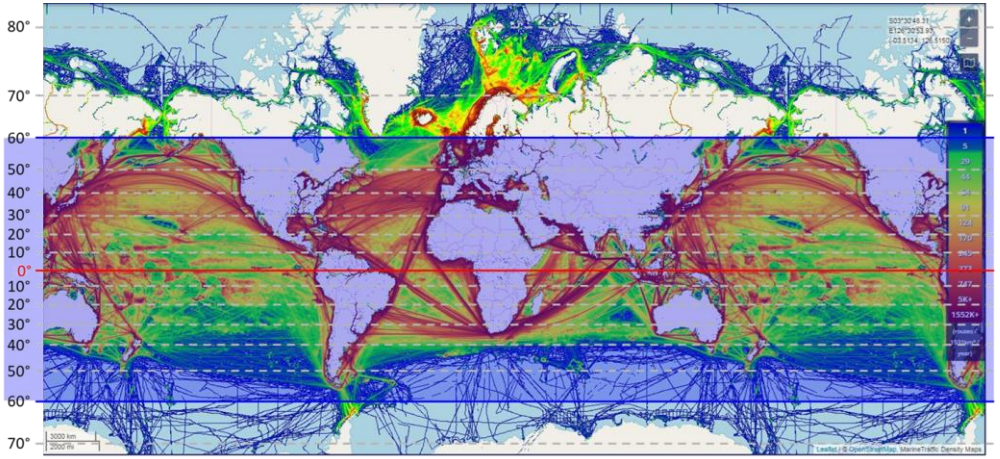


Covers a radius of several thousand kilometers

Coverage with Constellation (Image)



Major global routes and satellite coverage (image)



Source: Prepared by ArkEdge Inc. based onhttps://moverdb.com/shipping-traffic-density/

Marine VDES - Satellite VDES Consortium set up

✓ The seven managing companies, including ArkEdge Space, together with the Institute for Ocean Policy Studies of the Sasakawa Peace Foundation, established the Satellite VDES Consortium on October 13, 2022, to promote social implementation of satellite VDES, the next-generation maritime communications infrastructure.

Preparatory meeting for the establishment of the Satellite VDES Consortium
(September 15, 2022)

Source: "Satellite VDES Consortium" press release

[Managing Companies]

- IHI Corporation
  (Representative Managing Director)
- Mitsui O.S.K. Lines, Ltd.
- Furuno Electric Co.
- Ark Edge Space Inc.
- TOYO SIGNAL TSUSHIN Co.
- Japan Radio Co.
- Mitsui & Co.

[Secretariat]

- The Sasakawa Peace Foundation Ocean Policy Research Institute

[Advisors]

Name	Organization / Position
Mr. Toru Sato	Professor, Department of Marine Technology and Environment, Graduate School of New Frontier Sciences, The University of Tokyo
Mr. Ryosuke Shibasaki	Vice President, Reitaku University; Specially Appointed Professor, Interfaculty Initiative in Information Studies, The University of Tokyo
Ms. Ruri Shoji	President, National Research Institute of Venue, Port and Aerospace Technology
Mr. Atsushi Sunami	Special Assistant to the President and Visiting Professor, National Graduate Institute for Policy Studies
Mr. Shinichi Nakasuka	Professor, Department of Aerospace Engineering, Graduate School of Engineering, The University of Tokyo
Mr. Yoshio Miyatera	Asia-Pacific Telecommunity APT-WRC Preparatory Meeting Aviation and Maritime Radio WP Maritime Radio Related Agenda DC ChairExpert, Business Strategy Group, Planning and Promotion Department, Marine Systems Division, Japan Radio Co.

High frequency multi-wavelength remote sensing by nano-satellites

- ✓ Data obtained from " **multi-wavelength sensors**," which can image the ground in many wavelength bands, to identify the **characteristics of substances** on the ground
- ✓ High-frequency monitoring of: **(1) the distribution of greenhouse gas concentrations, (2) deforestation and afforestation cycles, (3) crop growth, and (4) changes in the marine environment due to oil pollution**, etc.

What is multi-wavelength (hyperspectral)?

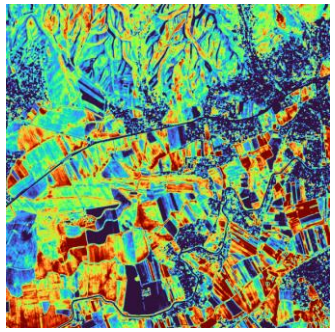
①Panchromatic

Images created in a single broad band. Black and white images suitable for high resolution.

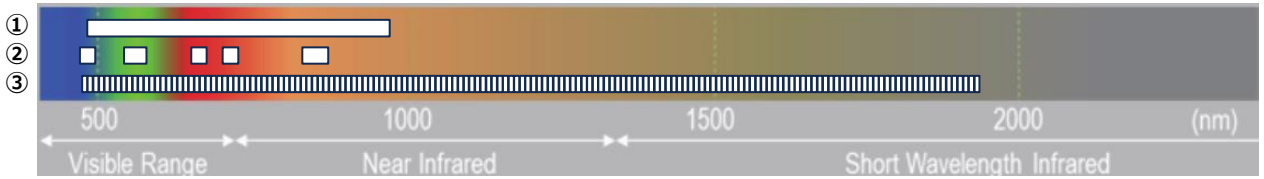
②Multi

An image created with several bands of wavelengths; using RGB produces an image equivalent to vision.

③Multi-wavelength



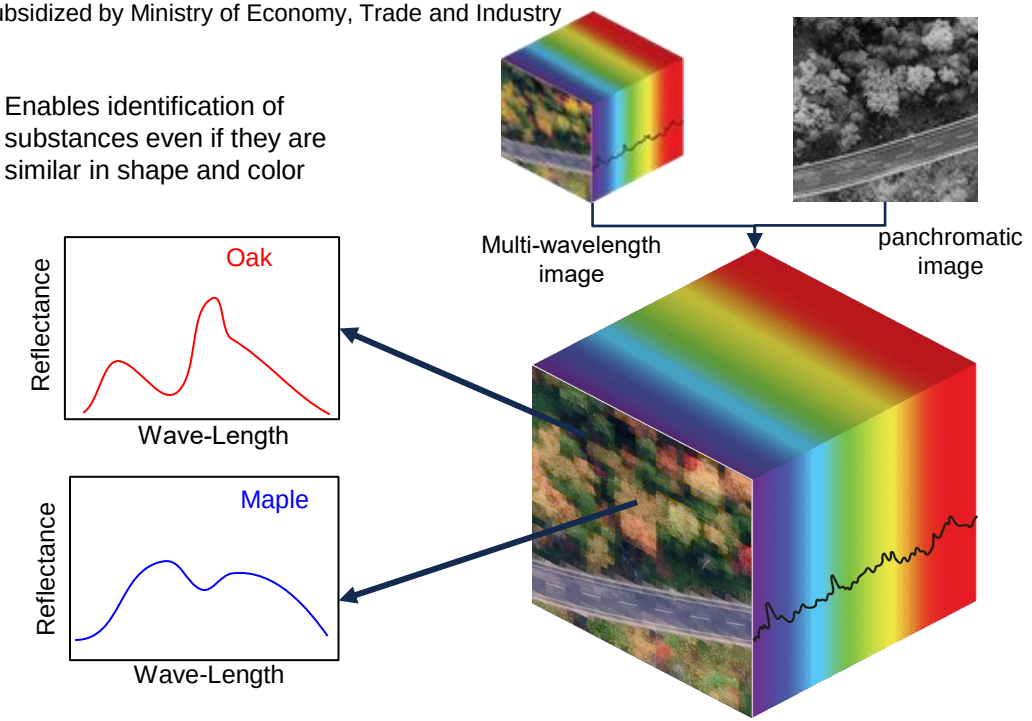
Continuous imaging of more than several dozen wavelength bands. Can be used for different purposes, such as classifying minerals and plants.



Developing a micro satellite equipped with a multi-wavelength sensor and a panchromatic camera (scheduled for launch in 2027)

Subsidized by Ministry of Economy, Trade and Industry

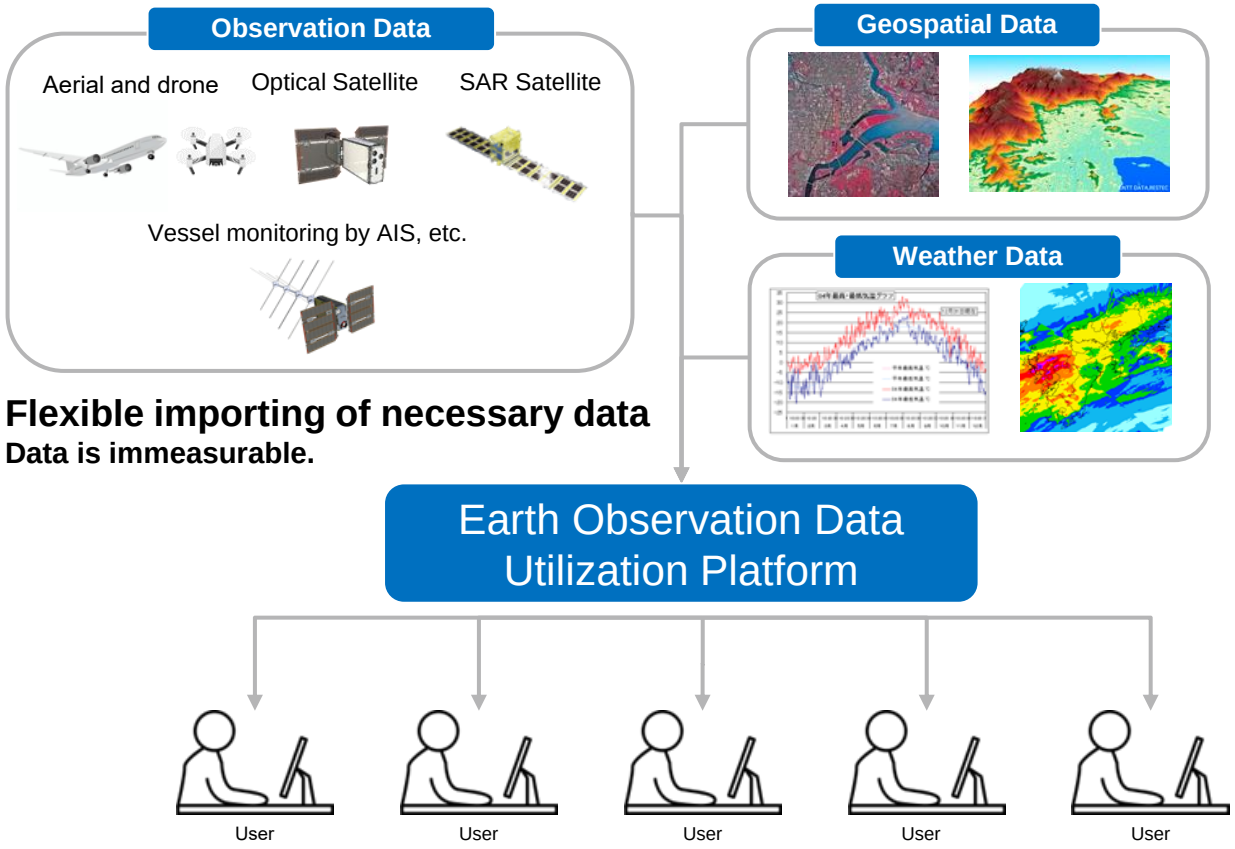
Enables identification of substances even if they are similar in shape and color



Aim to develop and on-orbit demonstration of a mass-producible camera system with high wavelength and spatial resolution and a micro satellite.

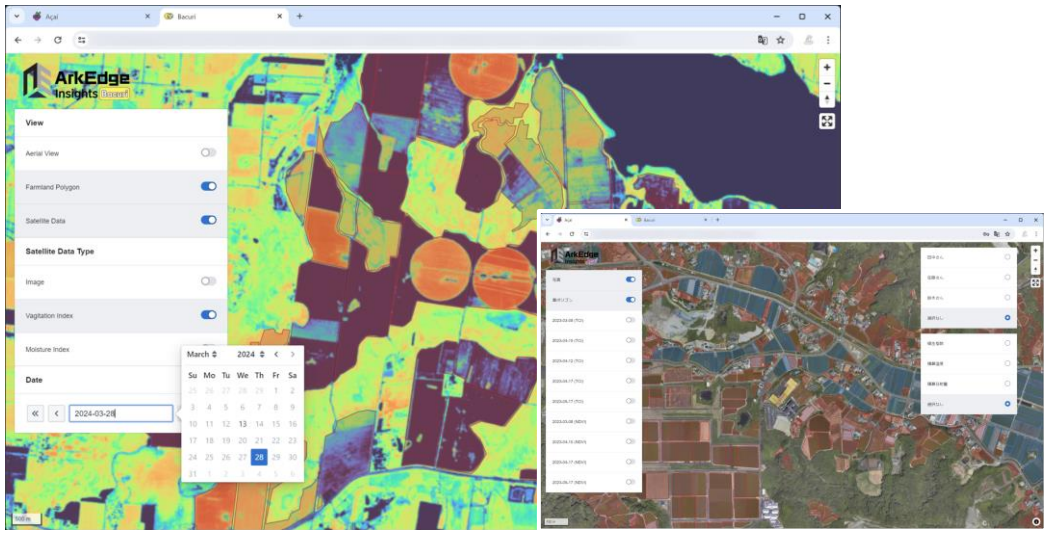
Earth Observation Data Utilization Platform

- ✓ Visualization of geospatial data, satellite data, etc. in various meshes to meet users' objectives
- ✓ Able to extract time-series changes by accumulating historical data.
- ✓ Intuitive web-based GUI makes data analysis, which used to require specialized knowledge, possible with simple operations.



Flexible importing of necessary data
Data is immeasurable.

Outputs can be tailored to meet each user's objectives



Feature

- Open platform development ensures scalability
- Individually customizable to maximize convenience for actual users.

Future

- Establishment of operations based on platform use through collaboration and discussions with users involved in agriculture, forestry, etc. in Paraguay and Brazil.
  (Plans are in place to expand the platform to other regions in Japan and overseas that have similar needs.)
- Respond to a wide range of user needs through additional input of images and data acquired by our nano-satellite constellation and other satellites that we plan to launch in the future.

Development and operation of a ground station for satellite control

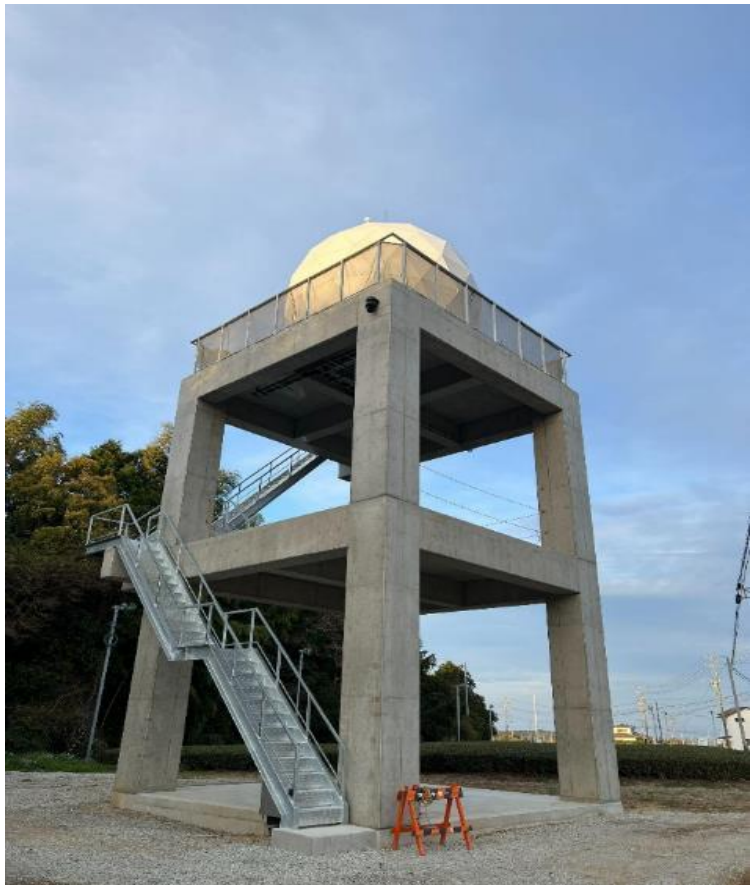
- ✓ ArkEdge Space's own ground station for satellite control (Makinohara City, Shizuoka Prefecture)
- ✓ Fully operational from May 2023
- ✓ The station can provide ground station services as well as control of its own satellites

Outline of Makinohara Ground Station

- Antenna height: 10m
- Parabolic antenna diameter: 3.9m
- Supported frequency bands
  （Frequency bands supported (S-band up/down, X-band down only, Ka-band down only)
- Equipped with a radome (for all-weather use)
- High-speed leased line connection to our head office in Ariake,
- Satellite operation is possible remotely via a high-speed dedicated line connected to the head office in Ariake.

Operation room in Tokyo HQ

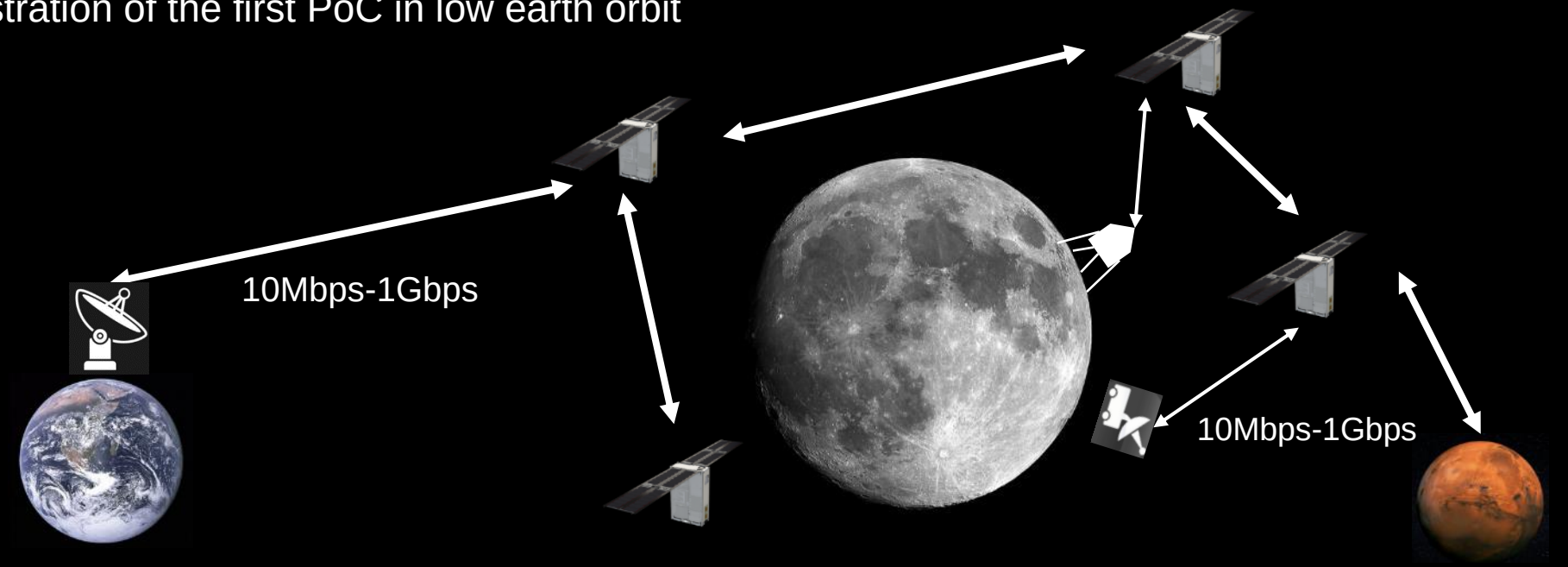
Grand Station in Makinohara, Shizuoka



Outlook of Ground Station in Makinohara
(Completed in March 2023)

ArkEdge Space's Lunar Infrastructure Initiative

Demonstration of the first PoC in low earth orbit



High-capacity communications

Enables systems that explore and utilize the lunar surface, lunar orbit, and deep space to communicate at several tens of Mbps ~ several Gbps without the need for large antennas.

Real-time communication

Enabling real-time communications, security of lunar activities, sustainable economic activities, and efficient resource and scientific exploration (lunar and deep space)

implementation method

- Nano-Satellite Constellations
- Optical communication technology
- Inter-satellite and inter-lunar satellite communication technology
- Positioning technology

Moon Infrastructure - Communications and Positioning as the Infrastructure for Business

With increasing investment in lunar surface activities, it’s essential to establish communication and positioning systems.

1. Moon transportation Toyota

Developed a "manned pressurized rover" using fuel cell vehicle (FCV) technology in collaboration with JAXA. Plans to make it possible to travel more than 10,000 km on the lunar surface.

Competitor: General Motors of the U.S.

Source: "Toyota Press Release" https://global.toyota/jp/newsroom/corporate/26986678.html

2. Energy HONDA

Research is underway, in collaboration with JAXA, on a circulating renewable energy system for the manned lunar orbiting base "Gateway" and lunar rover, utilizing HONDA's high-pressure water electrolysis and fuel cell technologies.

Competitor: Takasago Thermal Engineering Co.

Source: "Honda Press Release," https://www.honda.co.jp/news/2021/c210614.html

3. Construction Obayashi Corporation

Plans and basic experiments of underground buried inflatable structures as a construction method on the Moon, and deployment of unmanned construction technology to the Moon.

Competitors: Kajima Corporation, Shimizu Corporation

Source: "Lunar Industry Vision."https://ispace-inc.com/wp-content/uploads/2021/07/LunarIndustryVision_Full_JP-lowres_ver1.1.pdf

4. Entertainment Toppan x avatarin

The world's first technology demonstration of avatars installed in the Japanese Experiment Module of the ISS and operated by the general public. Demonstration at manned bases on the Moon and in lunar orbit is also planned.

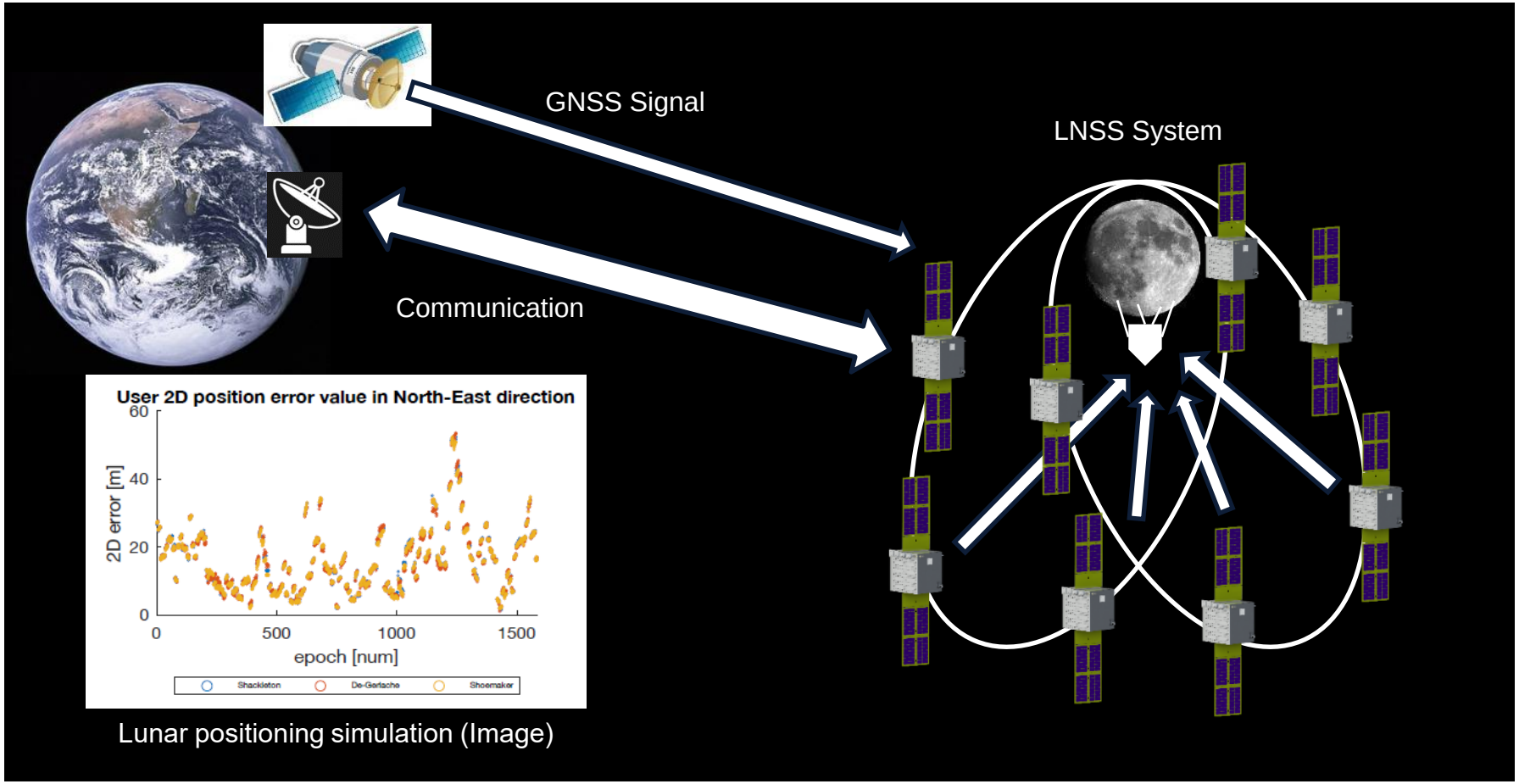
Competitor: Yspace

Source:”avatarin press release" https://about.avatarin.com/info-news/news-release/593/

Moon Positioning and Communications Initiatives

✓ Selected as a contractor for JAXA's "Study on Development of Positioning and Communications Technologies for Activities on the Moon and the Moon's Surface".

- Examination of satellite constellations that provide positioning and communication services to the vicinity of the Moon.
- Examination of satellite system for lunar positioning demonstration mission



Lunar positioning simulation (Image)

Comet Interceptor - Scientific Exploration Mission with International Cooperation

✓ Joint mission between ESA and JAXA to directly explore long period comets for the first time in the world.

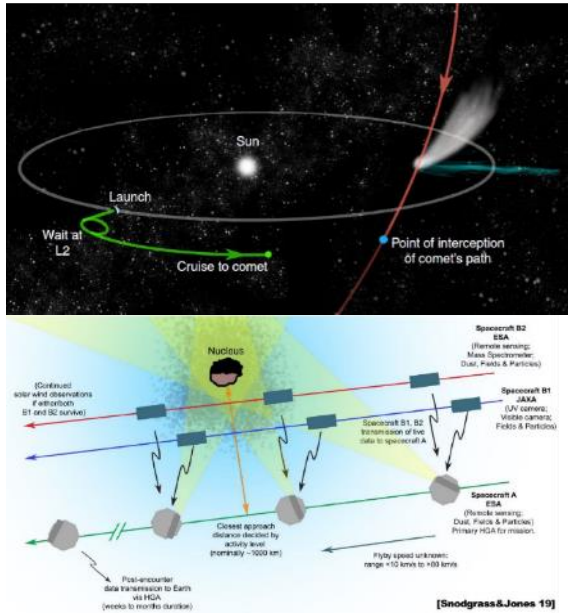
✓ JAXA plans to provide one ultra-small spacecraft (child B1), and our company was selected as the contract partner (spacecraft system development manufacturer) for the spacecraft development on November 14, 2022.

- First case of a Japanese space startup developing a deep space probe for JAXA

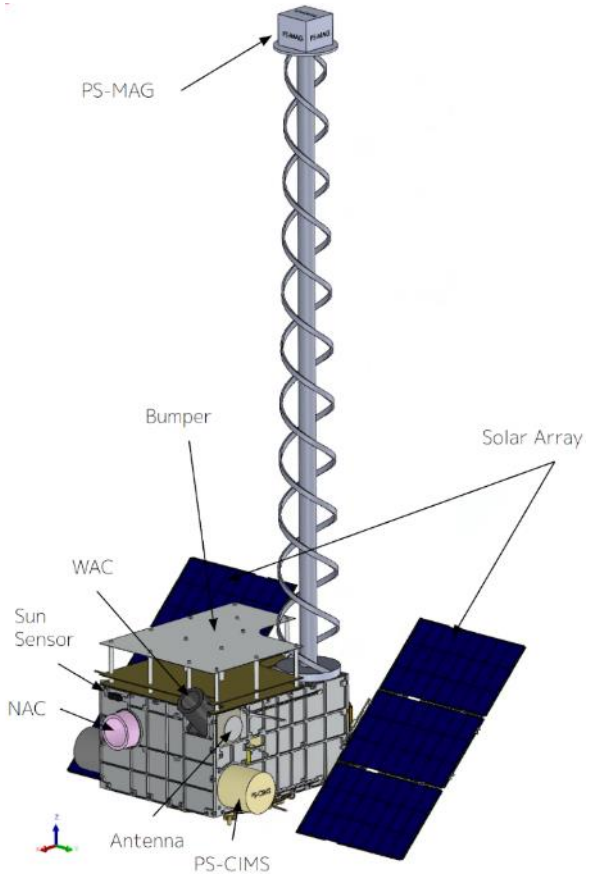
✓ Schedule

- 2026：Delivery of spacecraft to ESA
- 2029: Launch-
- ~2035: Fly-by exploration to long-period comets

Mission Logo



Operation Sequence



Spacecraft Appearance

Thank you