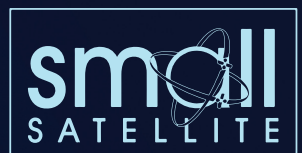


# JAPAN BOOTH

A CONSORTIUM OF SPACE INDUSTRY BUSINESSES LOCATED IN JAPAN

hosted by: *Japan Space Systems*

- ARKEDGE SPACE p.3
- CRYSTAL OPTICS & KIYOHARA OPTICS p.5
- IHI AEROSPACE p.7
- INTERSTELLAR TECHNOLOGIES p.9
- KAWASAKI HEAVY INDUSTRY p.11
- KYOCERA CORPORATION p.13
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- WARPSPACE p.23
- JAPAN SPACE SYSTEMS p.25



CONFERENCE  
AUGUST 6-11, 2022

LOGAN, UTAH

# JAPAN BOOTH

## ABOUT THE JAPAN BOOTH

The space industry is experiencing a global boom and perhaps nowhere more so is that apparent than in Japan where scientists, engineers, and entrepreneurs are the driving force behind the world-renowned brands, universities, and growing numbers of start-ups that are at the fore front of technology with developing solutions that is shaping the future by increasing and maximizing access into space.

Here, at SmallSat 2022, Japan Space Systems have brought together some of the most innovative technologies being developed in Japan. Visit the Japan Booth, located inside the Field House, to meet engineers and scientists who are developing everything from thrusters, bus components, and lenses to launch solutions, data management and analysis, and so much more.

### MONDAY, AUGUST 08, 2022

Start 3:30PM

#### Overview of Japan's Space Industry

**location: LSB 207**

The Space Industry Office at Ministry of Economic, Trade and Industry (METI) is hosting an information session to present an overview of the Japanese space industry. Topics include:

- Supply chains and logistics
- inter-satellite and satellite-ground optical communication technology
- VDES satellite
- Remote sensing satellite data platform and data sharing
- Hyper & multi spectrum satellite data utilization
- Radiation test ecosystem
- Satellite-system Cybersecurity guideline
- Space robotics
- Lunar exploration technology
- Space solar power system

### TUESDAY, AUGUST 09, 2022

Start 9:45AM

#### Japan Tech Show (VOL 1)

**location: ESLC 46**

- Crystal Optics and Kiyohara Optics
- IHI Aerospace
- Kawasaki Heavy Industries
- Takasago Fluidic Systems
- ArkEdge Space

Start 3:30PM

#### Japan Tech Show (VOL 2)

**location: ESLC 46**

- KYOCERA CORPORATION
- Interstellar Technologies
- NIKON
- WARPSPACE
- Mitsubishi Electric TOKKI Systems





ArkEdge Space Inc.  
 6F Nihonbashi Mitsui Tower  
 2-1-1 Nihonbashi Muromachi  
 Chuo-ku, Tokyo, JAPAN  
[arkedgespace.com](http://arkedgespace.com)

**ABOUT:** Headquartered in Tokyo, Japan, with rapidly expanding facilities, ArkEdge Space Inc. is an emerging force in the space 2.0 industry that specializes in the design, manufacture, and rapid delivery of low-cost nanosatellites capable of deployment in low earth constellations, and even for deep space exploration missions.

Our 3U and 6U CubeSats are designed using modularized bus sections that can be integrated with your mission equipment. They also come standard-equipped with LoRa to support IoT anywhere, especially for geographic locations with little or no ground infrastructure.

The capability for multiple configurations of our 3U and 6U CubeSats enable them to operate alone or within constellations. They are cost-effective solutions that are ideally suited to perform multiple missions across a wide range of business industries, from geological surveys to monitoring rapidly shifting environmental conditions.

Furthermore, because we've reduced our costs by streamlining our designs and optimizing our manufacturing process, we're able to provide you with an unprecedented saving that will allow you to get into space faster.

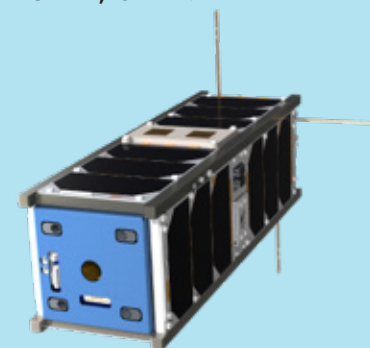


Members of the satellite design and development team for ArkEdge Space, hard at work in our Tokyo based lab.

### 3U

Based upon the TRICOM-1R from the Intelligent Space System Laboratory (ISSL) at the University of Tokyo, the 3U weighs 3kg and is approximately the size of a soda bottle. The 3U is equipped with a 20m GSD multi spectral camera and a sub-camera, along with a data storage and relay (S&F: Store & Forward) system for the acquisition of weak radio signals.

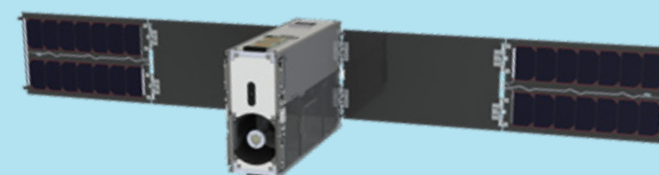
*Flight Heritage: RWASAT-1, OPTIMAL-1*



### 6U

Developed by ArkEdge Space in collaboration with ISSL, the 6U nanosatellite is smaller than a desk drawer and comes well equipped with a satellite bus system containing precision attitude control technology. In addition, the 6U is capable of performing highly advanced, medium-resolution imaging for Earth-based missions as well as for missions to Mars or even beyond.

*Flight Heritage: ONGLAISAT*



#### ArkEdge team attending SmallSat 2022



**Akira Tatsuno**  
 General Manager  
 Business Development  
[tatsuno-akira@arkedgespace.com](mailto:tatsuno-akira@arkedgespace.com)

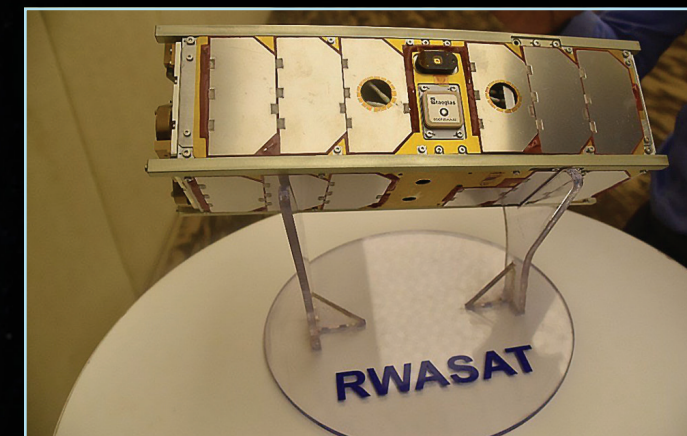


**Ryo Suzumoto**  
 General Manager  
 Software & Infrastructure Department  
[suzumoto-ryo@arkedgespace.com](mailto:suzumoto-ryo@arkedgespace.com)

Please visit us at the Japan Booth to say hello and ask about our products and capabilities that ArkEdge Space can provide.

### ArkEdge Collaborations

Our 3U is the platform for the Rwanda Satellite 1 (RWASAT-1) which was developed as part of the engineer training program for the Rwanda Utilities Regulatory Authority. In collaboration with the Rwanda Space Agency, ArkEdge Space conducted satellite systems operations for RWASAT-1 and performed a demonstration of its S&F capabilities.



ArkEdge Space established a cooperative framework with the United Nations Development Programme (UNDP) and the African Union for the achievement of Sustainable Development Goals (SDGs), and signed a Memo of Understanding (MOU) with Smart Africa.



ArkEdge Space CEO, Takayoshi Fukuyo meeting with Egypt Space Agency (EgSA) CEO, Dr Mohammed El-Quosy.



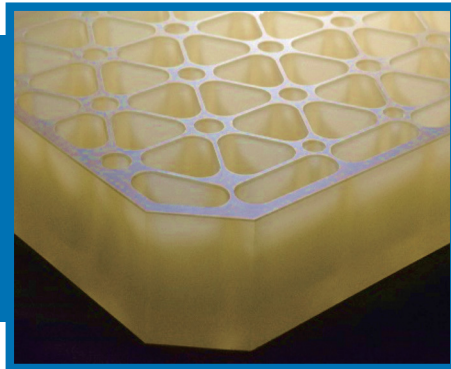


Proud partners of Crystal Optics

World renowned for our high standards of quality, Kiyohara Optics is an industry leading optics manufacturer with more than sixty years of seasoned experience in the design, development, and manufacture of finely tuned optics and precision optical components.

We specialize in providing built-to-order manufacturing to meet the most exacting expectations. Whether your mission is research and development or you need subject-matter expertise in the development of optics for a prototype, Kiyohara Optics is your choice for quality.

Please feel free to ask about any of our products and capabilities with optical design, opti-mechanical design, precision machining, optical manufacturing, assembly, mechanical and optical testing.



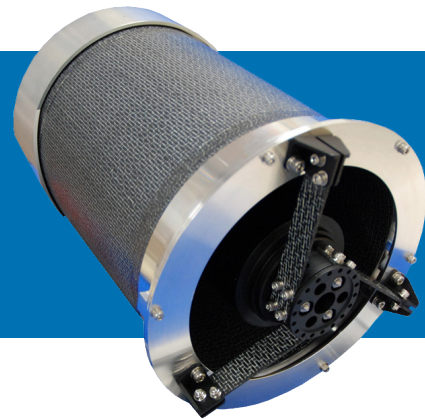
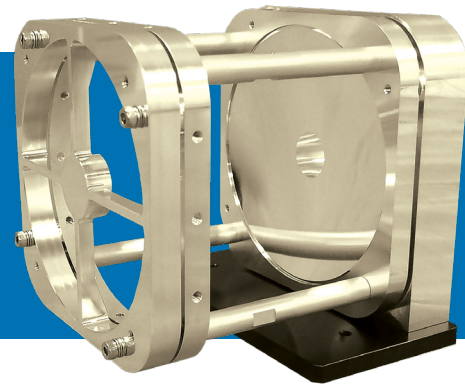
### OPTICAL SATELLITE RIB STRUCTURE

*Deployed into JAXA ALOS-3*

The sensor onboard ALOS-3 is designed for an improved ground resolution (0.8m) and wide-swath (70km) simultaneously by expanding the size and upgrading performance compared to that of ALOS

### OPTICAL COMMUNICATIONS TERMINAL (OCT)

KIYOHARA OPTICS Inc. has begun developing an Optical Communication Terminal (OCT) to support laser communication capabilities for next-generation small satellite constellations.



### SPACE TELESCOPE

*Deployed into LEO as part of HODOYOSHI-4 sat*

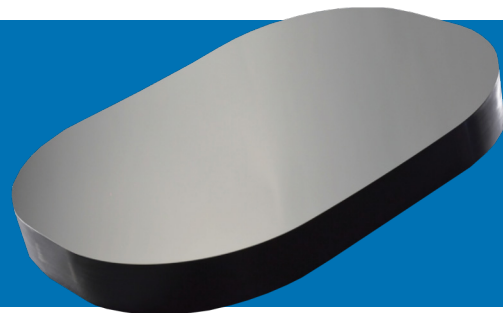
Designed and developed specifically for configuration and integration with small satellites

GSD : 6m
Primary dia : $\phi$ 150mm
FL : 1000mm
Total unit weight : 3.8kg

### LARGE STAINLESS TOROIDAL MIRROR

*Developed for ITER fusion energy*

Size: 400x300mm



*Crystal Optics*

*Qualified Masters in the extremely delicate process of ultra-precision polishing*

*Armed with the arsenal of cutting-edge technology developed and housed within our state-of-the-art, 5-axis composite machining center, Crystal Optics is the aerospace industry's leading solutions provider for precision polishing and quality assurance.*

*Crystal Optics*



visit our website

kiyohara



visit our website



Kosuke Kiyohara  
Executive Officer  
KIYOHARA OPTICS Inc.  
kosuke.kiyohara@koptic.co.jp

For More Information: [sales@koptic.co.jp](mailto:sales@koptic.co.jp)

For More Information: [web\\_sales@crystal-opt.co.jp](mailto:web_sales@crystal-opt.co.jp)



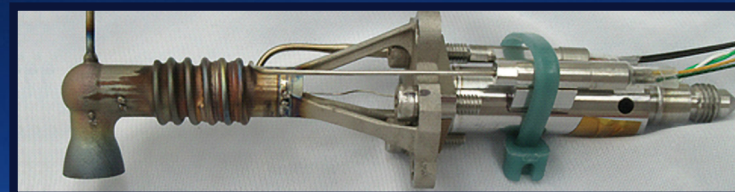
# IHI AEROSPACE Co., Ltd.

Established in 1953, IHI Aerospace is Japan's leading manufacturer of propulsion systems for launch vehicles and spacecraft. Our robust product line of thrusters, tanks, and integrated propulsion systems can seamlessly integrate to fit any design, development, manufacturing, operational, or mission specification.

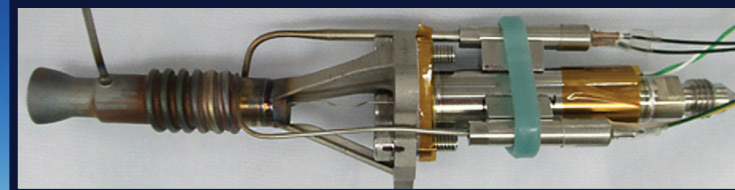
With our additive manufacturing technology you will enjoy greatly reduced lead times and lowered costs. So, whether you require monopropellant, cold-gas, bipropellant, or an electric propulsion system, IHI Aerospace has the perfect flight-qualified propellant solution for you.

## 0.5N GREEN PROPELLANT THRUSTERS

- Our 0.5N thruster was developed in partnership with JAXA.
- Our additive manufacturing process reduces both lead time and the number of component parts.
- Both our canted and straight nozzle 0.5N thrusters are qualified.



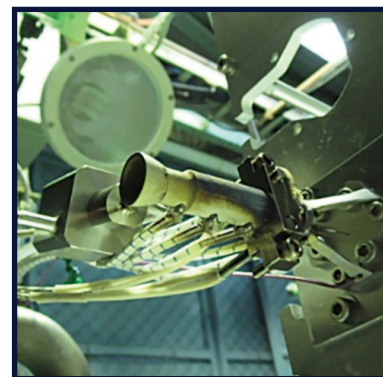
Canted nozzle



Straight nozzle



Takashi Arime  
t-arime@iac.ihico.jp



## GREEN PROPELLANTS

Our green propellants are available for 0.5N thrusters and our additive manufacturing technology allows us to offer them at competitive prices. Currently, our 4N and 22N thrusters, along with other thruster options, are under consideration for future development with green propellants.

## Propulsion Subsystems

IHI Aerospace is one of the largest Japanese manufacturers of spacecraft propulsion systems and has developed a large number of propulsion subsystems since 1964. Flight proven propulsion systems include hydrazine monopropellant propulsion systems, cold gas propulsion systems, and bipropellant (hydrazine/MON or MMH/MON) propulsion systems.

IHI Aerospace's space propulsion product line includes thrusters, tanks and propulsion system integrations that satisfy customers' needs in spacecraft design, development, manufacturing, and operation.

Scan to download our propulsion subsystems brochure



## Bipropellant Thrusters

IHI Aerospace's development of our apogee engines with N<sub>2</sub>H<sub>2</sub>/NTO propellant began in 1980. Since then, their excellent performance and reliability have been well recognized by US satellite manufacturers. Over 140 hydrazine/MON3 thrusters have been flown and been successfully operated.

IHI Aerospace has also developed 120N(27lbf) and 490N(110lbf) MMH/MON3 thrusters for the International Space Station cargo spacecraft, HTV(H-II Transfer Vehicle), as well as its propulsion subsystem.

Scan to download our bipropellant brochure



## Pressurant and Propellant Tanks

IHI Aerospace has developed a wide range of propellant tanks and pressurant tanks for launchers and satellites since the start of development in 1964. Over 250 propellant tanks have been flown and been successfully operated.

IHI Aerospace's product line covers a wide range of tanks from 3 to 1494 liters in volume and from diaphragms to surface tension channel mesh propellant management devices (PMDs).

Scan to download our propellant tanks brochure



## Monopropellant Thrusters

More than 1,000 hydrazine monopropellant thrusters manufactured by IHI Aerospace have been flown since the start of development in 1964. Its thrust ranges from 1N(0.2lbf) to 50N(11lbf).

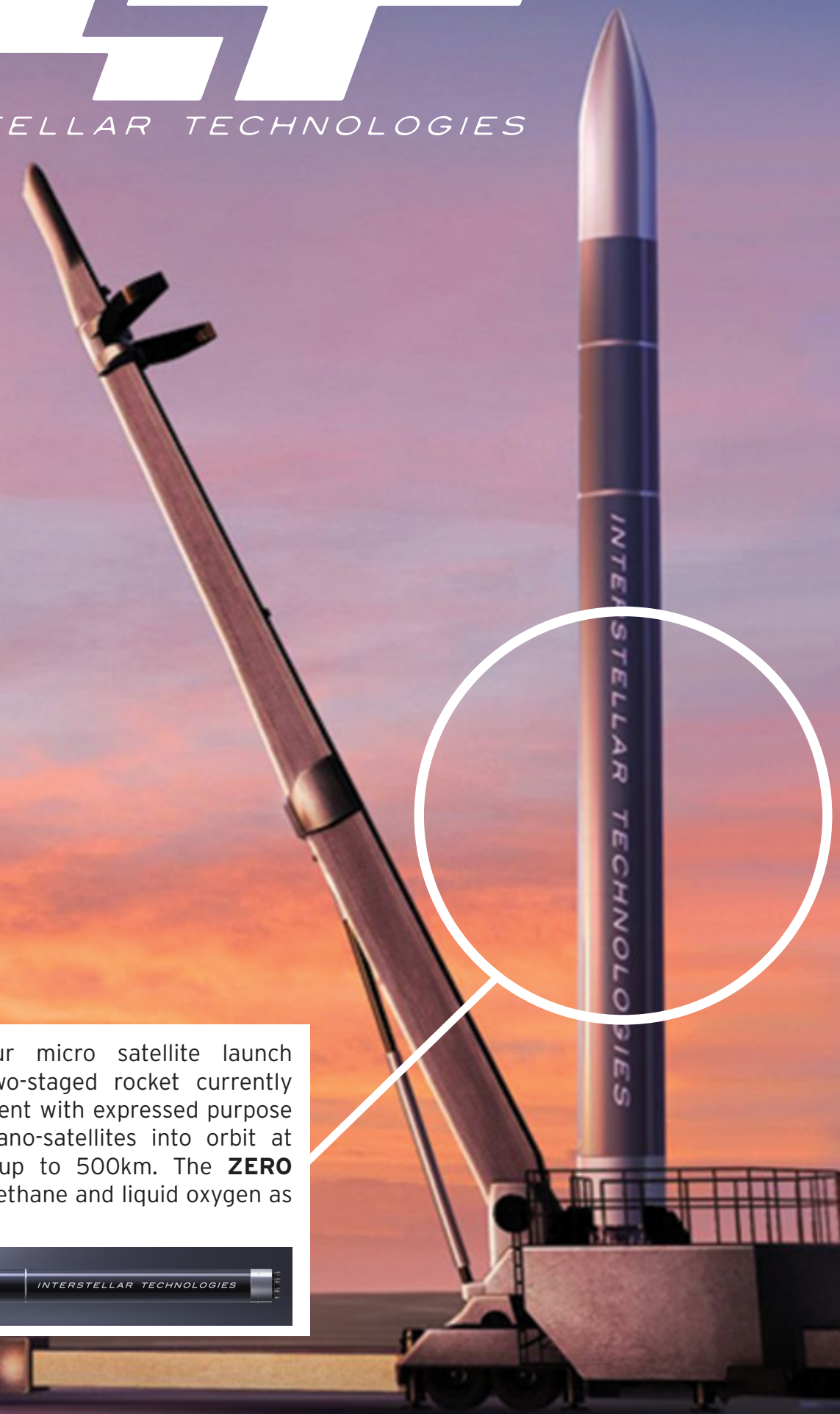
Scan to download our monopropellant brochure



Be sure to visit IHI Aerospace at booth 57 in the TSC and learn about launch opportunities with our Epsilon launch vehicle.

[www.ihico.jp/ia/en](http://www.ihico.jp/ia/en)



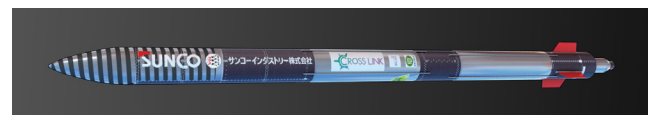


Interstellar Technologies Inc. is the world's leading launch services provider dedicated to micro satellite operators.

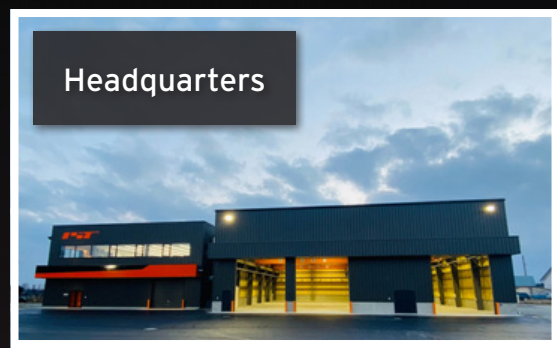
After the successful launch of our MOMO sounding rocket in 2021, our focus has been on developing our new micro satellite launch vehicle, ZERO, which is slated for launch early 2024.

Based in Japan and located in Taiki, Hokkaido, our facilities offer a Complex-1, LC1 capability, with construction underway for LC2 capability. Open to the East and South, our launch facilities provide the perfect location for reliable and cost-effective launch operations into space for both LEO and SSO.

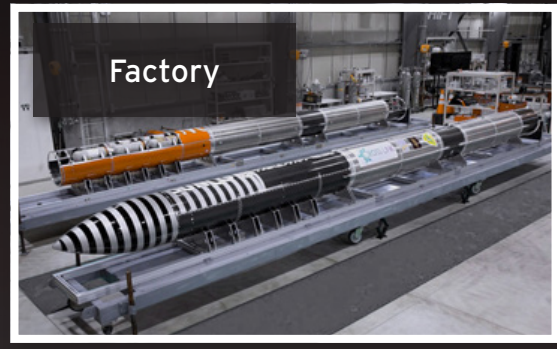
The **MOMO**, our single-stage sounding rocket, is capable of ballistic flight through space up to an altitude of 100km. The **MOMO** uses ethanol and liquid oxygen propellants, and lands on the ocean. To date, the **MOMO** has conducted scientific experiments in micro gravity environments in collaboration with national universities and it has released payloads in space in collaboration with private companies.



The **ZERO**, our micro satellite launch vehicle, is a two-staged rocket currently under development with expressed purpose of inserting nano-satellites into orbit at an altitude of up to 500km. The **ZERO** employs pure methane and liquid oxygen as propellants.



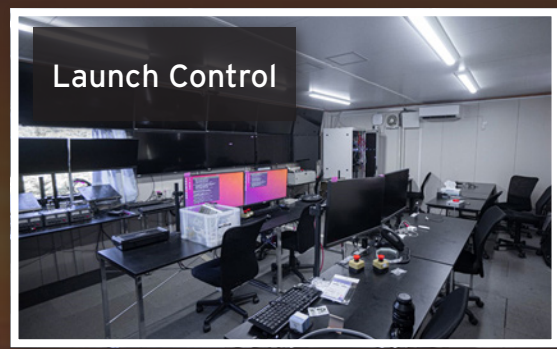
Headquarters



Factory



Launch Site



Launch Control

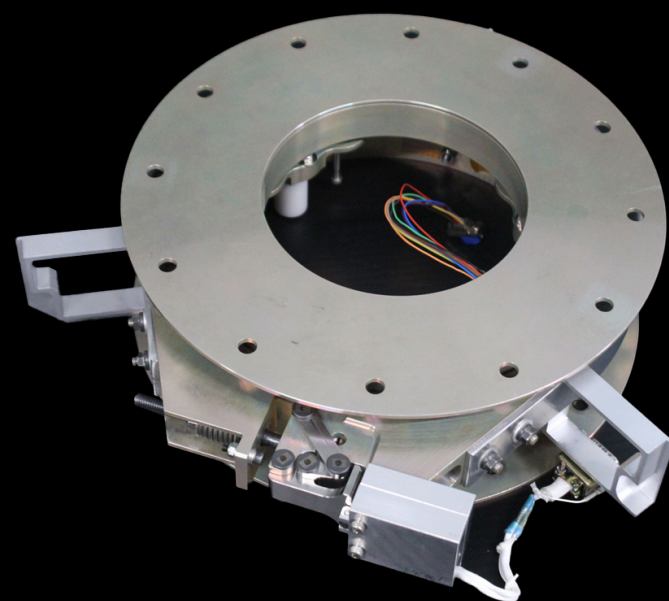
**Interstellar Technologies**  
149-7 Memu, Taiki, Hiroo-gun  
Hokkaido, JAPAN  
[info@istellartech.com](mailto:info@istellartech.com)  
[www.istellartech.com](http://www.istellartech.com)



# Kawasaki

## Powering your potential

<https://global.kawasaki.com>



### Simple PAF

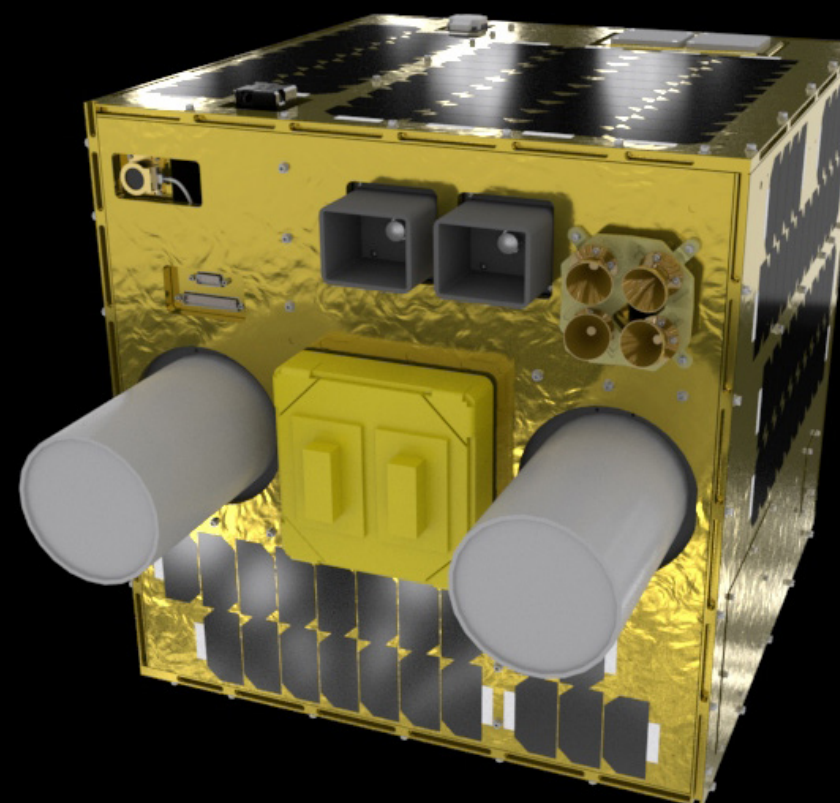
- Provides a solid connection between launch vehicles and small satellites weighing up to as much as 250kg.
- Can be configured for integration with any variety of launch vehicle.
- Upon signal from the rocket, they separate and release the spacecraft into orbit.

Type		Simple PAF 8M	Simple PAF 15M	Simple PAF 239M
<b>Mechanical I/F with satellite</b>	Pitch diameter	203.2mm (8in)	381.0mm (15in)	246.0mm
	Number of bolts	12	24	8
	Bolt standards	NAS 6204: 1/4 in Hex Head Bolt		
Electrical I/F with satellite		Separation confirmation SW: 2 or 3 (optional) UMB: Optional		
Satellite frame mass		0.4kg*1	0.9kg*1	0.6(TBD)kg*1
<b>Mechanical I/F with rocket</b>	Pitch diameter	203.2mm (8in)	381.0mm (15in)	271.0mm
	Number of bolts	12	24	8
	Bolt standards	NAS 6204: 1/4 in Hex Head Bolt		
<b>Electrical I/F with rocket</b>		Two operating lines: standard Separation confirmation SW: 2 (optional) UMB: Optional		
Satellite release spring		3 or 6	3, 6, or 12 pieces	3 or 6
Band tightening force		6 kN or 8.4 kN		
Total mass		2.4kg*1	3.2kg*1	3.5kg*1

Note \*1: Excluding some devices (Satellite emission spring, Limit SW, Umb connector)

## DRUMS

Debris Removal Unprecedented Micro-Satellite (**DRUMS**) has been developed to demonstrate basic technology required for in-orbit services, including debris removal. DRUMS releases the target, then, DRUMS separates from the target once to a certain distance and approaches the target while measuring the relative position with a camera. When the target is close enough to be captured, DRUMS activates the capture mechanism to perform simulated capture of the target.



Size	600mm*600mm*800mm
Mass (Wet)	< 65kg
Orbit	SSO, 540-570km
Launch Date	11/9/2021
Demonstration Content	On-orbit demonstration of approach and capture technologies to a non-cooperative target.
Mission	DRUMS releases a small, non-cooperative target as simulated space debris, then approaches the target and touches it.



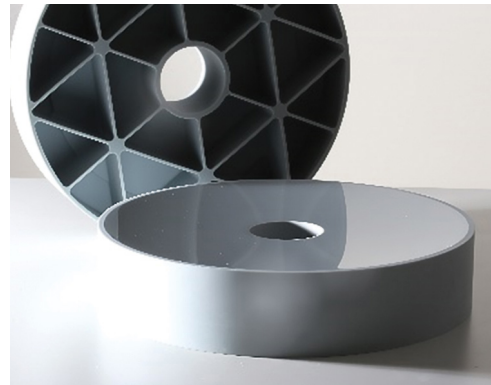
"Feel free to ask me about the mechanical connection and separation operations of our Payload Attachment Fitting (PAF).

I am very happy to answer any question you may have."

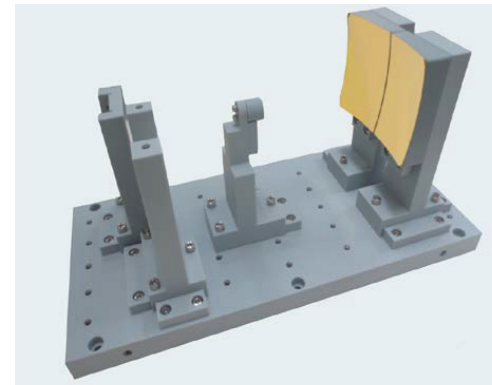
**Youichi Horie**  
horie\_youichi@khi.co.jp

Kawasaki Heavy Industries, Ltd.





**Low Thermal Expansion Cordierite**  
Superior mechanical strength enables lightweight mirrors with less deflection.



**Cordierite Optical System**  
Low thermal expansion mirror and structural parts are both made from one material, cordierite.



FINE CERAMIC  
COMPONENTS

Kyocera



**Light Weight**

Approx. 70% Weight reduction via ribbed structure design with high rigidity



**Structural Components**

Cordierite is applicable to structural components by its superior mechanical property



**Low Thermal Expansion**

Dense cordierite ceramic with extremely low thermal expansion rate  
CTE = 0 +/-20ppb at 22°C

**HISTORY**

For more than 60 years, Kyocera has endeavored to develop innovative new solutions and apply technological expertise in advanced materials to create valuable products that facilitate human progress.

In its four primary markets - Information & Communications, Automotive, Environment & Energy, and Medical & Healthcare - Kyocera is committed to creating value that exceeds customer expectations. The Kyocera brand promises performance in the areas of technological strength, superior quality, and reliability.

The Kyocera Group is comprised of 286 subsidiaries with a global workforce of over 76,000 employees, and consolidated sales revenue totaling 1.62 trillion yen (approx. USD 14.6 billion) FY2022.

**BUSINESS**

Kyocera is one of the world's leading manufacturers of high precision, high quality ceramic components and products. Kyocera manufactures over 200 varieties of ceramic materials for a wide range of applications with cutting edge technology and services designed to meet each customer's needs.

In the field of aerospace exploration, Kyocera has made numerous contributions through its superior quality materials, exemplified by the low thermal expansion ceramic material, cordierite, and other components including telescope mirrors, terminals for lithium-ion batteries, tank penetration flanges, and much more.



**Cordierite Telescope**

With superior mechanical properties, cordierite is suitable for structural parts.

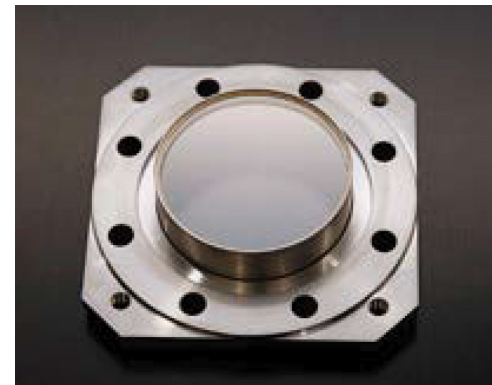


**SiC Mirror and Structural Parts**  
Kyocera develops SiC mirrors and structural parts for use in outer space.



**Li Ion Battery Seal**

Assembled metallization technology for a ceramic and metal parts.



**Sapphire Monitoring Window**

Usable under an ultra high strength vacuum.

Scan here to visit our website and learn more about our fine cordierite low thermal expansion ceramic.



THE NEW VALUE FRONTIER



**Masa Kamiura**  
(Japan Contact)  
masatsugu.kamiura.gt@kyocera.jp

**Shinobu Nagata**  
(US Contact)  
shinobu.nagata@kyocera.com



## OVERVIEW

### Flexible frequency function on Telemetry Transmitter and Command Receiver

Phase 1: Settable at MELOS before shipping

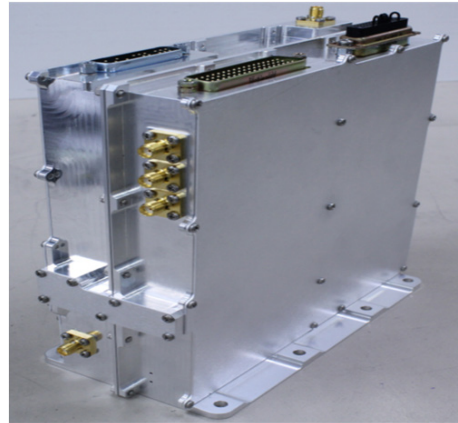
Phase 2: Settable at customer's facility after receiving

Phase 3: Selectable in-orbit by command

### GaN SSPA has high output power with good efficiency

L-band SSPA with 200W output and C-band SSPA with 100W output with GaN single-end amplifier

### Flexible Ku-band Telemetry Transmitter



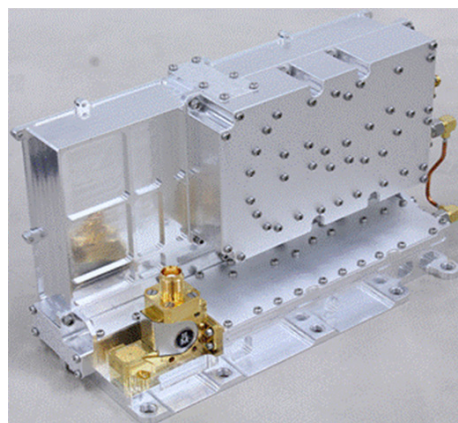
Frequency Range: 10.7 to 12.8 GHz  
Frequency Variation: 500 MHz/Range, 1.15 kHz/Step  
Frequency Stability: +/- 0.225 ppm  
RF Output Power: 9 Watt  
Size: 177 x 85 x 176 mm  
Mass: 1.6 kg

### Flexible Ku-band Command Receiver

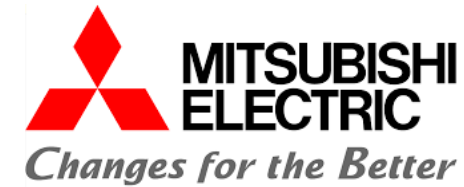


Frequency Range: 13.8 to 14.5 GHz  
Frequency Variation: 30 MHz/Range  
Input Dynamic Range: -60 to -113 dBm (PSK-FM)  
Range: -60 to -120 dBm (PSK-PM)  
Command Bit Rate: 205 to 4,000 bps  
Command BER: <math>1 \times 10^{-7}</math> @1 kbps  
Size: 231 x 39 x 173 mm  
Mass: 1.3 kg

### GaN C-band SSPA



Frequency: 3.7 to 4.2 GHz  
Output Power: 100 Watt  
Gain: 96 dB max  
PAE: 50% with DC/DC converter  
Size: 227 x 99 x 127 mm  
Mass: 1.4 kg



Mitsubishi Electric TOKKI Systems Corporation

## FACILITIES



Wire Bonder



Automated Test Equipment



Thermal Vacuum Chamber

MELOS's manufacturing facilities in Kamakura have all the necessary equipment for the manufacture and testing of RF equipment for space missions. Customers should bear no concern for being behind the schedule for capacity throughput issues. The clean room has a size of approx. 1,200m<sup>2</sup> and the cleanliness standard is in accordance with FED-STD-209E (Class 100K). Temperature and humidity is strictly controlled and ESD countermeasures are fully taken.



## OTHERS

MELOS has a good product heritage with over 2,750 onboard components, such as Telemetry and Beacon Transmitters, SSPAs, Command Receivers, LNAs, Receivers, Up/Down Converters, also DC/DC converters and Pyro Drive Units.



### CONTACT

hideyuki.tsuji@east.melos.co.jp

## FOR MORE INFORMATION

URL: <http://www.melos.co.jp/english/products/>

Contact Point: [hideyuki.tsuji@east.melos.co.jp](mailto:hideyuki.tsuji@east.melos.co.jp)

Address: 730-11 Kamimachiya, Kamakura-shi, Kanagawa 247-0065 JAPAN



# Nikon Space Camera NSC-1



	High Resolution MODEL	Wide Swath MODEL
Size	φ620mm φ880mm	Φ240mm×600mm
Mass	≤ 30kg	≤ 13kg
F-number	8.9	6.3
GSD	≤ 1.0m (altitude: 500km)	≤ 2.2m (altitude: 500km)
Swath	≥ 8.5km (altitude: 500km)	≥ 22.5km (altitude: 500km)
Mode	Monochrome , Color 12bit RAW output JPEG12/10/8 bit	Monochrome , Color (optional) 12bit RAW output JPEG12/10/8 bit
Use	<ul style="list-style-type: none"> <li>• Urban Monitoring</li> <li>• Natural Disasters</li> <li>• Security</li> <li>• Situational Awareness</li> </ul>	<ul style="list-style-type: none"> <li>• Agriculture, Forestry</li> <li>• Ocean Monitoring</li> <li>• Oil &amp; Gas, Eruption</li> <li>• Resources e.g., forest, ocean, et al.</li> </ul>
Electrical IF	Image data transfer: LVDS, TMTTC : RS485 Power : 12Vdc	



**Yoshikazu Ueda**  
(Sales)



**Tayuka Hirai**  
(Engineer)



**Sae Fujimoto**  
(Sales)



**Yuto Maeda**  
(Engineer)

Nikon offers two options from which to choose. Whether your mission requires high GSD or a wide swath, the capabilities of the all new NSC-1 provide an unparalleled value.



**Nikon Customized Products Business Unit**  
Shinagawa Intercity Tower C  
2-15-3, Konan, Minato-ku  
Tokyo 108-6290 JAPAN  
Sales.Cp1@nikon.com



# SPACE NTK MAGOKORO PROJECT

"warm heart project"

In partnership with SpaceX through its **Smallsat Rideshare Program**, we provide you with the opportunity to send your loved ones to rest among the stars.

## HOW DOES IT WORK?

1. Contact us to book your loved one's passage aboard the SpaceX Falcon 9.
2. We'll ship you a package containing a prepaid return label and space-grade aluminum capsule for you to transfer your loved one's ashes into.
3. After transferring your loved one's ashes into the capsule, use the prepaid label and package to return ship it to us. We got it from there!
4. Once the launch date, time, and location have been finalized you will be notified.
5. Enjoy knowing your loved one is looking down on you from space. You can track the progress of the launch as well as the location of your loved one's ashes as they fly overhead at an altitude of more than 500km in outer space.
6. Then, after circling the world for approximately 5 years at a speed of more than 28,000km per hour, your loved ones become a shooting star as their ashes reenter the earth's.

## TIMELINE

- 2022 - April: 1st Launch MAGOKORO
- 2023 - January: 2nd Launch MAGOKORO
- 2024 - (TBD): Funeral in space



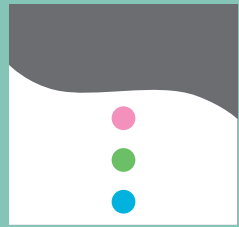
**Tomoko Kasai**  
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[k.tomoko@space-ntk.com](mailto:k.tomoko@space-ntk.com)



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## About

Takasago Electric, Inc. specializes in the manufacturer of miniature, chemically inert valves and pumps. Headquartered in Nagoya, Japan, we have a global presence with factory facilities in China and offices in United States, DBA Takasago Fluidic Systems.

Takasago Fluidic Systems’ (TFS) core strengths are **miniaturization, customization, and integration** and our offerings include the world’s smallest class of products capable of operating using only microliter(s) of fluid volumes and minimizing or completely eliminating waste.

TFS is recognized in the industry as a distinctive player that fulfills the niche demands of its clients.

As a result, we not only supply parts to major global analytical equipment manufacturers but we are partnered with Harvard, Stanford, MIT, and Cambridge as well as NASA and JAXA on technically demanding research projects.



Hello! We are very excited about attending the actual conference this year, for the first time in three years. We are very happy to come back here again.

Please meet us and find the real miniature products of Takasago and YUKI !

## Masahiko Inoue

m-inoue@takasago-elec.co.jp

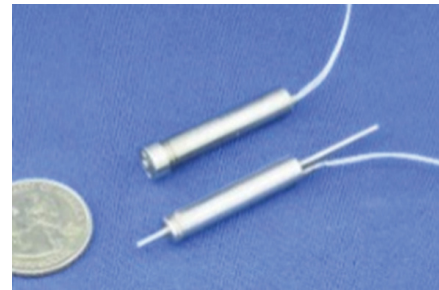
66 Kakitsubata, Narumi-cho, Midori-ku  
Nagoya, Aichi 458-8522, JAPAN

www.takasago-fluidics.com

## SOLENOID VALVES

### Micro Thruster Valve HVA/HVD Series

- 2MPa pressure-rated for HVA, 10MPa for HVD
- 8g weight for HVA, 12g for HVD
- For small satellites / thruster systems



### 20N-class Thruster Valve HVC Series

- 2.8MPa pressure-rated
- Frictionless moving core



### 10MPa High Pressure Gas Valve HVB

Our first flight heritage valve on the ALE-1, ALE-2 Satellites



## COTS Items

### Space Experimental Units

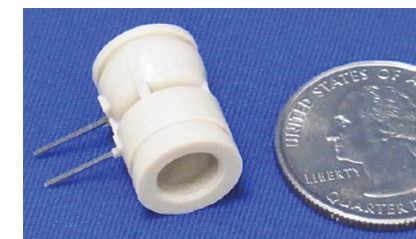


Piezoelectric micro pumps used in the ISS/Japanese Kibo Module



Auto-Ex1, JAXA's automated cell culture media replacement unit, was used in a mission aboard the ISS that was completed successfully 2021.

### EOP for Thrusters



This Electro-Osmotic Pump will generate main thrust for the new micro-thruster currently under developed with Nagoya University.

## THRUSTERS

In partnership with YUKI Precision, TFS has developed a **Green Propellant** small thruster designed cube sats that is suitable for attitude control, de-orbit, and other common spacecraft maneuvering.



**Propellant**  
90% HPT

**Thrust**  
0.2N

**ISP**  
150 - 155sec

**Supply Pressure**  
0.9MPa

**Power Supply**  
3V - 0.4W for holding  
12V - 6.5W for opening

**Heater Power**  
0W (cold start OK)

**Weight**  
31g including valve





#### ABOUT US

With a DNA structured on innovation and a heritage whose origins can be traced back to JAXA and OICETS based projects, as well as supply chain innovations in NewSpace, WARPSPACE aims to become the world's first private company to provide a globally accessible optical communication network in space.

#### PROBLEM

Every year the number of spacecraft launches continue to increase and the demand for communications connectivity grows exponentially. The existing infrastructure for conventional communications is no longer sustainable. The World needs a solution. **The World needs WARPSPACE.**

#### SOLUTION

Based in Japan, WARPSPACE, a privately held company, is a space-tech start-up that is shaping the future of space communications with WarpHub InterSat, the World's first optical inter-satellite data relay network service. WarpHub InterSat provides a cost-effective, high-speed optical link that delivers persistent connectivity for LEO satellites and enables uninterrupted space-to-ground communication in near real-time.

#### MARKET

WarpHub InterSat is an ideal solution for any satellite operators, private or public, government or military, with an Earth observation mission and the need to move large volumes of data from space to the ground on demand.

Scan this QR code to read more about WARPSPACE.

**SPACE**NEWS



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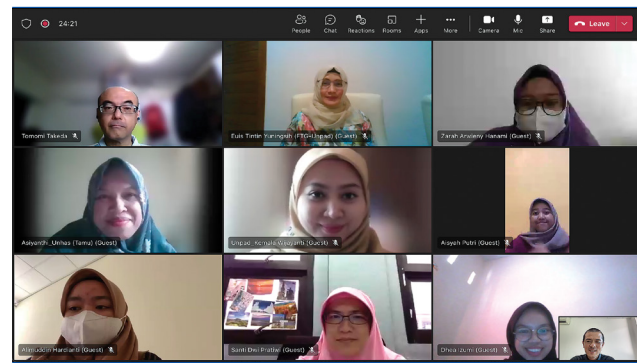


## ABOUT US

Japan Space Systems develops space industry technology with the aim of using geospatial information to enhance conservation capabilities, secure natural resources, protect the environment, and grow the economy so that we can all live in a better world. Along with partner agencies who participate in international cooperation efforts and research, we develop technology and human capital towards promoting advancements in space technologies like Michibiki, the Quasi-Zenith Satellite System (QZSS).

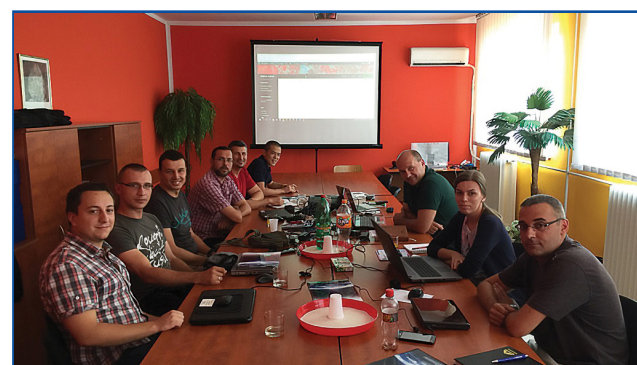
## INTERNATIONAL COOPERATION

International cooperation is a key aspect of our business model. At Japan Space Systems, our team engages with our counterparts and colleagues all over the world to analyze satellite data that is centric for sustainable global development.



## INTERNATIONAL INTERNSHIP PROGRAM

Spanning across 40 nations, our internship program provides hands-on experience with satellite data analysis, field surveys, conservation studies, and Japanese business culture. Since 2015, more than 300 students have participated in our internship program and have contributed to Japan Space System's efforts towards solving real-world problems.



*"Having had far too many virtual meetings over the past 3 years, I'm looking forward to attending in person this year and enjoying meeting face-to-face with everyone. Please feel free to ask me about Japan Space Systems and our services."*



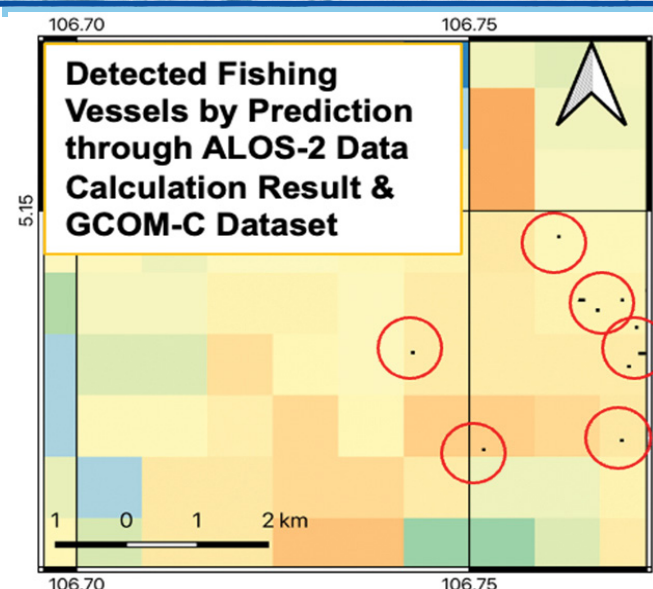
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 Tokyo 105-0011 JAPAN

## JSS MAKING THE WORLD A BETTER PLACE

### Monitoring Illegal, Unreported and Unregulated Fishing

Illegal, Unreported, and Unregulated (IUU) fishing is a tremendous problem on a global scale and according to the Marine Affairs and Fisheries Ministry of **Indonesia**, 90% of fishing vessels in their waters draw their catch from areas that have already been over-fished.

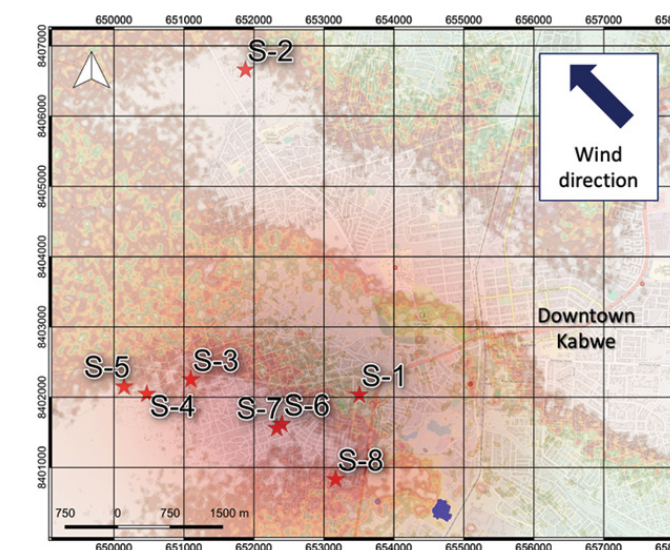
Japan Space Systems is helping the Indonesian government to solve its nation's IUU fishing problem by developing a satellite data platform and data analysis algorithm that tracks fishing activities as well as weather patterns and sea life.



### Simulation of Heavy Metal Dispersion

Residue and runoff from mining operations containing deadly amounts of lead and zinc pose a serious risk for humans and wildlife alike. In **Kabwe, Zambia**, Japan Space Systems joined forces with Hokkaido University and the University of Zambia to study the effects of this problem with their nation's borders.

Japan Space Systems designed simulation models for the Zambian government to detect lead-bearing residue around mining sites and unveil the mechanisms of heavy metal contamination.







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