

General overview of how to collaborate with a Japanese university for J-Cube



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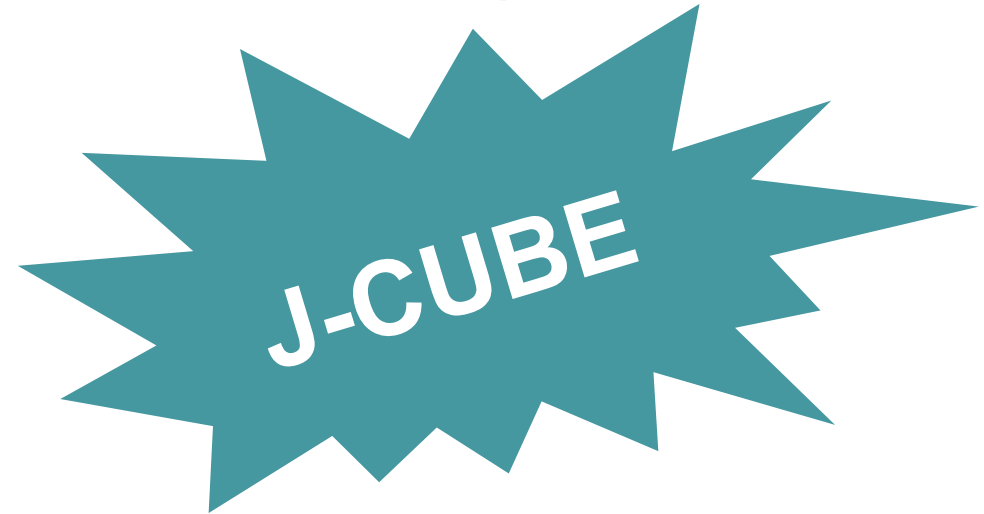
Kitakyushu, Japan

September 21, 2024

J-CUBE Webinar #1@48th UNIGLO Meeting



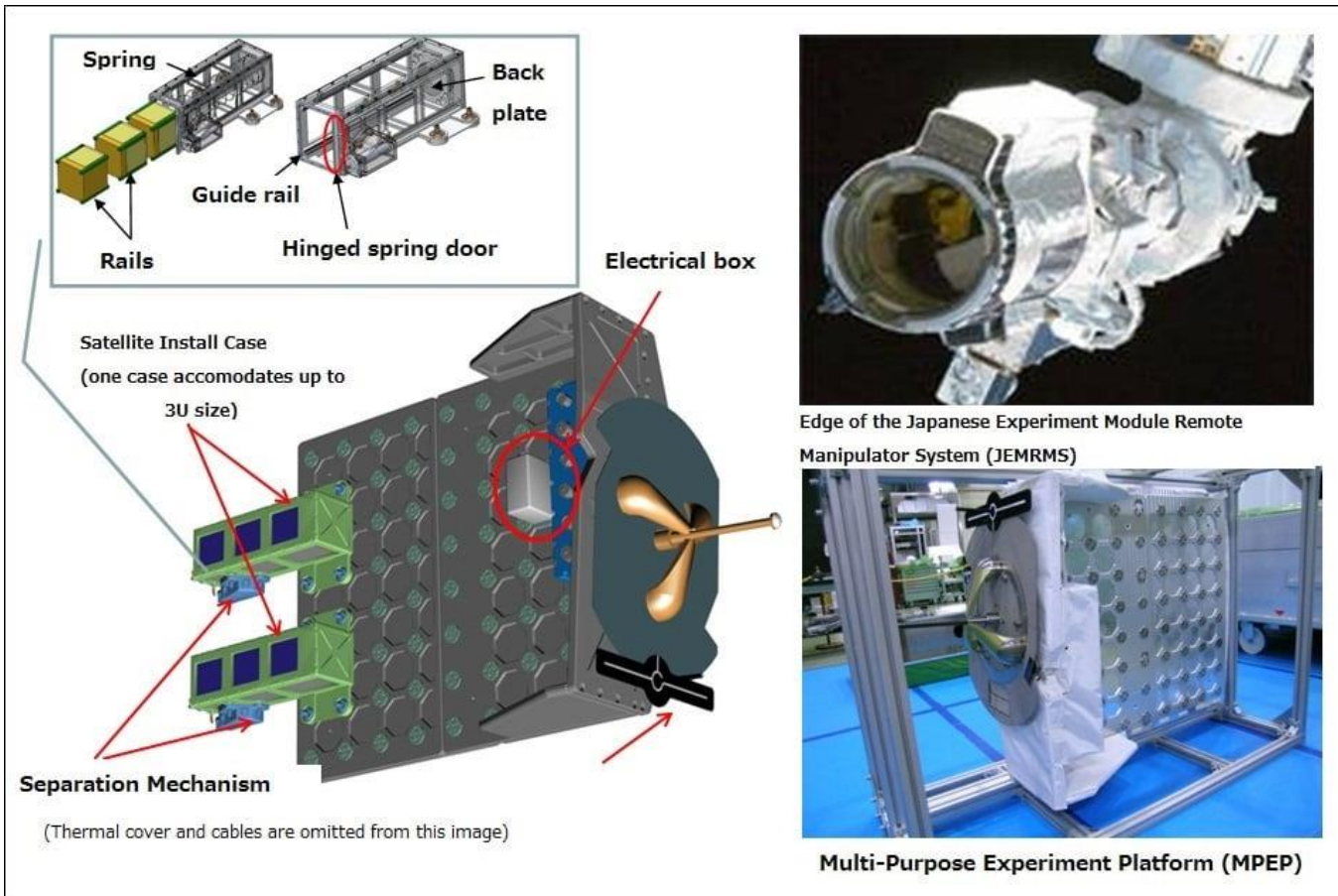
Introducing



A new collaboration between JAXA and UNISEC to help emerging space nations get their first CubeSats deployed into Low-Earth Orbit via the ISS.



UNISEC
University Space Engineering Consortium



JEM Small Satellite Orbital Deployer (J-SSOD) is a mechanism for deploying small satellites. It is designed in accordance with CubeSat design specification (10cm × 10cm × 10cm). The satellites installed in J-SSOD is transferred from the Japanese Experiment Module Kibo's airlock to space and are released on orbit.

In order to respond the increased demands for the CubeSat deployments, a reusable satellite orbital deployer (JEM Small Satellite Orbital Deployer Reusable: J-SSOD-R) has been introduced in March 2021, which accommodates the maximum 24U (6U per each deployer) capability.

JEM Small Satellite Orbital Deployer (J-SSOD)

FROM: <https://humans-in-space.jaxa.jp/en/biz-lab/experiment/facility/ef/jssod/>

J-CUBE is not to be confused with KiboCUBE

JAXA+UNISEC, low-cost opportunities

The program has two categories:

- ① one is construction of international collaborative relationships,
- ② another is for domestic capacity building.

Both categories require Japanese partners (UNISEC-Japan's universities, institutes, and technical colleges) for small sat development.

J-CUBE winners secure a low-cost launch opportunity 12U/per year (or 6 satellites/per year). The satellite size is assumed to be 1~3U.

J-CUBE:

<http://unisec.jp/serviceen/j-cube>

JAXA+UNOOSA, zero-cost opportunities



KiboCUBE:

[https://www.unoosa.org/oosa/en/ourwork/access2space4all/KiboCUBE/KiboCUBE Index.html](https://www.unoosa.org/oosa/en/ourwork/access2space4all/KiboCUBE/KiboCUBE%20Index.html)

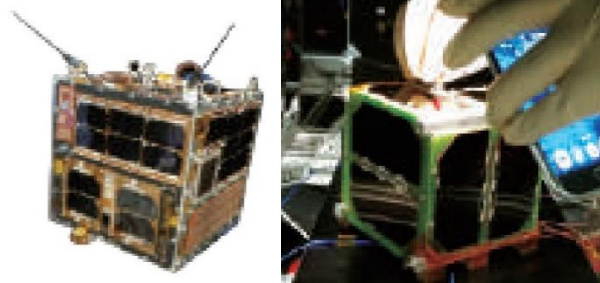
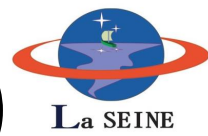
J-CUBE vs KiboCUBE

	J-CUBE	KiboCUBE
Launch price	Not free, but much lower than the market price	Free
Size	Up to 3U	1U
Selection	Application is reviewed by the selection committee	Very competitive
Requirement	Team up with a Japanese university Capacity building purpose	Capacity building purpose

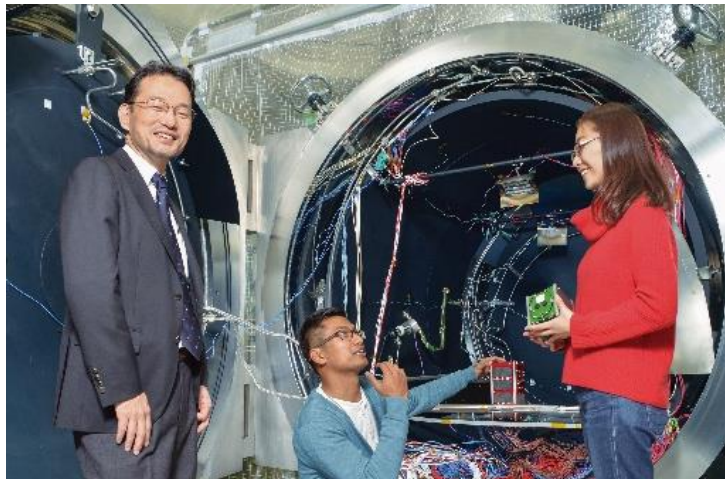
Would you like to know more about J-CUBE?

With J-CUBE you are more likely to secure a launch slot than with KiboCUBE, and at a cost far below commercial launch fees.

Kyushu Institute of Technology (Kyutech)



Laboratory of Lean Satellite Enterprises and In-Orbit Experiments



Laboratory of Lean Satellite Enterprises and In-Orbit Experiments

Hands-On Practical education

Kyutech record of collaborating with foreign partners



No.	Country	Project
1	Singapore	Aoba-VELOX III
2	Ghana, Mongolia, Nigeria, Bangladesh	BIRDS-1
3	Costa Rica	Irazu
4	Bhutan, Malaysia, Philippine	BIRDS-2
5	Singapore	SPATIUM-I
6	Nepal, Sri Lanka	BIRDS-3
7	Singapore	Aoba-VELOX IV*
8	Vietnam	MicroDragon*
9	Egypt	NARSSCube-1
10	Paraguay, Philippine	BIRDS-4
11	Philippine	Maya-3, Maya-4
12	Zimbabwe, Uganda	BIRDS-5
13	Philippine	Maya-5, Maya-6
14	Mexico	K'oto
15	Thailand	KNACKSAT-2



NepaliSat-1
(ネパール)

Raavana-1
(スリランカ)

Uguisu
(日本)

Photos by JAXA

*Epsilon rocket

To be launched

Why do we work with foreign partners?



- Our mission (LaSEINE/Kyutech)
 - Contribute to the humanity by bringing diversity to the space sector
- Assisting new-comers entering to the space sector is our mission
- But not all the Japanese universities have the same mission
 - For each case of collaboration, benefits to Japanese universities need to be identified when you find a Japanese partner

Typical flow

1. First contact
2. Meeting (remote/in-person)
3. Many remote meetings and many exchange of e-mails
4. Statement of Work (SoW)
 - What to do in the collaboration
 - Responsibilities of each party
5. Contract signed
6. Money transfer
 - Usually from foreign partners to Japanese universities
7. Actual works
 - Students may come to Japan as full-time graduate students or research visiting students
8. Satellite launch and operation
9. Discussion on the next collaborative project

Important points

- In-person meetings are important to know each other
 - Utilize conferences such as UNISEC-Global, IAC, etc.
- Clear definition of responsibilities in SoW
- Be careful about money transfer
 - Anticipate many dramas
- Continue the collaboration even after the project

What Japanese universities want

- Universities are not launch brokers
 - Not doing for money
 - Expect return in other ways
 - Students, papers, etc.
- Leverage the international collaboration to promote globalization of university research/education and campus
- Japanese university may simply want to lower the launch cost by sharing with the foreign partners
- Anyway, note that you are not dealing with launch brokers

Suggested schemes

- Good collaboration scheme
 - Joint development of CubeSat
 - Student exchange through the project
 - Students (both Japanese and non-Japanese) learn how to work with people from different cultural background
- Other good schemes
 - Satellite is built outside Japan, but students come to Japan for study
 - Learn satellite development/testing/operation via hands-on
 - Serve as a liaison with the home country
 - Satellite is built in Japan by students coming from abroad
 - Learn satellite development/testing/operation via hands-on



Student exchange

- Suggest long-term (> 1 year) stay
- Full-time graduate student is a good option
 - Japanese university tuition is much lower than other developed countries
- To enroll a graduate school in Japan, everybody needs to pass the exam.
- Be careful about the time-line
 - For October admission, the exam application period is May*
 - To send students to Japan, the preparation must start in advance

*Kyutech application period for Fall admission is May and Spring admission is October.
The application period differs depending on universities

Things to be noted

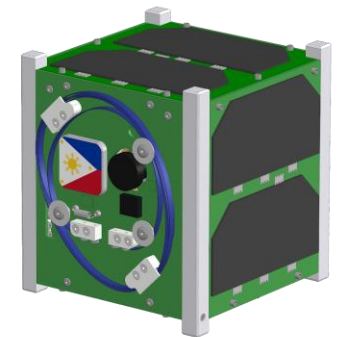
- As the money transfer occurs in J-CUBE, the contract between the foreign entity and the Japanese university is necessary
- The contract is legally-binding. Need assistance from the legal section of your organization
- The points in the contract
 - Non-military use
 - UN registration
 - Export control
 - Payment due
 - Payment currency (it is in Yen!)

J-Cube Projects currently ongoing

Maya-5 and Maya-6 Cube Satellites (Philippines university-consocium)

Project Brief /Description

Maya-5 and Maya-6 are the second set of Philippine university-built CubeSats, developed by the second batch of STeP-UP scholars. The project aims to gain and locally extend the knowledge and skills on satellite development acquired from foreign schooling and utilize the domestic capabilities for satellite development.



Deployed to space from ISS on July 19, 2023



Maya-5 and Maya-6
SUCCESSFULLY DEPLOYED TO SPACE!

Photo from Japan Aerospace Exploration Agency - JAXA live stream

KNACKSAT-2 KMUTNB (Thai)

Payload Rideshare Mission CubeSat



Satellite Bus System

Payload Area



Ready for flight (*almost*)

Satellite R&D Partners

- Thai-German Pre-Engineering School
- Advance Wireless Network (AWN) Co., Ltd. (AIS)
- National Astronomical Research Institute of Thailand (NARIT)
- Rail System Research Cluster KMUTNB
- Universiti Teknologi MARA (UiTM), Malaysia
- University of Perpetual Help, Philippines

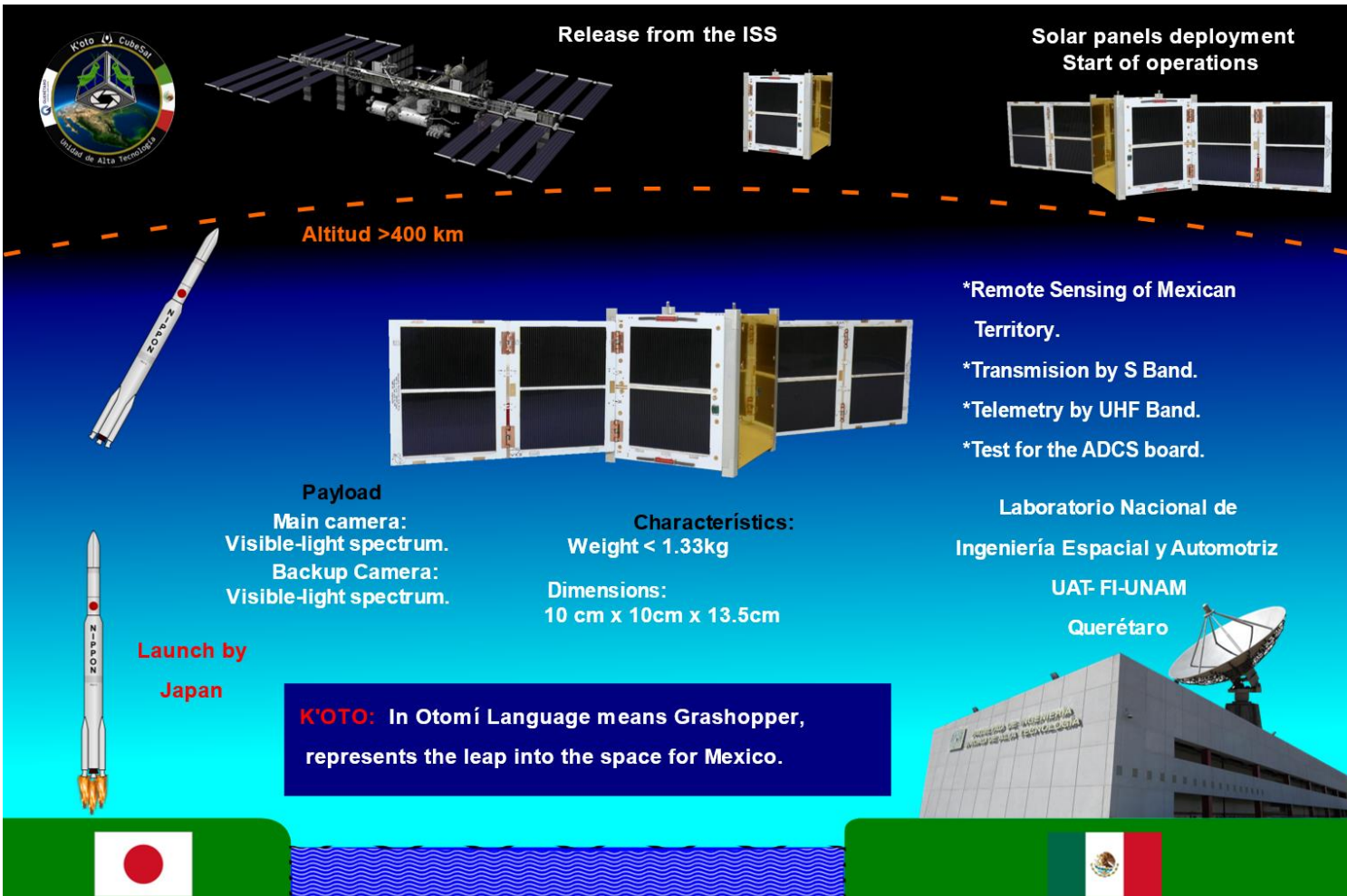


RAIL
Rail System Research Cluster KMUTNB



K'OTO UNAM(Mexico)

It is an initiative directed by academics and university students from the National Laboratory of Space and Automotive Engineering of the National Autonomous University of Mexico (UAT FI-UNAM), with the support of the Sustainable Development Secretariat (SEDESU) of the Queretaro State Government, to foster the space field in Mexico.



The infographic illustrates the mission lifecycle of the K'OTO satellite. It shows the satellite being released from the International Space Station (ISS), followed by the deployment of solar panels and the start of operations. The satellite is shown in orbit at an altitude greater than 400 km. The mission includes remote sensing of Mexican territory, transmission by S Band, telemetry by UHF Band, and testing for the ADCS board. The satellite is launched by Japan using a NIPPON rocket. The mission is managed by the Laboratorio Nacional de Ingeniería Espacial y Automotriz at UAT FI-UNAM in Querétaro. The infographic also includes the Japanese and Mexican flags at the bottom.

Release from the ISS

**Solar panels deployment
Start of operations**

Altitud >400 km

Payload
Main camera:
Visible-light spectrum.
Backup Camera:
Visible-light spectrum.

Characteristics:
Weight < 1.33kg
Dimensions:
10 cm x 10cm x 13.5cm

**Launch by
Japan**

***Remote Sensing of Mexican Territory.**
***Transmission by S Band.**
***Telemetry by UHF Band.**
***Test for the ADCS board.**

**Laboratorio Nacional de
Ingeniería Espacial y Automotriz
UAT FI-UNAM
Querétaro**

**K'OTO: In Otomí Language means Grasshopper,
represents the leap into the space for Mexico.**

Launch by Japan

**Laboratorio Nacional de Ingeniería Espacial y Automotriz
UAT FI-UNAM
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Launch by Japan

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ASEANSAT UiTM (Malaysia)

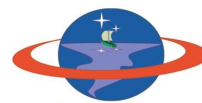
First ASEAN Collaboration (for South-East Asian Institution) Nanosatellite project



UNIVERSITY OF
PERPETUAL HELP
SYSTEM DALTA LAS PIÑAS CAMPUS
www.perpetualdalta.edu.ph



KMUTNB



La SEINE



Kyutech
Kyushu Institute of Technology



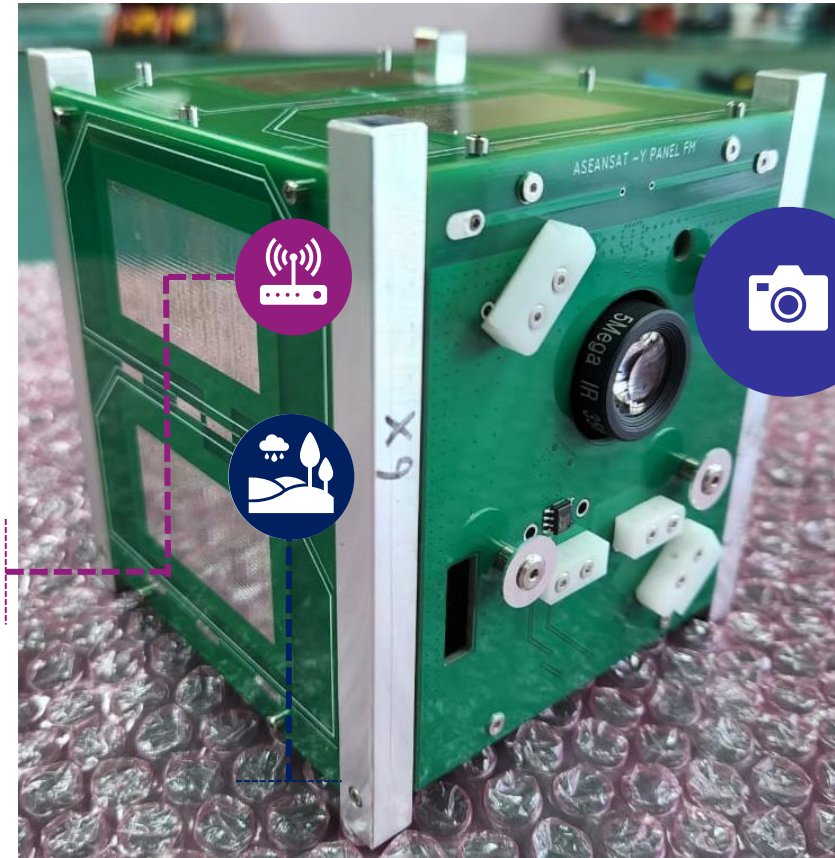
AGENSI ANGKASA MALAYSIA

**Main Mission:
Earth Observation Mission**

High ground resolution camera payload

ASEANSAT:

- **Resolution: 2592x1944 pixels array (5 MP)**
- **Spatial: GSD ~16 m @ 400 km**
- **Spectral: RGB (λ : 0.4 – 0.7 nm)**
- **Radiometric: 8 – 10 bits image data**
- **Temporal: 4 ~ 6 times/day (6~8 minutes/pass)**
- **Swath: FOV ~6° (41.5 x 31 km)**
- **Size ~360 MB**
- **JPEG compression**

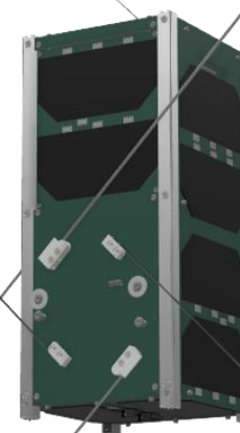


BIRDS-X

Kyutech(Japan) collaboration with ACCIMT(Sri Lanka)

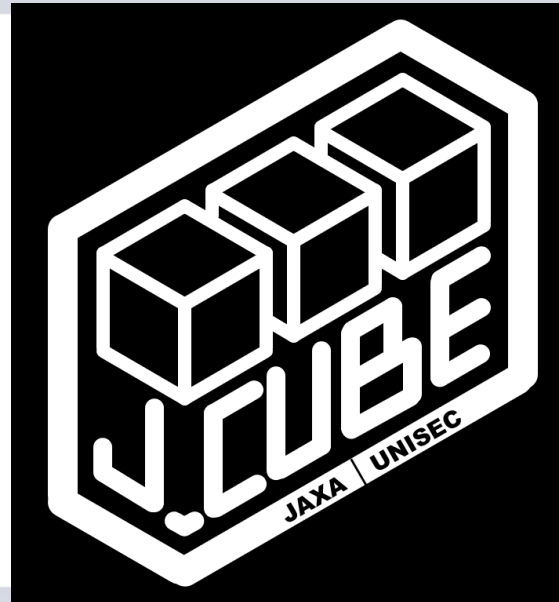


Goal	Bring diversity to the space sector and democratize the usage of space
Emphasis	Promotion of the satellite usage and Amateur Radio Community
Stakeholders	Kyutech with funding from ARDC
Missions	<ul style="list-style-type: none">▪ APRS Payload competition▪ APRS student mission▪ GT competition▪ UHF
Satellites	One 2U Satellite based on BIRDS bus
Approach	Lean Satellite
Team	Students
Operation	Use of BIRDS ground station network



**Why don't you try to join
J-Cube initiative?**

Thank you for listening



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