2023/6/22

Overview of ISS/Kibo and J-SSOD

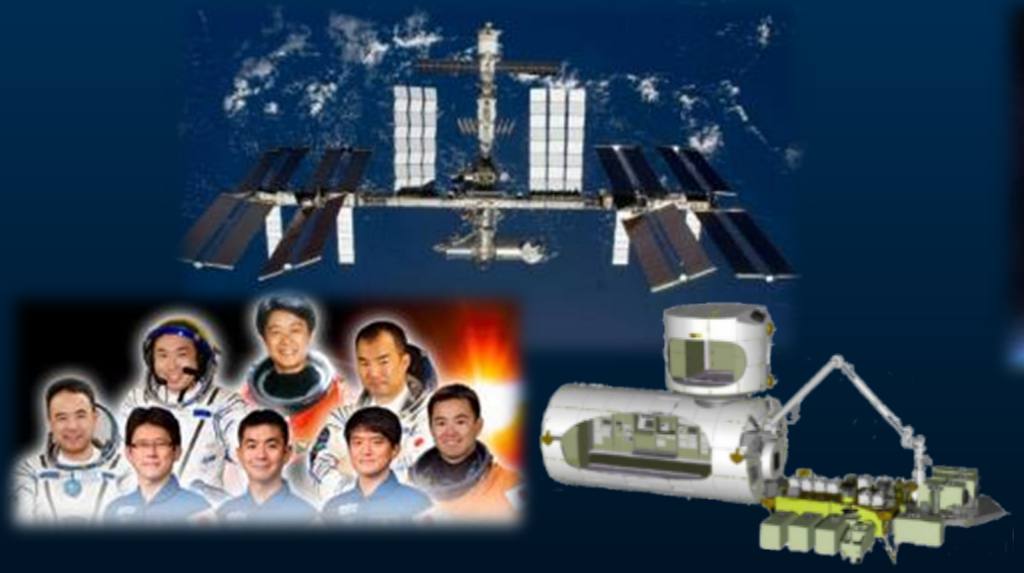
JEM Utilization Center
Human Spaceflight Technology Directorate
Japan Aerospace Exploration Agency (JAXA)

Japan Aerospace Exploration Agency

- The core implementing agency to support the Japanese government's development and utilization of space with technology.

Space Transportation

Human Space Activities

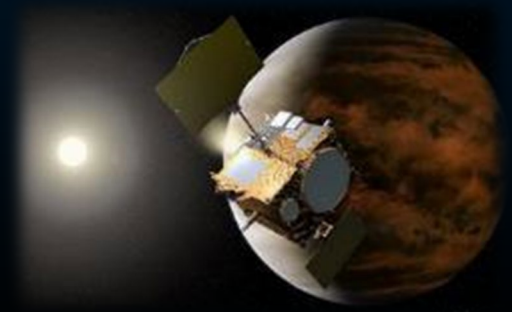


Satellite Program

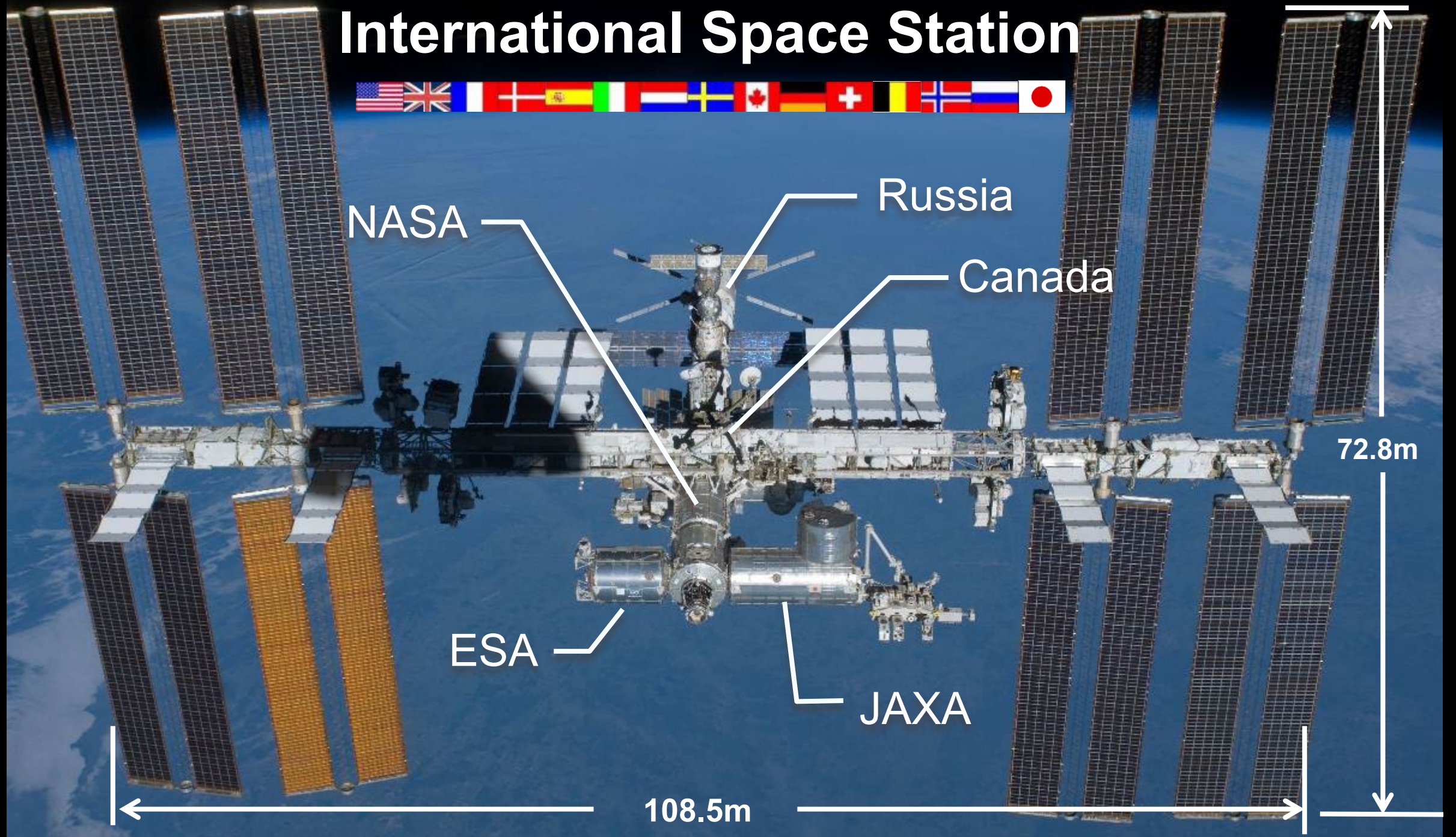
Aviation Program

Space Science

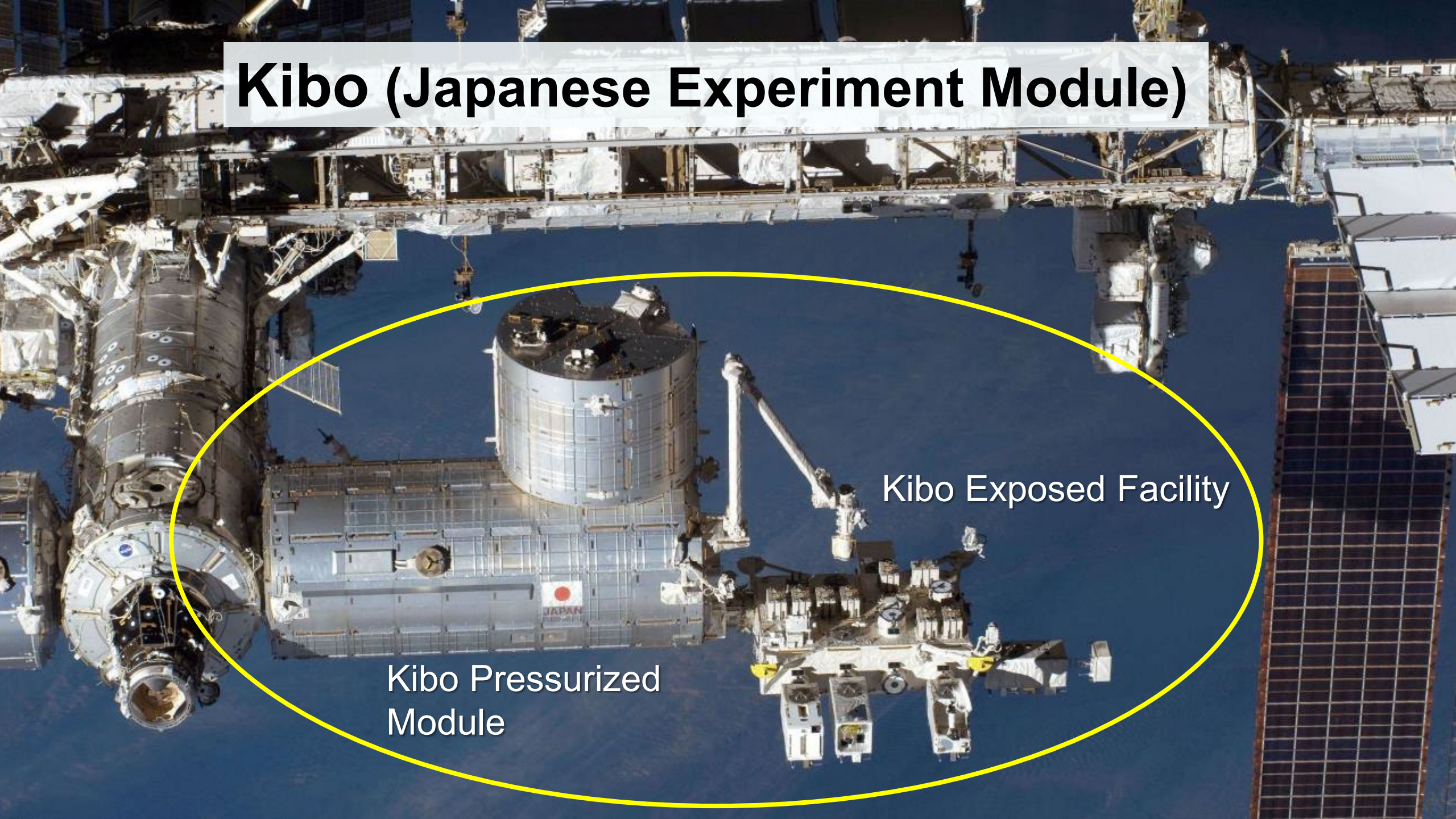
Lunar & Planetary Exploration Program



International Space Station

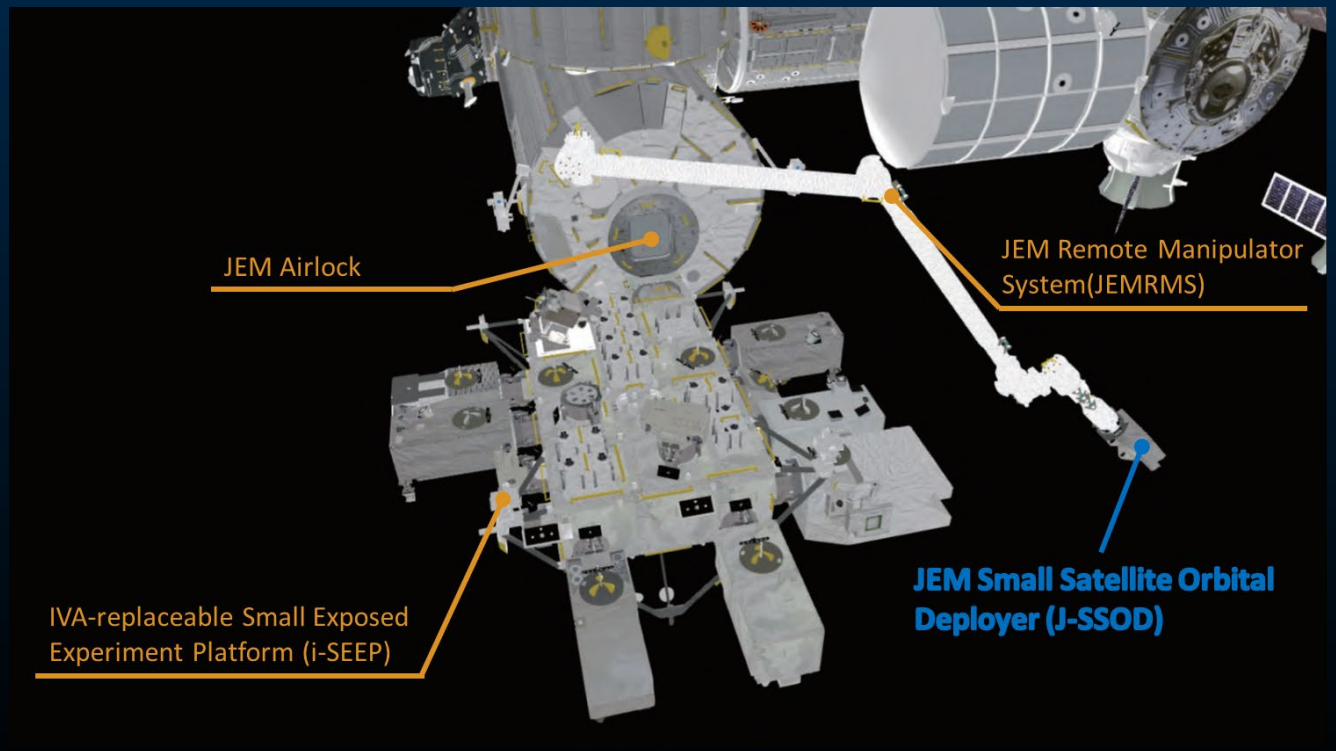


Kibo (Japanese Experiment Module)



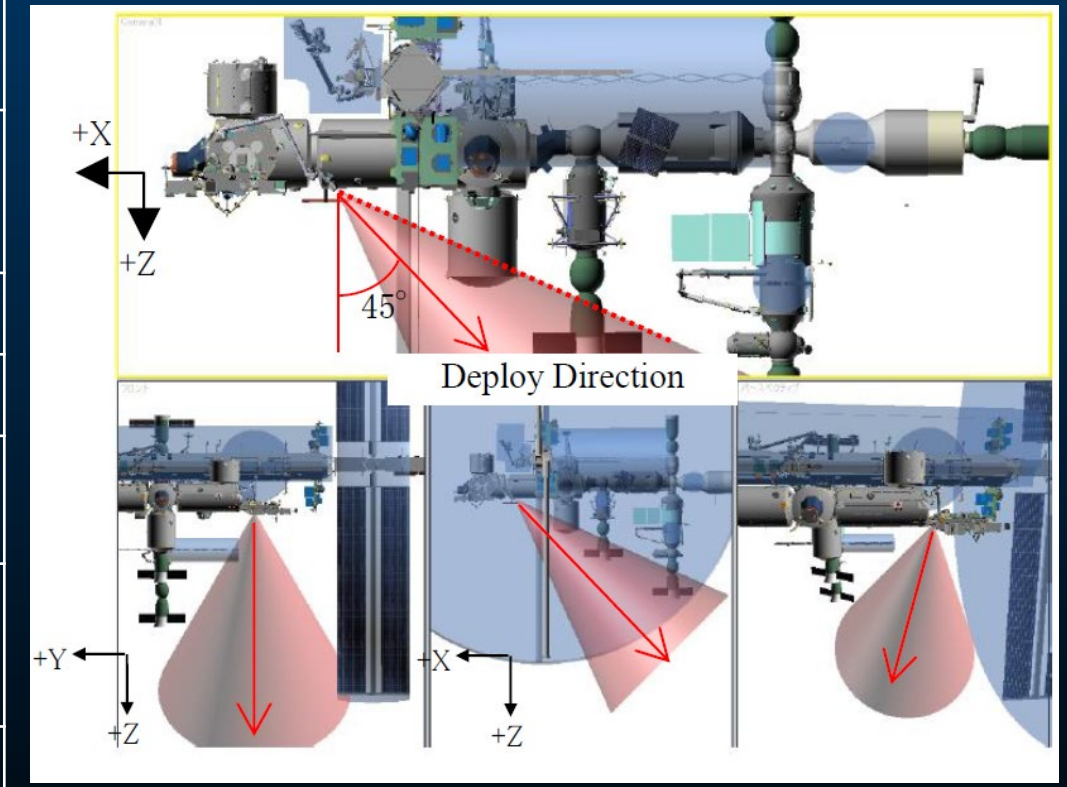
Kibo Exposed Facility

- Kibo has a unique Exposed Facility (EF) with an Airlock (AL) and a Remote Manipulator System (JEMRMS) and a high capacity to exchange experimental equipment.
- JEM Small Satellite Orbital Deployer has been operated to deploy the satellite from 2012.



Specification of J-SSOD

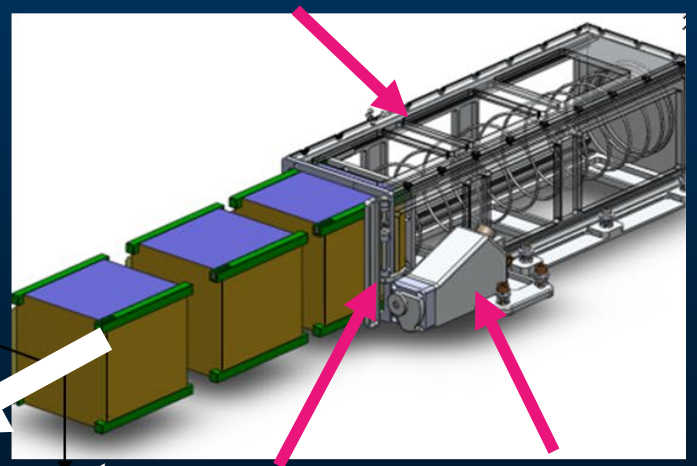
Item	Specifications
Satellite size	CubeSat: 1U[*1], 2U, 3U, 4U, 5U, 6U, W6U 50-kg class satellite: 55 × 35 × 55 cm
Satellite mass	CubeSat: 1.33 kg or less per 1U 50-kg class satellite: 50 kg or less
Orbital altitude	approximately 380 - 420 km[*2]
Inclination	51.6°
Deployment direction	Nadir-aft 45° from the ISS nadir side
Deployment velocity	CubeSat: 1.1 - 1.7 m/sec. 50-kg Microsat: 0.4 m/sec.
Ballistic coefficient	CubeSat: 120 kg/m^2 or less[*3] 50-kg Microsat: 100 kg/m^2 or less[*3]



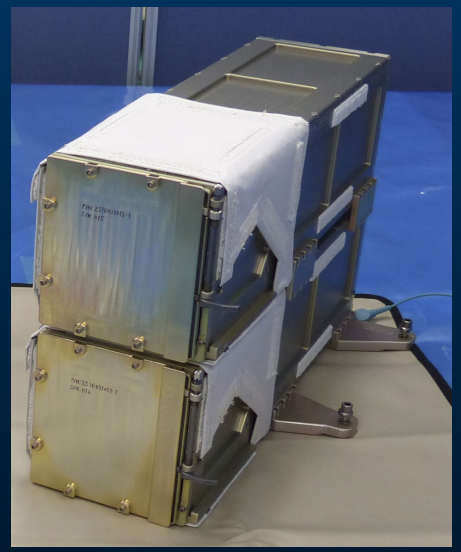
*1) CubeSat specifications:1U : 10 cm (W) x 10 cm (D) x 10 cm (H)
*2) Depends on the ISS altitude.
*3) Depends on the ballistic coefficient, altitude at release, solar activity, etc.

Deployment Mechanism of J-SSOD

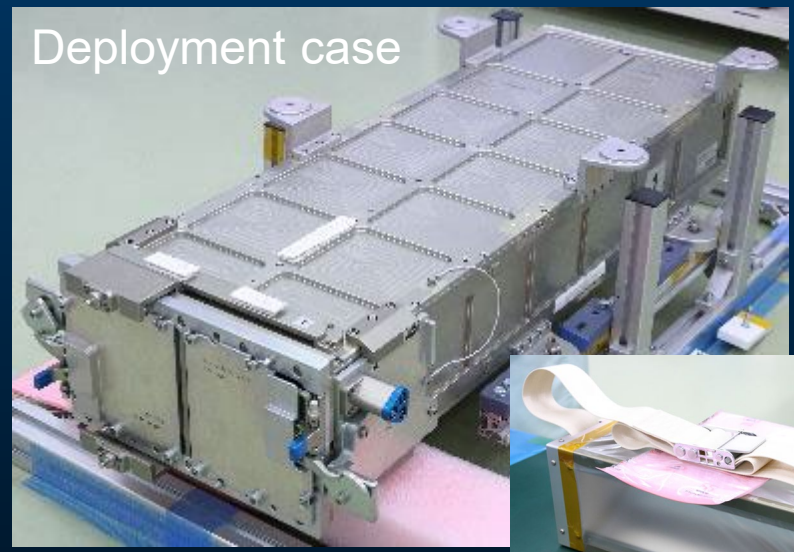
The spring mechanism

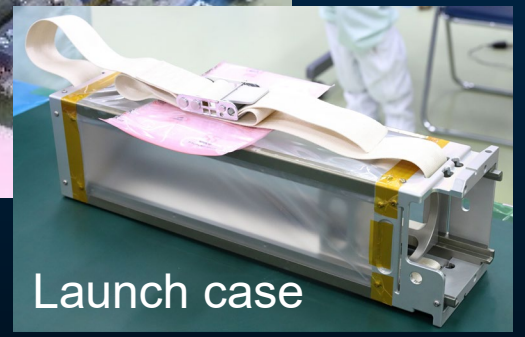


J-SSOD case(Twin type)



J-SSOD-R case





- The spring mechanism and the separation mechanism are installed on the J-SSOD case to deploy the satellites.
- A new deployment case (J-SSOD-R), which can be used repeatedly and can release 6U satellites in a slot.

Small Satellite Deployment Process

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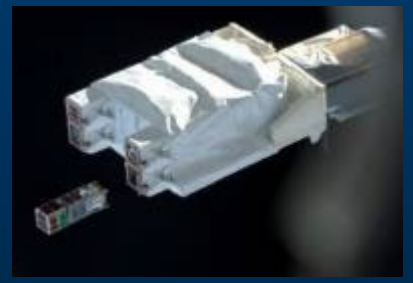
Support from the ground



Flight Control Team
and
Engineering Team

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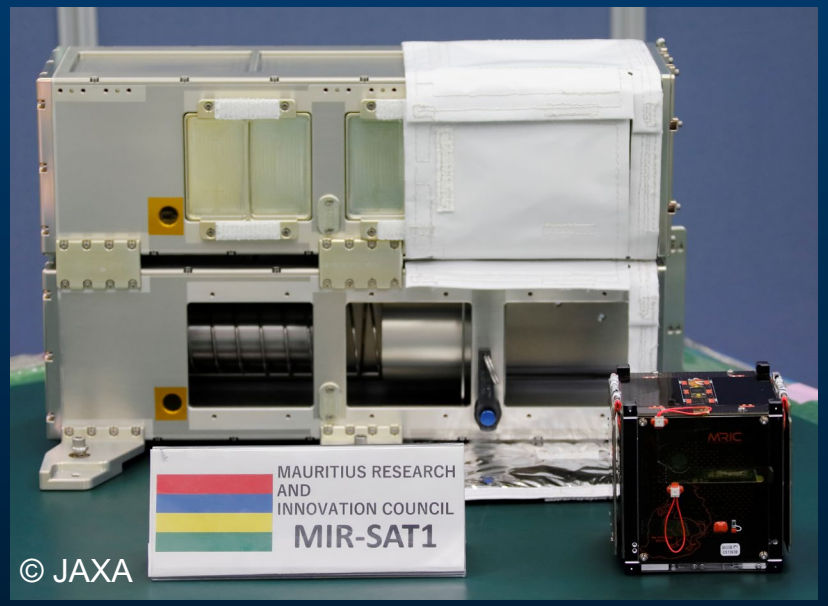
Overview of Small Satellites



MIR-SAT1(Mauritius : KiboCUBE 3rd winner)

Snapshot of Banana farm, Mindanao, the Philippines
(provided by PHL-MICROSAT, DIWATA-1)

◆ Extremely Low-cost

(more than 200 M$ → less than 5 M$)

- New players are welcome to join (enterprises, local governments, developing countries etc.)
- Great opportunity for education tools and challenging missions

◆ Short Turn Around Life Cycle

(more than 5 years → less than 1-2 years)

- College students can experience whole development cycle
- Curriculum can be standardized as sustainable program
- Quick return on your business investments, technology demonstration

◆ Cost-Effective Method for Various Missions

- Practical remote sensing data can be obtained from small satellites

Ref: Prof. Nakasuka, Tokyo Univ. (2017.6.12)
(modified by JAXA)

Deployment Achievements from J-SSOD

- Cubesats from 31 countries were deployed using J-SSOD.
- 72 Cubesats were successfully deployed from J-SSOD from 2012 to 2023.

- NASA and the U.S. private sector can operate the satellite deployment missions from Kibo. Including these deployment, **278** satellites have been successfully deployment from Kibo by May 2021.

Thank you for your kind attention!!