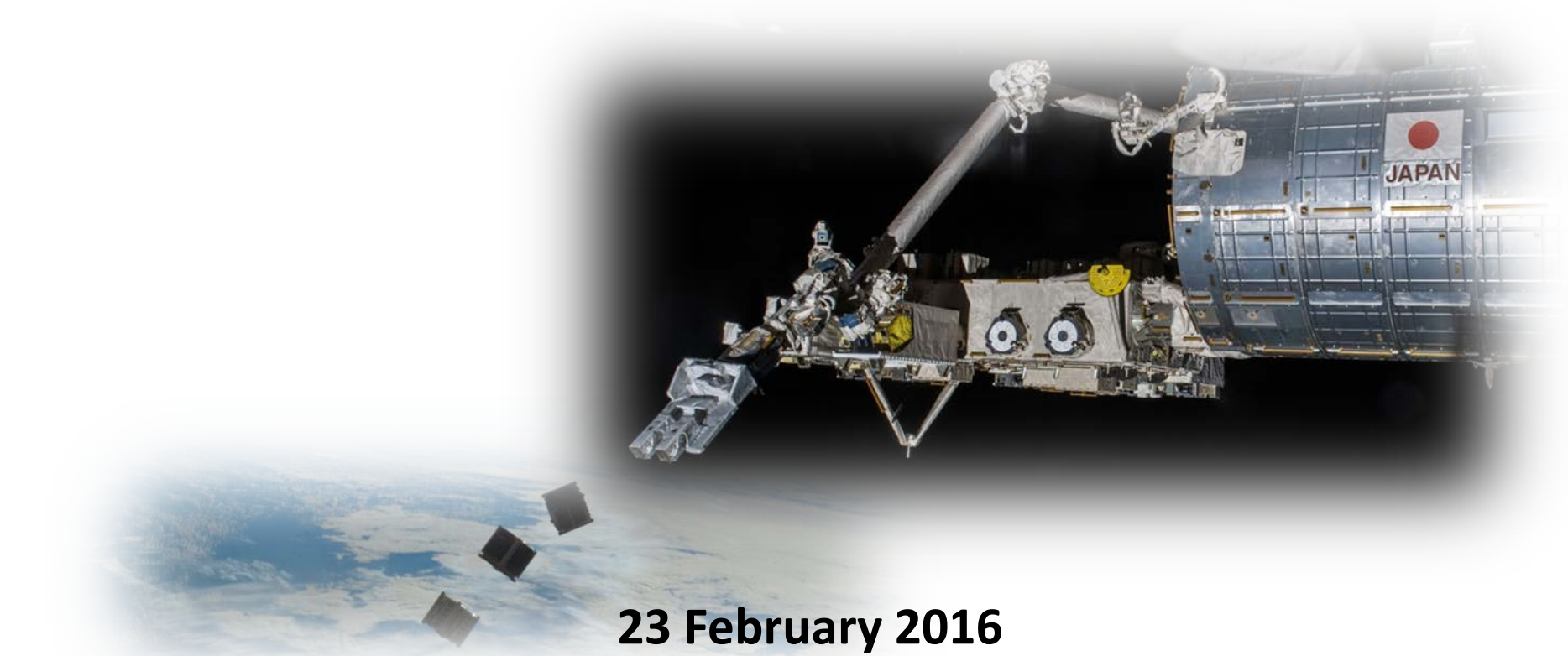
Maximizing Benefits through ISS/Kibo

The 53rd Session of Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space



23 February 2016

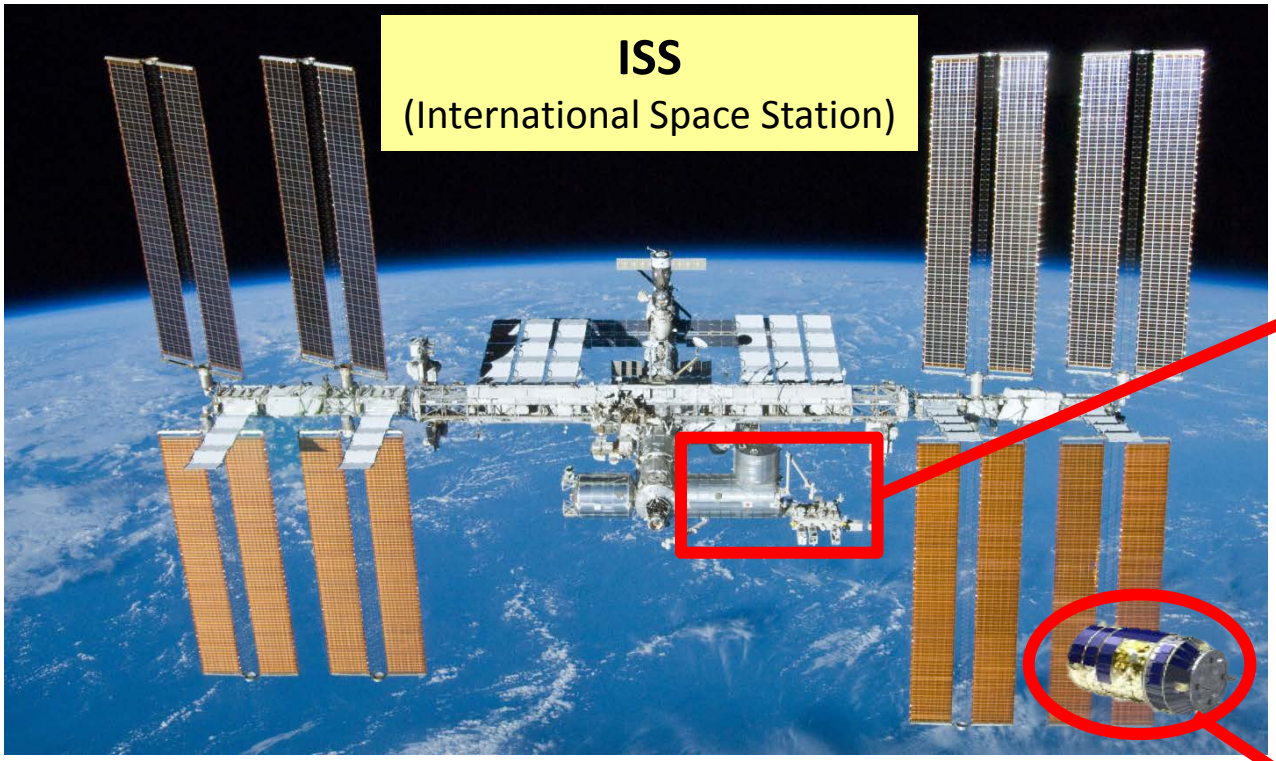
Koki Oikawa

Human Spaceflight Technology Directorate
Japan Aerospace Exploration Agency(JAXA)

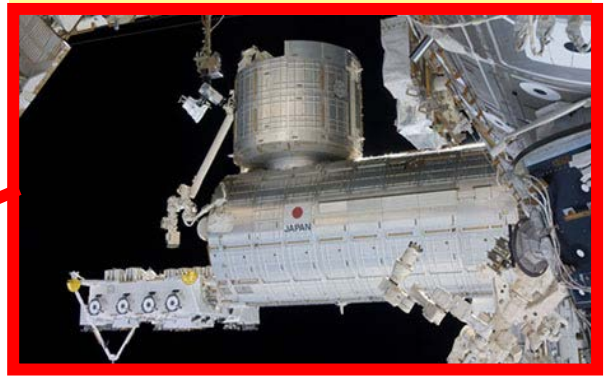
- Japan announced further participation in the ISS Program until 2024.

- JAXA promotes much more the extensive utilization of "Kibo" for bringing benefits on Earth.

ISS: Japan's Capabilities and Contributions



Kibo
(Japan Experiment Module)



HTV
(H-II Transfer Vehicle)

H-IIB

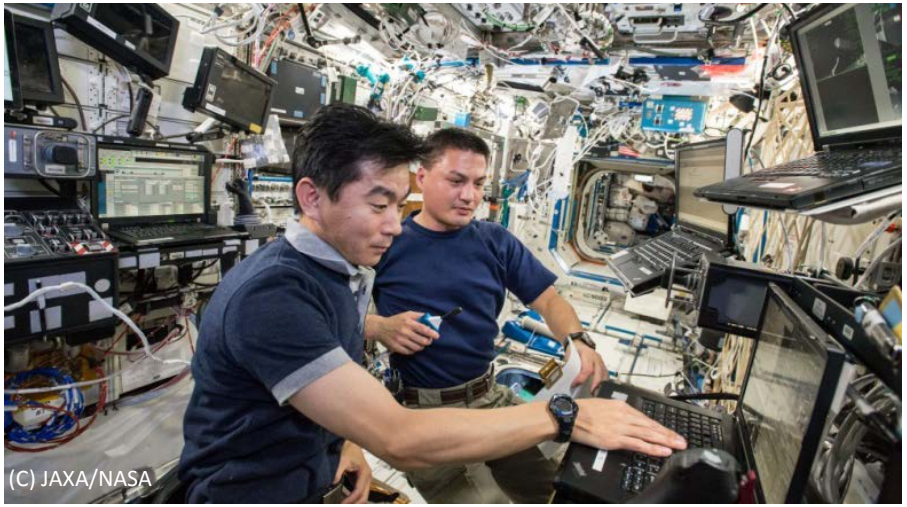
- ISS is a huge manned construction located about 400km above the Earth.
- 15 countries participate in the ISS program
- Japan strives to make concrete international contributions through extensive utilization of Kibo and HTV.

ISS Operation – Successful Mission of HTV

- HTV is essential to supply necessary goods to ISS. It has a track record of five consecutive mission successes. In 2015, H-IIB/HTV5 helped ease a critical situation by supplying additional goods to the ISS.
- In 2016, newly selected “Japanese Lithium-ion Batteries” will be supplied to ISS by H-IIB/HTV6.

ISS Operation—Astronaut, Kimiya Yui's Expedition

All worked as part of "Team Japan" in Kibo, Japan and U.S.



Preparation for capture of HTV5

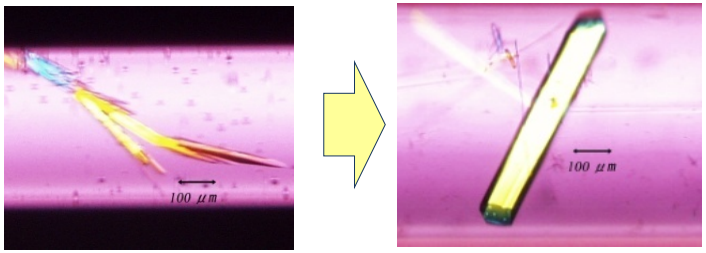
HTV Flight control team at JAXA

Japanese Astronaut Koichi Wakata in NASA's ISS Mission Control Room

Medical Research Enabled by "Kibo"

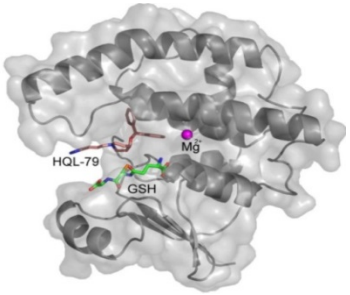
High-quality Protein Crystal Growth Experiment (JAXA PCG)

- JAXA established the crystallization of high-quality proteins utilizing Kibo and is providing a crystallization experiment services.
- The purpose of these experiment are:
  - To obtain high-quality protein crystals and to achieve more precise 3-D protein structures.
  - To develop industrial applications such as the production of functional proteins and drug designs.
  - To contribute to structural biology by clarifying protein structures and functions.

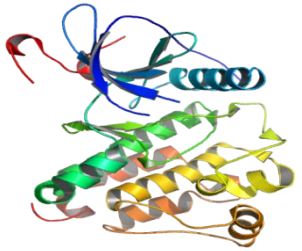


On Earth　　In Space

Little convection & disturbance
⇒ Improved crystal quality



Contributing to compound exploration of new drugs

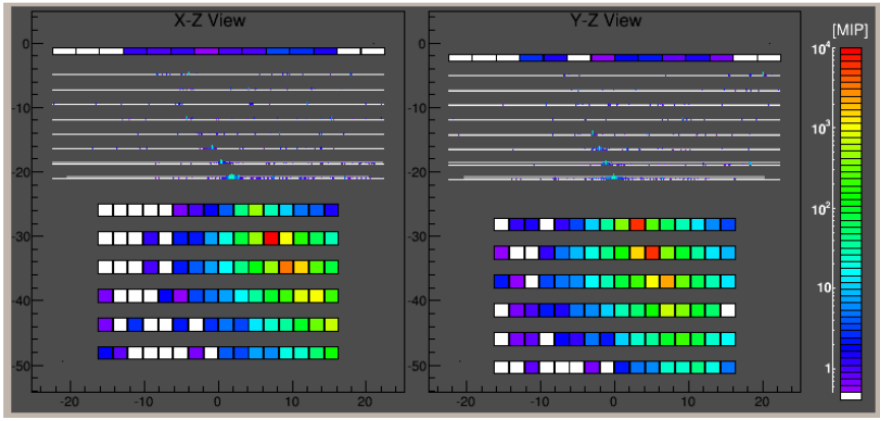


A specific inhibitor newly identified.

Science Research enabled by “Kibo”

Clarify space mysteries using CALorimetric Electron Telescope (CALET)

- Launched by H-IIB/HTV5 in August 2015.
- International collaboration with U.S. and Italy to shed light on the following space mysteries.
  1) Origin and acceleration mechanism of high-energy cosmic rays
  2) Diffusion mechanism of cosmic rays within the Milky Way
  3) Dark matter signature
- CALET observation data will be available for worldwide use in 2 years and all researchers are free to use this valuable observation data.



Electrons (candidates) event image
An Electron in the Tera electron Volt(TeV) region observed on Oct. 14, 2015.

Photo of CALET

Promoting Cooperation in Asia

Benefits of ISS/Kibo:

- Gateway for sharing the values of ISS/Kibo with Asian nations.
- Capacity building to enroll young researchers, engineers and students utilizing Kibo .

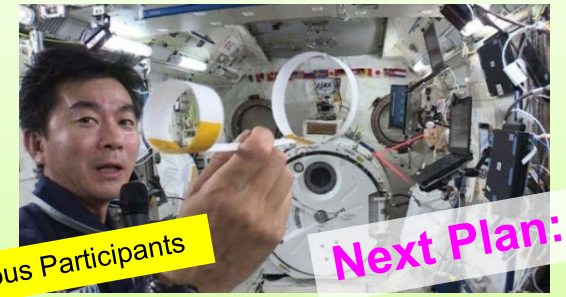
KIBO-ABC
Asian Beneficial Collaboration through Kibo Utilization

SSAF/ Space Seeds for Asian Future program

Next Plan:
AHiS(Asian Herb in Space)

Previous Participants

Asian Try Zero-G program



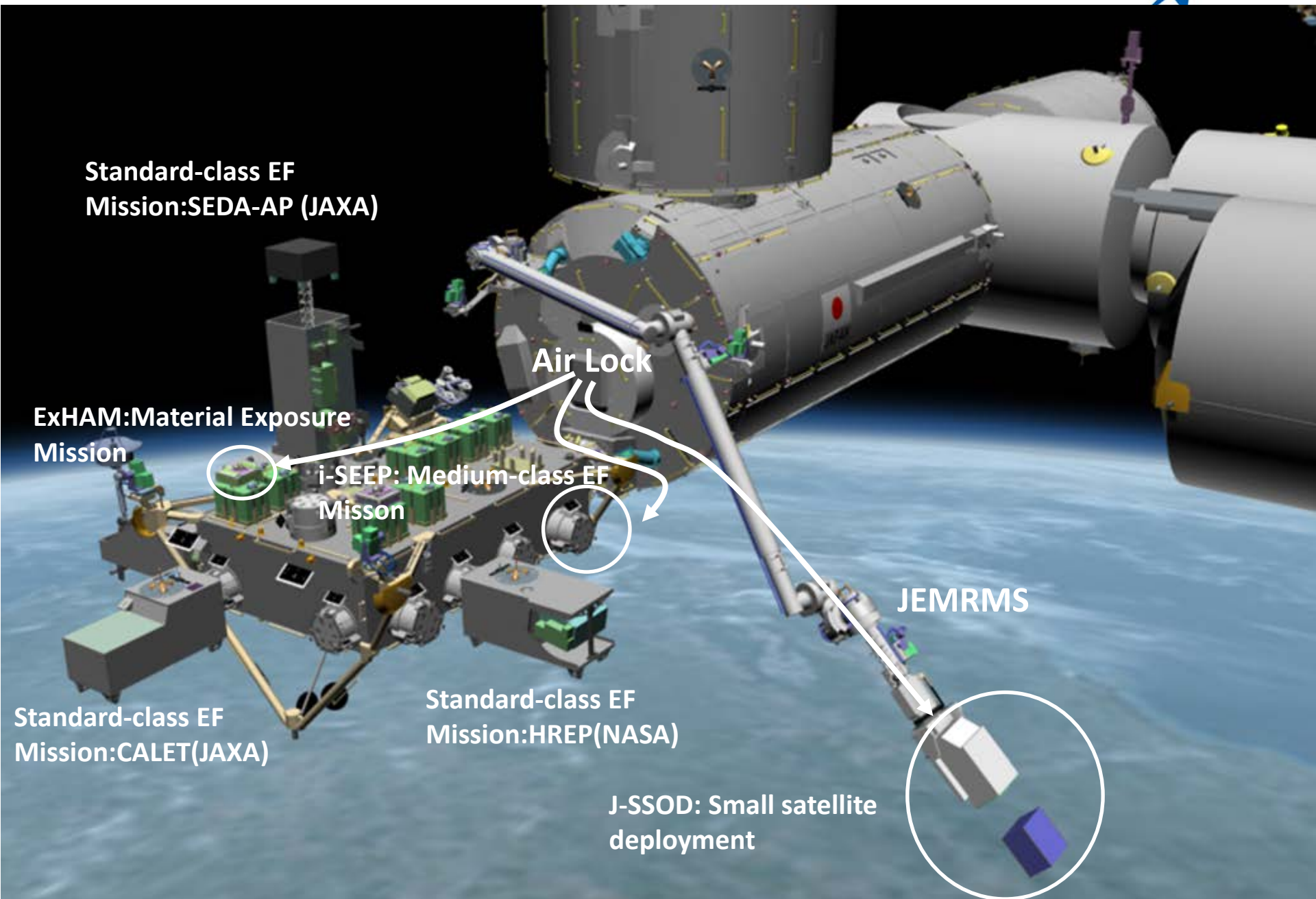
Previous Participants

Next Plan: 2016

Unique Capability of Kibo – Exposed Facility

- Kibo has a unique Exposed Facility (EF) with an Airlock (AL) and a Remote Manipulator System (JEMRMS), and has a high capacity to exchange experimental equipment.
- JAXA is promoting various functional missions to maximize the Kibo utilization outcome as follows:
  - Small satellite deployment mission (J-SSOD)
    (CubeSat (1U-3U) and Microsat (50kg))
  - Material exposure mission (ExHAM)
    (2cm x10cm x 10cm or 20cm/plate, total 20 sample plates)
  - Medium-class (200kg) EF mission (i-SEEP)
  - Standard-class (500kg) EF mission
- These various missions are enabled only by Kibo because it has an independent EF with AL and JEMRMS.

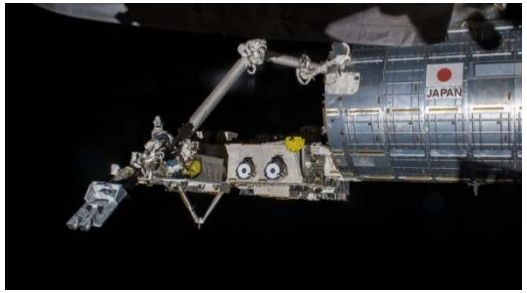
JEMRMS's Work on the ISS

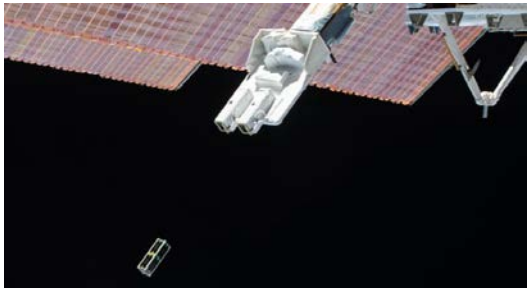


New Opportunities through UNOOSA-JAXA Cooperation
KiboCUBE – Small Satellite Deployment from Kibo

KiboCUBE

Collaboration between UNOOSA and JAXA to offer small satellite deployment opportunities from Kibo in order to facilitate improved space technologies in developing countries. (CubeSat (1U)/ once a year from 2017-2019)





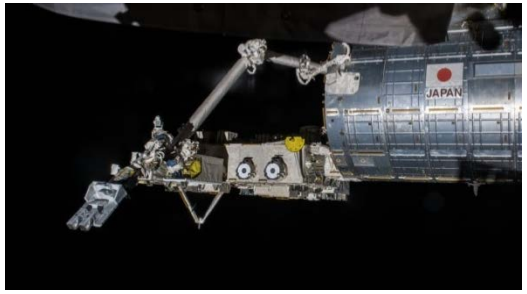
UNITED NATIONS
Office for Outer Space Affairs

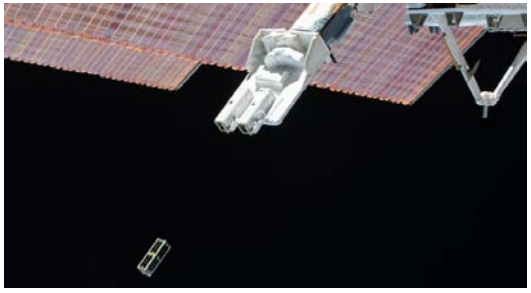
Japan Aerospace Exploration Agency

International Contribution
Small Satellite Deployment from Kibo

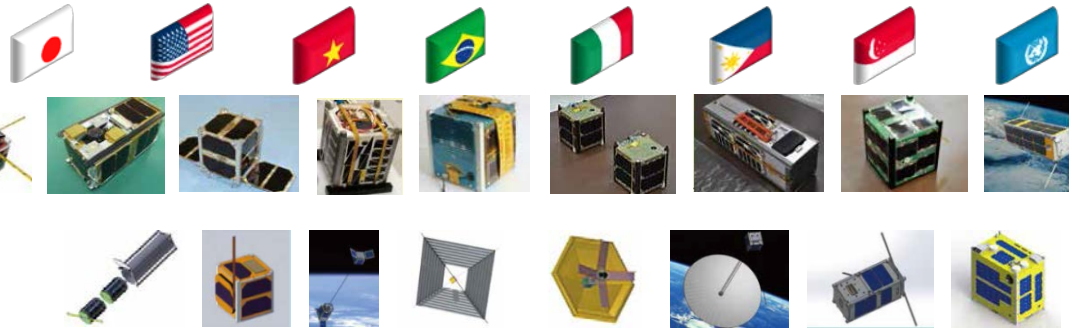
Opportunities while bearing the expenses

- JAXA encourage international applicants to collaborate with Japanese universities or private enterprises.
  (CubeSat (1U-3U) and Microsat (50 kg))
- To date, 105 satellites were deployed from Kibo and JAXA is promoting more deployment opportunities.



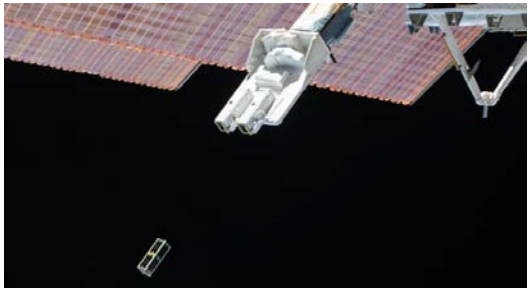


<Collaborating countries that have used these deployment opportunities>
Japan, United States, Vietnam, Brazil, Italy, Philippines, Singapore, United Nations

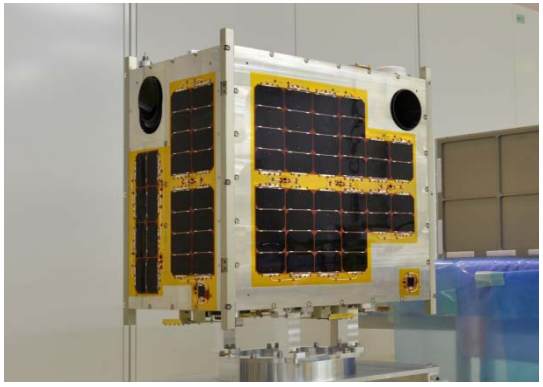


International Contribution
Small Satellite Deployment from Kibo

Ceremony to handover Philippine's Microsat at JAXA



Brazil's CubeSat SERPENS [3U]



Philippine's Microsat DIWATA-1 [50kg]

Watching Brazilian's CubeSat deployment at JAXA

Conclusion

- In line with Japan's decision to extend its participation in the ISS until 2024, maximization of further Kibo utilization outcomes is Japan's highest priority.
- JAXA has performed world-class experiments on Kibo, utilizing micro-gravity and the exposed environment.
- Kibo utilization has evolved through the promotion of many experiment opportunities and unique technologies.
- JAXA, through the KiboCUBE, hopes to contribute to the expanded utilization of outer space along with developing countries.
- We look forward to your participation in the KiboCUBE program as a new international cooperation through UN.
- We support the Human Space Technology Initiative of the UN Program on Space Applications, and are committed to continuing our efforts to promote the scientific and technological development of humankind.

Thank you for your attention

For further information, please contact

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