

‘Japanese Style’ Contribution on the International Space Station

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International Space Station (ISS) Program



- Crewed orbital facility for cutting-edge research and development, only for peaceful purposes.
- The largest international space program in history, with the participation of **15 countries**.
- **Japan is the only nation** participating in the ISS program **from Asia**.



Japan's contribution to the ISS Program : Japanese Experiment Module and H-II Transfer Vehicle

Pressurized Module

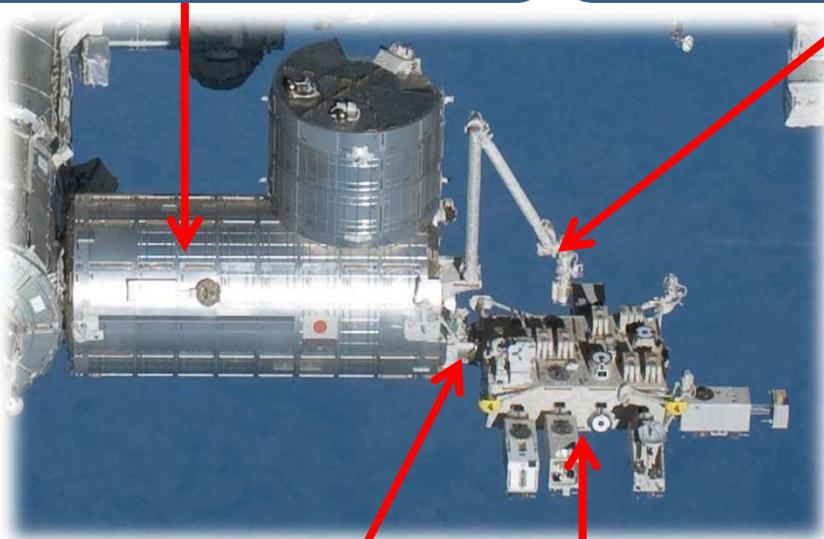
- The largest pressurized module on ISS
- 10 payload racks can be installed

JEM Remote Manipulator System (JEM RMS)

- Relocate payloads on the exposed facility without EVA
- Deploy Nano-Satellites



H-II Transfer Vehicle(HTV):
KOUNOTORI



Japanese Experiment Module(JEM): Kibo

JEM Airlock

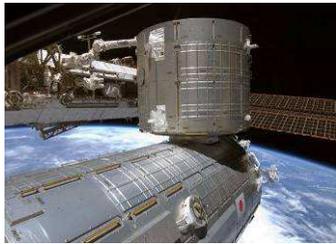
- Transfers equipment to/from exposed area

Exposed Facility

- The only full-scale external experiment area on ISS

- ① The sole transportation vehicle that can transfer large pressurized experiment rack to the ISS.
- ② Delivers a total of 6 tons of pressurized and unpressurized cargo to the ISS.
- ③ 7 HTV launches in total (planned so far)
(4 have been launched)

History of Japanese human space activities



- 2009: Japanese astronauts started long-duration stays on the ISS. H-II Transfer Vehicle (HTV) was launched for the first time and transported various cargos to the ISS.



- 2012: Astronaut Hoshide made a long-duration stay on the ISS.



- 2008: Started construction and operation of Japanese Experiment Module Kibo on the ISS.

- 2005: Japanese Astronauts have boarded the Space Shuttle 7 times.



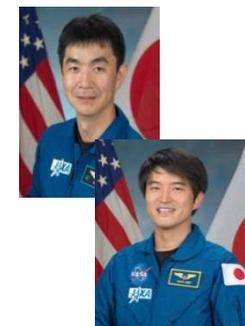
- 1992: Astronaut Mori boarded the Space Shuttle for the first time.



Total duration of stay in the outer space of Japanese Astronauts is the 3rd longest in the world.

• 2013 – 2014
Astronaut Wakata made his 2nd long-duration stay on the ISS.
He assumed the 39th Commander of the ISS;
The first Japanese commander.

- 2015 - Astronaut Yui
- 2016 - Astronaut Onishi will make a long-duration stay on the ISS



Overview of Astronaut Wakata's mission



R. Mastracchio



Koichi Wakata



M. Turin



Launched on
7th November, 2013

- The 38th/39th ISS Expedition.
- Stayed at the ISS for 188days.
- Served as the commander in the last 2 months of his stay.



Returned
on 14th May, 2014

Overview of Astronaut Wakata's mission

Commander of the ISS:

- Responsible to emergency response for ensuring the safety of crewmembers and the ISS.
- Versatile skills, outstanding leadership and deep trust from colleagues are required.



Astronaut Wakata applied Japanese spirit of '和'('Wa') as a commander.



Having meal with other crew members.

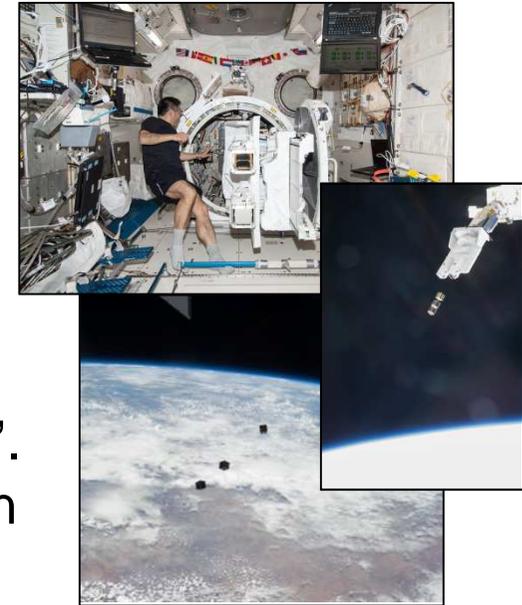
Leadership in 'Japanese Style'

- '和'('Wa') means harmony in Japanese. one of the most important virtues for Japanese people.
- Placing great value on teamwork.
- Bringing out the best in other crew members.

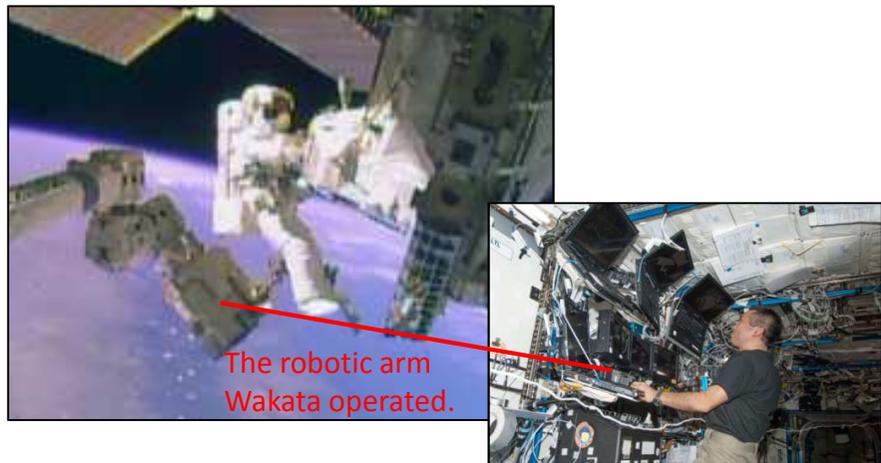
Overview of Astronaut Wakata's mission

Highlight of Astronaut Wakata's mission:

- Carried out various space experiments in 'Kibo'.
life science, space medicine, material engineering, etc.
- Operation of the RMS (Remote Manipulator System) to support the docking of the Dragon and Cygnus spacecraft to the ISS, and extravehicular activity (EVA) of other astronauts replacing the failed pump module.
- Accomplished nano-satellites deployment from 'Kibo'.
- Demonstrated the 4K high-resolution video camera in space for the first time in the world.
in photographing the comet ISON etc...

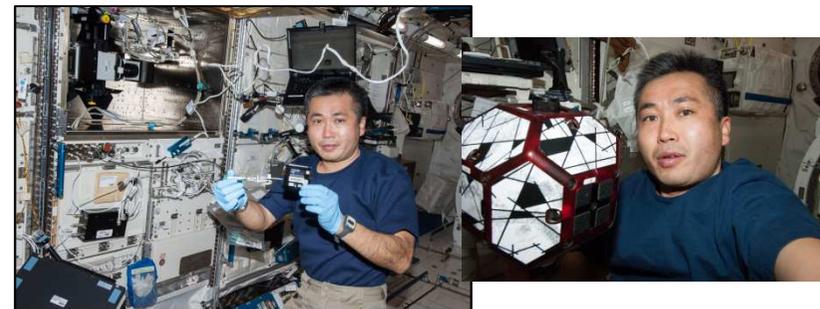


Deployment of nano-satellites from Kibo



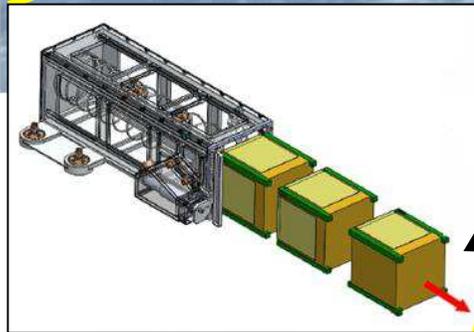
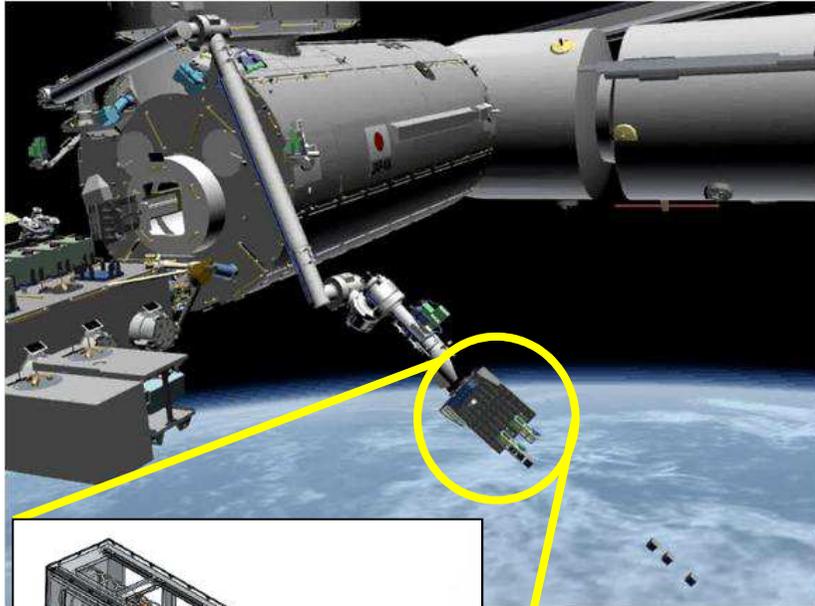
The robotic arm Wakata operated.

Conducted the RMS operation to support EVA



Carried out space experiments

Nano-satellite deployment from 'Kibo'



Satellite
installation case
(10x10x10 cm)



- One of the 'Japanese style' in the ISS utilization.
- Unique way of satellite deployment into space using both Kibo's airlock and the RMS.
- 37 nano-satellites were deployed from Kibo, during Astronaut Wakata's stay in the ISS.



Vietnamese nano-satellite "Pico Dragon",
deployed from "Kibo" in Nov.2013

- The nano-satellites of Japan, USA, Vietnam, Peru, Lithuania have been deployed from Kibo so far.

Kibo utilization activities in Asia (Kibo-ABC)

Kibo-ABC:

- **Asian Beneficial Collaboration** through Kibo utilization.
- One of the initiatives of the Asia-Pacific Regional Space Agency Forum (APRSAF), established in 2012.
- Objectives to share benefits of ISS/Kibo:
 - Gateway to the Kibo Utilization;
Increase the awareness of ISS/Kibo's benefits, and expand collaboration with nations in Asia and the Pacific.
 - Capacity Building;
Provide opportunities for Asian students and young researchers to learn micro-gravity environment in order to disseminate Kibo utilization for future space experiments/activities onboard Kibo through the cooperation with space agencies in Asia-Pacific region.
- Agencies from 9 nations in Asia-Pacific region are the current members of the initiative.

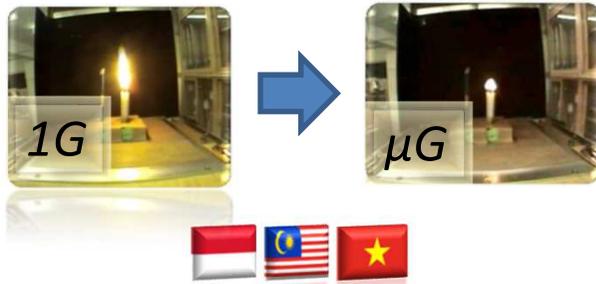


APRSAF
ASIA-PACIFIC REGIONAL
SPACE AGENCY FORUM

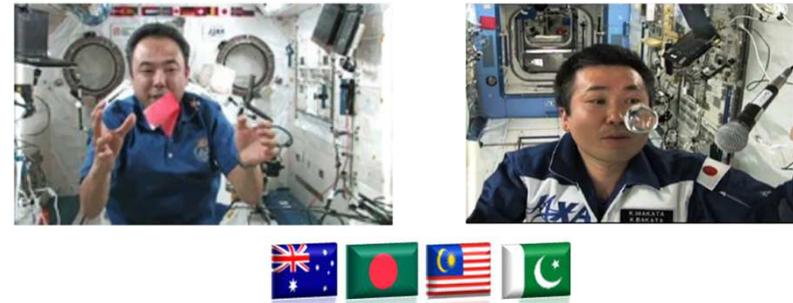


Kibo utilization activities in Asia (Kibo-ABC)

1. 1/2sec- μ G program (2012~)



2. Try Zero-G program (2011~)



3. Space Experiment for Asian Future program (2011~)



4. Parabolic Experiment program (2006~)



➤ Japan would like to continue these unique collaborations with Asian countries in the 'Japanese Style'.

Summary

- Astronaut Wakata's achievement as ISS commander was with made based on the spirit of '和' ('Wa'), which is one of the significant 'Japanese Style' contribution to the ISS program.
- 'Japanese style' is also demonstrated in nano-satellite deployment missions and the other collaborations with Asian countries.
- Japan continues contributing to the ISS program and sharing the values of the ISS with Asian countries.