

JAXA Increment 47&48 Utilization Overview

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Payload Operations Integration working Group Face to Face #39
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Increment 47/48 JAXA Utilization

✚ **JAXA has defined Key Message since Increment 45/46 for new stage of Utilization.**

✚ **Key message of Increment 47/48 is “Continuous and stable operations in the new stage of Kibo Utilization”**

~ Usability improvement with variation of exposed payload size and more frequent opportunities of pressurized experiment~

Important topic of investigations

1. Mouse Experiment

Inc.47/48: Mouse Epigenetics

2. Protein Crystalization

Inc.47/48: PCG #10, PCG Demo #2, Low Temp PCG

3. Electrostatic Levitation Furnace (ELF)

4. Diversification of Exposed Facility

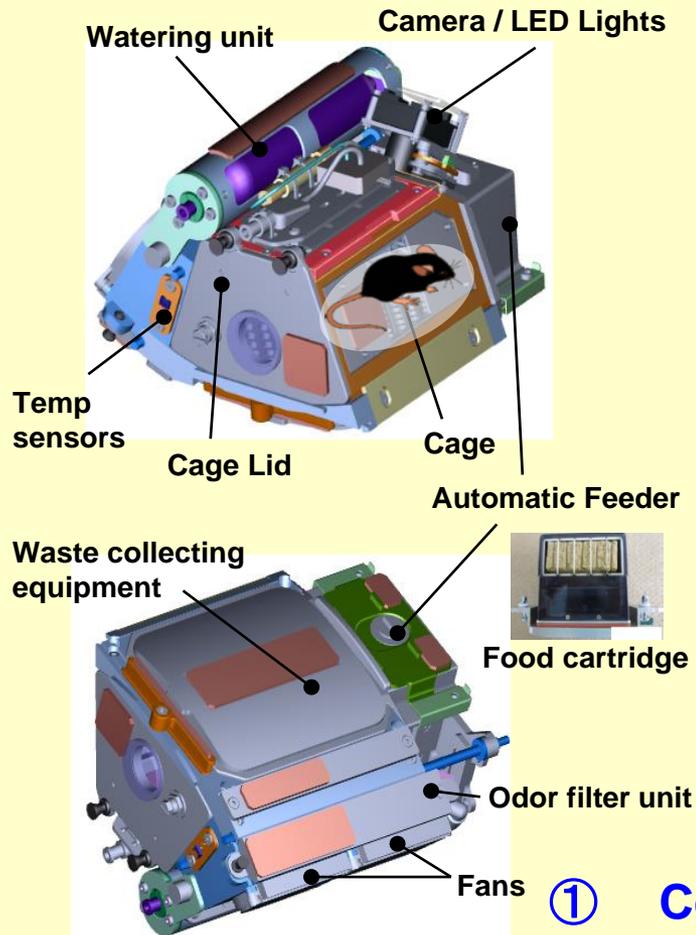
Inc.47/48: J-SSOD-M1, EFU-Adapter, ExHAM, J-SSOD #5

5. Medical Health

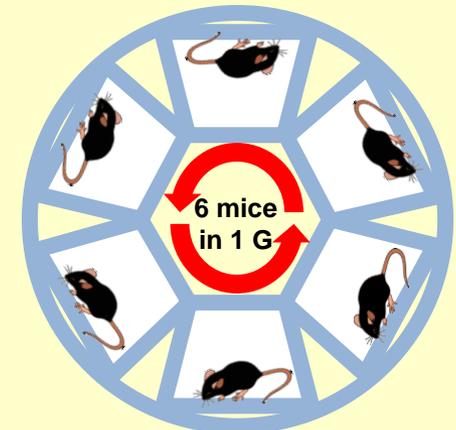
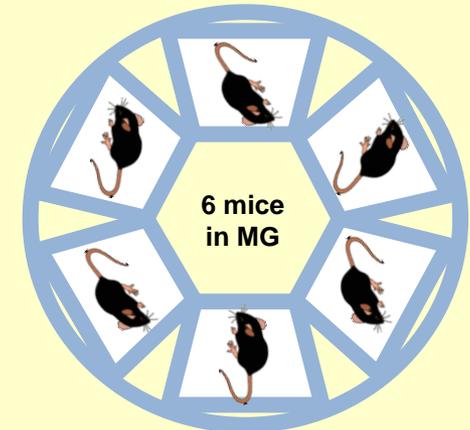
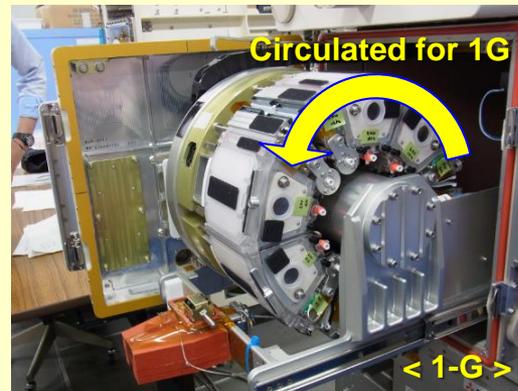
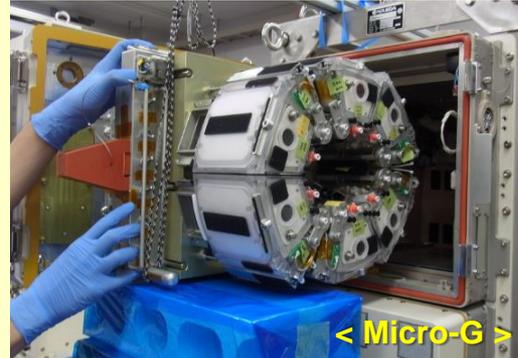
Inc.47/48: IPVI, Multi-Omics

Life Science / JAXA Mouse Project

Mouse Habitat Unit (MHU)



Mouse Habitat Cage Unit



- ① Comparison between micro-G and artificial-G (1G)
- ② Individual habitat (1 male mouse per cage)
- ③ Return mice to the ground in live condition

Inc. 44

Inc. 45/46

Inc. 47/48



MHU installation and Function Checkout were completed in Inc 45/46.

MHU Checkout



Mouse habitat Unit (MHU)
Launched by HTV5

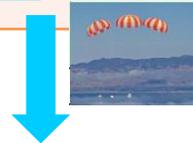


Weekly maintenance (Food/Water supply, Cleaning) are performed.

Experiment <30days>



Live mice (12)
Launched by SpX-9

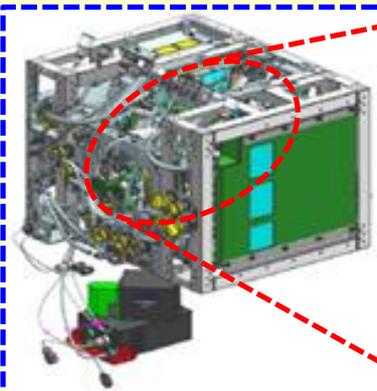


Live mice (12)
Returned by SpX-9

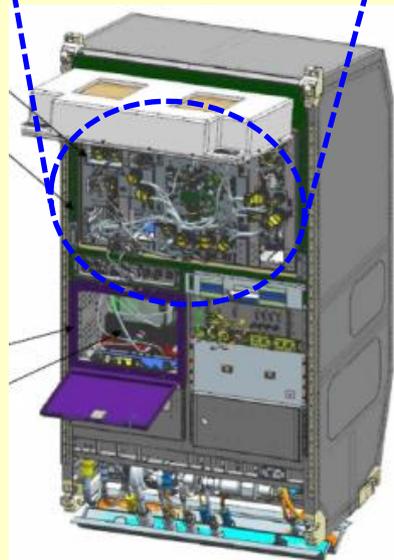
Overview of Mouse Experiment

- ① MHU was launched by HTV-5, and then installed into the Cell Biology Experiment Facility (CBEF) for checkout. (MHU installation and checkout was completed by K.Yui (43S crew))
- ② Live mice (12) will be launched and returned by SpX-9.
- ③ Skilled researchers dissect mice for detailed analysis.

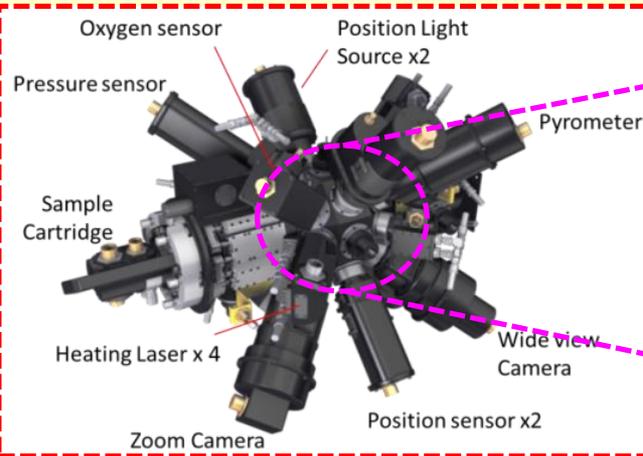
Material science / High melting point



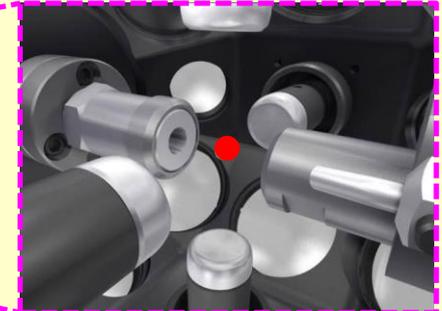
External view



Multi purpose Small Payload Rack #2 (MSPR2)



Observation Unit



Non-contact positioning

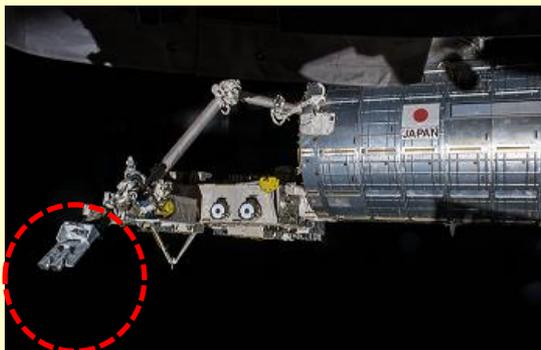
- ① Levitate a sample by Coulomb force. (can handle insulators as well as conductors)
- ② Melt the sample by semiconductor lasers (4)
- ③ Capable to measure – density, surface tension, viscosity of molten samples at high temperatures.

Movie is available at <http://iss.jaxa.jp/kiboexp/equipment/pm/elf/>

Electrostatic Levitation Furnace (ELF)

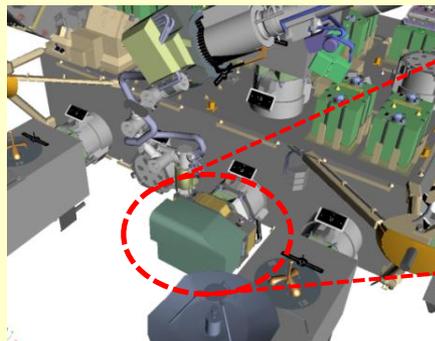
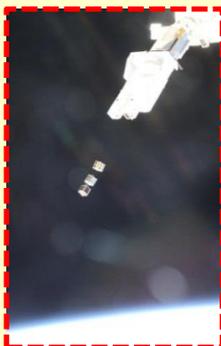
Space Science / Exposed Facility

Offer of the space utilization opportunity



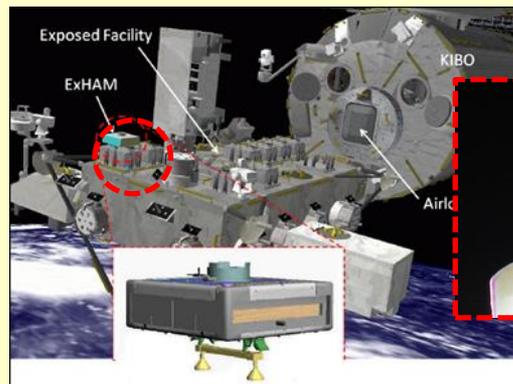
JEM Small Satellite Orbital Deployer (J-SSOD)

- Mechanism for deploying small satellites designed in accordance with CubeSat specification (10cm x 10cm x 10cm or 20cm or 30 cm).



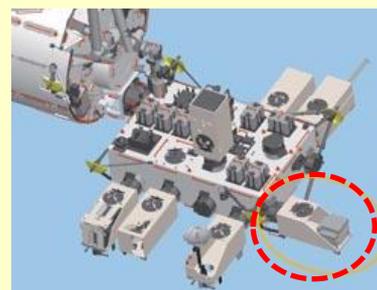
Exposed Facility Unit (EFU) Adapter

- Platform for providing opportunities of high-frequency exposed experiment. Accommodate two payloads.



Exposed Experiment Handrail Attachment Mechanism (ExHAM)

- Mechanism for conducting space exposed experiments. Experimental samples can be placed onto the surfaces of the ExHAM.



CALorimetric Electron Telescope (CALET)

- CALET mission is to research for dark matter and origin of high energy cosmic ray. CALET is equipped with the latest detection technology and electronics called "CALorimeter" to determine energy and directions of cosmic ray.



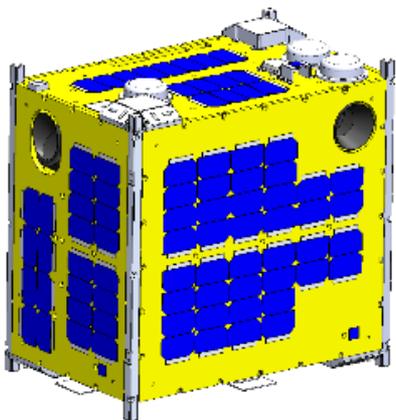
Space Science / Exposed Facility

Variation of Small Satellite Orbital Deployer size

J-SSOD-M1

- Mechanism for deploying
550x550x350mm satellite

Diwata-1
Collaboration
between Universities
of Japan and
Philippines.



Diwata-1 Overview

Class; 50kg Microsatellite
Dimensions: 550x550x350mm
Inclination: 51.6deg
Altitude: 400 km - 420 km
Lifespan: ~1 year at 400 km
Launch Date: 1Q 2016

High Precision Telescope



Spatial Resolution
3m

Field of View
1.9 x 1.4km

Application
Determine the extent
of damages from
disasters

Monitor cultural and
natural heritage sites

SMI with LCTF



Spatial Resolution
80m

Field of View
52 x 39km

Application
Monitor changes in
Vegetation

Monitor ocean
productivity

Wide Field Camera



Spatial Resolution
7km

Field of View
180° x 134°

Application
Observation of cloud
patterns and weather
disturbances

Middle Field Camera



Spatial Resolution
185 m

Field of View
121.9 X 91.4 km

Application
Assists in determining
the locations of
images captured using
the HPT and SMI

Increment 47/48 JAXA Investigations



The red letter is a new investigation in Increment 47/48.

<i>Discipline</i>	<i>Investigations</i>
Physical Science	Electrostatic Levitation Furnace (ELF)#1~4, Interfacial Energy, Group Combustion , Dynamic Surf 3, Marangoni UVP2, Atomization (Reserve Task)
Biology and Biotechnology	Mouse Epigenetics , PCG#10, PCG Demo #2 Low Temp PCG#1 , Cell Mechanosensing3, Plant Gravity Sensing-3, Embryo Rad, Stem Cells, Space Pup Microbe-IV, Auxin Transport
Human Research	Intracranial Pressure & Visual Impairment (IPVI) Multi Omics, Probiotics Dry Run, Biological Rhythms 48Hrs
Technical Development	Area PADLES 16
Earth and Space Science (Exposed Facility)	J-SSOD M-1 , JAXA Small GPS/Whl Demo Box, HDTV-EF2 (EFU Adapter) CALET, J-SSOD#5 , MAXI, SEDA-AP, Handhold Platform (ExHAM)

Increment 47/48 JAXA Investigations



The red letter is a new investigation in Increment 47/48.

	Mar	Apr	May	Jun	Jul	Aug	Sep
	47-3	47-6			48-3	48-6	
N2 Nadir		SpX-8 3/22 4/21	SpX-9 5/9 6/8		SpX-10 8/3 9/2		
N1 Nadir	3/13	OA-6 5/6			7/10	OA-5 8/26	
SAIBO Rack		Cell Mechano sensing-3	Mouse Epigenetics			Auxin Transport #1,4	
RYUTAI Rack	Dynamic Surf 3						
	JAXA PCG #10						
MSPR#1 Rack					Group Combustion		
MSPR#2 Rack	Interfacial Energy				Electrostatic Levitation Furnace (ELF) #2-4		
Non Rack	Area PADLES 16						
	PCG Demo #2					Low temp PCG	
		Asian Herb					
Human Research	BLR48			IPVI			
	Multi-Omics						
External Payload		J-SSOD M-1					
		EFU Adapter					
	CALET / MAXI / SEDA-AP						
	Ex-HAM						
Docked Ops						J-SSOD #5	

Thank you for your kind attention.

