JAXA Increment 47&48
Utilization Overview

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Payload Operations Integration working Group Face to Face #39
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
Comparison between micro-G and artificial-G (1G)

Individual habitat (1 male mouse per cage)

Return mice to the ground in live condition
### Life Science / JAXA Mouse Project

<table>
<thead>
<tr>
<th>Inc. 44</th>
<th>Inc. 45/46</th>
<th>Inc. 47/48</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Mouse habitat Unit (MHU) Launched by HTV5" /></td>
<td><strong>MHU Checkout</strong>&lt;br&gt;MHU installation and Function Checkout were completed in Inc 45/46.</td>
<td><img src="image2" alt="Weekly maintenance (Food/Water supply, Cleaning) are performed." /></td>
</tr>
<tr>
<td><img src="image3" alt="Live mice (12) Launched by SpX-9" /></td>
<td><strong>Experiment &lt;30days&gt;</strong>&lt;br&gt;Weekly maintenance (Food/Water supply, Cleaning) are performed.</td>
<td><img src="image4" alt="Live mice (12) Returned by SpX-9" /></td>
</tr>
<tr>
<td><img src="image1" alt="Mouse habitat Unit (MHU) Launched by HTV5" /></td>
<td><img src="image3" alt="Live mice (12) Launched by SpX-9" /></td>
<td><img src="image4" alt="Live mice (12) Returned by SpX-9" /></td>
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</tbody>
</table>

### 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

Observation Unit

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/
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 Experiment Handrail Attachment Mechanism (ExHAM)**
- Mechanism for conducting space exposed experiments. Experimental samples can be placed onto the surfaces of the ExHAM.

**Exposed Facility Unit (EFU) Adapter**
- Platform for providing opportunities of high-frequency exposed experiment. Accommodate two payloads.

**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.
**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

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**Diwata-1**

Collaboration between Universities of Japan and Philippines.

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**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

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**SMI with LCTF**

- **Spatial Resolution:** 80m
- **Field of View:** 52 x 39km

**Application**
- Monitor changes in Vegetation
- Monitor ocean productivity

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**Wide Field Camera**

- **Spatial Resolution:** 7km
- **Field of View:** 180° x 134°

**Application**
- Observation of cloud patterns and weather disturbances

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**Middle Field Camera**

- **Spatial Resolution:** 185m
- **Field of View:** 121.9 x 91.4km

**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.

<table>
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<tr>
<th>Discipline</th>
<th>Investigations</th>
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</thead>
<tbody>
<tr>
<td>Physical Science</td>
<td>Electrostatic Levitation Furnace (ELF)#1~4, <strong>Interfacial Energy</strong>, Group Combustion, Dynamic Surf 3, Marangoni UVP2, Atomization (Reserve Task)</td>
</tr>
<tr>
<td>Biology and Biotechnology</td>
<td><strong>Mouse Epigenetics</strong>, PCG#10, PCG Demo #2 Low Temp PCG#1, Cell Mechanosensing3, Plant Gravity Sensing-3, Embryo Rad, Stem Cells, Space Pup Microbe-IV, <strong>Auxin Transport</strong></td>
</tr>
<tr>
<td>Human Research</td>
<td>Intracranial Pressure &amp; Visual Impairment (IPVI) Multi Omics, Probiotics Dry Run, Biological Rhythms 48Hrs</td>
</tr>
<tr>
<td>Technical Development</td>
<td>Area PADLES 16</td>
</tr>
<tr>
<td>Earth and Space Science (Exposed Facility)</td>
<td><strong>J-SSOD M-1</strong>, JAXA Small GPS/Whl Demo Box, HDTV-EF2 (EFU Adapter) CALET, J-SSOD#5, MAXI, SEDA-AP, Handhold Platform (ExHAM)</td>
</tr>
</tbody>
</table>
## Increment 47/48 JAXA Investigations

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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
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<tr>
<td>47-3</td>
<td>47-6</td>
<td>48-3</td>
<td>48-6</td>
<td>8/3</td>
<td>9/2</td>
<td></td>
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</tbody>
</table>

**N2 Nadir**
- 3/22: SpX-8
- 4/21: SpX-9
- 5/9: SpX-9
- 6/8: SpX-10
- 8/3: SpX-10
- 9/2: SpX-10

**N1 Nadir**
- 3/13: OA-6
- 5/6: OA-5
- 7/10: OA-5
- 8/26: OA-5

**SAIBO Rack**
- Cell Mechano sensing-3

**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
- EPU Adapter
- CALET / MAXI / SEDA-AP
- Ex-HAM
- J-SSOD #5

**Docked Ops**
- SpX-8
- 9/26
- N2 Nadir
- SpX-9
- 5/9
- 6/8
- SpX-10
- 8/3
- 9/2
- N1 Nadir
- OA-6
- 5/6
- OA-5
- 7/10
- OA-5
- 8/26

- Cell Mechano sensing-3
- Dynamic Surf 3
- JAXA PCG #10
- Group Combustion
- Interfacial Energy
- Electrostatic Levitation Furnace (ELF) #2-4
- Area PADLES 16
- PCG Demo #2
- Low temp PCG
- Asian Herb
- J-SSOD M-1
- EPU Adapter
- CALET / MAXI / SEDA-AP
- Ex-HAM
- J-SSOD #5
Thank you for your kind attention.