

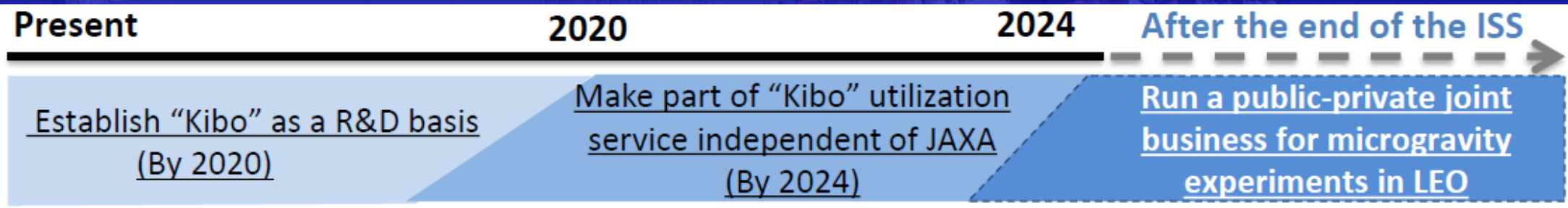


JAXA strategy of JEM/EF utilization and Extension of CALET mission

Feb. 3, 2020
JAXA JEM(Kibo) Utilization Center
DOI Shinobu

1. Goals of Kibo Utilization

- ❑ By 2020, to establish “Kibo” as a valuable R&D basis (platform) for science & technology innovation
- ❑ By 2024, to make a part of “Kibo” utilization services through these platforms independent of JAXA.
 - External organizations and groups will independently and constantly provide end users with utilization service, and thus a new market is expected to be formed.
- ❑ Beyond the ISS, to run a public-private joint business for microgravity experiments in LEO

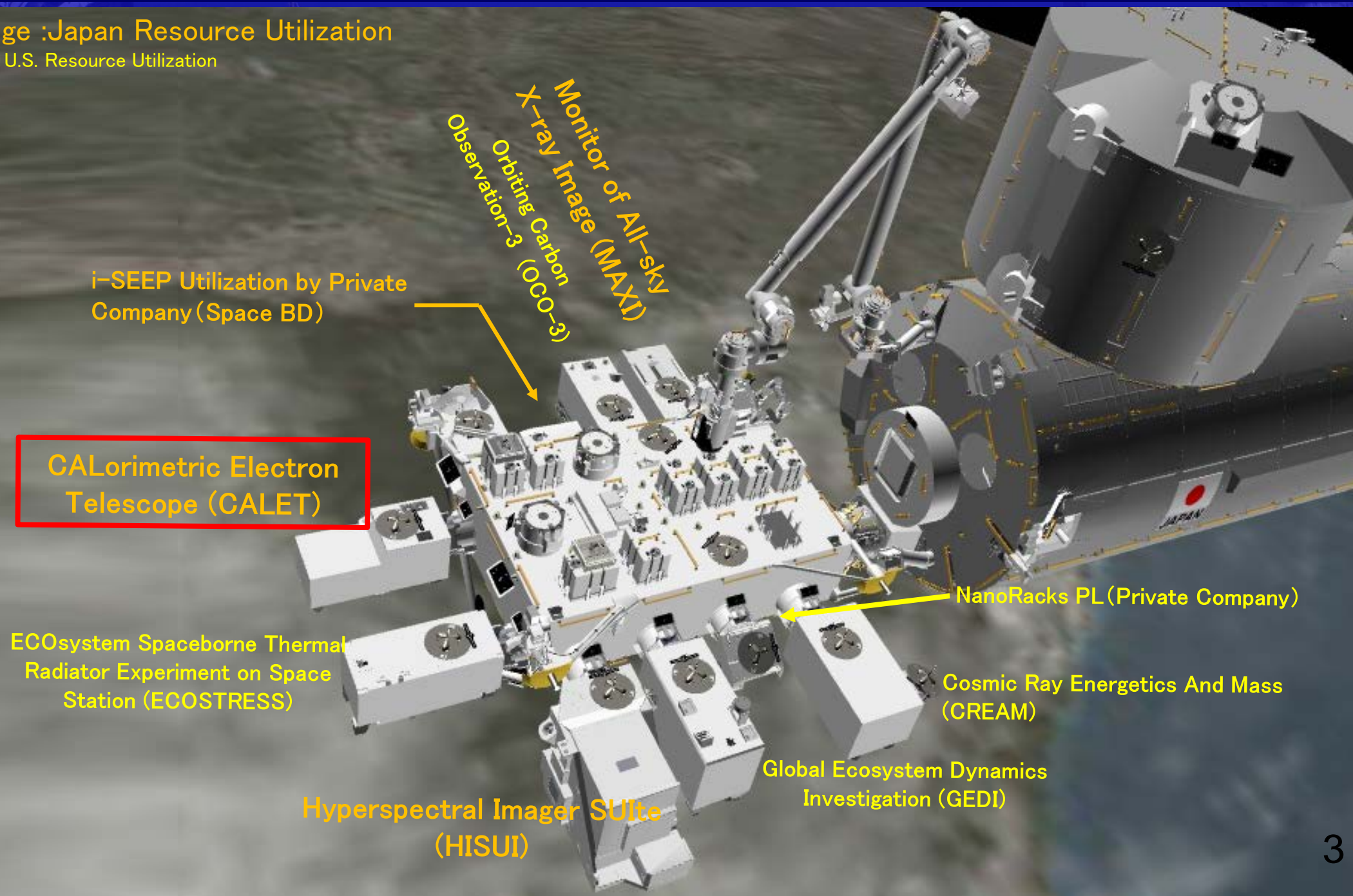




2. Current Outlook of Kibo Exposed Facility(EF)



Orange :Japan Resource Utilization
Yellow :U.S. Resource Utilization



CALorimetric Electron Telescope (CALET)

Monitor of All-sky X-ray Image (MAXI)
Orbiting Carbon Observation-3 (OCO-3)

i-SEEP Utilization by Private Company (Space BD)

NanoRacks PL (Private Company)

ECOsystem Spaceborne Thermal Radiator Experiment on Space Station (ECOSTRESS)

Cosmic Ray Energetics And Mass (CREAM)

Global Ecosystem Dynamics Investigation (GEDI)

Hyperspectral Imager Suite (HISUI)



3. Easy-to-Use External Platform (i-SEEP)

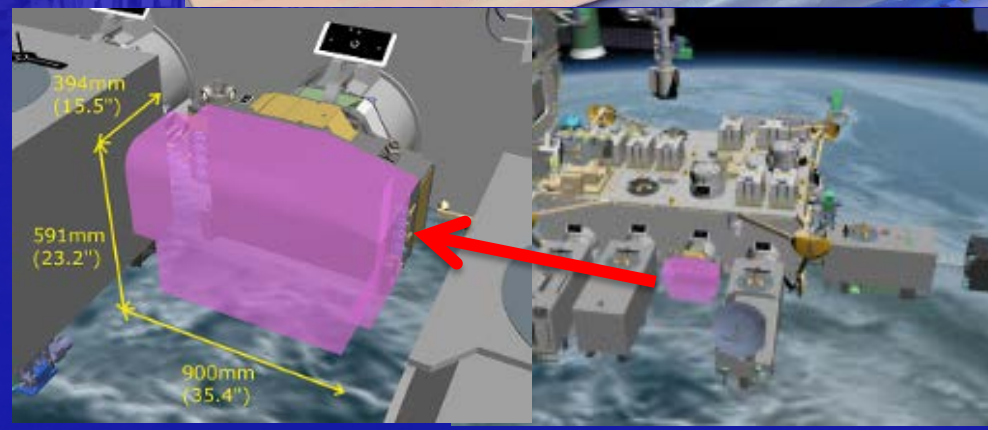
IVA-replaceable Small Exposed Experiment Platform (i-SEEP)

Space BD Inc. selected as the service provider(2019/3~)

- Experiment device(s) is launched as pressurized cargo and attached to i-SEEP inside Kibo Module by crew.
- i-SEEP with experiment device(s) is transferred outside through the JEM Airlock, and then robotically attached to the Exposed Facility.
- Resources such as electrical power, Ethernet communication, and a cooling function are provided through the Exposed Facility and iSEEP.
- Devices can be returned to Earth for further analysis, if required.



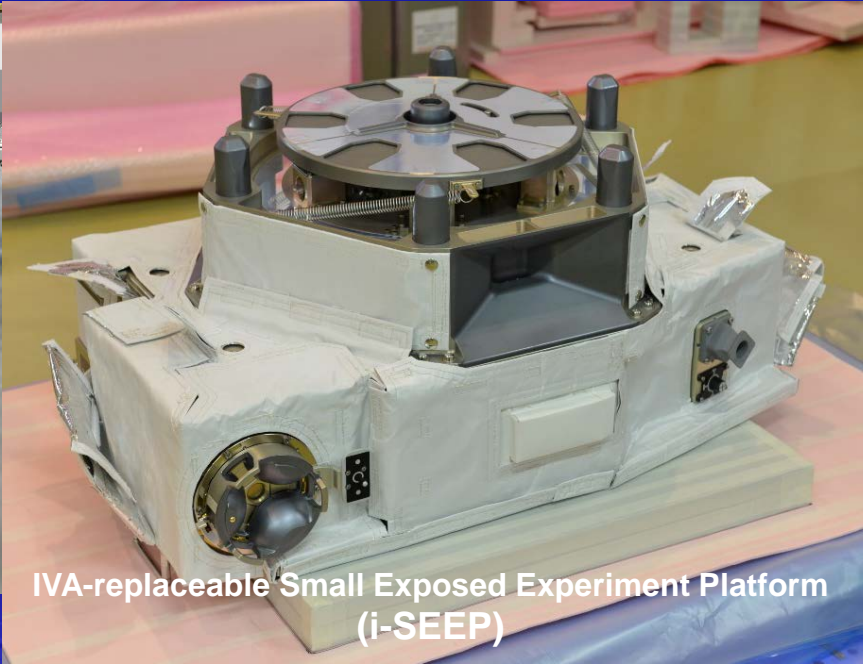
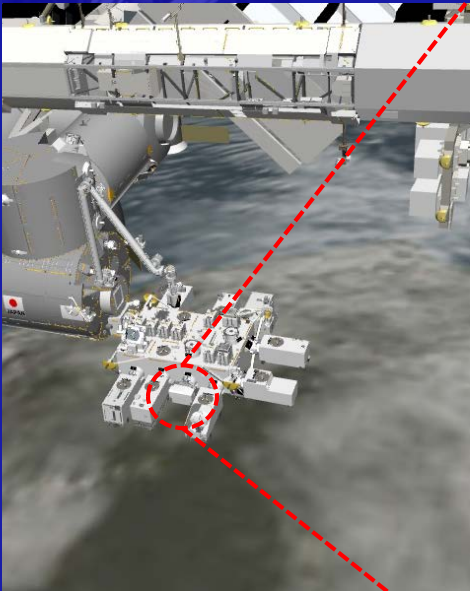
Overview of i-SEEP



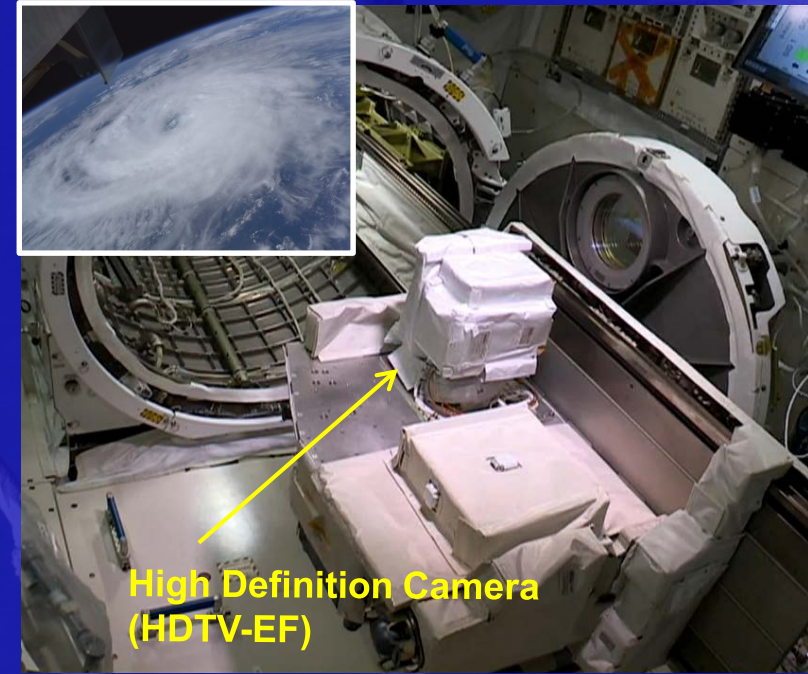
Capability:
up to 50 cm × 70 cm × 35 cm and 200 kg in total

Resources	Characteristics
Power	28 V DC (rated) 2 ch, up to 200W/ch
Communications	<p>Mid-speed Ethernet, Ethernet II, or IEEE 802.3m 2 ch Wireless LAN: IEEE 802.11n, 1 access point</p> <p>Low-speed MIL-STD-1553B, 2 systems USB, USB 2.0, 2 ch</p> <p>Video NTSC, 1 ch</p>
Downlink	Max 27 Mbps including overall equipment data
Heat dissipation	<p>400 W (max.) (2 cold plates attached to experimental equipment) Cold plate temp.: 16–40 ° C</p>

3. Easy-to-Use External Platform (i-SEEP)



IVA-replaceable Small Exposed Experiment Platform (i-SEEP)



High Definition Camera (HDTV-EF)



Small Optical Link for ISS (SOLISS) [SONY CSL/JAXA]



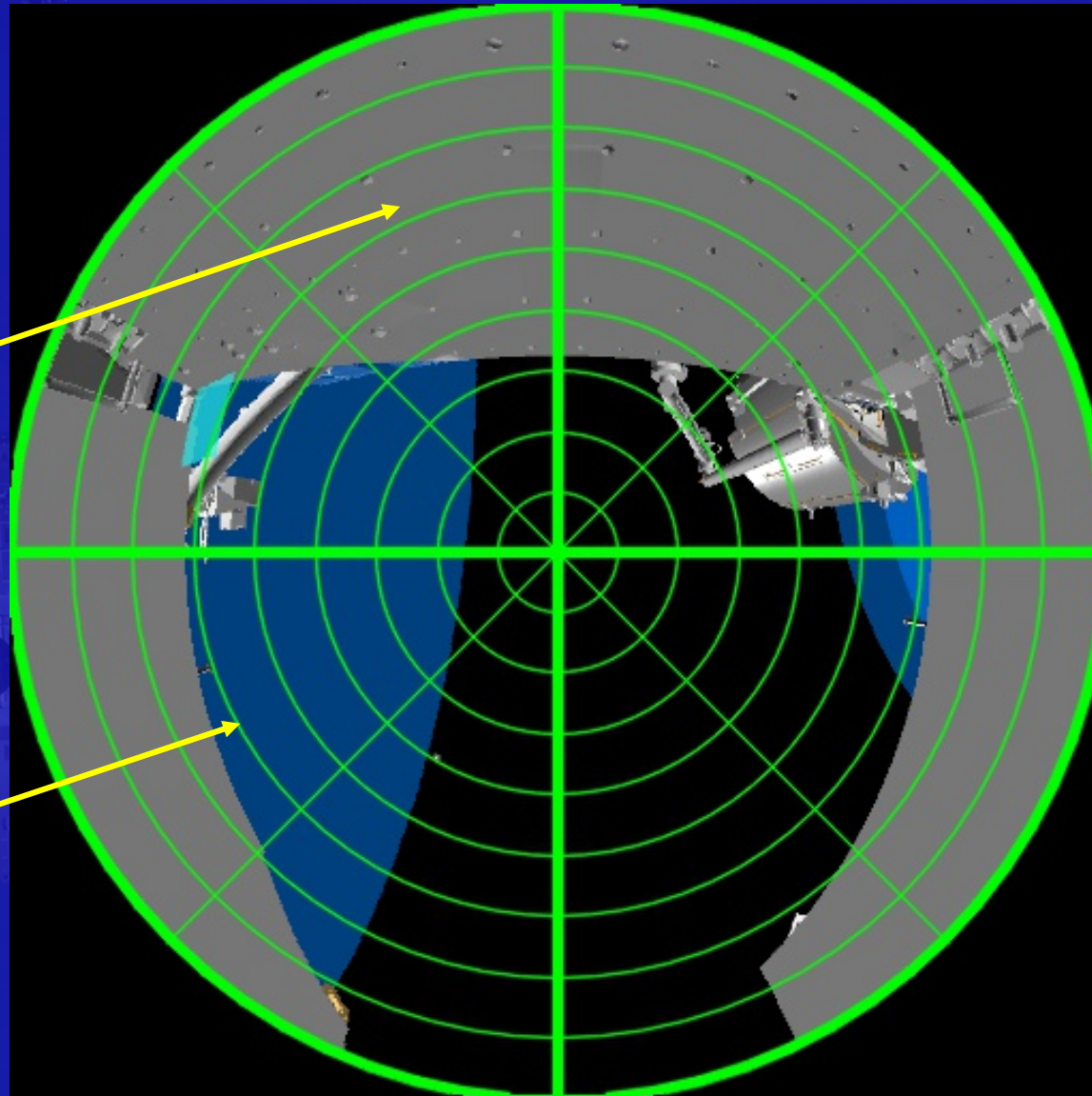
integrated Standard Imager for Microsatellite (iSIM) [SpaceBD/Satlantis]



3. Easy-to-Use External Platform (i-SEEP)

i-SEEP and adjacent payloads (Gray-hatched)

Envelope of Solar Array Paddle (Blue-hatched)



Zenith Observation FOV from i-SEEP at EFU#5

✓ Adjusting eyepoint may improve the FOV.



4. Notional Utilization Plan for Exposed Facility

	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	
#1	MAXI (X-ray)						TBD				
#2	NASA/CREAM (Cosmic ray)				NASA/STP H-8						
#3	NASA/CATS (Aerosol)			NASA/OCO-3 (CO2)			NASA/ILLUMA-T				
#4	NASA/NREP (provided by NanoRacks (US company))										
#5	Checkout		SOLISS		iSIM		i-SEEP (provided by SpaceBD)				
	HDTV-EF2/i-SEEP										
#6	NASA/HREP (Eath Observation)			NASA/GEDI (LIDAR)			NASA/TBD				
#7	ICS (Inter-Satellite Communication)						TBD				
#8	HISUI(Hyperspectral)					TBD					
#9	CALET						TBD				
#10	NASA/ECOSTRESS				TBD						
#11	SEDA-AP (Space Environment Monitor)										
#12	Backup										

Extension Review
 Science Review - Sep.2020
 Program Review - Dec. 2020

5. Summary

- As “Kibo” utilization strategy, JAXA is trying to realize various external missions by various users, by collaboration with commercial service providers.
- By further CALET operation extension, JAXA expects that CALET will produce additional science outcome through the collaborative observation or research with other science communities.
- JAXA Program Review for CALET operation extension will be held to evaluate the following perspectives:
 - Science criteria achievement (Science review result)
 - Expectation for additional science outcome
 - Hardware soundness
 - Operation cost