International Space Station Status

Sam Scimemi
Director, International Space Station
NASA Headquarters
July 2016

For current baseline refer to SSP 54100 Multi-Increment Planning Document (MIPD)

ISS Flight Plan

Flight Planning Integration Panel (FPIP)

(Pre-decisional, For Internal Use, For Reference Only)

NASA: OC4/John Coggeshall
MAPI: OP/Randy Morgan

Chart Updated: July 07th, 2016

2016 | 2017

Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug

Inc 48 | Inc 49 | Inc 50 | Inc 51 | Inc 52

Crew Rotation

- J. Williams (CDR-48) 172 days (46S)
- A. Ovchinin 172 days (46S)
- O. Skripochka 172 days (46S)
- S. Kimbrough (CDR-50) 155 days (48S)
- A. Borisenko 155 days (48S)
- S. Ryzhikov 155 days (48S)
- A. Misurkin (CDR-52) 170 days (50S)
- N. Tikhonov 170 days (50S)
- M. Vande Hei 170 days (50S)
- A. Ivanishin (CDR-49) 115 days (47S)
- T. Onishi 115 days (47S)
- K. Rubins 115 days (47S)
- P. Whitson (CDR-51) 181 days (49S)
- E. T. Pesquet 181 days (49S)
- O. Novitsky 181 days (49S)
- F. Yurchikhin (CDR-53) 151 days (51S)
- J. Fischer 151 days (51S)
- P. Nespoli 151 days (51S)
- (SpX-DM2)
- (SpX-DM2)

Soyuz Lit Landing

07/14 | 08/07 | 09/09 | 10/12 | 11/02 | 12/15 | 12/31 | 02/10 | 03/03 | 04/06 | 05/09 | 06/02 | 07/11 | 08/04

07/17 | 09/10 | 11/05 | 01/03 | 03/09 | 05/15 | 07/14

Stage S/W

X2 PMPV R5 7/22

(Transition required prior to first crewed VV)

X2 R15 2/13

Stage EVAs

(IDA2 Install) | (TTCR) | (Battery R&R A-B) | (Contingency C) | (Contingency D-F) | (ExPCA) | (NODE 3) | R-43

Port Utilization

MRM2 / SM Zenith

9/6 | 9/25 (34 orbit rendezvous) | 2/25 | 3/11 | 8/28

172 / 172 Landing 9/7 early GMT | 155 / 153 | 170 / 170

46S | 48S | 50S

MRM1 / FGB Nadir

7/9 (34 orbit rendezvous) | 10/30 | 11/16 (Early GMT) | 5/15 | 5/29

115 / 113 | 181 / 181 | 151 / 151

47S | 49S | 51S

DC1

7/3 | 7/19 (34 orbit rendezvous) (Early GMT) | 1/19 | 2/1 | 6/13 | 6/15

186 / 184 | 132 / 132 | 185 / 185

62P | 64P | 66P | 67P

SM Aft

10/14 | 10/20 | 4/29

197 / 195 | 191 / 191

63P | 65P

N2 Fwd / PMA2 (Dock)

IDA #2 installed on PMA2

5/12 | 6/7 | 26 Days | SpX-Demo1 (un-crewed)

8/24 | 22 D | SpX-Demo2 (crewed)

N2 Zenith (Dock)

N2 Nadir (Berth)

7/20 | 8/29 | 40 Days | SpX-9

10/4 | 11/11 | 38 Days | HTV6

11/13 | 12/20 | 37 Days | SpX-10

HTV6 KITE experiment

2/3 | 3/5 | 30 Days | SpX-11

6/3 | 7/3 | 30 Days | SpX-12

N1 Nadir (Berth)

9/1 | 9/10 | 9 D | OA-5

1/2 | 4/2 | 90 Days | OA-7

7/9 | 8/25 | 47 Days | OA-8

Solar Beta >60

07/22 -07/31 | 10/24 -10/30 | 12/20 -12/30 | 02/21 -02/24 | 05/20 -05/30 | 07/19 -07/28

External Cargo

HTV6: 6 x Li-Ion Batt + AP [direct mount]

SpX-9: IDA 2

SpX-10: STP-H5, SAGE IP, SAGE NVP

SpX-11: ROSA, MUSES, NICER

SpX-12: CREAM

Launch Schedule

SpX-9	OA-5	HTV6 (10/1 JST)	SpX-10	OA-7	SpX-11	SpX-Demo1	SpX-12	OA-8	SpX-Demo2
7/18	NET 8/22	NET 9/30	11/11	12/30	2/1	5/12	6/1	7/6	8/24

N°731 MS | N°433 MS-03 | N°732 MS-02 | N°434 MS-04 | N°733 MS-03 | N°435 MS-05 | N°734 MS-04 | N°735 MS-05 | N°436 MS-06

47S 7/7 | 64P 7/16 (Late GMT) | 48S 9/23 | 65P 10/20 | 49S 11/15 | 66P 2/1 | 50S 3/11 | 51S 5/29 | 67P 6/15

Increment 48 Overview: Crew

46S Dock 3/19/16
46S Undock 9/7/16

Oleg Skripochka
FE (R) – 46S

Jeff Williams
CDR (US) – 46S

Alexey Ovchinin
FE (R) – 46S

47S Dock 6/26/16
47S Undock 10/30/16

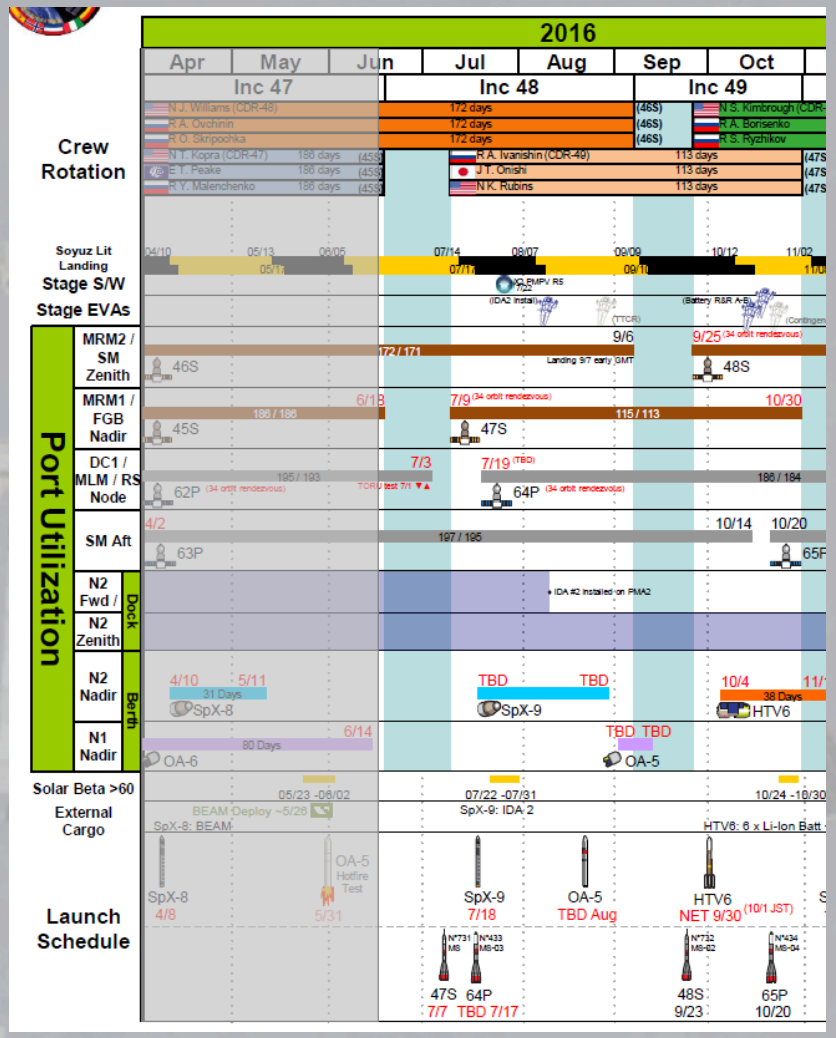
Anatoli Ivanishin
FE (R) – 47S
(CDR Inc. 49)

Kate Rubins
FE (US) – 47S

Takuya Onishi
FE (J) – 47S

Increment 48 Overview: Major Stage Objectives

- Increment 48: 80 Days
  - Stage 48-3: 45S Undock to 47S Dock: 20 days
  - Stage 48-6: 47S Dock to 46S Undock: 60 days
  - EVAs
    - » IDA 2 Install
    - » *TTCR Retract*
  - Cargo vehicles:
    - » SpX-9 Capture/Berth (7/20) / Unberth (8/29)
    - » 62P Undock (7/3) / 64P Dock (7/19) at DC1 Nadir
    - » OA-5 Arrival/Capture (NET Aug)
  - Science/Utilization:
    - » JAXA Mouse Epigenetics
    - » Fluid Shifts
    - » Heart Cells
    - » DNA Sequencer
  - Maintenance/Outfitting
    - » External Wireless Cable Install
    - » Lab MCA Troubleshooting
  - Software Transitions
    - » PMPV R5



Per FPIP In Work, June 16, 2016

Increment 48
EVA Plan

- Contingency EVA Assignments
  - EV1 – Jeff Williams
  - EV2 – Takuya Onishi
  - IV/Robotics – Kathleen Rubins
- Support provided for EVAs in CSRD Chit 14317 (preliminary)

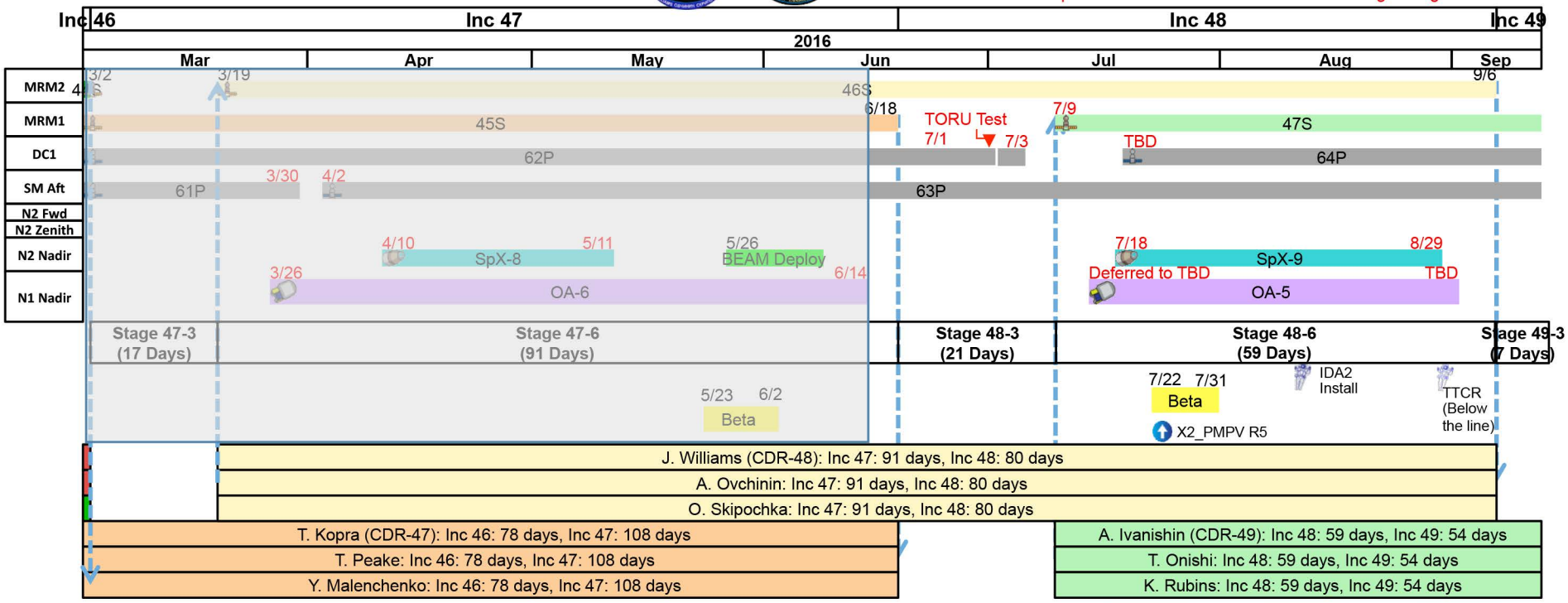
- **IDA Installation EVA**
  - Perform final IDA2 cable routing.
  - Perform IDA2 MLI removal.
  - Perform IDA2 outfitting.
    - Install HEMI reflectors (2).
    - Install H-Fixture MLI.
    - Install PMA2 planar reflector cover.
    - Install PMA2 HEMI reflector cover.
  - Perform EHDC installation on CP03 ETVCG.

- **TTCR Restow EVA**
  - Perform retraction of TTCR, cinch, and install shroud.
  - Perform tightening of Port AJIS struts 3, 2, and 1.
  - Perform installation of EHDC on CP09 ETVCG.
  - Perform CP09 luminaire R&R.
  - Perform imagery of port SARJ at cover #17 location.

- **Get Aheads**
  - Perform EHDC installation at CP09 ETVCG (IDA Install EVA, Only if no TTCR EVA)
  - Perform EHDC installation on CP08 ETVCG
  - PFCS MLI Removal (TTCR EVA only)
  - Route White/Green Cable W2288 for IDA3
  - Perform SSPTS cap removal.
  - Connect MDM Ethernet cable
  - EPIC MDM Ethernet Cable Route
  - AMS Picture Task (TBD, IDA Install EVA only)
  - Port CETA Cart Brake Handle Tieback

INCREMENTS 47 & 48

Updated 05/26/2016: All Dates GMT
SSCN/CR: 15088A, 15191, 15261, 15340, 15398 (in work)
Proposed dates in red under assessment in Flight Program CR



Highlights	Increment 47	Increment 48
Utilization	BEAM install, inflate, outfit (SpX-8) RR-3 (SpX-8) OA-6 Post Unberth Activities: - Saffire operations - External NRCSD deployments (below ISS) - REBR-W	Mouse Epigenetics-1 (SpX-9)
EVAs, Resupply and Outfitting		IDA2 install TTCR EVA (Below the line)
S/W & Av Updates		X2 PMPVR5

45Soyuz Crew

Y. Malenchenko, T. Peake, T. Kopra

46Soyuz Crew

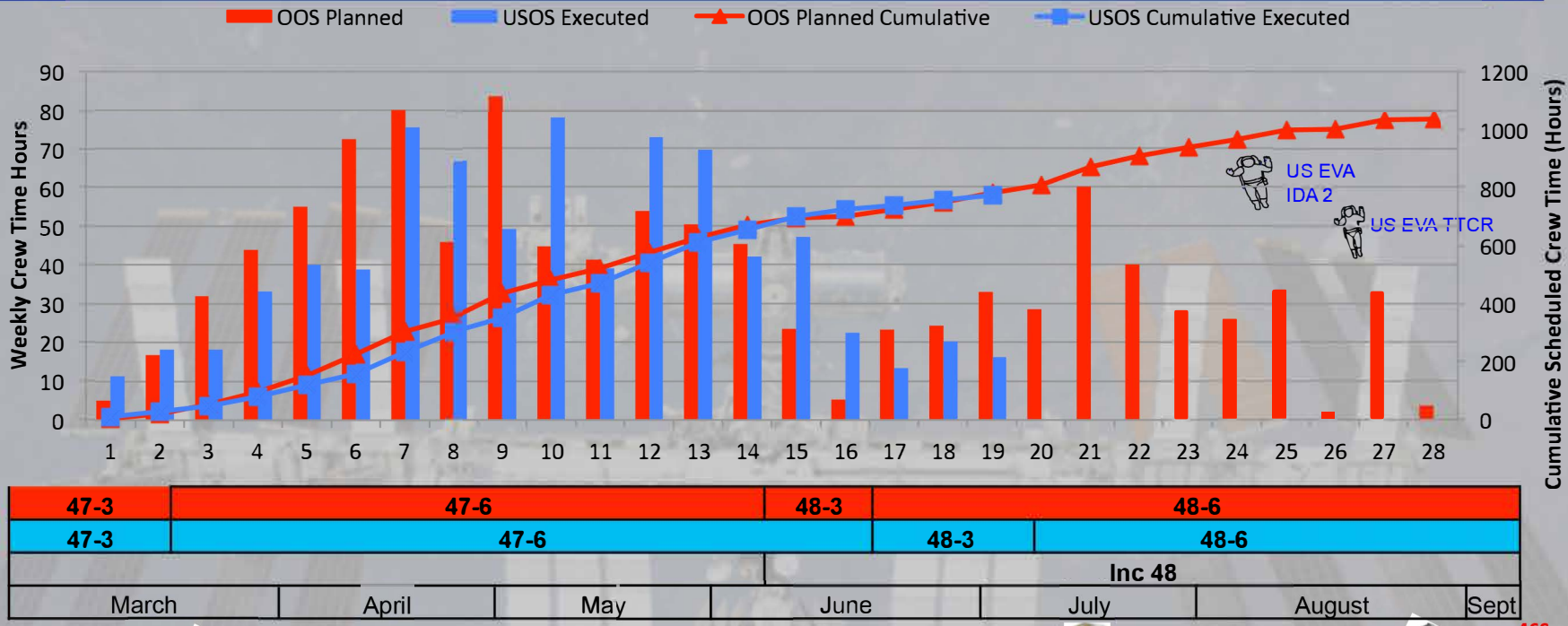
J. Williams, O. Skripochka, A. Ovchinin

47Soyuz Crew

A. Ivanishin, K. Rubins, T. Onishi

IM - Hubert Brasseaux (x48079)
IDM - Jaime Marshik (x38796)
IE - Mark Stovall (x41752), Cindy Cranford (x47677)
IPE - Desiree Smith (x48218)

Inc 47 - 48 Utilization Crew Time



OA-6
Berth 3/13/16
Berth 3/26/16
Unberth 5/24/16
Unberth 6/14/16

SpX-8
Berth 3/22/16
Berth 4/10/16
Unberth 4/21/16
Unberth 5/11/16

*

Berth 5/9/16
Berth TBD
Unberth 6/8/16
Unberth TBD

SpX-9

Berth 7/10/16
Berth August TBD
Unberth 8/29/16
Unberth August TBD

OA-5

46S
Undock
9/7/16

Wk15 data under review

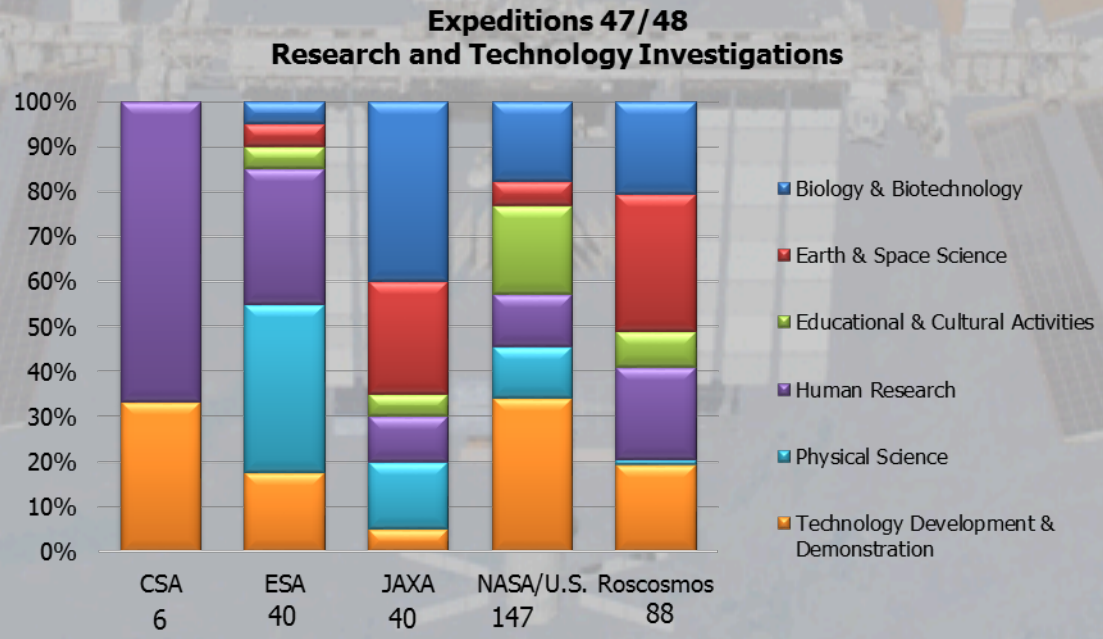
Color Key:
Completed
Final OOS
FPIP Plan

Executed through Increment Wk (WLP Week) 19 =	17.6 of 25.8	work weeks 68.22% through Increment
USOS IDRD Allocation:	1,021.00	hours
OOS USOS Planned Total:	1,034.33	hours
USOS Actuals:	771.67	hours
	75.58%	through IDRD Allocation
	74.61%	through OOS Planned Total
Total USOS Average Per Work Week:	43.84	hours/work week
Voluntary Science Totals to Date:	0	hours (Not included in the above totals or graph)
RSA/NASA Joint Utilization to Date:	32.5	Hours (not included in the above totals or graph)

ISS Research Statistics

Number of Investigations for 47/48: 321

- 147 NASA/U.S.-led investigations
- 174 International-led investigations
- 103 New investigations
  - 1 CSA
  - 14 ESA
  - 9 JAXA
  - 76 NASA/U.S.
  - *3* Roscosmos (Preliminary Data)
- Over 800 Investigators represented
- Over 1300 scientific results publications (Exp 0 – present)



Estimated Number of Investigations Expedition 0-48: 2198*

Working data as of May 31, 2016
***Pending Post Increment Adjustments**

Increments 47 & 48 Research Plan - Investigation List

Human Research

Bone & Muscle Physiology
Bisphosphonates (Control), Sprint, Marrow, Tbone (P), Brain-DTI (P), CARTILAGE (P), EDOS-2, Muscle Biopsy (P)

Cardiovascular & Respiratory Systems
Cardio Ox, Vascular Echo, Airway Monitoring, IPVI↑

Crew Healthcare Systems
Skin-B

Habitability & Human Factors
Body Measures, Fine Motor Skills, Habitability

Human Behavior & Performance
Cognition, At Home in Space, Circadian Rhythms, Synergy (P)

Human Microbiome
Microbiome

Immune System
Salivary Markers, IMMUNO-2, Multi-Omics

Integrated Physiology & Nutrition
Biochem Profile, Telomeres (P), Repository, Dose Tracker, Energy, MARES, Biological Rhythms 48hrs

Nervous & Vestibular Systems
NeuroMapping, Field Test (P), Space Headaches, Straight Ahead in Microgravity (P)

Vision
Fluid Shifts, Ocular Health

Biology and Biotechnology

Animal Biology
Rodent Research-3
Space Pup ↓↑ Mouse Epigenetics-1

Cellular Biology
Micro 9, Micro 10, NanoRacks Mod-28, Heart Cells*, WetLab-2, Stem Cells, Cell Mechanosensing-3, Spheroids, Payload Card-X

Macromolecular Crystal Growth
CASIS PCG 4, JAXA PCG Demo 2, JAXA PCG

Microbiology
Microbe-IV , Myco, BRIC-NP*, BRIC -23*, Microbial Observatory-1

Plant Biology
Auxin Transport
Plant RNA Regulation*, Veg-03, NanoRacks Mod -33 (Agar), Plant Gravi Sensing-3

Physical Sciences

Combustion Science
Cool Flame Investigation (CFI), FLEX 2

Complex Fluids
OASIS*, ACE H2*, ACE T-1 ACE T-9*

Fluid Physics
Marangoni-UVP, Two-Phase Flow, PBRE*
Hard to Wet Surfaces*
Microchannel Diffusion

Fundamental Physics
DOSIS-3D, MagVector*

Materials Science
EML Batch – 1 , MSL 2b, SODI DC Mix- III*, Manufacturing Device, Synthetic Muscle*, NanoRacks Module -40*, ELF Batch #3,4

Earth & Space Science

Astrobiology/Astrophysics/Heliophysics
AMS-02 (E), Meteor, NanoRacks Mod-24*, Solar-SOLACES/SOLSPEC (E), CALET (E)[4], MAXI(E)

Earth Remote Sensing
CATS (E), HICO-RAIDS (HREP) (E), ISS-RapidScat (E), NREP Inserts

Near-Earth Space Environment
SEDA-AP (E), Ex-HAM #1 (E), #2 (E)

Technology Development and Demonstration

Characterizing Experiment Hardware
ESA-Haptics-1,-2*, ARTE (ASI), Biomolecular Sequencer, NanoRacks Mod-29*, MVIS Microcontroller -1 , NanoRacks Black Box

Communications & Navigation
MobiPV*, METERON , Vessel ID System, Maritime Awareness*, Scan Testbed

Fire Suppression and Detection
Saffire I/II

Multipurpose
Programmable Isolation Mount*

Repair and Fabrication
3D-Printer*

Power and Thermal Management Systems
Phase Change HX, Universal Battery Charger.

Robotics & Imaging
HDEV (E), Gecko Gripper*, Robonaut, RRM Phase 2 (E)↓ JAXA HDTV

Radiation Measurements & Shielding
Area PADLES↓↑ PS-TEPC↑ Radi-N2, REM

Avionics & Software
SNFM, Telescience Resource Kit*
NanoRacks Module -63*

Life Support and Habitation
Mini Exercise Device-2, UBNT

Air, Water and Surface Sampling
Water Monitoring Suite, Personal CO2 Monitor*

Spacecraft and Orbital Environments
Long Duration Sorbent Test bed, Strata-1, REALM, SPHERES Tether*, SPHERES Halo*

Space Structures and Materials
BEAM, Manufacturing Device, REBR-W

Small Satellites & Control Technologies
NanoRacks NRCSD ext*, JSSODM-1, JSSOD#5, EFU Adapter RTcMISS, SPHERES UDP*, SPHERES Slosh*

Educational Activities

Educational Competitions
SPHERES-Zero-Robotics

Educational Demos
ESA-EPO-PEAKE, ISS Ham Radio, Story Time Demo*, Tomatosphere*, JAXA EPO
Sally Ride EarthKAM

Student-Developed Investigations
NR Modules-16, -18, -20, -21, -22, -51
NanoRacks Module-9, Mod-48*, Genes in Space*, NanoRacks Modules* -41, -43, -44, -45, -46,-69

Classroom Versions of ISS Investigations
Windows on Earth

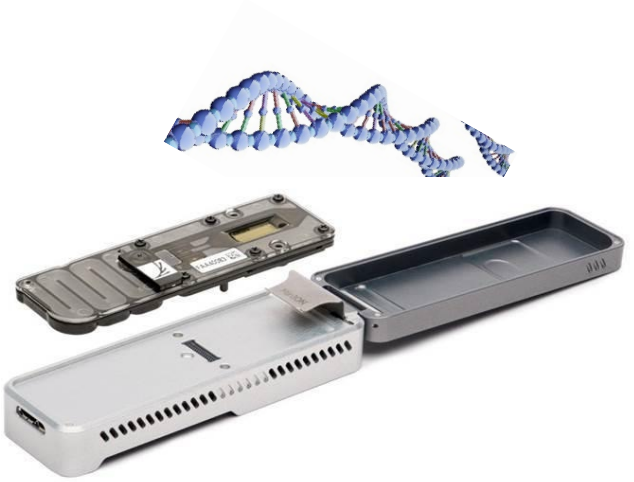
NASA NatLab CSA ESA JAXA

↑↓Ascent/Descent, **(P)** Pre/Post only, * Added by CEF, **(E)** External Payload

Featured Investigations: Technology Development and Demonstration

Biomolecule Sequencer

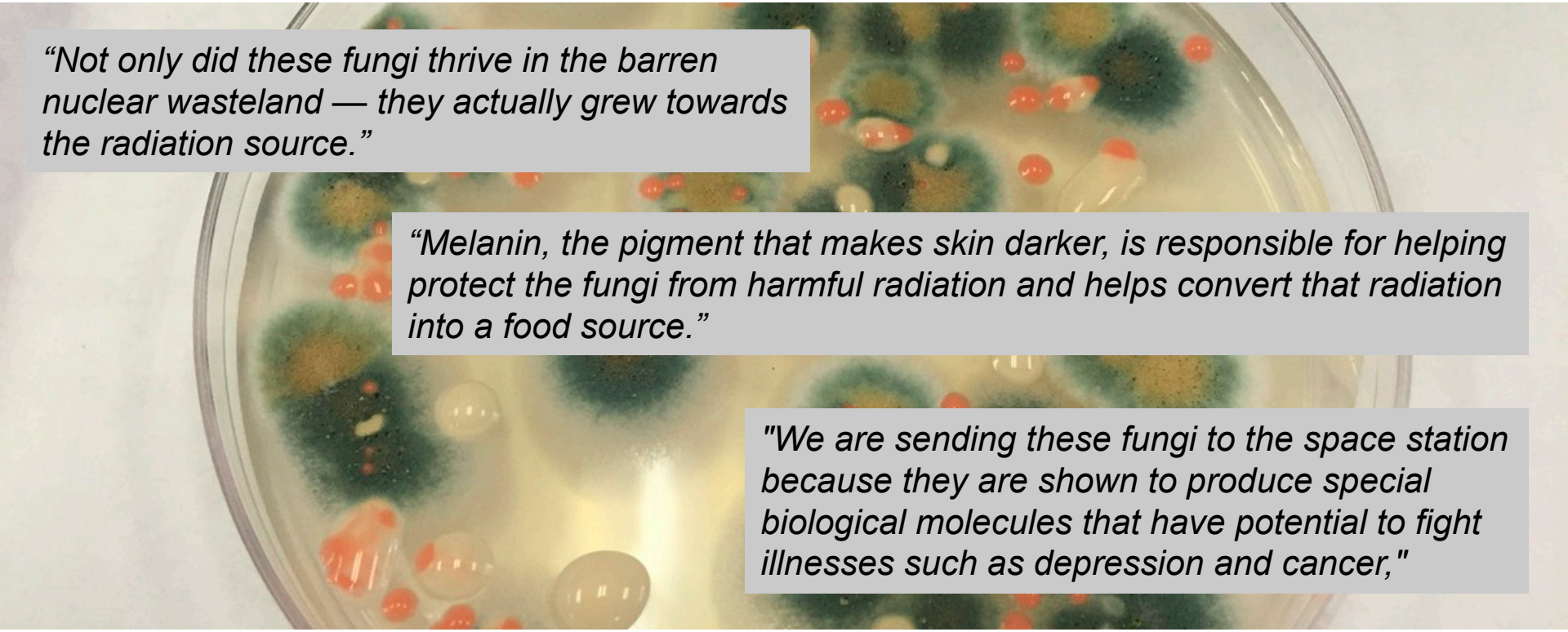
- The Biomolecule Sequencer investigation seeks to demonstrate, for the first time, that DNA sequencing is feasible in an orbiting spacecraft. A space-based DNA sequencer could identify microbes, diagnose diseases and understand crew member health, and potentially help detect DNA-based life elsewhere in the solar system.



Phase Change HX

- The Phase Change Heat Exchanger Project seeks to advance the technology readiness level of phase change heat exchangers for infusion into future exploration vehicles. Phase change material heat exchangers are a useful technology that serve as a supplemental heat rejection device during time-varying heat loads and/or transient environments by storing waste energy by melting a phase change material during peak loads. It can then reject this energy through a radiator when conditions allow, causing the phase change material to freeze.

Molecules Produced in Microgravity from the Chernobyl Nuclear Accident



“Not only did these fungi thrive in the barren nuclear wasteland — they actually grew towards the radiation source.”

“Melanin, the pigment that makes skin darker, is responsible for helping protect the fungi from harmful radiation and helps convert that radiation into a food source.”

"We are sending these fungi to the space station because they are shown to produce special biological molecules that have potential to fight illnesses such as depression and cancer,"

Principal Investigator: Dr. Kasthuri Venkateswaran

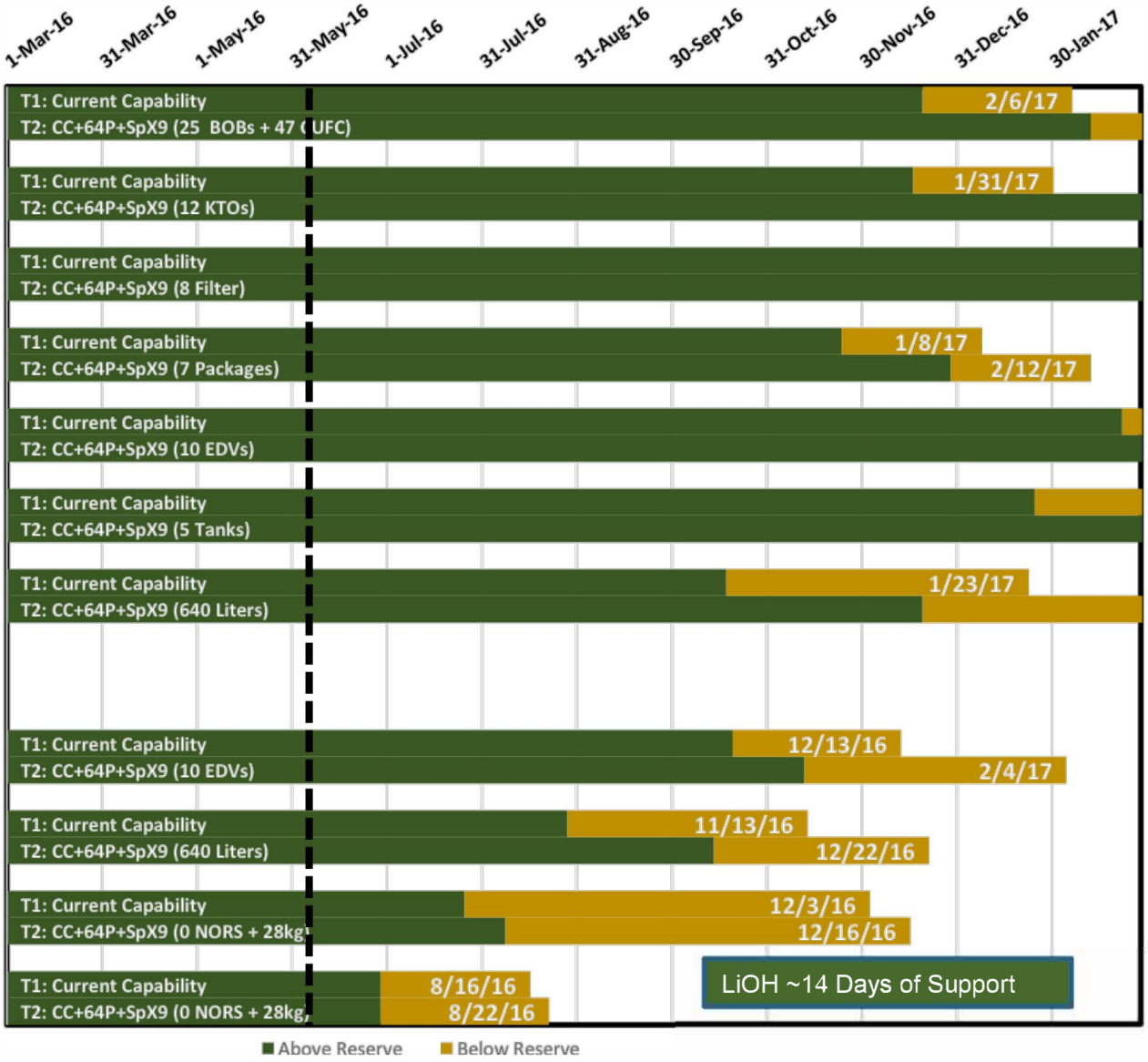
Affiliation: Jet Propulsion Laboratory/Caltech

Partnership between JPL, Berkley Labs and CASIS

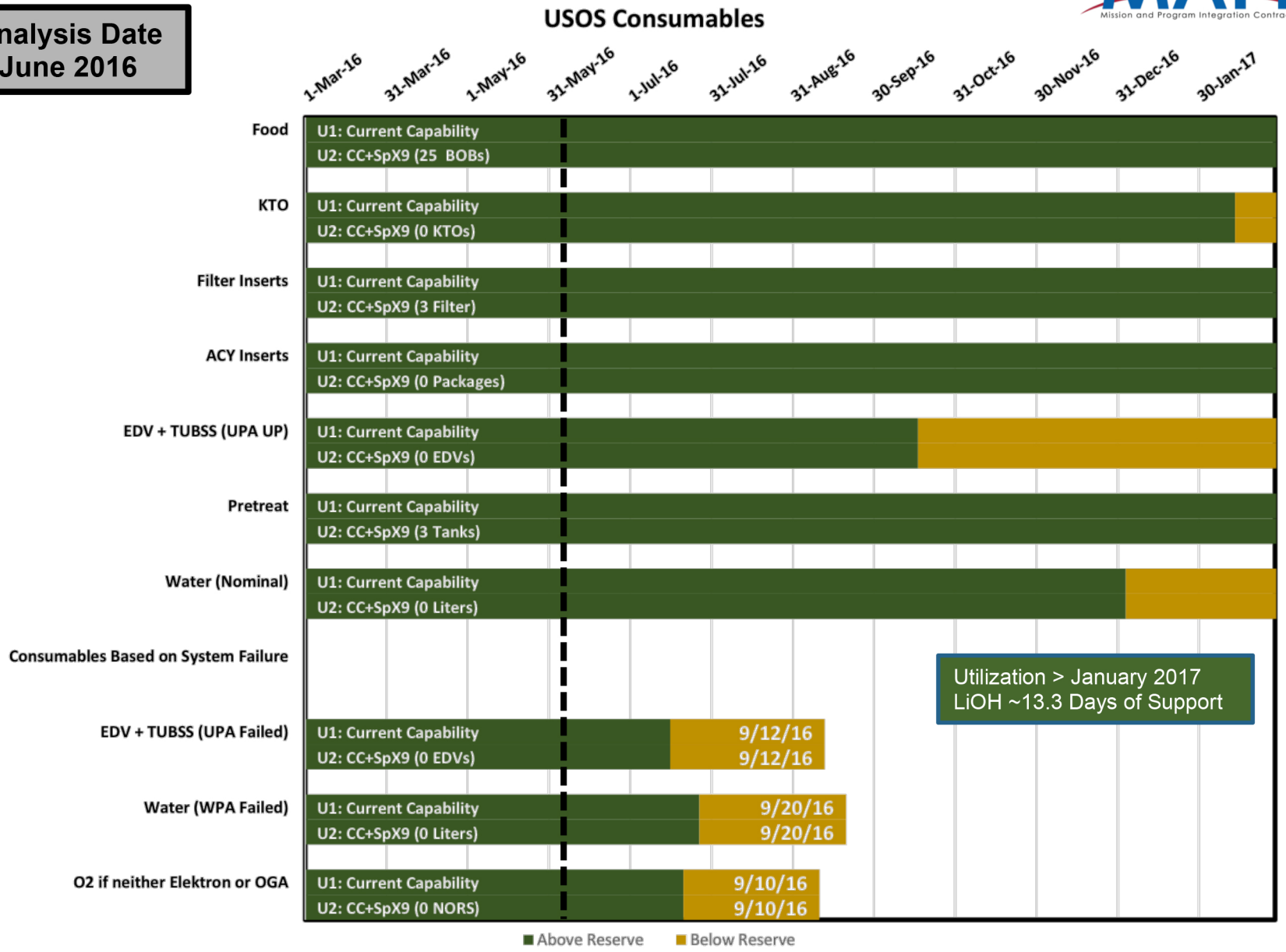
Fungal strains isolated from the Chernobyl nuclear power plant accident will be screened for the secretion of natural products that could be beneficial for biomedical and agricultural applications. Since fungal strains isolated in and around the ChNPP produce agro- and pharma-related natural products on Earth, the NPμG team proposes to test the fungal cells under stressful microgravity conditions to measure whether they can produce novel secondary metabolites.

Analysis Date
3 June 2016

Total Consumables



Analysis Date
3 June 2016



Pertinent ISS Vehicle Issues

Issue	Impact to Stage Ops	Rationale
Inadvertent Soyuz 41S thruster firing	No	On June 9, 2016 ISS experienced an unexpected torque (primary in the roll axis) • Torque was due to inadvertent firing of Soyuz 41S small thrusters • Fired Soyuz thrusters point towards the port side of ISS Cause of thruster inadvertent firings: • Unexpected activation of 41S MCS after the end of the scheduled KURS in-loop test being conducted between 41S and FGB • Firings were due to a test script error

RPCM P12B_A extraction - high loads event	No	On June 3, RPCM P12B_A experience higher loads than planned during SPDM extraction attempt.
		• Extraction was attempted without FMA enabled.
		• RPCM P12B_A R&R was aborted. RPCM was bolted and loads powered.
		• MART results (6/14).
		  • MSS loads violations are not expected to have caused damage to SPDM arm/OTCM or RMCT.
		  • RPCM stress analysis shows negative margins for yielding and ultimate (plastic deformation). This is worst case – load path is difficult to determine.
		• Impact - R&R of this RPCM is required for the installation of the External High Definition Camera (EHDC) at the CP09 location (get ahead for IDA EVA).

Pertinent ISS Vehicle Issues

Issue	Impact to Stage Ops	Rationale
Inadvertent Progress thruster firing	No	On June 1 during 62P re-docking test, after soft dock was achieved, the 62P vehicle initiated thruster firings while soft docked. Ground control issued commands to terminate thruster firing and docking was successfully completed. A Russian commission was formed immediately and determined that the vehicle software was not configured correctly. The vehicle though it was still free-flying and attempted to control attitude
Water in EMU suit	No	EVA 35 on Jan. 15, 2016, was terminated due to water in EV1's helmet (EMU 3011) • Estimates of total water was 50-250 cc, compared to 1000-1500 cc on EVA 23 Extensive failure investigation is in work including TT&E for EMU 3011 that was returned on SpaceX 8 (May 2016) Cause of EVA 35 failure is still under investigation • Water in helmet may be a result of a number of contributors to system sublimator performance, not a single source (higher condensate load on the sublimator, water driven off METOX due to high heat load, blockage in 8 supplemental slurper holes, high latent load conditions, and condensation downstream of the sublimator) • Sublimator system and component performance is within specification for all ground testing

OA-6 Mission Success

- **Mission Planning**
  - Successful unberth on 6/14/16 for a total of 80 days berthed
  - Three experiments on-going post unberth; 8 days of data downlink
    - Spacecraft Fire Experiment (Saffire) #1 operations were successful with all data and video successfully downlinked
    - Four out of five NanoRacks cubesats deployed successfully
    - Re-Entry Breakup Recorder (REBR) data transmission was not successful (payload issue under investigation)
  - Re-entry successful on 6/22/16 with successful Ames/SETI re-entry viewing efforts
  - Post Flight Review (PFR) was completed on 6/20/16
  - Lessons learned presented to ISS Program on 7/8/16
- **Pressurized Cargo –** 3519 kg
- **Unpressurized Cargo –** 83 kg
- **Disposal** - 1670 kg estimated

OA-6 Departure on 6/14/16

Photo Credit: NASA

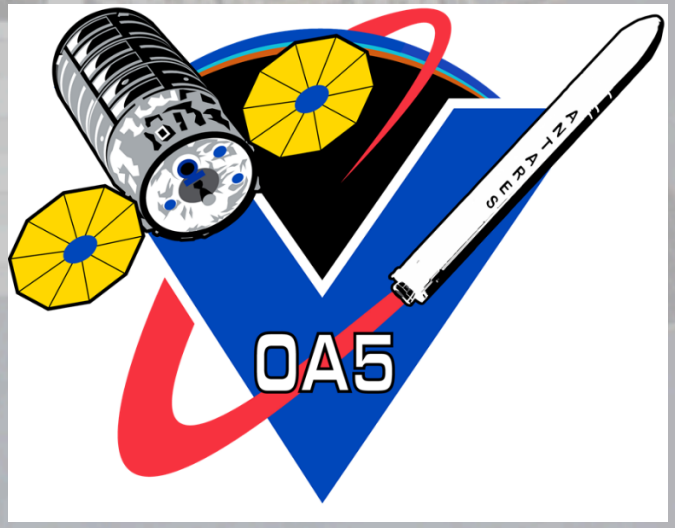
OA-5 Antares Return to Flight Mission

Antares Stage Test Complete 5/31/2016

Photo Credit: Orbital

OA-5 Mission Status

- **Mission Planning**
  - Mission Readiness Review (MRR) was conducted on 6/7/16
  - Cygnus Flight Readiness Certification Review (FRCR) was held on 6/8/16
  - Safety Review Panel (SRP) Ph 3 Pt 3 was held on 6/15/16
  - Antares FRCR is tentatively planned for 7/28/16
  - Stage Operations Readiness Review (SORR) is tentatively planned for 8/4/16
  - Flight Readiness Review (FRR) is tentatively planned for **8/11/16**
- **Pressurized Cargo** – 2400 kg planned; 1802 kg disposal estimated
  - Saffire #2 payload was integrated into Cygnus on 5/12/16
- **Unpressurized Cargo**
  - NanoRacks CubeSat Deploy (NRCSD) for deploy planned post unberth
- **Cygnus Status**
  - Cygnus SM and PCM were mated on 6/2/16
- **Antares Status**
  - Stage Test Article hot fire test was conducted on 5/31/16
  - Engine data review conducted during the week of 6/13/16
  - Launch Vehicle Assessment (LVA) is planned for 8/2/16
  - Mission Dress Rehearsal (MDR) is tentatively planned for 8/20/16



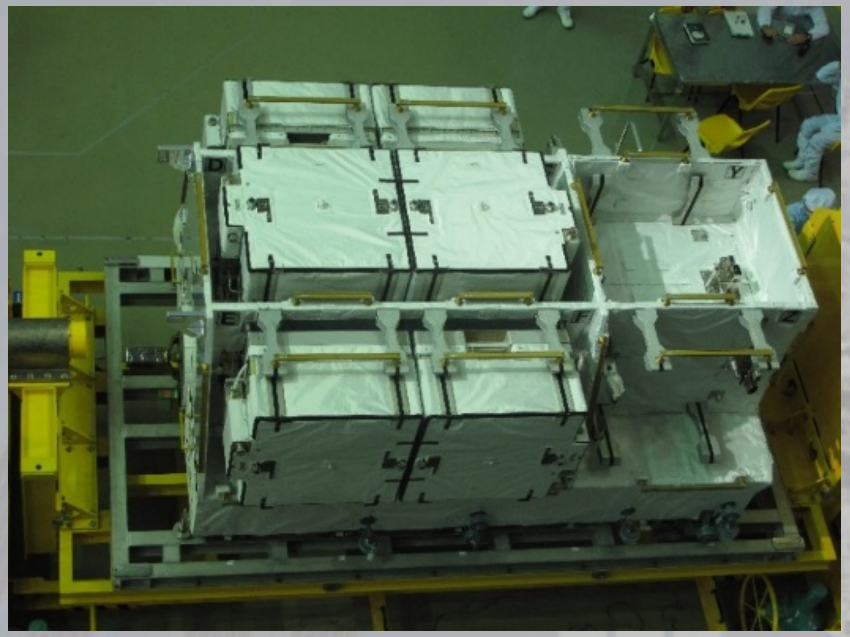
SpaceX-8 Mission Success

- **Mission Planning**
  - Successful return of vehicle cargo and science on 5/11/16
  - Preliminary Post Flight Review was conducted on 6/7/16
  - Lessons learned presented to ISS Program on 6/14/16
- **Pressurized Cargo –** 1710 kg; 1714 kg return estimated
  - **Launch:**
  - 1 Animal Enclosure Module-Transporter, 2 Polar, NORS O2 tank, and cold bags
  - **Return:**
  - 3 Polar, and 1 Short Extravehicular Mobility Unit (SEMU) and cold bags
- **Unpressurized Cargo** – 1552 kg
  - Bigelow Expandable Activity Module (BEAM) was expanded on 5/28/16 with ingress on 6/6/16

SpaceX-9 Mission Status

- **Mission Planning**
  - Stage Operations Readiness Review (SORR) was held on 6/16/16
  - SpX Launch Readiness Review (LRR) is planned for 7/16/16
- **Pressurized Cargo –** 1850 kg planned; 1750 kg return estimated
  - Launch: JAXA Rodent Module (first flight), 4 Polars, Short Extravehicular Mobility Unit (SEMU), and cold bags
  - Return: JAXA Rodent Module with live mice, 3 Polars, NORS O2 tanks, Short Extravehicular Mobility Unit (SEMU), and cold bags
- **External Cargo** – 500 kg
  - International Docking Adapter (IDA) #2 was integrated to the trunk on 5/19/16
- **Dragon Status**
  - Capsule was mated to the trunk on 5/31/16
  - Initial cargo load was installed on 6/23/16 with late load planned for 7/17/16
  - Mate to F9 is planned for 7/14/16
- **Falcon 9 Status**
  - First and Second Stage completed ATPs in TX and arrived at the Cape on 6/21/16 and 6/23/16, respectively
  - Stage Mate is planned for 7/13/16
  - Static fire is planned for 7/16/16

HTV6 Mission Status



6 Batteries loaded on the Exposed Pallet (EP) and the Pallet loaded into the Unpressurized Logistics Carrier (ULC)

HTV6 Mission Status

- **Mission Planning**
  - All modules have been shipped to TNSC, completion on 4/8/16
  - HTV-6 JOP (face-to-face) in TKSC successfully completed the week of 5/23/16
  - TDRS/Ground Segment End-to-End (ETE) checkout completed on 6/10/16
  - Stage test dry run held from 6/24/16 – 7/12/16
  - ISS Post Qualification Review is planned for 8/4/16
- **Pressurized Cargo –** planned 2848 kg upmass and 2040 kg disposal
  - Rack internal cargo delivered to TNSC on 4/26/16
  - Rack front cargo delivered to TNSC on 5/19/16
  - Completed Pressurized Logistics Carrier (PLC) nominal cargo loading on 6/6/16
- **External Cargo** – planned 1400 kg and 1000 kg disposal
  - External Pallet (EP) arrived at TNSC on 5/16/16
  - Delta HTV/Exposed Pallet Phase III SRP completed on 6/1/16
  - All Li-Ion batteries were installed to the Exposed Pallet as of 6/3/16 and charged as of 6/10/16
  - EP installation to the Unpressurized Logistics Carrier (ULC) was completed on 6/16/16
- **HTV Vehicle**
  - Carrier Assembly (ULC and PLC) integration from 6/23/16 – 7/6/16
  - Flight Segment (ULC, PLC, AM, PM) Assembly completion is planned for 8/9/16
  - Launch vehicle (H-IIB) handover is planned for 9/5/16 with fairing capsulation completed 9/9/16

International Space Station

SpaceX CRS-1 Cargo As of June 30, 2016

Mission	Previously Reported Launch Date/Window	Cargo Actuals		Comments
		Upmass (kg)	Return/ Disposal (kg)	
SpX-1	10/07/2012 (A)	450	846	Mission Completed
SpX-2	03/01/2013 (A)	865	1216	Mission Completed
SpX-3	04/18/2014 (A)	2116	1811	Mission Completed
SpX-4	09/21/2014 (A)	2338	1645	Mission Completed
SpX-5	01/10/2015 (A)	2394	1883	Mission Completed
SpX-6	04/27/2015 (A)	2024	1402	Mission Completed
SpX-7	6/28/2015 (A)	Lost	N/A	Mission Lost Due to Anomaly
SpX-8	04/08/2016	3262	#1714	Mission Completed
		13,449	**#10,517**	**Cumulative Totals for Completed Missions**
SpX-9	6/18/2016 (A)	~2,300	TBD	Pressurized Cargo; External Cargo Planned; IDA2
SpX-10	*NET 8/01/2016			Pressurized Cargo; External Cargo Planned; STP-H5, SAGE-III, SAGE NVP
SpX-11	*08/15/2016-09/13/2016			Pressurized Cargo; External Cargo Planned; NICER, MUSES, ROSA
SpX-12	*12/15/2016-01/13/2017			Pressurized Cargo; External Cargo Planned; CREAM
SpX-13	*02/13/2017-03/14/2017			Contract extension Mission; Pressurized Cargo; ASIM, TSIS, MISSE
SpX-14	*04/08/2017-07/06/2017			Contract extension Mission; Pressurized Cargo; RRM3, PFCS, SDS
SpX-15	*08/01/2017-10/29/2017			Contract extension Mission; Pressurized Cargo; ECOSTRESS

* Under Assessment - The overall flight schedule for ISS is currently being re-assessed to align with Program Requirements

Final mass reconciliation in process.

International Space Station

SpaceX CRS-1 Cargo As of June 30, 2016

Mission	Actual Launch Date (A) or Current Launch Date/ Window	Cargo[2] Actuals		Comments
		Upmass (kg)	Return/ Disposal (kg)	
SpX-16	06/02/2018-08/30/2018			Contract extension Mission; Pressurized Cargo; IDA3; L-18 mo. establishes the 90 day launch window.
SpX-17				
SpX-18				
SpX-19				
SpX-20				

* Under Assessment - The overall flight schedule for ISS is currently being re-assessed to align with Program Requirements
# Final mass reconciliation in process.

International Space Station

Orbital ATK CRS-1 Cargo As of June 30, 2016

Mission	Actual Launch Date (A) or Current Launch Window	Cargo[2] Actuals		Comments
		Upmass (kg)	Return/ Disposal (kg)	
Orb-1	01/09/2014 (A)	1462	1466	Mission Completed
Orb-2	07/13/2014 (A)	1664	1741	Mission Completed
Orb-3	10/28/2014 (A)	Lost	N/A	Mission Lost Due to Anomaly
OA-4	12/06/2015 (A)	3513	1411	First mission with longer pressurized cargo module (PCM); Atlas V401 planned launch vehicle;
OA-**6**	03/22/2016 (A)	3602	#1670	Saffire #1 payload; Atlas V401 planned launch vehicle; NanoRacks CubeSat Deployers (83kg)
		10,241	**#6,288**	Cumulative Totals for Completed Missions
OA-**5**	NET 08/2016			Saffire #2 payload; Antares 230 with RD181 engines planned launch vehicle.; NanoRacks CubeSat Deployers.
OA-7	12/01/2016-12/30/2016			Saffire #3 payload; Antares 230 with RD181 engines planned launch vehicle. Two powered Middeck Lockers
OA-8	06/07/2017-07/06/2017			Contract extension mission; Antares 230 with RD181 engines planned launch vehicle; Two powered Middeck Lockers
OA-9	*12/2017			Contract extension mission; Antares 230 with RD181 engines planned launch vehicle; Two powered Middeck Lockers; L-18 mo. establishes the 90 day launch window
OA-10	*06/2018			Contract extension Mission; Antares 230 with RD181 engines planned launch vehicle; Two powered Middeck Lockers; L-18 mo. establishes the 90 day launch window.
OA-11	*12/2018			Contract extension Mission; Antares 230 with RD181 engines planned launch vehicle; Two powered Middeck Lockers; L-18 mo. establishes the 90 day launch window.

* Under Assessment - The overall flight schedule for ISS is currently being re-assessed to align with Program Requirements

Final mass reconciliation in process.

Commercial Resupply Services
CRS-2 Integration

- CRS-2 Contract award was announced on Jan. 14, 2016
  - Awardees are Orbital-ATK Inc. (OA), Sierra Nevada Corporation (SNC) and SpaceX (SpX)
  - Contractor post award briefings were completed in April 2016
  - ISS Integration work has been ordered for each provider as of 6/3/16
    - SNC held it's Integration Review (IR) #1 on 6/8/16 with IR #2 planned for 7/20/16
    - OA IR #1 was completed on 6/21/16 with IR #2 completed on 7/7/16
    - SpX IR #1 is scheduled for 7/27/16 with IR #2 planned for Sep (date to be set at IR#1)
  - A minimum of six missions will be ordered from each provider
  - CRS-2 missions are planned for launch in 2019

ISS Integration Status of Crew Vehicles

- Mission Planning
  - Supported the mass reduction efforts for CST-100
  - Inc 51/52 kickoff in work for upcoming demonstration mission
  - Coordinating cargo planning for the demonstration missions
  - Define dates for data exchanges with the International Partners
  - Detailed the ISS Surveillance activities and working to integrate within CCP plan

- ISS On-orbit Readiness
  - Common Communications for Visiting Vehicles (C2V2) on-orbit checkout completed in May 2016; initial joint testing conducted with SpaceX Crew Dragon in June was successful
  - International Docking Adapter (IDA-2) installation planned with SpX-9 mission in July 2016

- Joint Integration Activities
  - Early joint interface test and analysis activities have commenced
  - Verifications are being now being submitted for ISS interface requirements

ISS Research and Development Conference
San Diego, California July 12-14, 2016

ISS R&D CONFERENCE 2016

Discussed medical technology advancements with Dr. Ellen Stofan and implication for astronaut health

Discussed 1 year crew and twins research
And implications for Journey to Mars

Discussed advancements in technology applications for space and the broader technology industry

Other highlights:

714 registered participants
(increase of about 20 over last year)

Workshops targeted for new users

Forums for linking together investors with emerging companies

Advancing Economic Development in LEO via Commercial Use of Limited Availability, Unique International Space Station Capabilities RFI

NASA is investigating options and approaches to expedite commercial activity in Low Earth Orbit (LEO).

Specifically, NASA is looking to increase private sector demand for space research and expand on the work of Center for the Advancement of Science in Space (CASIS), the manager of the ISS National Laboratory.

NASA is not only interested in technical solutions to advance these goals, but also in contract or agreement structures that potential offers' would see as beneficial to advance private sector demand for low Earth orbit research.

Some unique capabilities that could be made available include:

- Currently available
  - Common Berthing Mechanism ports, if the user provides equivalent capability to maintain ISS functionality
  - Trunnion Pins
  - Other unique interfaces or capabilities of the ISS as suggested by the offeror
- Available in the future
  - Common Berthing Mechanism attachment site at Node 3 Aft

RFI was released on July 1 – Responses are due July 29, 2016

https://www.fbo.gov/index?s=opportunity&mode=form&id=203c8f1a3a4f0497cdea6dbf205ee2b1&tab=core&_cview=0

Successful deployment of BEAM on May 26, 2016