

ISS National Laboratory Q2FY25 Report

Quarterly Report for the Fiscal Year 2025 Period January 1, 2025 - March 31, 2025

Table of Contents

Q2FY25 Metrics	2
ISS NATIONAL LAB UTILIZATION AND OPERATIONS TARGET METRICS	. 2
ISS NATIONAL LAB UTILIZATION AND OPERATIONS TRACKING METRICS	. 3
FINANCIALS	7
IN-ORBIT ACTIVITIES	. 9
R&D PROGRESS AND SUCCESSES	. 9
LEO ECONOMY	10
STEM EDUCATION AND WORKFORCE DEVELOPMENT	11
OUTREACH AND STAKEHOLDER ENGAGEMENT	11
Full Project Pipeline Details	12

Authorized for submission to NASA by: Ramon Lugo III

Ramon Lugo III

CENTER FOR THE ADVANCEMENT OF SCIENCE IN SPACE®

Q2FY25 Metrics

ISS NATIONAL LAB UTILIZATION AND OPERATIONS TARGET METRICS

ТА	RGET METRICS	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total	FY25 Target	FY25 Stretch	
		DEMAND F	OR ISS RESOU	RCES	1		1		
1)	Ratio of awardable proposals evaluated to expected awards (year to date)	3:1	3:1			3:1	3:1	N/A	
2)	Leverage ratio of external funding to internal funding (new awards) (year to date)	11:1	6:1			6:1	1:1	2:1	
		FUNDAN	IENTAL SCIEN	CE	1	1	1		
3)	Fundamental Science projects selected		1			1	7	9	
4)	External funding supporting Fundamental Science users of the ISS National Lab	\$	\$0.8M			\$0.8M	\$6M	\$9M	
	Α	PPLIED RESEA	RCH & DEVEL	OPMENT					
5)	Applied Research & Development projects selected						2 ª	3	
6)	Ratio of external funding (self-reported) to CASIS and MI&O funding supporting Applied Research & Development users of the ISS National Lab (year to date)						1:1	2:1	
		TECHNOLOG	Y DEMONSTR	ATION					
7)	Technology Demonstration projects selected	3	4			7	11	14	
8)	Ratio of external funding (self-reported) to CASIS and MI&O funding supporting Technology Demonstration users of the ISS National Lab (year to date)	14:1	6:1			6:1	4:1	6:1	
		EDUCATI	ON & OUTREA	СН					
9)	Education & Outreach projects selected	1	0			1	2	3	
10) New Corporate or OGA sponsorships agreements	0	0			0	1	2	
	PROPOSAL MANAGEMENT								
11)) Time from solicitation close to selection/non-selection notification (year to date)	67 days	65 days			65 days	≤65 days	≤60 days	

a. Beginning in FY25, the Applied Research & Development target metric will not include an estimate of NASA InSPA NRA awards flying under ISS National Lab allocation.

ISS NATIONAL LAB UTILIZATION AND OPERATIONS TRACKING METRICS

The following metrics have no target for FY25 but will be tracked internally and discussed in face-to-face meetings with NASA.

TRACKING METRICS	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total
OVERALL PR	OJECT QUALITY A	ND DEMAND			
1) Percent of proposals reviewed that were awardable (year to date)	61%	61%			61%
2) Percent of proposals reviewed that were high quality (year to date)	13%	13%			13%
3) Percent of high-quality proposals not selected (year to date)	0%	40%			40%
 Percent of completed projects that met research objectives (year to date) 	100%	100%			100%
5) Percent of completed Technology Dev/Demo and In-Space Production projects demonstrating technology readiness level (TRL) advancement (year to date)	100%	100%			100%
6) ISS National Lab projects selected	4	5			9
7) Users by new/returning					
(a) ISS National Lab return users	1	0			1
(b) ISS National Lab new users	3	5			8
8) Projects by type					
(a) Commercial	3	4			7
(b) Academic/nonprofit	1	1			2
(c) Government agency	0	0			0
9) Leverage ratio of external funding to internal funding (year to date)	11:1	6:1			6:1
10) Active solicitations	2	3			5
11) ISS National Lab concepts received	53 ^c	174			227
12) ISS National Lab proposals received	23	13			36
13) Time from selection notification to agreement draft sent to principal investigator (year to date)	39 days	37 days			37 days
14) Time from agreement draft to award (year to date)	32 days	32 days			32 days
15) Time to flight	16 ^c months	12 months			14 months

TRACKING METRICS (Continued)	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25 Total
	YLOADS DELIVER	ED			
16) Commercial Service Provider Facility Utilization payloads delivered	14	2			16
 (a) Percentage of Commercial Service Provider Facility Utilization payloads flown that met mission success criteria (previous fiscal year quarter)^b 	100%	96%			98%
17) Education & Outreach payloads delivered	2	0			2
18) Fundamental Science payloads delivered	5	0			5
(a) Percentage of Fundamental Science payloads flown that met mission success criteria (previous fiscal year quarter) ^b	100%	100%			100%
19) Applied Research & Development payloads delivered	2	0			2
 (a) Percentage of Applied Research & Development payloads flown that met mission success criteria (previous fiscal year quarter)^b 	0%	67%			34%
20) Technology Demonstration payloads delivered	2	0			2
 (a) Percentage of Technology Demonstration payloads flown that met mission success criteria (previous fiscal year quarter)^b 	N/A	100%			100%
21) Total ISS National Lab-sponsored payloads delivered	25	2			27
COMMUNITY E	ENGAGEMENT AN	D INVESTMENT	1		
22) New partnerships formed	0	0			0
23) Total external funding committed	\$5,474,854	\$1,857,634			\$7,332,488
24) Funds raised post award and postflight by startup companies with ISS National Lab-sponsored flight projects					
(a) Funds raised postflight	\$146.4M	\$56.3M			\$202.7M
(b) Funds raised post award	\$146.4M	\$56.3M			\$202.7M
25) External funding committed from new OGA partnerships	\$0	\$0			\$0
26) New educational partnerships	0	0			0

TRACKING METRICS (Continued)	FY25 Q1	FY25 Q2	FY25 Q3	FY25 Q4	YTD FY25
COMMUNITY ENGAGE	•		-	Q4	Total
27) (a) Number of high school and higher education students contributing to research projects completed during the fiscal year	0	27			36
(b) Number of interns supported by ISS National Lab - Industry Partner cost-share program	0	0			0
28) Total individuals participating in ISS National Lab Education & Outreach programs and projects (self-reported)	1,232,064	347,832			1,579,896
29) Total individual users of ISS National Lab online education products (self-reported)	2,535,547	1,291,474			3,827,021
IMPLEMENTATION PARTNERS A	AND COMMERCIA	L SERVICE PROVI	DER ACTIVITIES		
30) Number of Implementation Partners (year to date)	33	33			33
31) Number of Commercial Service Providers (year to date)	13	13			13
32) New Umbrella User Agreements executed	0	0			0
33) New commercial facilities added	0	0			0
34) Commercial facilities (year to date)	23	23			23
35) RRFs submitted	26	23			49
36) RRFs approved	25	18			43
37) RRF approval time	6 days	9 days			8 days
RE	SOURCE UTILIZAT	ON			-
38) Crew time (actual vs. increment pair – 3 months allocation)	51	.%			51%
(a) Ascent flight resources					
Upmass	91%	96%			94%
Cold stowage	51%	N/A			51%
Big bags	25%	N/A			25%
Powered lockers	75%	N/A			75%
(b) Facility resources (reported in Q2 and Q4)					
Commercial facilities	42	.%			42%
JEM airlock	10	0%			100%
Life Sciences Glovebox	33	8%			33%
Microgravity Science Glovebox	67	%			67%

	FY25	FY25	FY25	FY25	YTD FY25			
TRACKING METRICS (Continued)	Q1	Q2	Q3	Q4	Total			
RESOURCI	E UTILIZATION (CO	ONTINUED)						
39) Number of payloads that did not turnover per the nominal delivery schedule	2	0			2			
Principal investigators	0	0			0			
Implementation Partners	2	0			2			
CASIS	0	0			0			
NASA	0	0			0			
40) Number of re-flight experiments flown	0	0			0			
Fundamental Science	0	0			0			
Applied Research & Development	0	0			0			
Technology Demonstration	0	0			0			
Education and Outreach	0	0			0			
Commercial Service Provider Utilization	0	0			0			
41) Number of payloads ready to fly that were left on the ground due to limited resources (upmass, crew time, cold stowage, etc.)	0	44			44			
42) Number of payloads removed from the manifest after the freeze date because the principal investigator/payload could not make the flight	1	0			1			
OVERALL PROJECT RESULTS								
43) Number of peer-reviewed papers including those accepted for publication in Tier 1 journals	17 ^c	12			29			
44) Number of new patents pending	2	2			4			

a. Beginning in FY25, the Applied Research & Development target metric will not include an estimate of NASA InSPA NRA awards flying under ISS National Lab allocation.

b. Data is from the previous fiscal year quarter. Whether a payload met research objectives often cannot be determined until it has been returned to the investigator and initial data has been reviewed.

c. Additional/new data available after previous quarterly report completion.

FINANCIALS

Business Status Report (unaudited)

Expenses	Q2 Actuals	Q2 Budget	Variance	Actual YTD FY25	Budget YTD FY25	Variance YTD FY25
Direct Labor	\$2,051,063	\$2,451,045	(\$399 <i>,</i> 982)	\$4,237,138	\$4,829,328	(\$592,190) ^a
Subcontracts	\$262,386	\$260,631	\$1,755	\$503,640	\$493,952	\$9,688
Other Direct	\$216,360	\$465 <i>,</i> 456	(\$249 <i>,</i> 096)	\$600,972	\$919,577	(\$318,605) ^b
Travel	\$84,514	\$112,198	(\$27 <i>,</i> 684)	\$158,888	\$236,774	(\$77,886)
Office Supplies and Equipment	\$80,290	\$87,219	(\$6 <i>,</i> 929)	\$176,808	\$196,736	(\$19,928)
Grants & Mission-Based Costs	\$1,747,412	\$1,394,122	\$353,290	\$2,733,585	\$3,533,585	(\$800,000) ^c
Total Expenses	\$4,442,025	\$4,770,671	(\$328,646)	\$8,411,031	\$10,209,952	(\$1,798,921)

a. Salaries and Benefits: At 3/31 51 FTE vs 53 budgeted.

b. Other Direct: Timing of advertising expenses for ISSRDC. Membership fees: about \$40k is permanent and \$45k is timing.

c. Grants: Recipient milestone payments shifted based on awardees' actual spend rates and their ability to successfully deliver milestones on schedule.





IPP = Implementation Partner Payments

IPP = Implementation Partner Payments

Breakout of ISS National Lab Grants Payments

	Q1FY25	Q2FY25	Q3FY25	Q4FY25	FY25 YTD Total
Academic	\$270,708	\$297,877			\$568 <i>,</i> 585
Commercial	\$715,465	\$1,444,535			\$2,160,000
Other Government Agency	-	\$5,000			\$5,000
Total	\$986,173	\$1,747,412			\$2,733,585

Total Value of Grants Awarded (i.e., funds committed toward future projects)

	ACTUAL Q1	ACTUAL Q2	ACTUAL Q3	ACTUAL Q4	ACTUAL FY25
Total value of grants awarded ^a	\$487,798	\$340,693			\$828,491

a. Grants include awards to projects and programs as well as modifications and extensions. The ability to award new grants will be dependent on the availability of additional funding for the ISS National Lab.

Breakout of Cooperative Agreement Funding

	Q1FY25	Q2FY25	Q3FY25	Q4FY25	FY25 YTD Total
Direct	56%	32%	%	%	43%
Indirect	19%	29%	%	%	24%
Grants	25%	39%	%	%	33%

IN-ORBIT ACTIVITIES

- <u>NASA's 10th rotational crew mission (Crew-10)</u> launched to the ISS carrying four new crew members who will work on a wide variety of ISS National Lab-sponsored research during their time on the space station.
- <u>NASA's Crew-9 mission</u> astronauts safely returned to Earth after a months-long science expedition working on ISS National Lab-sponsored projects, including several investigations to improve therapeutics and multiple student-led experiments.
- The ISS crew successfully tested Kall Morris' REACCH <u>space debris capture system</u> using NASA's Astrobee free-flying robots.
- Astronauts on station also used the Astrobee robots to test a new <u>autonomous spacecraft docking system</u> called CLINGERS.
- The pressurized cargo module for Northrop Grumman's 22nd Commercial Resupply Services (NG-22) mission was damaged during shipment. NASA is working with Northrop Grumman to accelerate NG-23, and the ISS National Lab is working with NASA to reschedule NG-22 payloads.

R&D PROGRESS AND SUCCESSES

- In Q2, 12 new peer-reviewed journal articles were published, including three from top-tier journals (view a full list of publications related to ISS National Lab research at <u>www.ISSNationalLab.org/publications/</u>):
 - Adam JA, Riley FP, Lopez JM, et al. <u>Non-Newtonian interfacial modeling of protein drops sheared in</u> <u>microgravity</u>. *Fluids*. 2025;10(3):58.
 - Cahill R, Blaber EA, Juran CM, et al. <u>37-Day microgravity exposure in 16-week female C57BL/6J mice is</u> associated with bone loss specific to weight-bearing skeletal sites. *PLOS One*. 2025(3):e0317307.
 - This publication in the top-tier journal *PLOS One* discusses results that revealed the major cause of bone loss in microgravity is the unloading of weight-bearing sites in the skeleton, such as the femur (thigh bone). However, sites loaded predominantly by muscle activity, such as the spine, appeared to be unaffected. This information better informs human health in space and methods to prevent musculoskeletal disease progression.
 - Conradt J, Furst E. <u>Quantitative imaging of colloidal structures</u>. Langmuir. 2025;41(12):8176-8191.
 - Dunlap C, Li C, et al. Hit2flux: <u>A machine learning framework for boiling heat flux prediction using hit-based acoustic emission sensing</u>. *AITF*. 2025;1:100002.
 - Finch RH, Vitry G, Siew K, et al. <u>Spaceflight causes strain-dependent gene expression changes in the kidneys of mice</u>. *npj Microgravity*. 2025;11(1):11.
 - Forghani P, Liu W, Wang Z, et al. <u>Spaceflight alters protein levels and gene expression associated with</u> <u>stress response and metabolic characteristics in human cardiac spheroids</u>. *Biomaterials*. 2025:123080.
 - Gupta A, Elliott R. REX: An autonomous resource exchange system for optimizing microgravity manufacturing efficiency. *IEEE Aero Conf Proc.* 2025;979-8-3503-5597-0.
 - Huang P, Piatkowski BT, Cherukuri Y, et al. <u>Impact of spaceflight on gene expression in cultured human</u> <u>mesenchymal stem/stromal cells</u>. *PLOS One*. 2025;20(3):e0315285.
 - This publication in the top-tier journal *PLOS One* discusses results that revealed critical "master regulator" genes activated in microgravity that are also related to basic cell functions and could be used to identify health risks for astronauts and preventative measures to ensure astronaut safety on future long-duration missions.
 - Mucci TJ, Liu BL, Adam JA, et al. <u>Nonequilibrium interfacial diffusivity resolves anomalies in monolayer</u> <u>hydrodynamics</u>. *Phys Rev E*. 2025;111:L013501.
 - Pinto PE, Xi X, et al. <u>Transient horizontal flame spread under non-steady concurrent airflow</u>. Fire Saf. J. 2025;152:104336.

- Roy U, Hadad R, Rodriguez AA, et al. Effects of space flight on inflammasome activation in the brain of mice. *Cells*. 2025;14(6):417.
- Salido R., Zhao H, McDonald D, et al. <u>The International Space Station has a unique and extreme microbial</u> <u>and chemical environment driven by use patterns</u>. *Cell*. 2025;188:1-20.
 - This publication in the top-tier journal *Cell* discusses results that showed ISS modules have a striking lack of microbial diversity compared with natural environments on Earth, which may negatively affect human health and contribute to crew members developing chronic inflammatory diseases.
- Two non-peer-reviewed papers were also published in Q2:
 - Hoff MT, Ralph SE. <u>Photonics for space: radiation testing of silicon photonic modulator via International</u> <u>Space Station flight</u>. Proc. SPIE, Silicon Photonics XX. 2025;13371:1337107.
 - Montilla A, Ochoa AM. <u>ISS technology demonstration open data</u>. AWS Reg Open Data. 2025:1-6.
- One patent related to ISS National Lab-sponsored research was granted and another was filed:
 - Oregon State was granted a patent on a cardiac tissue chip platform that mimics human cardiac tissue structures and filed a second patent application on systems, methods, and devices for microstructure characterization. These two patents are related to the team's NSF/CASIS Tissue Engineering investigation.
- One product related to an ISS National Lab-sponsored project was released in Q2:
 - miniPCR added commercial content to its free <u>online learning tool</u>, developed through an ISS National Lab-sponsored project, that immerses students in a virtual ISS environment as they carry out a lab activity.

LEO ECONOMY

Demand

- In Q2 FY2025, five new projects were selected.
 - Two were selected through <u>RFP 2024-8: Technology in Space Prize 2024</u>:
 - RedPoint Oncology will leverage the accelerated disease progression of cancers in microgravity to test antibody-drug conjugates that can treat cancers resistant to standard treatments.
 - Fourier will test the performance of its new radiation-shielding material in protecting sensitive electronic devices from the harsh conditions in space.
 - Two were selected through <u>NLRA 2025-7: Technology Advancement and Applied Research Leveraging</u> <u>the ISS National Lab</u>:
 - Amplified Space will test a power system for spacecraft that can be configured using software to power many types of devices with different requirements, eliminating the need to custom design power system-compatible hardware for space research.
 - SQUID3 Space will test a new thermal control system for satellites that can be easily adjusted using software to manage heat in changing orbits and mission environments.
 - One was selected through the <u>2024 NSF/CASIS Transport Phenomena solicitation</u>:
 - In a collaborative project, the University of Kentucky and Washington State University will study how alloys melt and flow in microgravity, which is important for applications that involve joining two metals in space, such as in-orbit spacecraft repair or assembly.
 - This is the first time an ISS National Lab-sponsored project has been funded by NSF's Mathematical and Physical Sciences Directorate's Division of Materials Research, expanding the number of NSF directorates that collaborate with CASIS.
- Two solicitations opened in Q2:
 - o NLRA 2025-5: Technology Advancement and Applied Research Leveraging the ISS National Lab, Cycle 1
 - o NLRA 2025-6: Leveraging the ISS National Lab for STEM Education and Workforce Development

Supply

- Aegis Aerospace announced it will <u>partner with Texas A&M University</u> to create TAMU-SPIRIT, a private flight facility on the ISS dedicated to university research. Additionally, Aegis Aerospace CEO Stephanie Murphy was named on <u>Inc.'s 2025 Female Founders 500 List</u>.
- Redwire Corporation announced its <u>acquisition of Edge Autonomy</u>, a leading provider of uncrewed airborne system technology. Additionally, Redwire was awarded a NASA contract for four investigations using the company's <u>Pharmaceutical In-space Laboratory (PIL-BOX)</u> on the ISS. Redwire is also developing <u>research</u> <u>payload lockers</u> that can be installed on Virgin Galactic's Delta-class vehicles.
- <u>Space Tango supported</u> a NASA-sponsored project from Auxilium Biotechnology that used the Auxilium Microfabrication Platform to 3D print medical devices on the ISS.
- Voyager Space announced its evolution to Voyager Technologies, Inc. to highlight the company's capabilities and position across broad technology markets.

Investment

- Q2 showed continued funding progress in the ISS National Lab's startup ecosystem amid <u>shifting investor</u> <u>sentiment</u> and increased volatility. Based on publicly available data, a total of \$56.3 million of private capital and grant funding was raised during the quarter by startups that have completed a flight project with the ISS National Lab. To date, more than \$2.4 billion of such startup funding has been raised post-ISS National Lab flight projects.
 - Funding activity included capital raises or grant awards for Brain.Space, EnduroSat, Lynk Global, Sachi Bioworks, Tympanogen, and others.
- The ISS National Lab investor ecosystem includes more than 320 participants across financial and corporate investment organizations. To date, CASIS has facilitated more than 1,440 capital introductions between startups and investors in the ISS National Lab ecosystem. While investor appetite toward space startups remains highly selective and may be influenced by broader market volatility, our ecosystem continues to serve as a source of capital connections and potential future funding for early-stage companies planning R&D on the space station.

STEM EDUCATION AND WORKFORCE DEVELOPMENT

- The Zero Robotics high school finals were held on the ISS using NASA's Astrobee free-flying robots. Developed by MIT, the Zero Robotics program teaches students computer coding through hands-on activities and culminates in a competition to program Astrobee robots onboard the space station.
- The ISS National Lab STEM Education team partnered with the American Society for Gravitational and Space Research (ASGSR) to host a student webinar with guest speaker Amy Williams, who discussed her career at the intersection of geology, biology, and space exploration. The ASGSR Student Webinar Series allows undergraduate and graduate students to learn about space-related careers.
- The ISS National Lab STEM Education team held a virtual, semi-annual meeting for all ISS National Lab STEM Education partners. Twenty participants attended to hear updates on ISS National Lab education and workforce development initiatives.
- Illana Raia, chair of the STEM Education and Workforce Development Subcommittee of the ISS National Lab's User Advisory Committee, was named on <u>Inc.'s 2025 Female Founders 500 list</u>. Raia launched Être Girls to help introduce young girls to career possibilities through real-world experiences.

OUTREACH AND STAKEHOLDER ENGAGEMENT

• The latest issue of <u>Upward</u> was published, reaching the magazine's more than 10,100 subscribers. This issue highlighted research from startup Oculogenex on <u>gene therapy for macular degeneration</u>, studies from the University of Connecticut and Eascra Biotech on <u>Janus base nanomaterials</u> to treat osteoarthritis and cancer,

and an investigation from Emory University on <u>heart cell production for regenerative medicine</u>. The issue also featured a <u>perspective</u> by Oculogenex CEO Hema Ramkumar.

- <u>Between a Rocket & a Hard Space</u>, the ISS National Lab's official podcast, launched its first episode, kicking off a monthly series exploring the discoveries, innovations, and people shaping the future of space.
- The ISS National Lab held a virtual meeting to discuss issues related to the NG-22 mission and upcoming manifest changes. Implementation Partners and researchers with near-term flight projects were invited to attend and participate in the discussion.
- As part of NASA's SpaceX Crew-10 launch, the ISS National Lab engaged astronauts Anne McClain and Nichole Ayers in pre-launch briefings and media efforts while spotlighting Crew-9's completed mission and return.
- ISS National Lab media coverage during Q2 includes:
 - <u>Space Daily</u> highlighted heart cell research from Emory University, originally featured in Upward.
 - <u>Space.com</u> announced the ISS National Lab's new podcast, Between a Rocket & a Hard Space.
 - o <u>The Wall Street Journal</u> covered ISS microbial research from the University of California, San Diego.
 - <u>Advanced Manufacturing</u> and other outlets reported on research updates, including the 10th annual NSF-CASIS funding solicitation on transport phenomena.
 - <u>Electronics Weekly</u> and others covered the release of the ISS National Lab's annual report, which showcased a record-breaking year of R&D in LEO.
- An ISS National Lab science team member co-edited a new section on biomanufacturing for the journal *Current Stem Cell Reports*.
- An ISS National Lab science team member gained significant international visibility, appearing in a major Italian TV news segment, being featured in a leading <u>Italian newspaper</u>, and authoring an article on biotech in microgravity for the prestigious Italian journal *Healthcare Policy*.
- ISS National Lab staff participated in invited speaking engagements at a <u>Southeastern Universities Research</u> <u>Association</u> workshop on space research, the <u>American Chemical Society's Rubber Division</u> spring technical meeting, the <u>Florida Semiconductor Institute's</u> annual Florida Semiconductor Summit, the Sanford Stem Cell Institute's annual <u>Global Astrobiotechnology Hub</u>, and the <u>W.M. Keck Observatory</u> in Hawaii.

Full Project Pipeline Details

Visit our <u>project pipeline database</u> for a complete list of ISS National Lab-sponsored projects, including flight status.