Opportunities for the SmallSat Community

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Deputy Chief Technologist Science Mission Directorate
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Panelists:

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Chair, Small Spacecraft Working Group
Science Mission Directorate

Liam Cheney
Mission Manager
CubeSat Launch Initiative (CSLI)
Launch Services Program

SmallSat Conference
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NASA LEADERSHIP PANEL
OPPORTUNITIES FOR THE SMALLSAT COMMUNITY

NASA and its partners are deeply engaged in every aspect of small spacecraft mission concept design, development, and operations. We harness our interests and capabilities to promote small spacecraft as innovative and adaptable platforms that contribute to the agency's goals for exploration, scientific return, and workforce development. Join a panel of NASA leaders from SMD, STMD, and SOMD as they discuss how NASA collaborates to define capability needs and investment strategies that enable funding opportunities for the small spacecraft community. An active dialogue with conference attendees is encouraged.

PANELISTS

Christopher Baker serves as the program executive for the Flight Opportunities and Small Spacecraft Technology programs within NASA's Space Technology Mission Directorate (STMD).

Rachele Cocks is a Program Executive in the Astrophysics Division of the Science Mission Directorate at NASA Headquarters. She is currently the Program Executive for Time Domain Multi-Messenger Astronomy (TDAMM) and UltraViolet Explorer mission (UVEX). She is also the Chair of the Science Mission Directorate Small Satellite Working group.

Liam J. Cheney is a mission manager in NASA's Launch Services Program (LSP) at NASA's John F. Kennedy Space Center in Florida. In this role, he manages launches for the program. A major portion of his responsibilities includes co-managing the agency's CubeSat Launch Initiative.

CubeSat Launch Initiative (CSLI), Liam Cheney, Mission Manager

CSLI provides launch opportunities to U.S. CubeSat developers

Small spacecraft emphasis/interest areas:

CubeSat Launch Services, Education, Research

Overall Implementation strategy / philosophy:

Provides launches to enable CubeSat missions.

➔ *You build your CubeSat, NASA launches it, and you operate it.*

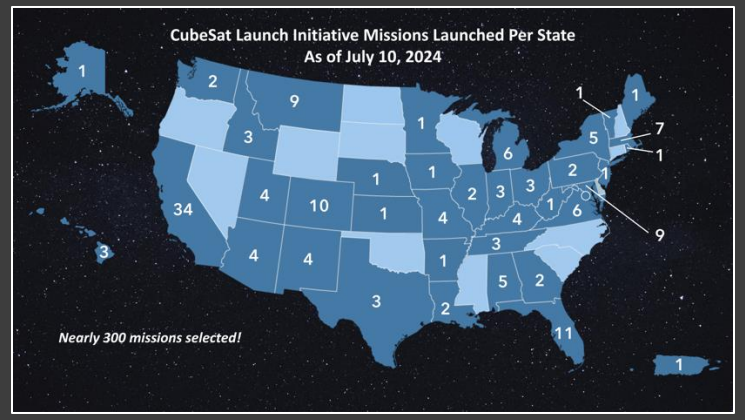
Recent accomplishment(s):

162 CubeSats launched successfully (as of 7/19/2024)

First CSLI projects from Kansas and Maine launched in July

https://www.nasa.gov/kennedy/launch-services-program/cubesat-launch-initiative/

CubeSat Launch Initiative (CSLI), Liam Cheney, Mission Manager




CURIE (ELaNa 48)
Credit: ExoLaunch

How to apply to CSLI:
The CSLI Announcement of Partnership Opportunity (AoPO) posted in early August, applications due around Thanksgiving.

New maximum of 6U size and orbit constraints, but exceptions may be proposed.

https://www.nasa.gov/kennedy/launch-services-program/cubesat-launch-initiative/

An opportunity to prepare for CSLI:
The Mission Concepts Program (MCP) (a NASA / DoD partnership) is a summer program to strengthen the readiness of universities, teams, and faculty in preparation to propose for CSLI and the DoD's UNP.
MCP 2024 proposal cycle was open for 4 weeks during Winter

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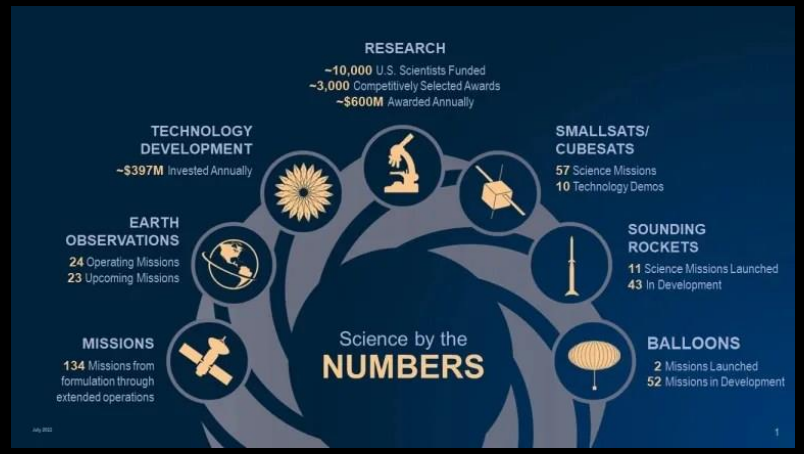
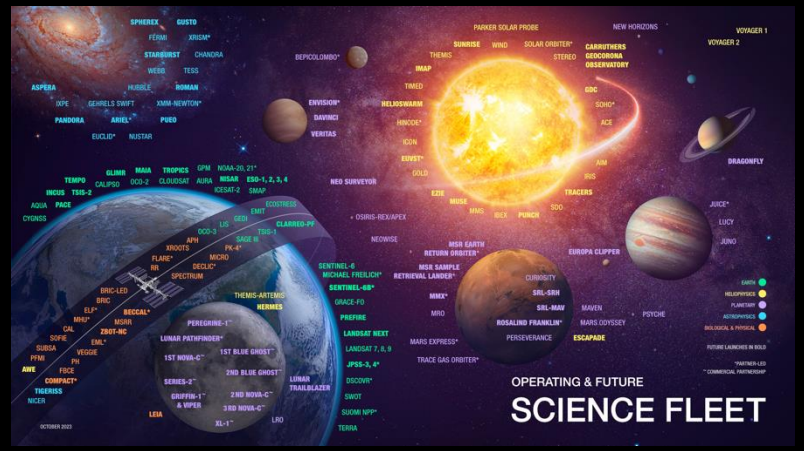
NASA Science Mission Directorate (SMD) / Rachele Cocks





Current SMD Missions
57 Science Missions
10 technology demonstrations

NASA Science seeks to discover the secrets of the universe, search for life elsewhere, and protect and improve life on Earth and in space.
https://science.nasa.gov/

"The size and cost of spacecraft vary depending on the application; some you can hold in your hand while others like Hubble are as big as a school bus. Small spacecraft (smallsats) focus on spacecraft with a mass less than 180 kilograms and about the size of a large kitchen fridge"
https://www.nasa.gov/what-are-smallsats-and-cubesats/

SMD Website https://science.nasa.gov/about-us/

NASA Science Mission Directorate (SMD) / Rachele Cocks

BurstCube/SNoOPI
Launched on Mar 22, 2024

https://heasarc.gsfc.nasa.gov/docs/burstcube/gallery/burstcube_launch.html

NASA SMALL SPACECRAFT OPPORTUNITIES

https://www.nasa.gov/smallsat-institute/nasa-smallsat-opportunities/

Research Opportunities in Space and Earth Sciences 2024 (ROSES-2024)

Remote Sensing Theory for Earth Science
Commercial Smallsat Data Acquisition New Vendor Onramp Evaluation
Heliophysics Guest Investigators
Heliophysics Technology and Instrument Development for Science
Heliophysics Flight Opportunities for Research and Technology
Astrophysics Research and Analysis
Astrophysics Pioneers

SMD Website https://science.nasa.gov/about-us/

Discussion

NASA Sciened Mission Directorate Astrophysics Division

National Aeronautics and Space Administration

Future Plans

- Relevant ROSES 2024 links:

D.13 AstrophysicsPioneers **Proposals due Mar 2025**	**D.3 APRA CubeSats** **Proposals due Jan 2025**

- Selection goal is two Pioneers missions per year and one CubeSat per year

Looking forward to successful missions and valuable science!

Point(s) of Contact

- Michael Garcia - Program Scientist and Officer

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- Rachele Cocks– Deputy Program Executive

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NASA Science Mission Directorate, Heliophysics Division Programs

Research

Highlights the newest mission data, utilizes the latest advances in modeling and machine learning, and develops the most innovative technological solutions.

Solar Terrestrial Probes (STP)

Addresses fundamental science questions about the very nature of space itself, and the flow of material and energy throughout the solar system– from the Sun to Earth to other planets to the interstellar boundary.

Explorers

Provides frequent flight opportunities for world-class scientific investigations from space utilizing innovative, streamlined and efficient management approaches within the heliophysics and astrophysics science areas.

Living With a Star (LWS)

Targets specific aspects of the Sun-Earth system that affect life and society: provides a predictive understanding of the Sun-Earth system, linkages among the interconnected systems, and, specifically, space weather conditions at Earth and the interplanetary medium.

Space Weather

Advances the science of space weather to empower a technological society safely thriving on Earth and expanding into space.

Technology

The Heliophysics Technology Program Office (HESTO) enables more focused, impactful, and innovative technology investments.

NASA Science Mission Directorate, Heliophysics Division
ROSES-2024 https://nspires.nasaprs.com/

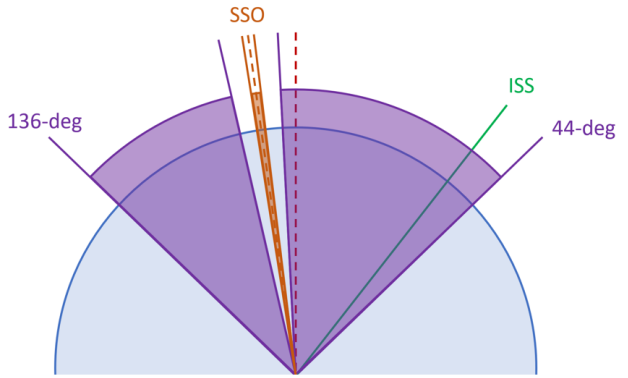
National Aeronautics and Space Administration

Status	Solicitation	Release Date	Due Date
Due in <30 days	B.5 Living with a Star Science	2/14/24	8/13/24
Due in <30 days	B.10 Heliophysics Flight Opportunities Studies	2/14/24	8/28/24
Open	B.11 Heliophysics Flight Opportunities for Research and Technology	2/14/24	9/20/24
Open	B.13 Heliophysics U.S. Participating Investigator	2/14/24	4/9/25
Open	B.14 Heliophysics Early Career Investigator Program	2/14/24	12/3/24
Open	B.15 Heliophysics Innovation in Technology and Science	2/14/24	3/28/25
Open	B.16 Heliophysics Artificial Intelligence/Machine Learning-Ready Data	2/14/24	4/3/25
Open	B.17 Interdisciplinary Science for Eclipse: Not Solicited in ROSES-2024	2/14/24	NA
Open	B.18 Living With a Star Tools and Methods: Not Solicited in ROSES-2024	2/14/24	NA
Open	B.19 Heliophysics Living with a Star Infrastructure: Not Solicited in ROSES-2024	2/14/24	NA
Open	B.20 Heliophysics Tools and Methods	2/14/24	2/27/25
Open	B.21 Heliophysics Citizen Science Investigations: Due Dates TBD	2/14/24	TBD
Due in <30 days	B.22 Artificial Intelligence Applications in Heliophysics	2/14/24	8/20/24
Open	B.3 Heliophysics Theory, Modeling and Simulations: Not Solicited in ROSES-2024	2/14/24	NA
Open	B.6 Living with a Star Strategic Capabilities: Not Solicited in ROSES-2024	2/14/24	NA
Open	B.7 Space Weather Science Application Research-to-Operations-to-Research: Not Solicited in ROSES-2024	2/14/24	NA
Due in <30 days	B.8 Heliophysics Technology and Instrument Development for Science	2/14/24	8/29/24
Open	B.9 Heliophysics Low Cost Access to Space	2/14/24	9/23/24
Open	F.17 Multidomain Reusable Artificial Intelligence Tools: Not Solicited in ROSES-2024	2/14/24	NA

CSLI – Backup Chart

Must be compatible with any deployment orbit within at least one of the following options.

	1 Deployment from ISS	2 Sun-Synchronous Orbit (SSO)	3 Non-SSO Orbit
Altitude*	Approximately 400 km	≤ 650km May define a 50 km span of acceptability	≤ 650km May define a 50 km span of acceptability
Inclination	51.6 degrees	SSO ± 1 degree	44 to 136 degrees, and not within 5 degrees of SSO
Mean Local Time of the Ascending Node (MLTAN)	N/A	At least 8-hour span of acceptability	N/A



* Relevant orbital debris mitigation requirements must be met (Ex., FCC's "5-year rule" if applicable) which may reduce the acceptable altitude depending on spacecraft design.

You may request a waiver with necessity and significant value and benefit to NASA, but waiver acceptance is not guaranteed.

https://www.nasa.gov/kennedy/launch-services-program/cubesat-launch-initiative/

NASA LEADERSHIP PANEL – OPPORTUNITIES FOR THE SMALLSAT COMMUNITY

For scientists and industry: (RACHELE, CHRIS)

How can external institutions get involved in NASA's small spacecraft programs? What specific opportunities are available for payloads and experiments?

What are the key criteria NASA considers when evaluating proposals for small spacecraft missions? How can scientists or technologists ensure their projects align with the agency's exploration, scientific, or technology goals to increase their chances of receiving funding?

Outside of being the lead organization for NASA missions, what opportunities exist for external partners to collaborate on NASA small spacecraft activities? How can external partners best position themselves to participate in upcoming missions and projects?

How does NASA support commercial space? What funding or partnership programs are available to help both industry and academia bring innovative small spacecraft solutions to market?

For College Students: (LIAM, CHRIS, RACHELE)

What programs or initiatives does NASA offer for college students to participate in small spacecraft missions, and how can students apply to get involved in hands-on projects or internships?

How can college student teams propose and develop their own smallsat projects with support from NASA, and what resources or mentorship opportunities are available to assist them throughout the process?

For K-12 Students: (LIAM, CHRIS)

What educational programs and competitions does NASA have in place to engage K-12 students in small spacecraft technology, and how can schools participate in these activities?

How can K-12 students learn about and contribute to small spacecraft missions, and are there specific projects or resources designed to introduce younger students to space science and engineering?

Technical Area	SMD Requests for STMD Investments in FY24 – modified by gap discussions with STMD 3/26/24
TX01 Propulsion	ESPA-Class propulsion (stay the course) (PSD, HPD); Scalable solar sails (stay the course) (HPD); Micro-thrusters (HPD, APD)
TX02 Avionics	HPSC (stay the course) (PSD, HPD, APD, ESD); **HPSC SBC and Peripherals** (PSD, HPD, APD, ESD)
TX03 Power	**Lunar night technologies** (ESSIO, BPS, PSD); **RPS with Dynamic Power Conversion** (PSD, possibly HPD)
TX05 Comm/Nav	Inter-Satellite Networking (ESD, HPD)
TX08 Sensors	QPI (stay the course) (ESD); **Quantum sensing component technology** (BPS, ESD, APD); **Low TRL improvements to photon detection, energy resolution & scaling to large low-SWaP arrays** (APD, PSD, HPD, ESD)
TX09 EDL	Aerocapture Demo (stay the course) (PSD), Entry Systems Modeling (stay the course) (PSD)
TX10 Autonomy	AutoNav demo (PSD, HPD, ESD, APD, ESSIO); Automated Science Operations & Sensor Development (BPS, ESD, HPD)
TX11 Software	CFM Modeling Infrastructure (stay the course) (BPS)
TX12 Structures	**Disturbance Free Payload Tech Demo** (APD, ESD, BPS); **Micrometeoroid-robust deployable membranes and baffles** (APD, ESD)
TX14 Thermal	**Low-vibration cryogenic cooling for single photon detectors** (APD); **Research-worthy freezer technology for lunar PSR sample conditioning/return** (ESSIO, PSD); Research-worthy freezer technology for biological sample return (BPS); Cryo sample containment for comets (PSD); Long Duration Cryo Fluid Management Technologies and Cryo Fluid Transfer (BPS as a supplier/partner)

KEY:

- grey text: STMD is investing in this per our prior request, stay the course, highest priority
- **bold text: Highest priority new requests**
- regular text: new request, not highest priority

Our "Top 10" list of STMD Requests