

Working with Mission Directorates

National Council of Space Grant Directors FEBRUARY 28, 2025

Moderator: Jim Stofan

Panelists:

Dave Berger, ARMD

Susan Poland, SMD

Veronica Seyl, ESDMD & SOMD

Stephanie Yeldell, STMD

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Panelists



Stephanie Yeldell STMD Liaison to OSTEM

Veronica Seyl SOMD/ESDMD STEM Engagement Embed Susan Poland SMD STEM Engagement Embed Dave Berger ARMD STEM Engagement Embed







EXPLORATION IS A TEAM SPORT

We have the right plans and the right teams in place to carry our plans forward. Now we GO.





COMMERCIAL LUNAR PAYLOAD SERVICES LANDING SITES



1 Astrobotic Peregrine Mission-1 LANDING SITE: Did not land on the Moon LANDER NAME: Peregrine CLPS CONTRACT AWARD: TO 2-AB STATUS: Completed

2 Intuitive Machines IM-3

LANDING SITE: Reiner Gamma LANDER NAME: NOVA-C CLPS CONTRACT AWARD: TO CP-11

3 Firefly Blue Ghost Mission 1

LANDING SITE: Mare Crisium LANDER NAME: Blue Ghost CLPS CONTRACT AWARD: TO 19D IN TRANSIT Lands Mar. 2

4 Firefly Blue Ghost Mission 3

LANDING SITE: Gruithuisen Domes LANDER NAME: Blue Ghost CLPS CONTRACT AWARD: TO CP-21



5 Firefly Blue Ghost Mission 2

LANDING SITE: Lunar Farside and Orbit LANDER NAME: Blue Ghost CLPS CONTRACT AWARD: TO CS-3 and CS-4

6 Team Draper

LANDING SITE: Schrödinger Basin LANDER NAME: ispace-U.S. APEX®1.0 Lunar Lander CLPS CONTRACT AWARD: TO CP-12

SOUTH POLE



7 Intuitive Machines IM -1 LANDING SITE: Malapert A LANDER NAME: NOVA-C CLPS CONTRACT AWARD: TO 2-IM

Astrobotic Griffin Mission -1 LANDING SITE: Mons Mouton LANDER NAME: Griffin CLPS CONTRACT AWARD: TO 20A

9 Intuitive Machines IM-4 LANDING SITE: Mons Mouton LANDER NAME: NOVA-C CLPS CONTRACT AWARD: TO CP-22

10 Blue Origin Blue Moon MK1 Pathfinder

LANDING SITE: South Polar region (specific location still being identified) LANDER NAME: Blue Moon Mark 1 (MK1) CLPS CONTRACT AWARD: CT-3

1 Intuitive Machines IM-2

LANDING SITE: South Polar region LANDER NAME: NOVA-C CLPS CONTRACT AWARD: TO PRIME-1

NASA Space Technologies and Major Investments on IM-2

Nokia NokiaSurface Communications Services

Nokia Lunar Surface Communications Services

NA\$#\$©MOOLO (Wasses Speed toometter for for Oblese viring Lunaar Operations) NASA's TRIDENT (The Regodiithand Ice Drill for Exploring New Terrain)

ULTRA-EFFICIENT AIRLINERS

FUTURE AIRSPACE AND SAFETY

ADVANCED AIR MOBILITY

HIGH-SPEED COMMERCIAL FLIGHT

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Four Transformations for Sustainability, Greater Mobility, and Economic Growth

Airspace Operations and Safety Program with ...



Sustainable Flight National Partnership with ...



Partnering Approach for AAM Technology Demonstrations

TCL-1: eVTOL pilot on board operations for multiple operators

- Live Virtual Construct with NASA and FAA, including crewed eVTOL aircraft
- Cooperative operating practices
- Airspace automation
- > System actor roles & responsibilities



TCL-2 [FY28]: Initial remotely piloted operations

TCL-3 [FY29]: Degraded weather operation

Industry partner engagement



Focus: Integration of eVTOL aircraft into UAM airspace infrastructure





Focus: Uncrewed operations and UAM service provision

AURA

Focus Area: UAM communication digitization needs including command & control

National Aeronautics and Space Administration



Companies Contributing to the X-59

This map shows the locations of companies that provide expertise, parts and manufacturing capabilities to build NASA's X-59 aircraft. The X-59 will be flown over U.S. communities to generate data on responses to the sounds the vehicle makes, hopefully leading to a change in the rules that prohibit commercial supersonic flight over land. Learn more at: www.nasa.gov/Quesst



Progress: Quesst Phase 1, X-59 Development



Accomplishments

- Moved to flight line and aircraft painted
- X-59 unveiled during Rollout Ceremony
- Completed post-paint X-59 laser scan of vehicle for acoustic evaluation model validation
- Engine runs complete
- Electromagnetic Interference
 Testing complete

Ongoing

- Aluminum bird testing
- Taxi testing

A Look Ahead

- First flight (2025)
- First supersonic flight (2025)
- First quiet supersonic flight (2025)

Aerosciences Evaluation & Test Capabilities Portfolio



LaRC 14'x22' Subsonic Tunnel Subsonic, Alternate Uses



LaRC National Transonic Facility High Reynolds Number Flow



ARC Unitary Plan Wind Tunnels 11'x11' Transonic Wind Tunnel 9'x7' Supersonic Wind Tunnel



LaRC Unitary Plan Wind Tunnel Supersonic Speed Range



LaRC Aerothermodynamics Laboratory Exploration Workhorse



onic

Transonic

Su

Supersonic



GRC 9'x15' Low Speed Wind Tunnel Low-speed Propulsion Acoustic GRC 8'x6' Supersonic Wind Tunnel Transonic-Propulsion



LaRC Transonic Dynamics Tunnel Aeroelasticity & Flutter



GRC 10'x10' Supersonic Wind Tunnel Large-scale Supersonics & Propulsion



Hypersonic

LaRC 8' High Temperature Tunnel Large-scale Hypersonics & Propulsion



GRC Icing Research Tunnel Aircraft Icing Condition Simulation



Specialty Tunnels

GRC Propulsion Systems Laboratory Engine (and Icing) Simulation at Altitude



LaRC 20' Vertical Spin Tunnel Spin Characteristics & Dynamic Stability

AETC Impacts Toward Dragonfly Mission to Titan (Moon of Saturn)

SMD New Frontiers

SMD New Frontiers





FY28 Dragonfly Launch

SMD New Frontiers



FY21 Dragonfly Free-flight Test of the Aeroshell-drogue **Parachute System at** Langley Vertical Spin **Tunnel (VST)** Impact: Data required for

system design for Dragonfly parachute system procurement

SMD New Frontiers



FY22 Dragonfly Aeroshell Test at Langley TDT Impact: Improved aero models will provide greater success probability of a Dragonfly Rotorcraft deployment in Titan's atmosphere

SMD New Frontiers



FY22-23 **Dragonfly Performance Test at Langley TDT** Impact: Obtain coaxial rotor performance data across the Dragonfly flight envelope to validate CFD performance for extrapolation to the Titan environment

SMD New Frontiers



FY23 Dragonfly Aeroshell Test at Langley TDT Impact: Improved **Dragonfly Aeroshell** aerodynamic modeling for flight under drogue and main parachute. These improved aero models will provide greater success probability of Dragonfly Rotorcraft deployment in Titan's atmosphere



Subsonic Wind Tunnel **Impact:** Characterize the transition to powered flight mode and forward flight mode



Risk Reduction through Wind Tunnel Testing Driving Planetary Mission Success Through CFD Validation

AETC Impacts Toward SLS/Artemis

Risk Reduction through Wind Tunnel Testing Driving Return to Moon through CFD Validation





FY18 Space Launch Systems (SLS) Test at Ames UPWT Impact: Assessed forces and moments on the SLS for transonic flight





means of data

analysis

NESC HEOMD



FY18-FY21 **SLS Block 1B Booster** Separation Test at Langley UPWT Impact: Gathered forceand-moment data of the booster separation event to validate the CFD predictions and assessment for vehicle development

HEOMD



FY19 SLS Buffet Validation Test at Langley TDT Impact: Groundwork set for 2nd entry of SLS Rigid Buffet test



FY23 Artemis-I Launch



FY23 SLS Block 2 with Mobile Launcher (ML) Tests at Langley 14' x 22' Subsonic Tunnel Impact: Characterized force and moment over model in transition flight and SLS next to

ML

ESDMD

ESDMD



FY23 Artemis Heat Shield Tests at Langley Aerothermo**dynamics** Laboratory (LAL) Impact: Obtained aeroheating and boundary-layer transition data on the Artemis heat shield due to Thermal Protection System char loss. Data will drive Artemis 2



ESDMD





FY26 Return to Moon w/Artemis 3

www.nasa.gov | 14

Artemis II Progress





Artemis II core stage rollout from Michaud Assembly Facility



Artemis II Core Stage (left) and Launch Vehicle Stage Adapter (right) at Arrive at Kennedy Space Center



ML 1 Preparations for Artemis II



EGS Teams Test Emergency Egress Baskets



Artemis II Crew Practice Maneuvers Inside Orion Mock up



Artemis II Crew Field Training in Iceland₁₅

Gateway Progress





Canada began work on the new Canadarm3 robotic arm on June 27, to launch no earlier than 2029

Maxar technicians installed xenon tanks into Power and Propulsion Element (PPE) central cylinder for Gateway

Gateway's Habitation and Logistics Outpost (HALO) stands vertically after completing static load testing.

Artemis Suppliers





For Artemis, NASA works

with suppliers across the country, representing a total of over 34,000 jobs



Who is in space as we speak?

Top from left to right: Alexey Ovchinin, Suni Williams, Butch Wilmore

> Second row left to right: Ivan Vagner, Don Petit

Third row left to right: Aleksandr Gorbunov, Nick Hague OUR VISION

Leading the next generation of human presence in low Earth orbit to advance microgravity science, technology, and exploration.

NASA'S FUTURE LEO NEEDS

NASA estimates the agency's future needs in low Earth orbit will require:

- Continuous accommodations and training for at least two crew members
- The ability to support a national institute in LEO
- Conducting approximately 200 investigations annually to support human research, technology demonstrations, biological and physical science



Technology Demonstrations



National Lab Services





Crew Accommodations and Training



Physical and Biological Research

LEO MICROGRAVITY STRATEGY Finalized Goals and Objectives

TOTAL GOALS

13

Science and Exploration-Enabling Research and Technology Development together have seven goals, representing 50% of the total goals.

TOTAL OBJECTIVES

44

Science and Exploration-Enabling Research and Technology Development make up over 50% of the total objectives. Workforce and Engagement comprise nearly 20%.



STAKEHOLDER INPUT

Articulating the "Why"

Enhance goals further with rationale on why low Earth orbit is important and why humans are needed

Commercial LEO Infrastructure

Highlight the importance in goal categories; Transportation and Habitation in critical path

Continuous Human Presence

Address the need and meaning of continuous human presence

Clarify Terminology

Goals and objectives were refined across the board to clarify intent

Reconfiguring

Added or removed goals and objectives to address things we missed or needed to be realigned with other categories

NASA's Low Earth Orbit Microgravity Strategy

Read about it here!

<u>NASA's</u> <u>LowEarthOrbit</u> <u>Microgravity</u> <u>Strategy - NASA</u>



CLPS Missions:

- IM-2 Launch, scheduled landing March 6
- Blue Ghost Launch, scheduled landing March 2
 PUNCH & SPHEREx: Scheduled for launch March 2
 Planetary Defense:
- Tracking 2024 YR4
- Planetary Defenders documentary coming April 2025

Faculty Opportunities

Research Opportunities in Space and Earth Sciences (ROSES)

SMD's omnibus-style solicitation supporting over 100 program elements in support of SMD's space and earth science research.

ROSES – 2025: To be released soon.

Additional program elements will be added over time.

Consider citizen science!

- Proposals submitted to any NASA Research Opportunities in Earth and Space Science (ROSES) element, unless otherwise noted in the program element, may leverage citizen science.
- Citizen Science Seed Funding Program (CSSFP)
- High Priority Open Source Science (HPOSS)

SMD Science Activation (ROSES F.6)

Context:

The Science Mission Directorate (SMD) Science Activation Program (SciAct) seeks to inspire people of all ages and backgrounds to actively participate in science, through projects developed by a collaborative network of project teams drawing on NASA SMD assets (science content, experts, data, etc.). The program began in 2016 and is currently in the second phase of 5-year awards. This solicitation requests proposals for projects to participate during calendar years 2026-2030 for a period of performance not to exceed five years.

Opportunity:

- Projects that cover the full breadth of NASA science disciplines
- Operate across all 50 states plus territories
- Reach people of all ages and backgrounds
- Operate across STEM ecosystems
- Engage community partners to deepen and extend reach and impact

NASA seeks a balance of projects that seek to broadly share resources and opportunities built from NASA assets, and community-based projects (both geographically- and audience-based) that work deeply with specific audiences to understand and meet their needs.

Eligibility:

Participation is open to all categories of U.S. institutions, except media organizations since communication is not a focus.

Non-U.S. participation in teaming arrangements or leveraging relationships on proposals submitted by U.S. institutions may only be proposed at no cost to NASA.

Aeronautics Research Mission Directorate (ARMD) Solicitations

ARMD annually solicits for proposals in aeronautics research

- Solicitations are released through the NSPIRES system (<u>https://nspires.nasaprs.com</u>)
 - The current open solicitation for ARMD Research is ROA-2024
- All NASA Research Announcement technical work is defined and managed by ARMD projects
 - Projects post amendments to the ROA to solicit proposals to enhance their core capabilities
 - ARMD sends notifications of amendments through the NSPIRES email system. Register in NSPIRES and sign-up to receive these email notifications.
 - Eligibility requirements are specified in the ROA and may be modified by the specific amendment
 - POCs are available to answer questions
- Solicitations advance ARMD's mission found in the Strategic Implementation Plan (SIP)
 <u>https://www.nasa.gov/directorates/armd/armd-strategic-implementation-plan/</u>

<u>)23</u>

University Innovation Project Expands Innovation Ecosystem

Over \$200M in awards across a diverse portfolio of investments

Seeking and awarding proposals addressing all topics in ARMD's research portfolio

- More than 80 awards to more than 100 universities
- Nearly 40 Historically Black Colleges/Universities or Minority Serving Institutions
- More than 500 students
- Women faculty represented in fractions greater than the academic population
- University Innovation Project includes University Leadership Initiative, University Student Research Challenge, Gateways to Blue Skies, and Future Aircraft Maintenance Technician studies

Continuing Portfolio Items in University Innovation

ULI Targets Faculty Proposals	USRC Seeks Student Ideas	BLUESKIES Student Group Competitions
 Propose to solve major, system-level technical challenges in aeronautics 	 Students propose their novel ideas for aviation 	 New competition topic each year As a team work on a future aviation concept
 Receive \$1-2M/year for 3-4 years 	Receive up to \$80K	 Winning team receives NASA internships
 1 solicitation per year, typically solicitation opens in March 	 3 proposal cycles per/year, proposals due around February, June, November 	 Current competition was announced July finishing end of May the following year
 Opportunities for undergraduate and graduate students to participate in aeronautics research Promote diversity in aeronautics with inclusion of minority-serving institutions and underrepresented university faculties 	 Gain technical and entrepreneurial skills Teams use crowdfunding (\$2K) Interface with NASA experts Open to all majors and interdisciplinary teams 	 Gain systems-level thinking Increase college students' interest in climate friendly aviation research Open to all majors and interdisciplinary teams
4 ULI awards / year	10 USRC awards / year	1 competition / year
NASA seeks aviation-relevant creative ideas/concepts		

from interdisciplinary university faculty and student teams

Progress: Quesst Phase 3, Community Response Testing

Accomplishments

 In the fall of 2023, NASA completed a 4-month long test in Nashville, TN of the community response recruitment and survey methods

Ongoing

- Design of community test campaign with government team and industry contractors
- Engagement with FAA, International Civil Aviation Organization's Committee on Aviation Environmental Protection (ICAO-CAEP), and the international research community
- Airfield and community selection process

A Look Ahead

- Finalize recruitment and survey methods
- Conduct detailed planning for initial community test location

NASA Space Grants for Aviation Resilience Research

Ensure resiliency of the aviation system by researching affecting disasters, understanding economic impacts, and identifying

mitigation approaches

- Backaround
 - NASA Convergent Aeronautics Solutions is conducting early research on aviation system resilience due to disasters.
 - Focus areas include the impact of disasters on airports, runways, and airspace.
 - Developing mitigation strategies through structured research methodologies. *Proposed Collaboration with NASA Space Grants*
- - Leverage NASA Space Grant network to engage universities across 50 states.
 - Identify historical aviation disruptions by state due to disasters such as flooding, extreme weather, extreme heat, drought, etc.
 - Develop models and analyze economic impact of past disruptions
 - Develop a harmonized approach with standardized metrics to scale research and study local as well as network effects of disasters
- Potential Benefits
 - Enables a consistent, structured, state-by-state aviation resilience framework and modeling approach to assess impacts of disasters
 - Accelerates data collection, analysis, and policy-relevant recommendations. Develop mitigation strategies that will benefit the entire US and American •
 - public's quality of life.
- Next Steps
 - Initiate exploratory discussions to align on the collaboration framework. Assess feasibility and approval requirements within NASA ARMD.

 - Define key research parameters and engagement strategy with Space Grants.

Workforce Development

Aviation is Vital to our Nation's Economy

E1

- \$1.37 trillion economic impact from commercial aviation in 2023*
- \$77.3 billion positive manufacturing trade balance in 2022**
- 8.97 million flights by U.S. carriers worldwide in 2022***
- 24 million tons of freight transported by U.S. airlines in 2022***
- 2.2 million aerospace/defense jobs; 603,000 in aeronautics/aircraft in 2022**
- * From Airlines for America
- ** From Aerospace Industries Association
- *** From Bureau of Transportation Statistics

Career Clusters that Apply to NASA

Original Model

- Engineering, Technology, and Media Arts
- Skilled Trades and Technical Sciences
- * Agriculture, Food and Natural Resources
- * Health Science, Criminal Justice and Public Safety
- * Business, Marketing, Entrepreneurship, Finance, and Public Administration
- * Hospitality, Human Services, and Education

Modernized Model

- Supply Chain and Transportation
- Advanced Manufacturing
- Construction
- Energy and Natural Resources
- Agriculture
- Education
- Financial Services
- Healthcare and Human Services
- Public Service and Safety
- Arts, Entertainment and Design
- Hospitality, Events, and Tourism

Learning at Work

- Internships
- Apprenticeships
 - GRC
 - LaRC
 - ARC
- NASA Pathways Interns

A E R O N A U T I C S

Learning About Work: What jobs can you do at NASA?

Pilot

Engineer

Quantum Scientist

Technician

National Aeronautics and Space Administration

NASA'S INTERNSHIP PROGRAMS

NASA's internship programs provide training, mentoring, and career development opportunities while working with the best science, engineering, financial, information technology and business minds in the world. Interns have the opportunity to engage in world-class experiences.

ARE YOU READY TO EXPLORE THE EXTRAORDINARY?

intern.nasa.gov

NASA'S INTERNSHIP PROGRAMS?

NASA has two internship programs, the Pathways Internship Program and the NASA Office of STEM Engagement (OSTEM) Internships. Both are paid and engage students with real-world experiences while contributing to the operation of a NASA facility and the advancement of NASA's missions. NASA also offers many other internship-style and fellowship programs. Visit intern.nasa.gov to learn more.

Pathways Internship Program

The Pathways Internship Program offers students and recent graduates paid internships that are direct pipelines to full-time employment at NASA upon graduation.

- Pathways interns gain valuable work
- experience and professional development.
- Interns are paid federal civil servants with benefits.
- Completion of the Pathways program may lead to a NASA job offer.
- Pathways internships are listed on www.usajobs.gov.

NASA OSTEM Internships Program

NASA Office of STEM Engagement (OSTEM) paid internships allow high school and collegelevel students to contribute to agency projects under the guidance of a NASA mentor.

- Applicants for this internship must be U.S. Citizens and meet a minimum 3.0 GPA requirement.
- These paid internships are offered across NASA facilities in fall, spring, and summer sessions.
- One application is viewed agencywide.
- OSTEM interns may receive a stipend based on academic level and session length.
- · Prior experience is not required.
- Opportunities are available at the high school, undergraduate, graduate, and educator levels.

WHY APPLY FOR AN INTERNSHIP AT NASA?

As a NASA intern, you'll join a community of dynamic professionals who are united by a common purpose: to pioneer the future in space exploration, scientific discovery and aeronautics research. Regardless of your career goals, a NASA internship will give you the kind of rewarding experience that makes a brilliant start for career advancement.

NASA leads the world in space exploration and NASA internships are an important part of our commitment to ensuring that the next generation will be ready for the challenges ahead. And while we're known for our achievements in science and engineering, we're just as proud of our achievements in the workplace. NASA is consistently named the "Best Place to Work in the Federal Government" by the Partnership for Public Service.

Early Career Investigator Program in Earth Science

FINESST

Future Investigators in NASA Earth and Space Sciences and Technology

The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly-talented U.S. and non-U.S. scientists to engage in ongoing NASA research projects.

- In-residence program at NASA
- Research and Sr. Research fellowships (NPRP)
 - Senior Postdoctoral Fellow has held the doctoral degree for five or more years at the time of application
- Postdoctoral Management Program (NPMP) available after one year of any postdoc position

Merit-based awards, evaluated from:

- Scientific merit of research proposal (40%)
- Academic and research record (20%)
- References (20%)
- Laboratory / Center review (20%)

Currently three application deadlines each year, on March 1, July 1, and November 1

NPP Benefits

- Stipends start at \$70K / year (plus locality augmentation)
- Annual travel / professional development budget of \$10K
- Relocation allowance
- Financial supplement for health insurance purchased through the program
- Appointments renewable for up to three years
- Other resources and professional development
 opportunities

NASA Locations and Research

The NPP helps advance NASA's missions in space science, Earth science, aeronautics, space operations, exploration systems, and astrobiology through scientific and engineering research. Areas of interest include:

- Aeronautics
- Astrobiology
- Astrophysics
- Earth Science
- Heliophysics
- Interdisciplinary
- Biological Sciences Science
- Cosmochemistry
 Planetary Science
 - Technology

Development

Explore ALL the NPP research opportunities at https://npp.orau.org/applicants/opportunities.ht ml

Student Challenges, Competitions, and Citizen Science

Get Involved with NASA

Help Solve NASA Challenges

Apply your expertise and imagination to contribute to the agency's projects. You could win prizes and be recognized by NASA.

Participate in NASA Research

Collaborate with scientists on NASA research projects. You could be credited with helping to make important scientific discoveries.

nasa.gov/get-involved

@NASAPrize

ARTEMIS STUDENT CHALLENGES

NASA is committed to landing the first woman and first person of color on the Moon using innovative technologies to explore more of the lunar surface than ever before! Discover the Artemis Student Challenges and explore how you can take part in one of NASA's mission-related challenges.

Student Launch

- Colleges, universities, high schools, and middle schools.
- Research-based,
- Provides research and development of rocket propulsion systems.

SUITS - Spacesuit User Interface Technologies for Students

- Undergraduate and graduate teams
- Design and create spacesuit information displays within an augmented reality environment.

HERC - Human Exploration Rover Challenge

- High school and college students worldwide
- create a vehicle designed to traverse the simulated surface of another world.

Lunabotics

- University-level teams
- Design, build, and run autonomously operated robot, traverse the simulated off-world terrain, and excavate the simulated lunar regolith.

Micro-g NExT - Neutral Buoyancy Experiment Design Teams

- Undergraduate students
- Design, build, and test Addresses an authentic, space exploration challenge.

- Build and launch class K high-powered rockets.
- workshops teach concepts necessary for a successful launch.

ADC - App Development Challenge

- Middle and high school students
- Coding-based challenge to solve technical problems provided by NASA as they relate to deep space exploration missions.

To learn more about the Artemis Student Challenges visit stem.nasa.gov/artemis

Space Apps Challenge

SOLVE REAL-WORLD CHALLENGES ON EARTH & IN SPACE

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The NASA International Space Apps Challenge is a hackathon for coders, scientists, designers, storytellers, makers, technologists, and innovators around the world to come together and use open data from NASA and its Space Agency Partners to create solutions to challenges we face on Earth and in space.

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BE A PART OF THE LARGEST ANNUAL GLOBAL HACKATHON!

Scan the QR code to learn more!

NASA Citizen Science

Active Asteroids

Inspect images to find comet-like objects hiding in the asteroid belt. For anyone with a smartphone or laptop. **Read Project** Summary

> Cloudspotting on MARS

atmosphere. For anyone with a smartphone

Cloudspotting on Mars

Trace exotic clouds in the Martian

or laptop. Read Project Summary

Go to Project Website 😑

Go to Project Website 💿

Are we alone in the universe?

Examine radio signals to help search for intelligent life beyond Earth. For anyone with a smartphone or laptop. Read Project Summary

Go to Project Website 💿

Backyard Worlds: Cool Neighbors

called brown dwarfs in our cosmic

Go to Project Website 😔

Discover Jupiter-like objects, balls of gas

backyard. For anyone with a smartphone or

Backyard Worlds: Planet 9

Search the realm beyond Neptune for new planets, nearby stars and more. For anyone with a smartphone or laptop. Read Project Summary

Go to Project Website 💿

Burst Chaser

Decode signals from Gamma Ray Bursts, the universe's largest explosions. For anyone with a smartphone or laptop.

Go to Project Website 🗢

Daily Minor Planet

Discover asteroids and other small objects in the solar system. For anyone with a smartphone or laptop. **Read Project** Summary

Go to Project Website 💿

Uncover dark energy, a mysterious force driving galaxies apart. For anyone with a smartphone or laptop. **Read Project** Summary

Go to Project Website ᅌ

Everyone can participate, citizenship not required!

- Build students' science identity by involving them in real NASA science projects!
- Millions of participants are making friends, learning science, and making real discoveries
- No science degree required; training is provided online

laptop.

Dozens of projects available at: science.nasa.gov/citizen-science

2024 Dream with Us Design Challenge

Team-based Annual Design Challenge For students in grades 6-12 (ages 13-18)

- New theme each year (2024: Responding to Natural Disasters with Aviation)
 - 2024 Dates: Feb. 27th-May 1st, 2024
 - Based on current NASA and aeronautics industry needs—developed by subject matter experts and NASA's STEM team
 - Real-world context
 - Supplemental STEM activities for K-12 so all ages can engage in some way
 - Challenge support for educators and students
 throughout the challenge window
- Virtual awards ceremony at the conclusion for all participants
 - Winning teams meet with subject matter experts (in person or virtual)
- Challenge created and managed via ARMD; registration and tracking through OSTEM's Gateway

Continuing Portfolio Items in University Innovation

ULI Targets Faculty Proposals	USRC Seeks Student Ideas	BLUESKIES Student Group Competitions
 Propose to solve major, system-level technical challenges in aeronautics 	 Students propose their novel ideas for aviation 	 New competition topic each year As a team work on a future aviation concept
 Receive \$1-2M/year for 3-4 years 	Receive up to \$80K	 Winning team receives NASA internships
 1 solicitation per year, typically solicitation opens in March 	 3 proposal cycles per/year, proposals due around February, June, November 	 Current competition was announced July finishing end of May the following year
 Opportunities for undergraduate and graduate students to participate in aeronautics research Promote diversity in aeronautics with inclusion of minority-serving institutions and underrepresented university faculties 	 Gain technical and entrepreneurial skills Teams use crowdfunding (\$2K) Interface with NASA experts Open to all majors and interdisciplinary teams 	 Gain systems-level thinking Increase college students' interest in climate friendly aviation research Open to all majors and interdisciplinary teams
4 ULI awards / year	10 USRC awards / year	1 competition / year
NASA seeks aviation-relevant creative ideas/concepts		

from interdisciplinary university faculty and student teams

Capstone and Senior Design

- ARMD Capstone topics and subject matter experts identified
- Optimization of System Identification
- Wing Design
- Wind Tunnel Demand Prediction
- Predictive Maintenance
- Imagining 2040 Aviation
- Airspace Resilience Management
- Active Flow Control

Any Questions?

Stephanie Yeldell STMD Liaison to OSTEM

Veronica Seyl SOMD/ESDMD STEM Engagement Embed veronica.l.seyl@nasa.gov Susan Poland SMD STEM Engagement Embed susan.m.poland@nasa.gov Dave Berger ARMD STEM Engagement Embed dave.e.berger@nasa.gov

Backup Slides

NASA Has Five Mission Directorates

NASA explores technologies that reduce aircraft noise and fuel use, get you gate-to-gate safely and on time, and transform aviation into an economic engine at all altitudes.

NASA technologies developed for spaceflight benefit our everyday life. The Artemis program proves and matures what those technologies can do and reduces risk for exploration of Mars and beyond.

NASA and the nation's science community use space observatories conduct scientific studies of the Earth from space to visit and return samples from other bodies in the solar system, and to peer out into our galaxy and beyond.

NASA's Artemis program to the Moon and on to Mars, including the Orion System, Exploration Ground Systems, the Gateway, and Human Landing System.

is defining and creating the steps path from Earth back capsule, the Space Launch

NASA's work in beyond low-Earth orbit includes commercial launch services to the International Space Station, exploration systems, space transportation systems, and broad scientific research on orbit.

Commercial LEO Infrastructure Goals

ategory	Updated Text
ansportation and Habitation	Strategically invest in U.S. private sector LEO capabilities to support NASA's activities and U.S. space industrial base, while maximizing cost efficiency for NASA.
ational Research and evelopment	Support whole of U.S. government research and development in LEO to provide benefits to humanity.

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Category	

Operations

Updated Text

Leverage LEO operations to develop and maintain microgravity skills to support NASA's human exploration missions.

LEO MICROGRAVITY STRATEGY SCIENCE GOALS

Category	Updated Text
Biological Science	Leverage crewed platforms in LEO to advance our understanding of how model organisms, human micro-physical systems, and plants respond to microgravity and other spaceflight conditions.
Physical Science	Leverage crewed platforms in LEO to probe phenomena hidden by gravity or terrestrial limitations to make groundbreaking advancements in fields such as materials science, fluid dynamics, and combustion.
Rapid LEO Science	Dramatically increase the pace of research in LEO through on-board analysis capabilities, in-situ measurements, samples and experimental preparation, and by having crew iterate research in real-time.
Space and Earth Science	Leverage opportunities provided by crewed platforms in LEO to advance scientific understanding and observational capabilities for both space and Earth science.

Research & Technology Development for Exploration Goals

Category	Updated Text
Exploration Technology	Leverage the unique environment of LEO to advance technologies that enable future human exploration on and around the Moon and Mars.
Health & Human Performance Research in Exploration Analog Environments	Advance understanding of how to sustain human health and performance using relevant exploration analog environments in LEO to reduce risks and inform Moon, Mars, and deep space missions.
Using LEO Operations to Prepare for Deep Space Exploration	Validate crewed mission operations in LEO as part of a timely and effective methodology to test the Agency's evolutionary approach to living and working in environments relevant to Moon and Mars exploration.

International Cooperation Goal

Category	Updated Text
International Cooperation	Champion broad international participation in LEO by a diverse set of providers and users (government and non-government) to foster innovation, achieve NASA science and exploration goals, and maintain a strong, U.Sled international presence in LEO.

Workforce Development and STEM Engagement Goal

Category	Update Text
Workforce Development and STEM Engagement	Engage, develop, and retain the diverse U.S. workforce needed to conduct future NASA missions by leveraging authentic connections to human space operations in LEO.

Updated Text

Public Engagement Goal

Category

Public Engagement

Highlight agency-led efforts in low Earth orbit to educate and inform the general public to the widest practicable extent, focusing upon the many benefits humanity gains through science and technology development aboard crewed, orbiting research platforms.

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