



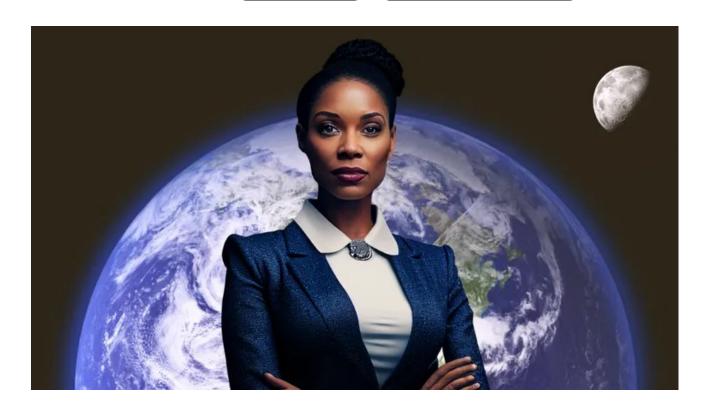




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NASA Entrepreneurs Challenge 2023

Venture to the Moon and Beyond with NASA: Launching Lunar Payloads and Unlocking Climate Science!

MY ENTRIES

MY TEAM

Stage: Prize: Help

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Science	Space	Technology		
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Technology Focus Areas

Technology Focus Area 1: Lunar Surface Payloads

NASA is seeking proposals for lunar surface payloads that may attract non-governmental funding for payload flight-readiness development and launch from a commercial provider. Your proposal should consider technical feasibility as a launchable payload as well as business credibility as a viable venture.

Proposed payloads of interest should include science instruments and technologies that align with NASA's <u>Moon to Mars Objectives</u> and the <u>Origins, Worlds, and Life: A Decadal Strategy for Planetary Science and Astrobiology 2023-2032 (particularly Chapter 22).</u>

General Guidance

To increase the likelihood of being manifested by a commercial lander provider, payloads should adhere to the following guidelines for easy accommodation by known commercial landers:

- Mass:
 - Under 50 kg, including accommodation hardware. Target 5-10 kg for easy accommodation for launch
- Standards:
 - Common and contemporary industry standards (e.g., RS422, Spacewire, etc. data interfaces, 28 VDC)
- Operational Complexity:

- Minimize disparate operational modes and transitions to reduce operational complexity
- Lander Resources:
 - Reduce demand, especially during critical times (e.g., power, downlink to Earth)
- Power Consumption:
 - Limit to approximately 150 Watts; lower is easier to accommodate
 - Data Downlink: Less than approximately 300 kilobits per second
- Contamination:
 - Minimize and document requirements and concerns (e.g., offgassing, byproduct venting)
- Risk:
 - Consider and minimize risks to other payloads or the lander
- Mechanical Load Limits:
 - Meet GSFC-STD-7000 General Environments Verification Standard
- Resource Requirements:
 - Minimize off-nominal peak resource requirements (e.g., instantaneous power peaks, data bursts)
- Avoid <u>Hazardous Materials</u>

Topic-Specific Evaluation Criteria

Technical feasibility of being manifested on a commercial lunar lander

Example of Suitable Topics for Lunar Surface Payloads

- "Survive the night" technologies:
 - o Experiments that can run for consecutive lunar days
- "Operate during the night" technologies:
 - o Experiments that can run for consecutive lunar days and nights
- Lunar science instruments:
 - Study dust transport, dust/plasma interactions, local magnetic fields, seismic activity, space weather, etc.
- Lunar engineering experiments:
 - Explore regolith properties, dust mitigation techniques, In-Situ Resource Utilization (ISRU) components, cold-operation bearings/seals/lubricants, radiation-tolerant electronics/computers, etc.

This list is not exhaustive. Any technology or science payload that
aligns with NASA's Moon to Mars Objectives and the Origins, Worlds, and
Life: A Decadal Strategy for Planetary Science and Astrobiology
2023-2032 (particularly Chapter 22) is of interest.

Technology Focus Area 2: Climate Science

NASA is seeking solutions to better leverage new and existing climate data to address climate and environmental problems. Proposals should focus on either developing innovative methods and/or instrumentation to generate high-quality climate science data or new ways to use and commercialize existing Earth Science data. Submissions may address either or both Climate Science Data Generation and Climate/Environment Data Usage objectives (detailed below).

General Guidance

- 1. Climate Science Data Generation
 - Generate high quality climate science data from low-mass/volume/power instruments that can be or are hosted on commercial spacecraft. Solutions may propose new remote (spacecraft-based) sensors or new ways to physically calibrate/validate existing spacecraft-based sensors.
 - Quantitative descriptions of the state-of-the-art in measurement parameters needed for climate science are provided in the climate variability and change panel of Table B.1 "ESAS 2017 Consolidated Science and Applications Traceability Matrix" (pages 596-612) in "Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space (2018).
 - Proposals should address means to increase performance in the state-of-the-art of the geophysical observables listed in this table (e.g., increase spatial or spectral resolution, sampling rates, range...) or propose means to substantially reduce the cost of current state-of-the-art measurements.

2. Climate/Environment Data Usage

- Develop new business models for generating revenue from existing Earth Science data to address a climate/environmental problem.
 For instance, proposers may identify a local environmental problem and propose extracting information with the required resolution and accuracy needed for mitigation actions.
- Data sources can be any governmental or commercial providers and should be used for environmental or climate related solutions.
- Example data sets available from NASA can be found at https://www.earthdata.nasa.gov/.

Topic-Specific Evaluation Criteria

- 1. Climate Science Data Generation:
 - Quality of data needed to address decadal science
- 2. Climate/Environment Data Usage:
 - Appropriateness of the data and data processing to address the proposed climate/environmental problem

Example Suitable Topics for Climate Science

- 1. Climate Science Data Generation
 - Greenhouse gas concentration/distributions
 - Snow water equivalent
 - Ice thickness
 - Atmospheric aerosols
 - This list is not exhaustive.
- 2. Climate/Environment Data Usage
 - Algal blooms
 - Local air quality
 - Local water quality
 - Crop health
 - Wildfire effects on local environments
 - This list is *not exhaustive*.

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