

National Aeronautics and  
Space Administration



# EXPLORE SCIENCE

## Lunar Discovery & Exploration Program Commercial Lunar Payload Services (CLPS)

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# Supporting National Space Policy Directives



## ***SPD-1: Reinvigorating America's Human Space Exploration Program***

“Lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities.”

Beginning with missions beyond low-Earth orbit, the United States will lead the return of humans to the Moon for long-term exploration and utilization, followed by human missions to Mars and other destinations.”



## ***SPD-2: Streamlining Regulations on the Commercial Use of Space***

“It is the policy of the executive branch to be prudent and responsible when spending taxpayer funds, and to recognize how government actions, including Federal regulations, affect private resources.”

It is therefore important that regulations adopted and enforced by the executive branch promote economic growth; minimize uncertainty for taxpayers, investors, and private industry; protect national security, public-safety, and foreign policy interests; and encourage American leadership in space commerce.”



## ***SPD-3: National Space Traffic Management***

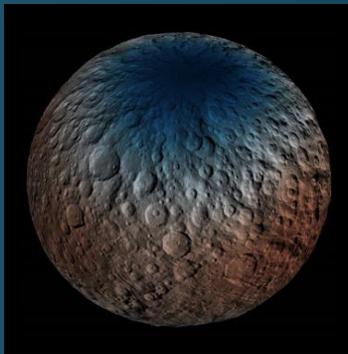
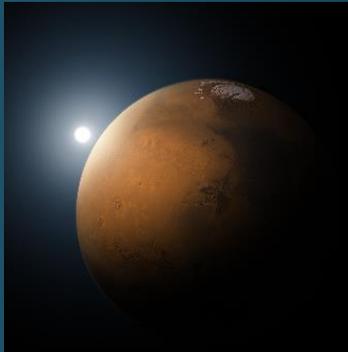
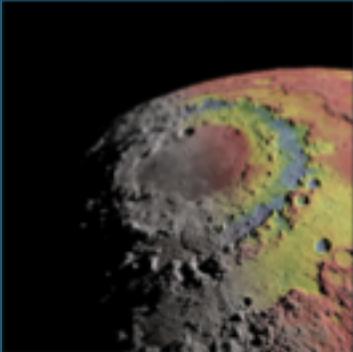
“For decades, the United States has effectively reaped the benefits of operating in space to enhance our national security, civil, and commercial sectors. Our society now depends on space technologies and space-based capabilities for communications, navigation, weather forecasting, and much more.”

Given the significance of space activities, the United States considers the continued unfettered access to and freedom to operate in space of vital interest to advance the security, economic prosperity, and scientific knowledge of the Nation.”

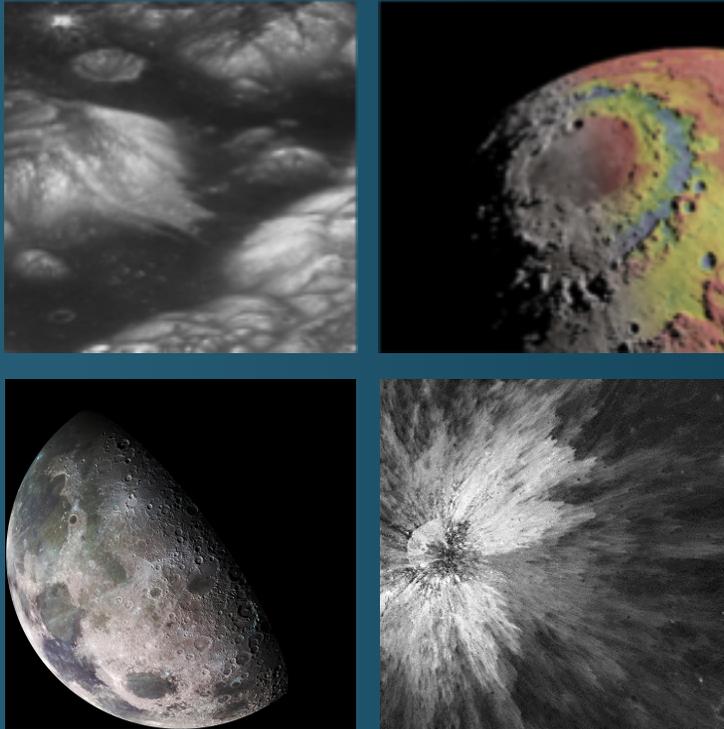
# Exploration Office Strategic Direction

Develop and integrate a strategy to enable Moon and Mars robotic and human exploration

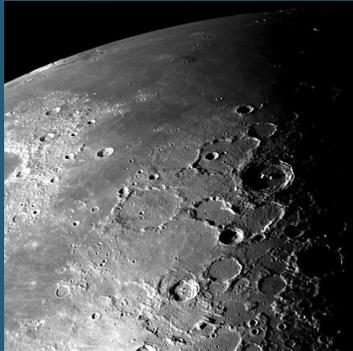
- Formulate and execute an integrated strategy for exploration through collaboration across NASA with interagency and international participation where appropriate
- Coordinate science research, technology development, and scientific payload development efforts, including commercial partnerships benefiting the science community
- Identify potential interdisciplinary research and technology opportunities, including commercial, necessary for NASA's Exploration Program



## Lunar Discovery & Exploration Program (LDEP)



- Utilizes an integrated strategy for exploration through cross-Agency collaboration, and interagency and international participation
- Optimizes ongoing lunar activities by taking advantage of commercial contracts for lunar transportation services
- Coordinates research, technology, and scientific payload development efforts, including commercial partnerships benefiting NASA science and exploration
- Identifies potential interdisciplinary research and technology opportunities, including commercial, necessary for NASA's Exploration Campaign
- Leverages future platforms for cross-disciplinary science



## LDEP Content

A key component of the National Exploration Campaign, which includes:

- Commercial Lunar Payload Services (CLPS)
- Lunar Payloads to be delivered by CLPS
- Instrument Development: Development and Advancement of Lunar Instrumentation (DALI)
- Lunar Reconnaissance Orbiter (LRO) Mission Operations
- Lunar SmallSats through Small Innovative Missions for Planetary Exploration (SIMPLEX) calls
- Future mobility capabilities
- Future comm/data relay assets

# Commercial Lunar Payload Services (CLPS)



## *Selected CLPS companies:*

- *Astrobotic*
- *Deep Space Systems*
- *Draper*
- *Firefly Aerospace*
- *Intuitive Machines*
- *Lockheed Martin Space*
- *Masten Space Systems*
- *Moon Express*
- *Orbit Beyond*

- Nine U.S. companies selected through CLPS Nov. 2018, developing landers to deliver NASA payloads to Moon surface; pre-authorized to compete on individual delivery orders
- Competition open to U.S. commercial providers of space transportation services, consistent with National Space Transportation Policy and Commercial Space Act
- Multi-vendor catalog, 10-year IDIQ contract, managed through task order competition for specific payload deliveries
- On ramps to the CLPS contracts will be used to provide additional capabilities as made available
- Structured for NASA as one of many customers of commercial service
- Building on NASA's model in low-Earth orbit, expands partnerships with industry and other nations to explore Moon and advance missions to farther destinations such as Mars, with America leading the way

# Lunar Payloads

Early payload selections begin the pipeline of scientific investigations and exploration pre-cursor investigations and technology development payloads using U.S. commercial lunar payload services

## Internal: NASA-Provided Lunar Payloads (NPLP)

Thirteen science and technology demonstration payloads selected as candidate CLPS payload deliveries to the Moon as early as end of 2020, depending on the availability of commercial landing systems

Instruments include:

- Linear Energy Transfer Spectrometer
- Near-Infrared Volatile Spectrometer System
- Advanced Neutron Measurements at the Lunar Surface
- Ion-Trap Mass Spectrometer for Lunar Surface Volatiles
- Quadrupole Mass Spectrometer
- Low-frequency Radio Observations from the Near Side Lunar Surface
- Stereo Cameras for Lunar Plume-Surface Studies
- Surface and Exosphere Alterations by Landers
- Navigation Doppler Lidar for Precise Velocity and Range Sensing

Two technology demonstrations include:

- Solar Cell Demonstration Platform for Enabling Long-Term Lunar Surface Power
- Lunar Node 1 Navigation Demonstrator

## External: Lunar Science Instrument and Technology Payloads (LSITP)

- Overall budget \$24 - 36 million in first year
- NRA released October 18, 2018
- Step 2 proposals received February of 2019
- Selections expected in the coming month for CLPS deliveries no earlier than 2020

Maintain the pipeline of CLPS-deployed payloads with internal/external calls annually

# CLPS On-Ramping



- Nearest-term CLPS capability is generally “smaller” stationary lunar surface deployment with little night-survival expected.
- As industry capabilities mature and more-demanding NASA needs are identified CLPS will “On-Ramp” increased capabilities and suppliers:
  - Expected in the nearer term:
    - Enhanced landed mass
    - Mobility services
    - Enhanced night survival.
  - Envisioned soon thereafter:
    - TLI small-sat delivery
    - Lunar orbit small-sat delivery
    - Further enhancements in landed mass, roving, survival
- NASA shapes evolution of commercial capabilities through service customer pull, rather than by DDT&E control.



# EXPLORE MOON *to* MARS

MOON LIGHTS THE WAY

