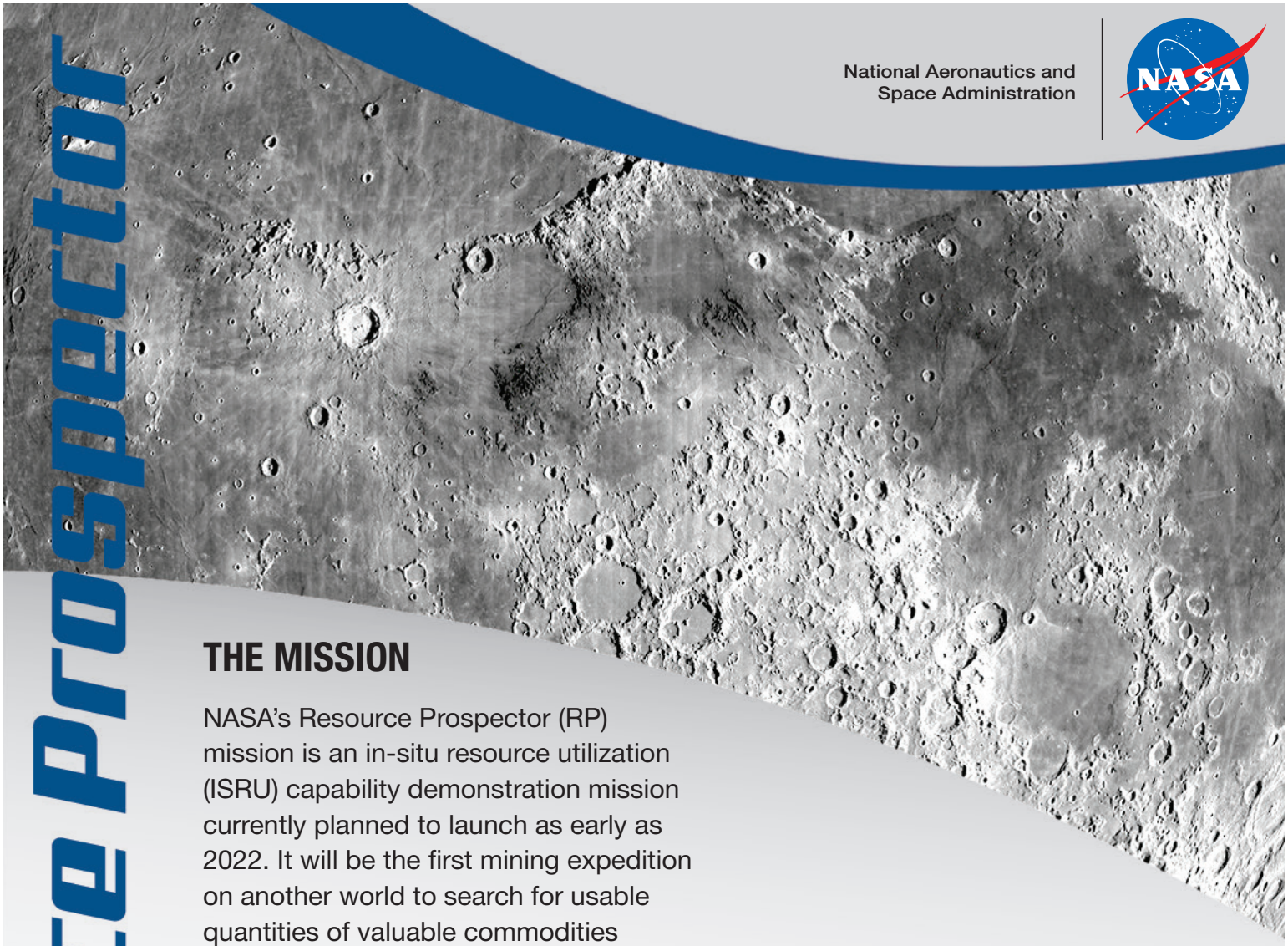
National Aeronautics and Space Administration

Resource Prospector



THE MISSION

NASA's Resource Prospector (RP) mission is an in-situ resource utilization (ISRU) capability demonstration mission currently planned to launch as early as 2022. It will be the first mining expedition on another world to search for usable quantities of valuable commodities needed for future missions. Expanding human presence beyond low-Earth orbit to asteroids and Mars will require the maximum possible utilization of local materials — so-called in-situ resources. Harvesting water ice and volatiles on the Moon is an important step in truly opening up the space frontier. Humans exploring deep space must be able to produce their own air, drinking water, food and fuel, whether on the Moon or Mars. RP will land a rover at a polar location on the Moon. It will then map the surface and subsurface concentrations of water ice and useful volatile compounds, such as oxygen and hydrogen, in both sunlit and permanently shadowed regions near the landing site. The data gathered will help future mission planners harvest and utilize these compounds. RP builds on the findings of NASA's Lunar Crater Observation and Sensing Satellite (LCROSS) and Lunar Reconnaissance Orbiter (LRO) missions that proved the existence of water ice and volatiles on the Moon.

Exploration Research and Technology Programs

To find out more, go to:
https://www.nasa.gov/resource-prospector

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THE SCIENCE PAYLOAD

The RP Payload is based on the Regolith and Environment Science and Optimized Lunar Volatile Extraction (RESOLVE) payload suite. This payload is capable of mapping the vertical and horizontal distribution of water and other volatiles as well as obtain and analyze samples of lunar soil, known as regolith, from a depth of up to one meter.

After a multi-day journey to the Moon, a lander will set down near one of the lunar poles and deploy the RP Surface Segment, which includes the rover and science payload. During the approximately 15-day mission, RP will perform near-continuous volatile prospecting with multiple drill-sampled collection and processing operations in an area covering several square kilometers.

RP's payload suite includes four main instruments:

- Neutron Spectrometer Subsystem (NSS) – prospects for subsurface hydrogen down to one meter (3 feet)
- The Regolith and Ice Drill for Exploration of New Terrain (TRIDENT) – acquires regolith samples from down to one meter for volatile analysis

RP15 Rover – Designed and built in a single year, this award-winning prototype rover/payload system enables Earth-terrestrial testing to inform system designs

- Near InfraRed Volatile Spectrometer Subsystem (NIRVSS) – prospects for surface water and quickly evaluates TRIDENT drill cuttings on the lunar surface for water and other volatiles
- Water Analysis and Volatile Extraction (WAVE) – accepts and heats regolith samples from TRIDENT to quantify subsurface water and identify captured water and other volatiles