



# DEEP SPACE

## EXPLORATION SYSTEMS

Over the next decade, NASA will practice deep space operations with decreasing reliance on Earth, gaining the experience and systems necessary to make pioneering the solar system a reality.

NASA's Deep Space Exploration Systems include the crew vehicle, rocket, and spaceport of the future that will enable the agency's bold new missions to extend human existence across the solar system.

The early missions for the Orion spacecraft and the Space Launch System (SLS) rocket will be the first of many missions that will travel more than 40,000 miles beyond the Moon to an area of space that is only a few days away from Earth, yet farther than the Apollo astronauts traveled. The vicinity of the Moon serves as a great area to gain experience with deep space operations and also as a staging area from which we can send future missions.

### **The Orion Crewed Spacecraft**

For the first time in a generation, NASA is building a deep space human spacecraft that will usher in a new era of exploration. Orion will operate in a challenging environment far from Earth. It will be the most capable spacecraft in the world, with a versatile design containing the systems and safety features to serve as the exploration vehicle that will carry the crew to space, provide emergency abort capability, sustain astronauts during increasingly long and challenging missions thousands of miles from Earth, and provide safe re-entry from deep space return velocities.

### **The Space Launch System Rocket**

SLS is the world's most powerful rocket and will be used to launch astronauts on deep space missions aboard Orion. Designed to be flexible and evolvable, SLS will be able to meet a variety of the most challenging crew and cargo mission needs. The rocket offers the highest-ever payload mass and volume capabilities, and also opens new possibilities for robotic scientific missions with the ability to deliver larger probes to deep space destinations faster than ever before.

NASAfacts



## The Multi-User Spaceport at Kennedy Space Center

The Exploration Ground Systems team continues to modernize Kennedy Space Center in Cape Canaveral, Florida, into a multi-user spaceport. NASA is adding capabilities to enable the launch of new vehicles in development by both the agency and its commercial partners. Teams at Kennedy have recently completed major milestones and progress on facilities including the Vehicle Assembly Building, Launch Control Center, Multi-Payload Processing Facility, Crawler Transporter, Launch Pad 39B modifications, and Mobile Launcher upgrades. The team has successfully upgraded its processes, facilities, and ground support equipment to safely handle rockets and spacecraft during assembly, transport, and launch.

### Exploration Mission-1 (Uncrewed)

Exploration Mission-1 will be the first integrated mission of Orion and SLS, and will lift off from the historic launch site at Kennedy Space Center's Pad 39B that supported shuttle missions for three decades. The 70-ton evolvable SLS will send an uncrewed Orion thousands of miles beyond the Moon. Orion will ultimately splash down about three weeks after launch off the coast of California. The mission will test SLS's launch performance, Orion's ability

to operate in deep space and return home safely, and deep space navigation and communication systems. This will demonstrate the agency's commitment and capability to extend human existence farther into the solar system than ever before.

### Exploration Mission-2 (Crewed)

The first crewed mission of Orion and SLS will focus on checking out the crew systems and demonstrating the capability for astronauts to operate the spacecraft in a deep space environment before returning safely to Earth. This second mission in the proving ground of space near the Moon will keep the crew in space for up to two weeks and test technology that will help develop habitation capabilities as well as explore multiple stable staging orbits for future deep space missions.

### Future Missions

Beyond the first two missions, NASA is aiming to fly at least one crewed mission per year as part of a wide range of potential activities at the Moon that will not only demonstrate the ability to live and work in deep space, but also accomplish a suite of objectives to validate key operational capabilities required to become independent from Earth.



National Aeronautics and Space Administration

#### Headquarters

300 E Street SW  
Washington, DC 20546  
[www.nasa.gov/centers/hq](http://www.nasa.gov/centers/hq)

[www.nasa.gov](http://www.nasa.gov)

NF-2018-03-590-HQ