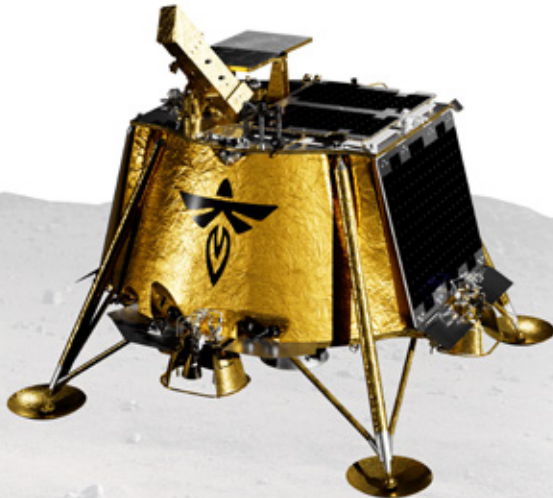
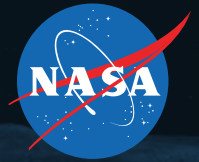


LUNAR GNSS RECEIVER EXPERIMENT

National Aeronautics and
Space Administration



Firefly Aerospace's "Blue Ghost" lunar lander will touch down on the Moon as part of NASA's Commercial Lunar Payload Services (CLPS) initiative. Onboard: the **Lunar GNSS Receiver Experiment (LuGRE)**. LuGRE will investigate whether signals from two Earth-orbiting satellite constellations can be used for navigation all the way the Moon.

Ever wondered how your phone knows exactly where you are? Or how it can provide directions from one place to another?

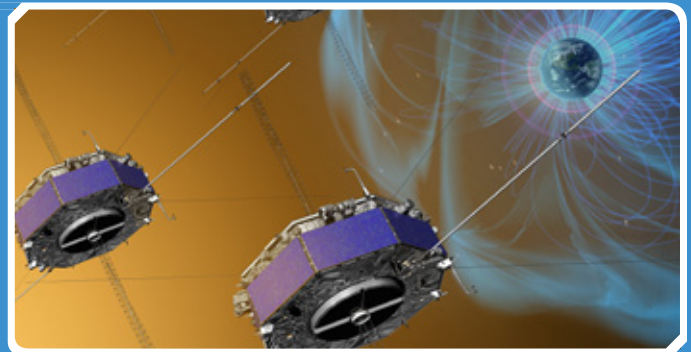
In the United States, people mainly use GPS – a satellite constellation orbiting Earth that provides precise location and timing information. GPS is just one constellation of location and timing satellites. There are currently six GPS-like systems, known as Global Navigation Satellite Systems (GNSS), providing navigation services to Earthlings traveling the globe.

GNSS

In addition to navigation, GNSS constellations support essential services like banking, power grid synchronization, cellular networks, and telecommunications. Even near-Earth space missions use these signals in flight to determine critical operational information like location, velocity, and time.

In 2019, NASA's Magnetospheric Multiscale (MMS) mission broke the world record for farthest GPS signal acquisition 112,314 miles from the Earth's surface.

LuGRE could double that distance.



Artist rendition of
Galileo spacecraft.

To demonstrate GNSS capabilities on the Moon, NASA and the Italian Space Agency partnered on the LuGRE mission. During its voyage, LuGRE will attempt to acquire and track signals from both the United States' GPS and the European Union's Galileo GNSS constellations during transit to the Moon, during lunar orbit, and finally for up to two weeks on the lunar surface itself.



The LuGRE payload is the first known demonstration of GNSS signal reception on and around the lunar surface. If successful, LuGRE will demonstrate that spacecraft can use signals from existing GNSS satellites at lunar distances, reducing their reliance on Earth-based ground stations for lunar navigation.

With the Artemis missions, NASA and its partners are establishing humanity's presence on the Moon. Astronauts and rovers traversing the rocky lunar surface will need precise location and tracking data for their exploration endeavors. The data gathered from the LuGRE payload will be shared with the world and used to further develop GNSS-based navigation systems for future missions to the Moon.

The LuGRE payload is one of 10 NASA-funded science experiments launching to the lunar surface through NASA's CLPS initiative. Through CLPS, NASA works with American companies to provide delivery and quantity contracts for commercial deliveries to further lunar exploration and the development of a sustainable lunar economy. LuGRE is funded and managed by NASA's Space Communications and Navigation (SCaN) program in partnership with the Italian Space Agency.



NASA, Firefly, Qascom, and Italian Space Agency team members examining LuGRE hardware.

To learn more about LuGRE, visit:
go.nasa.gov/4iHPHNE

