

NASA tests new spacecraft propellant gauge on lunar lander

February 6 2024, by Ellen Bausback



The Intuitive Machines Nova-C lander for the company's first Commercial Lunar Payload Services delivery is positioned before being encapsulated inside its launch fairing. The Nova-C lander will launch from NASA's Kennedy Space Center aboard a SpaceX Falcon 9 rocket no earlier than mid-February. Credit: Intuitive Machines

It's easy to measure fuel in tanks on Earth, where gravity pulls the liquid to the bottom. But in space, the game changes. Quantifying fuel that's floating around inside a spacecraft's tank isn't so simple.

"Because of the very small amount of gravity, fluid doesn't settle to the bottom of [propellant](#) tanks but rather clings to the walls and could be anywhere inside," said Lauren Ameen, deputy manager for the Cryogenic Fluid Management Portfolio Project Office at NASA's Glenn Research Center in Cleveland. "That makes it really challenging to understand how much propellant you have within your tank, which is really important to maximize your mission duration and plan how much you need to launch with."

A space-age fuel gauge technology meant to solve this problem will be demonstrated on an upcoming journey to the moon. Developed at NASA Glenn under the agency's Technology Demonstration Missions program, the Radio Frequency Mass Gauge (RFMG) payload is set to launch as a part of the Intuitive Machines IM-1 delivery to the [lunar surface](#) through the Commercial Lunar Payload Services (CLPS) initiative. With CLPS, NASA is working with American companies to deliver scientific, exploration, and technology payloads to the moon's surface and orbit.

RFMG technology uses [radio waves](#) and antennae in a tank to measure how much propellant is available. While smaller-scale experiments have been conducted on the International Space Station and during [parabolic flights](#), this will be the first long-duration RFMG testing on a standalone spacecraft, the Nova-C lunar lander. The data engineers receive throughout its journey could validate simulations done on the ground and mark the next step in developing this technology.

"It's definitely a critical point," Ameen said. "This is the first time we're getting this type of data for RFMG."

RFMG could be crucial during future long-duration missions that will rely on spacecraft fueled by cryogenic propellants, like [liquid hydrogen](#), liquid oxygen, or liquid methane. These propellants are highly efficient but are tricky to store as they can evaporate quickly, even at low temperatures. Being able to accurately measure spacecraft fuel levels will help scientists maximize resources as NASA moves toward its goal of returning humans to the moon through Artemis.

Provided by NASA

Citation: NASA tests new spacecraft propellant gauge on lunar lander (2024, February 6)
retrieved 29 April 2024 from
<https://phys.org/news/2024-02-nasa-spacecraft-propellant-gauge-lunar.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.