



Flight Opportunities



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Dear Flight Opportunities community,

2019 is in full swing and we hope your research goals for the year have gotten off to a great start.

This month's issue covers an upcoming solicitation, recent flights, and more:

- **NASA's "Tech Flights" solicitation** seeking innovation payloads is now open
- Virgin Galactic's SpaceShipTwo reaches suborbital space **in the company's first two missions for NASA**
- **Blue Origin** gives NASA-supported payloads a lift
- **ZERO-G's November flight campaign** helped advance both new payloads and frequent flyers
- A new video highlights **UP Aerospace's September launch** and the NASA-sponsored payloads onboard
- Latest edition of NASA's **Technology Innovation** features Flight Opportunities
- **Congratulations to Paul De León** on his Ames Honor Award
- Mark your calendars for important **upcoming events**

Looking forward,
The Flight Opportunities Team

“Tech Flights” Solicitation Now Open Mandatory Abstracts Due March 22 and Proposals Due April 26

NASA’s latest solicitation seeking innovation payloads for testing on suborbital vehicles is now open. The full “Tech Flights” solicitation can be viewed on [NSPIRES](#), which is also where proposals must be submitted.

This year we are seeking proposals from U.S. private entities, universities, or federally funded research and development centers with payloads related to two topics:

1. Supporting Sustainable Lunar Exploration and the Expansion of Economic Activity into Cislunar Space
2. Fostering the Commercialization of Low Earth Orbit and Utilization of Suborbital Space.

Please note the new requirement of the **Mandatory Abstract, which is due March 22, 2019 by 5pm ET.**

Full proposals are due **April 26, 2019.**

The Flight Opportunities program will conduct two Q&A sessions to provide an overview of the Appendix and to answer questions about the proposal process. The sessions will be held on the following dates:

Day 1: Wednesday, Mar 6, 2019

Tech Flights 2019 F1 Q & A

12:00 pm - 4:00 pm Pacific Time

WebEx website: <https://nasaenterprise.webex.com>

WebEx Meeting number: 905 246 671

WebEx Meeting password: 8Umbcp9@

Teleconference number: 844-467-6272

Teleconference listen-only passcode: 3480820

Day 2: Thursday, Mar 7, 2019

Tech Flights 2019 F1 Q & A

8:00 am - 12:00 pm Pacific Time

WebEx website: <https://nasaenterprise.webex.com>

WebEx Meeting number: 908 443 319

WebEx Meeting password: zNTBty\$9

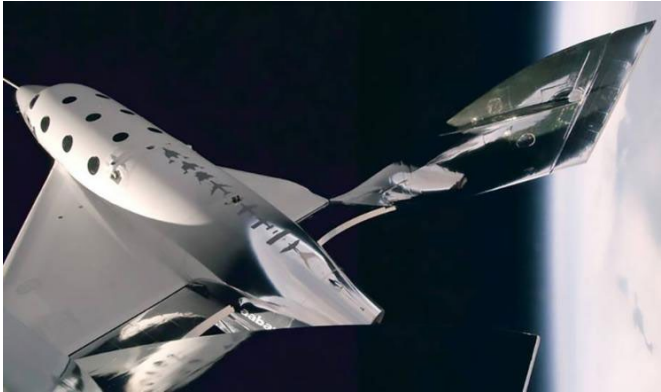
Teleconference number: 844-467-6272

Flight Opportunities strongly encourages interested organizations and principal investigators to begin gathering materials to support their proposals now to allow as much time as possible for a strong submission.

Looking for information on creating a successful proposal? [Read our quick tips here.](#)
Additional questions may be submitted via [NSPIRES](#).

Recent Flights

Virgin Galactic SpaceShipTwo Takes First Two Flights



Virgin Galactic's VSS Unity SpaceShipTwo conducted a supersonic test flight in July 2018. Credits: Virgin Galactic

Virgin Galactic's SpaceShipTwo has successfully taken its first two flights to suborbital space: first on December 13 and again on February 22.

Each flight demonstrated four NASA-supported technologies covering a range of research areas -- from life support systems to electromagnetic fields -- edging these technologies closer to inclusion on future space exploration missions.

[Read more about the December 13 flight and payloads.](#)

[Read more about the February 22 flight and payloads.](#)

Blue Origin Gives NASA-Supported Payloads a Lift



Carthage College students and Microgravity Propellant Gauging team members Taylor Peterson and Celestine Ananda observe tanks during a parabolic flight in November 2018. The suborbital payload is smaller and designed to test how the gauging technology will work with settled, non-sloshing liquids. Credit: Steve Boxall/Zero Gravity Corporation

Before a technology makes it to orbit or lands on another planet, researchers test--and retest--it in space-like conditions. These tests often take place on Earth, but some payloads take a trip to suborbital space for a few minutes of valuable microgravity testing.

Blue Origin's New Shepard rocket ventured into space with eight NASA-sponsored technology payloads onboard on January 23. [Video coverage of the launch is now available.](#)

The launch marked the fourth suborbital flight by Blue Origin with NASA-sponsored payloads onboard and the company's first full mission dedicated to bringing NASA technology payloads to space.

"This flight was focused on technologies from government, academia, and industry," said Flight Opportunities Campaign Manager Ryan Dibley from NASA's

Armstrong Flight Research Center in Edwards, California. "NASA is thrilled to have established flight providers and partners supporting new technology development with wide applications."

To learn more about the mission and the payloads onboard, [read the full NASA web feature.](#)

First-Time and Frequent-Flying Payloads Benefit from Recent Parabolic Demonstrations

From November 13 to 16, Zero Gravity Corporation's G-FORCE ONE modified 727 completed its latest parabolic research flight campaign for Flight Opportunities. Seven NASA-supported technology payloads were demonstrated during the campaign's four flights.

For experiments like Optimal Chill-down Methods for Cryogenic Propellant Tanks from the University of Florida (UF), the periods of microgravity provided by parabolic demonstrations have been instrumental to the technology development path over several flight campaigns.



Cryogenic propellant chill-down experiments from the University of Florida have accumulated data over multiple parabolic flight campaigns. Others flew for the first time on ZERO-G's recent flights. NASA photo.

“Since 2015, we’ve had nine parabolic flights supported by Flight Opportunities,” said principal investigator (PI) Jacob Chung, PhD. “This has helped us understand the cryogenic storage tank and transfer line chill-down requirements needed for efficient fuel transfer from a fuel depot in low-Earth orbit to a spacecraft’s fuel tank.”

Chung explained that effective chill-down is critical, because cryogen that vaporizes is no longer viable. Chung’s latest experiment will help his team identify the best methods for chill-down of the fuel storage tank itself, and ultimately help enable long-duration exploration missions.

For other researchers, the recent flights were a first foray into the learning that microgravity can provide.

“This payload represents my lab’s very first attempt to do experiments in low gravity, so we were extremely excited to fly with a team of five undergraduates who designed and built the apparatus,” said North Carolina State University’s Karen Daniels, PhD.

Daniels is the PI for the EMPANADA experiment, which stands for ‘Ejecta-Minimizing Protocols for Applications Needing Anchoring for Digging on Asteroids.’ As its name would suggest, the experiment aims to improve operations for future exploration of small asteroids and planetary bodies.

“We’ll be able to use the results from these flights to compare with laboratory experiments done on Earth’s surface,” noted Daniels. “And then we can take that learning and apply it to our next round of experiments.”

Recent Flights cont.

Other Flight Opportunities-supported payloads onboard the recent flights were:

PRIME-4.0: Miniaturized and Reusable Asteroid Regolith Microgravity Experiment for Suborbital and Orbital Use

PI: Josh Colwell, University of Central Florida

Gravity Effects on Flow Boiling Heat Transfer Using Temperature Sensitive Paints in Preparation for an ISS Flight Experiment

PI: Jungho Kim, University of Maryland-College Park

Microgravity Propellant Gauging Using Modal Analysis: Phase III

PI: Kevin Crosby, Carthage College

Lightweight Strain-Energy Deployed Spacecraft Booms

PI: Mark Pankow; North Carolina State University

Small-Sat Propellant Management Technology

PI: Seven Collicott; Purdue University

New Video Showcases Flight Opportunities-Supported Payloads on Recent UP Aerospace Launch



Three NASA technology demonstration payloads launched aboard UP Aerospace's SpaceLoft 12 mission from Spaceport America in New Mexico on September 12. A recently released video highlights the payloads and the Flight Opportunities program.

[View the video here.](#)

[Read more about the mission here.](#)

Latest Edition of NASA's Technology Innovation Features Flight Opportunities

The newest edition of NASA's Technology Innovation features the [Flight Opportunities program](#) and is now available for download.

Each issue of this digital publication features space technology innovators and project developments across NASA, highlighting the American inventors, entrepreneurs, and application engineers who have transformed space exploration technologies into products that benefit the nation.



[Click here for download options.](#)

Staff News

Paul De León Receives Prestigious NASA Honor Award

In a November 8 ceremony at NASA's Ames Research Center, Flight Opportunities Campaign Manager Paul De León received an Ames Honor Award, spotlighting his excellent achievements for NASA and in the field of engineering. We couldn't be prouder of our colleague.

Congratulations, Paul!



Paul De León, center, received an Ames Honor Award on November 8. Ames Deputy Center Director Carol Carroll (left) and Ames Center Director Eugene Tu (right) presented him with the honor.

Conferences & Events



NASA team members attended the 2018 Meeting of the American Society for Gravitational and Space Research (ASGSR) in November. From left to right: consultant Danielle McCulloch, NASA Associate Administrator Jim Reuter, and Flight Opportunities Campaign Manager Paul De León.



Flight Opportunities also attended the Innovation and Opportunities Conference in November. Here, Technology Manager Stephan Ord talks with a conference attendee about NASA's solicitation process for technology demonstrations.

Mark your calendar for these upcoming conferences...

- **National Council of NASA Space Grant Directors' Spring Meeting**, Crystal City, VA, Feb 28-Mar 2, 2019
- **National Space Symposium**, Colorado Springs, CO, April 8-11, 2019



If you will be attending these meetings, **let us know** — we'd welcome the opportunity to meet you!

Have ideas or feedback for the Flight Opportunities newsletter?

Drop us a line at: NASA-FlightOpportunities@mail.nasa.gov

STAY CONNECTED:



NASA Flight Opportunities Program

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