



Flight Opportunities



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Dear Flight Opportunities Community,

Our newsletter is now in its second issue, and we're excited to continue sharing the latest from the program with you each month! Feel free to share the newsletter with your colleagues, as we are hoping to grow awareness of the Flight Opportunities program. We also hope you'll **get in touch** with any suggestions for the news you would like to see here.

For now, spring is certainly off to a busy start for the Flight Opportunities program! In this issue, you'll find:

- **A profile of UP Aerospace**, one of our IDIQ flight providers. We'll feature other providers in the coming months, so check out future issues for more info about the commercial partners offering flight opportunities to our community.
- A spotlight on NASA's Jet Propulsion Laboratory's **Gecko Grippers technology**, which recently flew to the International Space Station (ISS) and offers promise for many future microgravity and space-based missions.
- A roundup of **upcoming solicitation calls** as well as **key industry events** that you'll want to mark on your calendars.

Thank you for reading!

Ronald Young, Program Manager
NASA's Flight Opportunities Program



Ronald Young, Program Manager

"Indeed, a major thrust of NASA's STMD is 'infusion'—how best to use a new technology to help enable a future space agency project."

— Steve Jurczyk, Associate Administrator, NASA Space Technology Mission Directorate

Flight Provider Profile: UP Aerospace

One of our IDIQ2 flight providers, **UP Aerospace** specializes in advanced engineering, launch technology development, and state-of-the-art rapid and low-cost launch operations. Headquartered in Denver, CO, the company's launch facilities are located at Spaceport America in New Mexico.

UP Aerospace developed the SpaceLoft™ XL suborbital reusable launch vehicle (sRLV) to help reduce the cost and scheduled time of launching experiments and commercial payloads for microgravity research. Since 2006, the company has flown this sounding rocket payload delivery system 10 times with over 40 payload customers, and recently completed its first deployment mission with Flight Opportunities (see the featured video below). This fully flight proven platform reaches an altitude of 115 km on average for commercial flights (160 km maximum altitude), with typical flight durations of 13 minutes, including at least 4 minutes of microgravity. The platform is optimized for flying payloads of up to 36 kg.



SpaceLoft-4; Credit: Las Cruces Sun News

Learn more about SpaceLoft XL, including details about the platform, flights, and whether it might be a good match for your payload. And, look for details in the coming months about UP Aerospace's new launch vehicle Spyder, which is a dedicated cubesat launcher. The company recently received a Flight Opportunities-funded Announcement of Collaborative Opportunity (ACO) award to develop this small, 6U cubesat payload launch vehicle in partnership with NASA's Marshall Space Flight Center. The new vehicle will add to the company's flight platform portfolio to benefit research teams seeking to mature promising technologies.

“UP Aerospace is pleased to work with the Flight Opportunities program, providing access to a relevant environment for developing and flight testing new technologies. This access is helping researchers save development costs and provides a pathway toward orbital flights.”

— Tracey Larson, Vice President of Public Relations, UP Aerospace

SpaceLoft is a trademark of UP Aerospace, Inc.

Video: SL-10 Launch for Flight Opportunities

On November 6, 2015, SL-10 was launched successfully —UP Aerospace's tenth SpaceLoft XL launch and its first deployment mission for Flight Opportunities. The mission deployed the Maraia Earth Return Capsule, reaching an altitude of 120 km above Spaceport America and carrying payloads investigating **green propellants**; **affordable avionics**; **entry, descent, and landing (EDL) subsystems**; and a **robotics-based method for identifying the inertia properties of a spacecraft in orbit**.



Click image to view on YouTube

Gecko Grippers: Getting a Handle on Objects in Space

Developed by researchers at NASA's Jet Propulsion Laboratory (JPL), the revolutionary **Gecko Grippers** (T0135) technology offers a novel way to grapple non-cooperative objects in microgravity--showing promise for a myriad of applications in both terrestrial environments and in space. Having flown the grippers to the International Space Station (ISS) in March, innovators are continuing to mature the technology and refine it for widespread use.



An artist's concept shows how a future robot called LEMUR (Limbed Excursion Mechanical Utility Robot) could inspect and maintain installations on the ISS, sticking to the outside using the gecko-inspired technology. Credit: NASA/JPL-Caltech

The grippers feature adhesives that use microscopic angled hairs (similar to those possessed by the gecko) that stick to surfaces using van der Waals forces. Adhesion can be turned on and off by moving the adhesive material in a shear motion, and the adhesives can be reused for thousands of cycles without losing effectiveness—of particular importance in helping to lower the cost and weight of space-bound payloads. The grippers do not damage surfaces, nor do they leave a residue--making them an alternative to pressure-sensitive adhesives, glues, and hook and loop fasteners. The material is unaffected by vacuum and radiation, and can operate in temperatures down to -100C.

The researchers' involvement in the Flight Opportunities program has helped to advance the technology. Data collected has been compared to data obtained on the ground in a 1g environment

at JPL. This research has enabled innovators to better understand the physics and mechanisms of gecko-like adhesive grippers and also to design improved grippers for future applications. The recent trip to the ISS is enabling the technology to be tested on a long-duration space-based mission. Successful completion of this microgravity testing will enable infusion of the technology in many applications, as well as serious consideration in important future NASA missions. Among those in consideration are future ISS Program applications as well as future long-duration space systems like the Deep Space Habitat and crewed missions to Mars. In addition, development toward a commercial application will soon be underway via an SBIR Phase II contract with Perception Robotics.



Stephen Chueng, President, World Trade Center - Los Angeles (second from right), demonstrates one of the astronaut grippers to German Chancellor Merkel (far left) and President Obama (second from left) at the Hanover Messe Trade Fair. Photo Credit: Adam Berry, Getty Images

“As our team was maturing gecko-like adhesives for space applications, we used the Flight Opportunities program to access an environment that was critical to our testing, but impossible to achieve on the ground. By testing in microgravity, we uncovered several design changes and operational tricks for our hardware that enabled us to be successful flying a new version of the Gecko Grippers as a payload on the International Space Station the following year.”
—Aaron Parness, PI, NASA’s Jet Propulsion Laboratory

Opportunities

Next NASA Internal Call for Payloads

Tentatively scheduled to open in July, Flight Opportunities will be accepting submissions from NASA researchers (and other government partners) for its next Internal Call for Payloads. These internal calls aim to help advance technology demonstration payloads, particularly across the gap between laboratory/ground-based testing and demonstration of technical readiness in a mission-relevant operational environment. The program will provide one or more flights from one of the flight providers currently on contract with Flight Opportunities. Check the [FO website](#) for updates. March 2016 Internal Payload Call selections are tentatively expected to be made in July.

SpaceTech-REDDI-2016-F1B Solicitation

The next Space Technology Research, Development, Demonstration, and Infusion (SpaceTech REDDI) solicitation is expected to open this summer. Proposals are accepted from all U.S. entities (or non-U.S. entities working with a U.S. organization) that demonstrate a need for testing cross-cutting technologies in a suborbital environment. Selected payloads from the SpaceTech-REDDI-2016-F1 call held in March 2016 are tentatively expected to be announced in June and awarded in August.

On-Ramp Solicitation for New Flight Providers

The most recent solicitation for new flight providers closed on March 31. Selections are targeted to be made in the coming months.

Upcoming Conferences & Events



Register for SpaceTech Expo

May 24-26, 2016
Pasadena, CA

Other events coming up in 2016:

- **June 2-4: Next-Generation Suborbital Researchers Conference** (NSRC)
- **June 20-23: Commercial and Government Responsive Access to Space Technology Exchange** (CRASTE)
- **July 12-14: ISS R&D Conference**
- **August 6-11: Small Satellite Conference**
- **September 13-16: American Institute of Aeronautics and Astronautics Space Forum & Exposition**
- **October 12-13: International Symposium for Personal and Commercial Spaceflight** (ISPCS)
- **October 26-29: Annual Meeting of the American Society for Gravitational and Space Research** (ASGSR)
- **November 15-17: Space Commerce Conference and Exposition** (SpaceCom)



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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Flight Opportunities is part of the Commercial Partners Portfolio of NASA's Space Technology Mission Directorate.