



Flight Opportunities

ISSUE: 29 | January 2020

Greetings from Flight Opportunities

In this issue:

- Tech Flights 2020 draft solicitation now available – time to prepare your proposal
- Aerospace Corporation tests solar cell experiment on a Black Sky balloon
- Tipping Point, ACO and SBIR/STTR solicitations now open
- Q&A with Flight Opportunities veteran investigators Robert Ferl and Anna-Lisa Paul
- Infusion news
- Special request for the March 2020 Next-Generation Suborbital Researchers Conference

Enjoy!

The Flight Opportunities team

Opportunities

NASA Seeks Input on Tech Flights Solicitation Draft

NASA has released a [draft of the Tech Flights 2020 solicitation](#).

The solicitation includes elements that will allow researchers to accompany their payloads on suborbital flights conducted using NASA grant and cooperative agreement funds. NASA is [seeking comments](#) from the suborbital research community and prospective flight providers on the proposed implementation of this new policy. **Comments are due Feb. 14, 2020.** NASA plans to issue the final solicitation a few weeks after the comment period closes.

Begin Preparing Your Proposal Now

If you have questions about the solicitation, please [reach out](#) as soon as possible so that we can speak with you before the final version is released.

You can also review our [Tips for Preparing a Successful Tech Flights Proposal](#).

Need more guidance? [Contact us for more information](#).

Three NASA Solicitations Now Open for Company Proposals

NASA's Space Technology Mission Directorate (STMD) has released three solicitations that may be of interest to companies in the Flight Opportunities community.

Tipping Point

NASA seeks proposals from U.S. for-profit entities to develop “**tipping point**” **space technologies** and integrated system capabilities and demonstrate them in relevant environments. Such environments include suborbital flights, in-space on the International Space Station (ISS) or Lunar Gateway (including free flyers), and as part of early lunar payloads. Multiple flight demonstration awards totaling about \$250M are anticipated.

Topic areas include:

- Cryogenic fluid management
- Lunar surface innovation initiative
- Closed-loop descent and landing capability

Mandatory Preliminary Proposals Due: March 18, 2020

Final Proposals Due: July 20, 2020

Announcement of Collaboration Opportunity (ACO)

NASA seeks partnerships with U.S. for-profit entities to advance Moon-to-Mars exploration technologies that can benefit both the commercial and government use of space. Utilizing STMD resources, NASA centers will provide successful industry partners with technical expertise, facilities, hardware, and software to accelerate the development and availability of these technologies.

Mandatory Preliminary Proposals Due: March 16, 2020

Final Proposals Due: June 25, 2020

Small Business Innovation Research (SBIR) & Small Business Technology Transfer (STTR)

Small businesses are encouraged to explore the wide range of topics that are part of the 2020 solicitation, as several of these are relevant to this community. For the SBIR program, NASA's mission directorates identify high-priority research problems and technology needs for their respective programs and projects, resulting in a broad range of topics. The STTR program is aligned with the priorities of NASA's Space Technology Roadmaps as well as the associated core competencies of the NASA centers.

Phase I Proposals due: March 20, 2020, at 5 p.m. EDT



Personnel from The Aerospace Corporation prepare their solar cell calibration experiment for a first flight with BlackSky Aerospace in January 2019. The most recent flight was the second test of the technology on a BlackSky balloon. Credit: The Aerospace Corporation

Solar Cell Calibration Technology Tested on Balloon Flight

When we return to the Moon through [NASA's Artemis program](#), living and working on the lunar surface will require cutting-edge equipment and technologies—and reliable power to run them. In December, investigators from The Aerospace Corporation tested their [Rapid Calibration of Space Solar Cells technology](#) on a Flight Opportunities–supported high-altitude balloon flight from BlackSky Aerospace. Data from the successful flight is helping researchers prepare for a second balloon flight this year. Ultimately, the system aims to help mission planners quickly benchmark new, high-efficiency solar technologies to improve the speed at which solar power is deployed in space.

A Case for Durational Research: Space Plants Co-Investigators Robert Ferl and Anna-Lisa Paul

University of Florida-Gainesville co-investigators Robert Ferl and Anna-Lisa Paul are no strangers to suborbital research. They've been conducting plant research in microgravity since the late 1990s—first on the Space Shuttle and then on the International Space Station (ISS) and parabolic flights, many of which have been facilitated by Flight Opportunities.

More recently, the pair have begun flying their “space plants” (*Arabidopsis thaliana*) on rockets, including Virgin Galactic's SpaceShipTwo and **Blue Origin's New Shepard**. We spoke with Ferl and Paul about how they have approached their long-duration research to lead to successful, iterative investigations on multiple flights.



What approach did you take on your early flights to set yourselves up for success?

We started with a lot of project development, hardware development, and preflight testing before we ever flew our experiments. That was back in the '90s, and what we were looking at then was the notion of how organisms—in our case, plants—behave on the ground and then how they behave in space. And all of our preflight work helped us be successful in capturing data about how those plants responded during flight. What we didn't know was what happened in the transition between the ground and space.

How did you design your experiments to start looking at that transition point?

Parabolic flights gave us 30-second windows into what was happening in the transition to spaceflight. But to capture it, we didn't just look at the part of the parabola where you achieve true 0 g. We looked at the whole thing, from the bottom of the parabola to the top, in order to get a brief window into that transition period. Now, with vehicles like New Shepard and SpaceShipTwo, we can get longer periods of microgravity and collect even more data during that transition.

Have you encountered any challenges in moving beyond parabolic flights to rockets?

Yes, rockets definitely present a unique type of environment. We're aiming to image metabolic changes inside plant cells that happen, potentially, very rapidly and at a very low signal. Think about how you see the flickering of a candle in a room—you want to make sure you're looking in the right place at the right time to capture that flicker. In our case, it's the signal or image. Then imagine that flicker on a rocket with intense vibration. Things get very complicated very quickly. So we had to tweak our cameras to be held stable as they were being shot up in the rocket. That's all trial and error that you need to be prepared for. The ability to test, fail, and then retest—which is a hallmark of Flight Opportunities—only becomes valuable when you make intelligent decisions after one test and then apply them to the next.

Your research is more fundamental than, say, a niche technology for a specific mission. How has this impacted the way you work?

We've put an incredible amount of personal and laboratory time into this project that, while we had faith in it, we had no idea whether it would actually produce anything of value. When money is tight and productivity is highly valued, making what is literally a flying leap into unknown territory at the expense of something else is a pretty significant risk—but one we think is well worth taking. We brought down that risk by taking an incremental approach with all of the parabolic flights that we've had the opportunity to collect data on. And the work we did on the ISS brought down the risk of entering this current rocket phase by taking instrumentation that was on the ISS and adapting it to the suborbital realm. So in other words, we didn't have to reinvent everything from scratch.

Are there any other professional or research tactics that have helped you be successful that you'd like to pass on to other investigators?

Absolutely. One of them is building a strong set of relationships with the folks at NASA—understanding their needs, the research questions they have, and where your interests and capabilities overlap. In our case, that was Kennedy Space Center in particular. They allowed us to borrow elements of technology that were originally developed for the Space Shuttle and ISS and adapt them for cameras and imaging hardware that we've put into parabolic and suborbital flights. Kennedy also loaned us middeck lockers and racks to use on parabolic flights and Virgin Galactic's vehicle. And in turn we're helping to answer next-generation imaging questions on the ISS while developing fundamental research questions that have a big impact on long-term human exploration. This is not trivial. Relationship building, trust, and a flow of expertise have helped us along the way.

“Building a strong set of relationships with the folks at NASA—understanding their needs, the research questions they have, and where your interests and capabilities overlap...This is not trivial.”

— Robert Ferl and Anna-Lisa Paul, University of Florida-Gainesville

University of Florida Investigators Receive Grant for New Collaboration

Flight Opportunities–supported co-investigators Robert Ferl and Anna-Lisa Paul from the University of Florida-Gainesville (see spotlight above) have received NASA funding to use their fluorescent imaging hardware on a biological sciences experiment from the University of Wisconsin. The collaboration is funded by NASA's Division of Space Life and Physical Sciences Research and Applications through a Research Opportunities in Space Biology (ROSBio) award. The experiment is funded for one test flight on a commercial vehicle, slated for later this year.

Do you have an update on how your technology has advanced since its testing with Flight Opportunities? [Please let us know.](#)

Events

Seeking Hardware Loans for NSRC

As the [Next-Generation Suborbital Researchers Conference](#) quickly approaches, Flight Opportunities is hoping to share examples of technology hardware that has been part of a flight test. Do you have hardware that you would be willing to display at our booth? Please [get in touch](#) and we can discuss the options.

March 2-4, 2020

Broomfield, Colorado



Seeking Presenters for AIAA's ASCEND

Presented by the American Institute of Aeronautics and Astronautics (AIAA), [ASCEND](#) (formerly AIAA SPACE conference) is scheduled for November 16-18, 2020, in Las Vegas, Nevada. Several members of the Flight Opportunities community are involved with the organization of this event, and we hope our investigators might consider participating. Two topic areas are well-aligned with work done by Flight Opportunities–supported investigators, and we encourage you to submit an abstract to present your work:

- “Utilization of Commercial Flight Vehicles for the Maturation of Space Technologies”
- “Development of Technologies that Further Low-Cost Access to Space”

The [call for content](#) is open now through March 17, 2020. If you are interested in these two topics, please [let us know](#) so that we can be aware of your interest.

Mark Your Calendars

SmallSat Symposium Silicon Valley

February 3-6

Mountain View, CA

Next-Generation Suborbital Researchers Conference

March 2-4, 2020

Broomfield, Colorado

Subscribe

Visit our Web site

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

650-604-5876 (Stephen Ord - Technology Manager) | www.nasa.gov/flightopportunities

Flight Opportunities is part of NASA's Space Technology Mission Directorate.