



# Flight Opportunities



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## Dear Flight Opportunities Community,

Summer is here, and we're kicking off the season on the heels of a great visit to the Next-Generation Suborbital Researchers Conference (NSRC) in Broomfield, CO. Be sure to check out Program Executive Bob Yang's thoughts on the conference below.

In this issue of the newsletter, we are continuing our coverage of exciting technologies, partners, and upcoming events:

- Our top story features **Carnegie Mellon University's (CMU) Flyover Mapping and Modeling Technology**—a promising innovation that may offer considerable advances in lunar and planetary exploration. The technology has been matured through Flight Opportunities in preparation for a lunar mission later this year.
- Our **2015 Annual Report** is now available to read online. Get a peak at what you can find in this edition.
- We have an exciting announcement this month about the **addition of Blue Origin** as a flight provider to the Flight Opportunities IDIQ contract.
- As always, we're keeping you up to date on **upcoming industry events**, including the Game Changing Technology Industry Day hosted by NASA later this month. You won't want to miss this great opportunity to engage with NASA technologists about future collaborative opportunities.



*Ronald Young, Program Manager*

We hope you enjoy reading!

**Ronald Young**, Program Manager  
NASA's Flight Opportunities Program

## Robert Yang: Reflections on NSRC

We've just returned from **NSRC**, and it was great to see so many of you there. A highlight for me was hearing STMD Associate Administrator Steve Jurczyk speak about the value of emerging space technologies to both NASA and the nation. And of course, Flight Opportunities is playing an instrumental role in helping to mature those technologies through relevant flight environments. We also had the great pleasure of hearing talks from many of our valued flight providers. A big thanks to all of the investigators who so willingly displayed their payloads at the Flight Opportunities booth—it was great to see the wide variety of research being pursued.

» [If you missed any of the NASA presentations, you can download them here.](#) Enjoy!

**Robert Yang**, *Program Executive*  
*NASA's Flight Opportunities Program*



*NASA personnel and Flight Opportunities researchers at NSRC 2016*

## Flight Opportunities 2015 Annual Report Now Available Online

Our 2015 Annual Report is now available to read online. In this edition, we continue our story of pathfinding NASA's role in partnership with the U.S. commercial space sector and the space technology R&D community to advance national space interests and develop technologies critical to NASA's future missions. You will find a brief introduction to the newly established STMD Commercial Partnerships Portfolio (of which Flight Opportunities is now a part), and several stories about a broad range of flight tests the program has helped to facilitate in 2015. Enjoy!



## Flyover Mapping & Modeling of Terrain Features



Pits and craters characteristic of the moon's landscape have long enticed researchers who have speculated that some of these pits (called "skylights") may be entrances to lava tubes or caves. Now, students at Carnegie Mellon University are developing a sensor package as part of an effort to three-dimensionally map a lunar crater to determine if it is such an opening. **A Flight Opportunities test in March 2015 on Masten Space Systems' Xombie vehicle** closely approximated a powered-rocket descent to the lunar surface, with researchers using shipping containers to mimic a lunar pit. This testing helped prepare the technology to enable autonomous landing of a robotic mission to the moon with Astrobotic Technology's Google Lunar XPRIZE® attempt.

The CMU project encompasses a multi-modal, high-resolution mapping instrument--including a sensor package and associated software--to characterize lunar caves, lava tubes, pits, and other convex surface features. Lava tubes could provide valuable clues to the moon's volcanic past. Caves offer the promise of providing shelter for future explorers from extreme temperatures, meteorites, and radiation on the moon. And, they may be among the most promising places on Mars to find life, revealing information about the planet's geology, climate, and even biology.

With the successful lunar simulation flight completed, the sensor package and associated software will potentially be used for a robotic mission to the Lacus Mortis region of the moon. This will enable researchers to take a closer look at a lunar pit's geometry, geology, and origin to determine whether it is an entrance to a cave.

» [Read the full technology story online.](#)

*XPRIZE is a registered trademark of XPRIZE Foundation, Inc.*

***"The flight test on a reusable propulsive vehicle provided by NASA Flight Opportunities was unprecedented for an undergraduate team and invaluable to demonstrate our research."***

***— Neal Bhasin, Student Team Leader, CMU Undergraduate Student Instrument Project***

## NASA Awards Contract for Suborbital Flight Services



Blue Origin's New Shepard spacecraft As part of its IDIQ-2 contract, NASA has selected **Blue Origin** to integrate and fly technology payloads near the boundary of space on the company's New Shepard suborbital spacecraft in support of Flight Opportunities.

The addition of Blue Origin's spacecraft to the Flight Opportunities platform portfolio provides a robust new option for research in microgravity physics, gravitational biology, technology payload demonstrations, and educational programs.

New Shepard offers:

- An apogee of over 100 km
- Payload lockers in two sizes, supporting experiments up to 50 lbs
- Custom solutions for larger payloads
- A unique payload avionics system and software

» [Learn more about Blue Origin's spacecraft](#)

» [Read the full NASA press release for this announcement](#)

## REDDI-16 F1 Solicitation to Open in July

The next REDDI 2016 F1 appendix to the Space Technology Research, Development, Demonstration, and Infusion (SpaceTech REDDI NRA) solicitation is expected to open in early July. 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.

Researchers planning to submit proposals can gain helpful insights in Steve Ord's presentation from NSRC ([available here](#)). Researchers are also encouraged to [contact Flight Opportunities](#) prior to the solicitation with any questions.

*"We are pleased to have Blue Origin join our cadre of Flight Opportunities service providers. Adding additional flight providers enables NASA and the broader aerospace community to demonstrate and transition space technologies, developing new capabilities faster and, potentially, at lower cost."*

— Steve Jurczyk, Associate Administrator, STMD

# Upcoming Conferences & Events

## Register for the Game Changing Technology Industry Day

Be sure to catch the upcoming **Game Changing Technology Industry Day**, hosted by NASA's Space Technology Mission Directorate (STMD). The day will focus on 11 current technologies that are potential targets for commercial and academic partnerships. Attendees will hear from project managers about the exciting work going on within STMD and have the opportunity to see hardware and ask questions in person.

Attendees will have the unique opportunity to engage with NASA technologists who seek partnerships that can further innovation in space exploration.

**June 29-30, 2016**  
**The Lockheed Martin Global Vision Center**  
**Arlington, VA**

» [More info and free registration here](#)

**Can't attend in person?**

» [View the livestream on the day of the event here.](#)

## Other events coming up in 2016:

- June 28 at 10:30 a.m. PDT: Infocast/Space Portal webinar: "Innovation at the Edge of Space: Commercial Microgravity Opportunities" [Free registration here](#)
- July 12-14: [ISS R&D Conference](#)
- August 6-11: [Small Satellite Conference](#)
- September 13-16: [American Institute of Aeronautics and Astronautics \(AIAA\) 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](mailto:NASA-FlightOpportunities@mail.nasa.gov)

STAY CONNECTED:



**NASA Flight Opportunities Program**

650-604-5876 (Stephen Ord - Technology Manager) | [www.nasa.gov/flighthopportunities](http://www.nasa.gov/flighthopportunities)

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