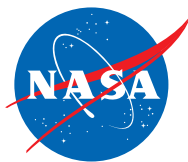


THE INNOVATION CATALYST



SEPTEMBER 2023

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- SOFTWARE CATALOG
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»»» UPCOMING EVENTS:



- BYTE SIZED TALKS
Coming Soon!

TECH TRANSFER TIP

with Technology Manager
Josh Levine:

If you have done a literature search before developing your innovation, please add it as an attachment to your New Technology Report. These background materials can give the tech manager a better idea of the value proposition of your innovation.





Goddard Team Wins NASA Software of the Year Award

On August 14 of this year, heavy rains triggered deadly landslides in the Himalayan Mountain range in the State of Himachal Pradesh in northern India. According to Sukhvinder Singh Sukhu, the Chief Minister of Himachal Pradesh, “Over 50 people have lost their lives in the State in last 24 hours,” he wrote on X, which has replaced Twitter. “Over 20 people are still trapped, the death toll can also increase. Search and rescue operation is underway.” Such landslides are not unique to India; they are a costly and potentially deadly geological hazard around the world.

To help provide insight to such events and ultimately save lives, a team of scientists and engineers in Goddard’s Earth Sciences Division (Code 610) has developed a data-driven software tool called the Landslide Hazard Assessment for Situational Awareness (LHASA) version 2.0. LHASA is designed to provide situational awareness, or the ability to perceive, understand, and effectively respond to events like rainfall-triggered landslide hazards at any location in the world. For their effort in developing LHASA, a team including Dalia Kirschbaum, Thomas Stanley, Robert Emberson, Pukar Amatya, Garrett Benz, Marin Clark, and William Medwedeff received the prestigious NASA Software of the Year Award (SOYA).

SOYA is the agency’s highest commendation for software excellence. The award is presented annually by NASA’s Inventions and Contributions Board for “NASA-developed software that has significantly enhanced the agency’s performance of its mission and helped American industry maintain its world-class technology status.” This is only the second time in the past 17 years that a team from Goddard has won the SOYA. Goddard’s Strategic Partnership Office helped write and facilitate the SOYA nomination.



Dalia Kirschbaum, Photo Credit: NASA

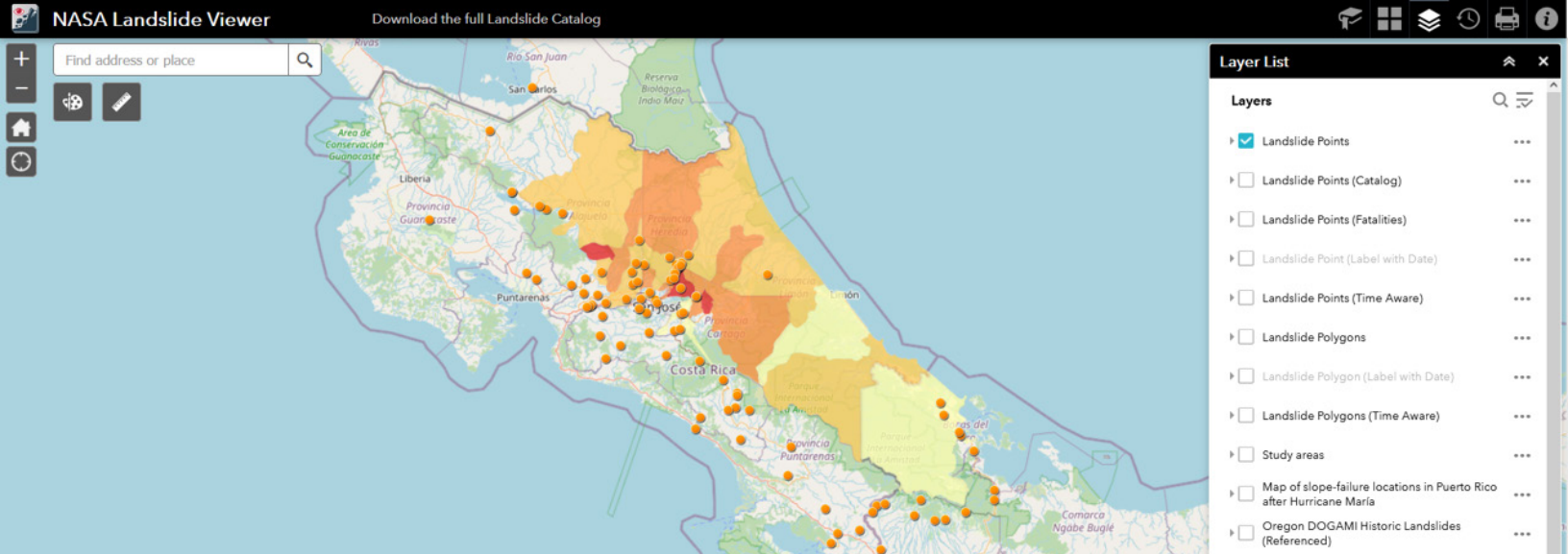


Image on LHASA of NASA Landslide Viewer interface, Photo Credit: NASA

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“Our team is thrilled,” said Kirschbaum, director of the Earth Sciences Division. “It is a testament to all of the hard work by a lot of people to pull this together. We have been working on this for over 10 years and have focused on how we can advance the science and work closely with stakeholders around the world to make an impact. It is exciting to be recognized for LHASA’s scientific as well as technological achievements.”

LHASA is a system that incorporates landslide data inventories from around the world within a machine-learning framework. LHASA can estimate the relative probability of a rainfall-triggered landslide occurrence on a grid size of roughly one kilometer wide around the world, from 60 degrees North to 60 degrees South latitude. These hazard estimates are intended to enable improved awareness and help facilitate disaster planning and response at regional scale to global scales and across a broad range of stakeholders such as government agencies, relief organizations, emergency responders, and insurers.

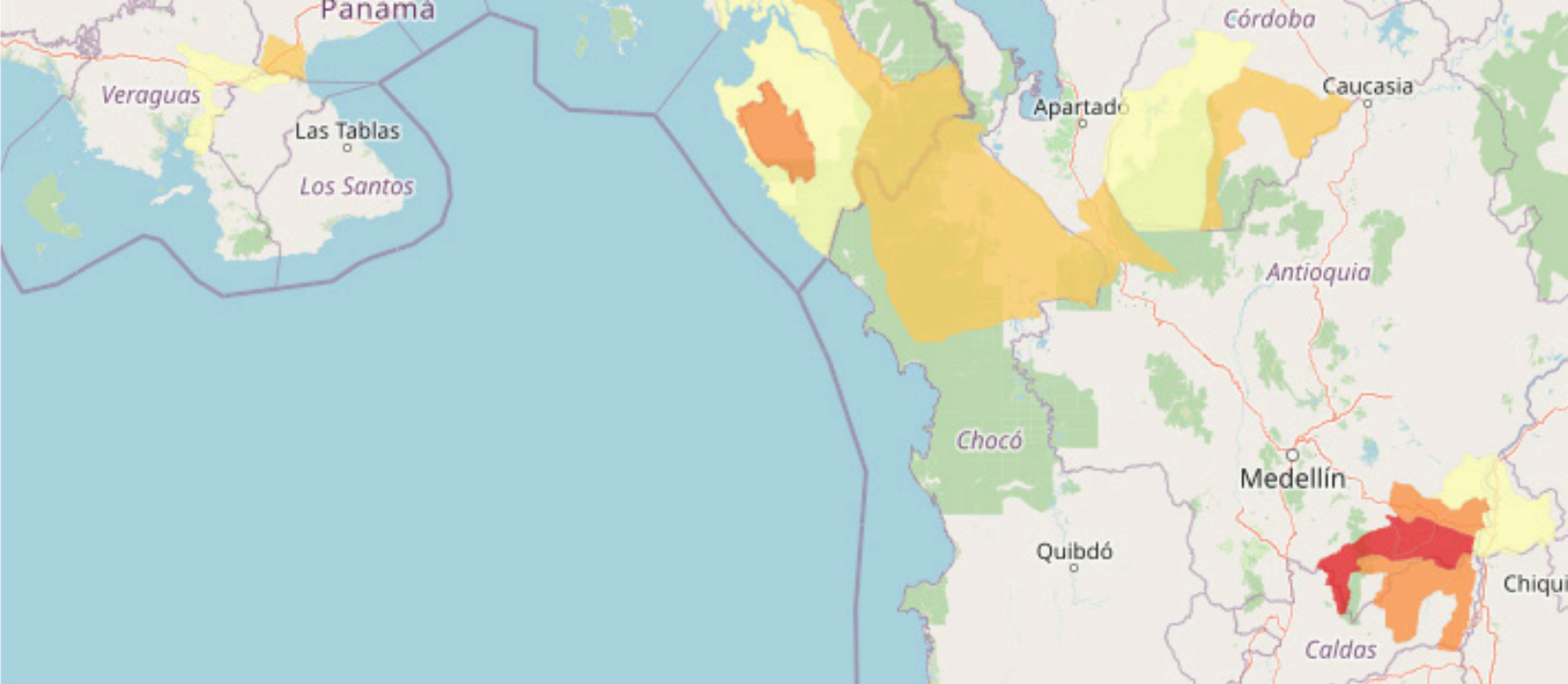
Because landslides look a lot different in Nepal than they do in South America or even in parts of the U.S., Kirschbaum said the goal of the software is that it can be customizable to specific regions. By combining landslide data and satellite imagery with machine learning, LHASA can be used to develop both regional and global models to help understand when and where landslide hazards may occur. This information shows how exposed a community may be to damage from landslides to help them prepare a response to these impending disasters.

“LHASA helps combine different sources of information, primarily from satellites, but also from other data sources and even landslide reports to help understand in near real-time the potential for landslide hazards,” explained Kirschbaum. “LHASA does not provide a warning or prediction, but rather it offers ‘situational awareness’ to give the broader representation of a potential hazard. Any warning or accurate prediction should be made locally by the relevant agencies supporting this type of alerting.”

LHASA already has several success stories. Kirschbaum said the team has worked with the Pacific Disaster Center (PDC), which provides global multi-hazard early warning, hazard monitoring, and risk intelligence to support rapid and effective disaster response, preparedness, recovery, and mitigation. “PDC did not have any real-time landslide alerting mechanism,” she said. “So, they have been able



Image on LHASA of potential landslide areas indicated with icons and logo overlay. Photo Credit: NASA



An example of the LHASA 2.0 landslide nowcast in South and Central America. Red indicates larger populations exposed to landslide hazard. Photo Credit: NASA

continued from page 3

to incorporate LHASA into their disaster framework to provide that kind of landslide situational awareness across many different countries in the world."

Kirschbaum said the team has also worked with the city of Rio de Janeiro in Brazil via a 10-year partnership agreement, which began in 2015. One of the goals of the partnership was to design a framework to support local landslide hazard awareness called LHASA Rio. "As part of that agreement," she noted, "we worked with the IPP (Pereira Passos Institute), a group in the mayor's office, which is the geographical science arm of the city government. The city now has a near real-time system in place, based on our LHASA framework, to provide landside hazards assessments at a city block scale. In a landslide emergency, they are now able to use LHASA Rio to make decisions about where they should mobilize civil protection and where they should be looking for landside impacts to have a broader perspective of hazards within their community."



Image on LHASA of areas in Rio affected by landslides. Photo Credit: NASA

LHASA is a free and open-source software, which can be found and downloaded from the Landslides @ NASA website at <https://landslides.nasa.gov>. On the site, you can also report a landslide via the Citizen Science Landslide Reporter tool, view a landslide and other relevant source data, learn more about NASA's landslide modeling efforts, collect landslide information and much more. Based out of Goddard, Landslides @ NASA has been supported by many different programs over the years, including NASA Disasters, the SERVIR Global Service Catalogue, High Mountain Asia, and NASA's Global Precipitation Measurement Mission Programs.

"I think LHASA represents an important step toward helping communities understand where and when landslide hazards happen all over the world," said Kirschbaum. "I hope that people take this model and use it regionally to get a better understanding of what is triggering landslide hazards in their area. More broadly, LHASA demonstrates the potential of harnessing different types of satellite and model-based information via advanced machine learning techniques to understand more about our Earth system and turn science into action, a key motivation of NASA's Earth Science Division."

Filing for a Patent: What is the Process Like?

Having new ideas is key to NASA Goddard's future. But protecting those ideas and leveraging the intellectual capital they represent is just as vital. When an inventor has a great idea or invented something amazing, naturally they should want to protect it, and this is where patent protection comes into the equation.

One thing that a lot of new inventors are unaware of is what the patent process involves. The process for filing a patent may seem quite challenging to an inventor. A formal application must be filed and then approved by the United States Patent and Trademark Office (USPTO) to protect NASA's intellectual property. The good news is that there are patent attorneys in Goddard's Office of the General Council (OGC) who will work with Goddard inventors through the complexities of the application process.

"From the inventor's perspective, the first and most important thing that they need to do when they come up with an invention is file an NTR (New Technology Report)," explained Matt Johnston, senior patent attorney with Goddard's OGC. "This is essential because nothing happens in the patent process unless an NTR is filed. Nothing is reviewed and no action is taken. Therefore, it never hurts to report new technologies and put them down on paper because that is how the Strategic Partnership Office (SPO) reviews them for commercial potential, licenses, and whether to file patent applications. For civil servant inventors, if SPO decides not to file, we are obligated to offer it back to them, and they can try and file an application on their own."

Patents are not granted for all new useful inventions and discoveries. According to USPTO's legal requirement (35 U.S.C. 101), a patent will be granted only for "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof subject to additional requirements."

Johnston said, if a technology manager at SPO sees commercial potential in a new technology and recommends that Goddard pursue a patent, there are a number of initial steps a patent attorney at OGC takes to see those requirements are met. "The very first thing we do is work with SPO and the inventor to make sure we understand the gist of the invention and then make an evaluation to determine if the technology is eligible for a patent," Johnston emphasized. "Is this innovation in fact something new, different, and useful, and are there no bars or obstacles that prevents filing for a patent."

Johnston explained that under certain conditions, U.S. patent law will prevent OGC from obtaining a patent even when the invention is considered new, useful, and nonobvious. These conditions are legally referred to as "statutory bars" because they bar a patent that would otherwise be valid. He explained that among the reasons OGC would be barred from filing a patent would be if the innovation was previously described in a printed publication, if the technology was already in public use, or if it is already on sale in the U.S. "Because of that, there are some good technologies that we will not be filing for patent protection, but that does not mean that the technology isn't outstanding," he said.

If OGC determines that a technology is eligible for a patent, the inventor then collaborates with the patent attorney to



Matt Johnston Senior Patent Attorney at NASA Goddard Space Flight Center, Photo Credit: NASA

put together an application for a patent with USPTO. Rest assured, Johnston says this one-to two-month collaboration process with the inventor is “usually not very complicated and pretty straight forward.”

“As it is their invention, it is essential that the inventors are involved in this process,” stressed Johnston. “They need to disclose to us everything that is relevant about their invention. They need to make sure the disclosure is comprehensive and includes every nuance of the invention, so we get all the information to then coordinate with the patent attorney assigned to prepare the application. For the most part, our inventors here at Goddard are really great and are very involved. But sometimes we have had inventors that say, ‘I gave you everything but not the secret sauce behind our invention.’ You need to give us the secret sauce, you need to include everything.”

“I found the process was really good,” said Berhanu Bulcha, Ph.D, a research engineer at the Microwave Instruments and Technology Branch at Goddard, who has applied for five patents. “They usually start with a draft application. In my case, I prepared a three-page document with an introduction, background, the research surrounding the work, and the advantages of the technology, which was divided into different subsections. What the patent attorneys do is convert that into legal terms and try to avoid redundancies in the application.”

Bulcha said this part of the process required ongoing conversations and frequent exchange of draft documents and information with the patent attorney. After about four-to-six weeks, the patent attorney was able to develop a good draft for review. Once Bulcha felt the document was an accurate description of the technology and the attorney believed they had inserted the required legal language, they then had a polished patent application, which was then filed with USPTO.

Johnston emphasized the importance of timeliness in filing a patent application. In the past, an inventor could rely on what was known as the “first to invent” rule, whereby an inventor could simply file an NTR and swear on a certain date that they first invented a particular technology and gain protection. “The law has changed in that respect,” he stressed. “Now, the first to file a patent application will be awarded a patent. People invent things parallel to one another or overlap all the time. Filing a patent application early has now become essential to obtaining protection.”

Once a patent application is filed, the waiting game begins. Getting a patent can take anywhere from 18 months to five years. Johnston said It depends on the technology and the examiner at USPTO. “Most always a patent application gets examined by an examiner at USPTO that has a background in the very technology related to the application,” said Johnston. “In some rare cases, when the examiner finds no material prior ‘art’ [or invention], we will get a first action ‘notice of allowance’ [or approval], pay a fee, and get a patent in as little as a couple years’ time.”

Other times, Johnston noted, the first action coming from the patent office will be a rejection of the patent application even if there is nothing wrong with the application. If they get a rejection, the Goddard patent attorney will then work with the inventors to file a rebuttal with the examiner, which often results in a patent at a later date. To help smooth the entire process along, Johnston advises, “Inventors should fully disclose everything about their innovation, review the application, and take the time to do it right upfront to avoid having to add disclosure in a follow up application. Be your own advocate and don’t be afraid to be fully involved in the patenting process. Our office welcomes input from our inventors”

Johnston also emphasized that, while all the OGC patent attorneys received law degrees, many of them also have a background in engineering so they understand and empathize with the problems and challenges that may arise for inventors. “Historically, many folks don’t like to call legal and speak to us for various reasons,” he said. “If there is one thing to get across to our inventors at Goddard, it is if they have a question in the patenting process, they can contact a project manager or patent attorney at OGC who will be quite helpful. They can always contact our office directly, especially for all the legal questions.”

What is it like to license and file a patent for software? What laws are available to protect software? Next month in the October Innovation Catalyst newsletter, our patent attorneys at OGC will discuss the laws that apply to software.

Newly Released NASA Software Catalog Offers Free Programs to Private Industry

Software has been a crucial component in many of NASA's major achievements, from space travel to the deepest images of our universe captured through the James Webb Space Telescope. Naturally, this has led NASA engineers and scientists to develop many high-quality software packages originally designed to manage space missions, test spacecraft, and analyze the petabytes of data generated through agency research. Now, many of those software packages are available for use by private industry.

On August 9, NASA's Technology Transfer Program released its 2023-24 NASA Software Catalog, featuring nearly 700 free software programs spanning more than a dozen categories that are openly available to the public. Private companies, non-profits, and other institutions can now browse the latest digital online catalog at <https://software.nasa.gov> and download free software that can help them develop new products or projects.

The release of this catalog underscores the work of Goddard's Strategic Partnership Office (SPO), which aims to facilitate and promote the transfer of NASA technology to the private sector. SPO also helps ensure that technologies including software developed by and for NASA are broadly available to the public, maximizing the benefit to American taxpayers.

"By making our innovations available to the public, we fulfill our goal of helping NASA's research and technology development find new uses beyond space exploration," said Daniel Lockney, program executive for the agency's Technology Transfer Program. "We're proud to make NASA software more accessible through our easy-to-use website, and we are dedicated to continuing this 'customer-service' approach to software release."

"There is a tremendous amount of software development that is going on at Goddard or at any of the other NASA centers," added SPO Chief Darryl Mitchell. "This catalog is just another example of the opportunity for business to benefit from the amazing research that is going on at NASA."

NASA routinely makes improvements to its Software Catalog website, ensuring the process of gaining access to agency technology is fast and easy. Dozens of new software packages were added this year. The Software Catalog is a product of NASA's Technology Transfer Program and managed for the agency by the Space Technology Mission Directorate.

NASA's Software Catalog offers private industry an extensive portfolio of agency software products, which can be used



NASA SOFTWARE

2023-2024 CATALOG



NASA TECHNOLOGY
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BRINGING NASA TECHNOLOGY DOWN TO EARTH

for a wide variety of technical applications. The catalog is organized into 15 broad subject matter categories, some of which include systems testing, aeronautics, autonomous (AI) systems, business systems and project management, data and image processing, and vehicle management.

All the software entries are listed alphabetically under the subject matter category. Each entry includes the software title, the product ID number (known internally as the NASA case number), a short description, and the software's specified release type. Some software descriptions contain links to additional information or downloading options. Some of the software in the catalog is limited for use by U.S. citizens or for government purposes only. Each listing in the catalog is available at no cost and has been evaluated for the following access requirements or restrictions:

- **General Public Release** — For broad release and no nondisclosure or export control restrictions
- **Open Source Release** — For collaborative efforts in which programmers improve upon codes originally developed by NASA and share the changes
- **U.S. Release Only** — Available to U.S. persons only, with no further transfer of the software allowed without the prior written approval of NASA
- **U.S. and Foreign Release** — Available to U.S. persons and (under special circumstances) persons outside of the U.S.
- **U.S. Government Purpose Release** — Used on behalf of the U.S. government
- **Project Release** — For use under a contract, grant, or agreement
- **Interagency Release** — For use by U.S. government agencies
- **NASA Release** — For use only by NASA personnel and contractors



NASA TECHNOLOGY
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A Refreshing Twist on the Traditional Lunch-and-Learn Format

As more of our fantastic staff return to the vibrant halls of Goddard, we're thrilled to introduce an exciting new initiative that's all about you: "Byte Sized Talks." This monthly in-reach program is designed to foster connections and knowledge-sharing among members of the Strategic Partnership Office (SPO) and our wider Goddard family.

What's "Byte Sized Talks" All About?

Imagine this: a friendly atmosphere where SPO experts are easily accessible at an information hub right in the heart of our community - the building 21 cafeteria. This is your chance to engage with us directly, ask questions, and delve into the myriad programs and opportunities that SPO has to offer.

Discover, Learn, Engage

Ever been curious about technology transfer and the wizardry behind software releases? Eager to learn about the latest awards, recognitions, and how you could earn royalties? "Byte Sized Talks" has got you covered. This initiative, happening during lunchtime, is here to enlighten you on these topics and more.

An Experience to Remember

We're taking this opportunity to make the experience unforgettable. Picture this: vibrant banners flanking the table, creating an atmosphere that draws you in. And that's not all - as a token of our appreciation, attendees will get to walk away with cool thank you items that'll remind you of the enriching "Byte Sized Talks" encounter.

Stay tuned, wonderful people! More details are coming your way soon.



EXPANDING WHAT'S POSSIBLE

It's a SmallSat World Afterall

From August 5-10, representatives from Goddard's Strategic Partnership Office (SPO) and Goddard's Small Satellite Special Projects Office (S3PO) hosted a booth at the 37th Annual SmallSat Conference at Utah State University (USU) in Logan, Utah. The conference provided a perfect backdrop for the SPO and S3PO teams to engage with commercial and government engineers and scientists, researchers, academics, program managers, sponsors, executives, and students from 44 countries in attendance.

With so much activity in the SmallSat arena, it is more crucial than ever for Goddard to collaborate with the SmallSat community. Meeting with members of this community furthers development of architectures to support the Distributed Systems Mission (DSM) concept. DSM missions involve multiple spacecraft to achieve one or more common goals. Some DSM development includes constellations, formation flying missions, or fractionated missions. A key component and advantage of DSM is the idea that this is an open architecture where anyone can join and contribute to the network.

"I do think that Goddard has a role to play in developing and demonstrating DSM smartly, particularly for science missions," said Goddard Center Director Makenzie Lystrup. "As one of our core capabilities is managing and implementing end-to-end missions, we have to be skilled in all of the tools like DSM that are required to carry out NASA's mission. I absolutely see Goddard working in this area."

Goddard had 27 participants and speakers at various technical and poster sessions taking place throughout the conference. Presentation topics ranged from the use of Artificial Intelligence, DSM, SmallSat reliability, NASA's Operational Simulation for Small Satellites (NOS3), radio frequency communications for DSM and lunar missions, and a Pandora SmallSat mission overview. "We are thrilled about NASA Goddard's participation; they always have a great turnout," said Pat Patterson, Ph.D., conference chair and director of Advanced Concepts at USU's Space Dynamics Laboratory.



SPO Technology Manager Josh Levine speaks with attendee at the 2023 SmallSat Conference in Logan, Utah. Photo Credit: NASA/GSFC

Stay tuned to next month's Innovation Catalyst to read more about the SmallSat Conference.

ATTENTION EVERYONE!

Have you seen the SPO banners around campus?

Rumor has it to head over to **Buildings 8, 23, 33, and 34**
to scan the QR code and see where it takes you!



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