

# THE INNOVATION CATALYST

STRATEGIC PARTNERSHIPS OFFICE  
NEWSLETTER  
MARCH 2020

## SPO HIGHLIGHTS GODDARD COLLABORATIONS IN NEW SERIES COLLABLAB

Goddard's Strategic Partnerships Office (SPO) will launch a brand new speaker series focusing on Goddard collaborations and technology transfer success stories. The first iteration of the series, scheduled to take place March 12 at 1:30 pm in the Goett Auditorium (Building 3), will focus on the unique collaboration between Nithin Abraham, a Goddard thermal coatings engineer, and Catharine Hawks, an objects conservator from the Smithsonian Institution's National Museum of Natural History (NMNH).

In the Contamination and Coatings Engineering Branch (Code 546), Abraham specializes in the research and development of coatings technology and testing. Abraham and her team took part in an effort to study the efficacy of the patent-pending Molecular Adsorber Coating (MAC), a sprayable porous substance made of zeolite that works to trap and contain contaminants. While the technology was developed in order to protect objects and components of spacecraft, Hawks saw its potential effectiveness in her own field of museum conservation.

"I wasn't sure what to expect, but thought MAC had potential to address a particular issue we had with mercury vapor off-gassing from our mercury ore collection," Hawks says. "We really wanted to explore the technology, just to see if it could work for this or even other contaminants in our collection environments."

The Smithsonian is renowned for its work in the arts and humanities while NASA focuses on advancements and innovations in STEM fields. Despite these differences, the two institutions mutually benefited from MAC's development

and are exploring ways to utilize the coating in conservation efforts.

"Contamination is an issue that reaches beyond space applications," Abraham says. "At NASA we care about protecting our scientific instruments and satellites from outgassed contaminants – both during ground testing and in space. Similarly, NMNH focuses on protecting historical artifacts and specimens from off-gassed contaminants. There's a commonality, and that's why this collaboration is so exciting!"

---

Portrait of NASA Thermal Coatings Engineer, Nithin Abraham, in a materials lab with her MAC panels: Chris Gunn/NASA Goddard



"The talk is a great opportunity to hear about how MAC can be used to help protect cultural artifacts and natural science specimens in enclosed spaces at the Smithsonian museums," says Technology Manager Dennis Small, a member of SPO's team responsible for creating connections between Goddard innovators and industry leaders. Small played a vital role in establishing the partnership between NASA and the Smithsonian's NMNH.

When Hawks first heard about MAC, she reached out to Abraham to see if an agreement could be reached between the two organizations. To establish such an agreement, Hawks and Abraham worked with SPO to explore their options.

"This collaboration came to fruition through a Space Act Agreement (SAA) between NASA and NMNH," Small says. "The SAA was the vehicle we used to create the partnership. Essentially, the partnership can be established through an SAA if there is mutual benefit for each of the parties involved." In this case, the Smithsonian sought to use MAC to minimize the amount of contamination the objects in their collection are regularly exposed to while Goddard used the opportunity to learn additional information about the technology's effectiveness.

"The outgassing of material in the vacuum of space was not even something I had considered prior to learning about MAC," Hawks says. "We need collaborations like the one with

NASA to find solutions that can be packaged for export to our suppliers."

The newly established CollabLab speaker series will highlight stories of innovation, partnerships, and collaboration in an effort to showcase how Goddard's body of work can be repurposed to advance human knowledge and innovation in all areas and fields. It also will emphasize the impact of the Technology Transfer program at Goddard and other partnership initiatives as well as celebrate the Goddard innovator community's achievements. The series will continue throughout 2020, and upcoming dates will be featured in Dateline postings.

For more information on this series, please call 301-286-5810 or email [techtransfer@gsfc.nasa.gov](mailto:techtransfer@gsfc.nasa.gov).

Below, NASA Thermal Coatings Engineer Nithin Abraham removes samples treated with a patent-pending adsorber from specimen-storage cabinets at the Smithsonian's Museum Support Center in Suitland, Maryland, a sprawling storage facility that holds more than 54 million collection items. Credits: NASA/Goddard/Chris Gunn



National Aeronautics and Space Administration

# COLLABLAB:

NITHIN ABRAHAM  
CATHERINE HAWKS

*What do NASA and the National Museum of Natural History have in common?*

Find out from Goddard engineer Nithin Abraham and Objects Conservator Catharine Hawks of the Smithsonian Institution as they share a story of collaboration between the two institutions. Under a Space Act Agreement, Abraham has helped test a NASA coating technology for use in the field of museum conservation. Collab Lab is a new speaker series that will focus on exciting collaborations and technology transfer success stories at Goddard.

MARCH  
**12th**  
1:30PM  
**BUILDING**  
THREE AUDITORIUM

**COLLABLAB**  
SPEAKER SERIES

# Featured Goddard Technology: MERRA Analytic Services

Businesses have leveraged the power of big data for years to gain more information about their customers. Look no further than online retailers, who analyze their customers' purchases and browsing history to generate targeted advertisements. As companies collect vast amounts of data about the people who buy their products, analysts learn more about customer characteristics and behavior, painting detailed portraits that can inform business decisions.

For scientists at NASA, this boom in data storage and processing capabilities has unleashed a new way to answer questions about the physical world that previously went unanswered.

"If you take a look at the legislation that brought NASA into existence, there's no mention of human spaceflight in the original document," says John Schnase, a computer scientist at NASA's Goddard Space Flight Center. "However, there is language about using space as a platform for the scientific measurements and observations that allow us to look back on Earth and understand our planet."

NASA has accumulated more than 40 years' worth of detailed information about Earth, and just as companies use data to understand their customers, NASA uses data to figure out the complex rhythms of the world. It's no small feat – NASA has approximately 100 petabytes of data in its possession. For context, a system with one petabyte of data storage could hold more than 250,000 movies. It would take about 57 years to play them all back-to-back. It's a little much, even for the most dedicated binge-watcher.

Schnase and other computer scientists at Goddard are developing tools to improve access to NASA's Earth science

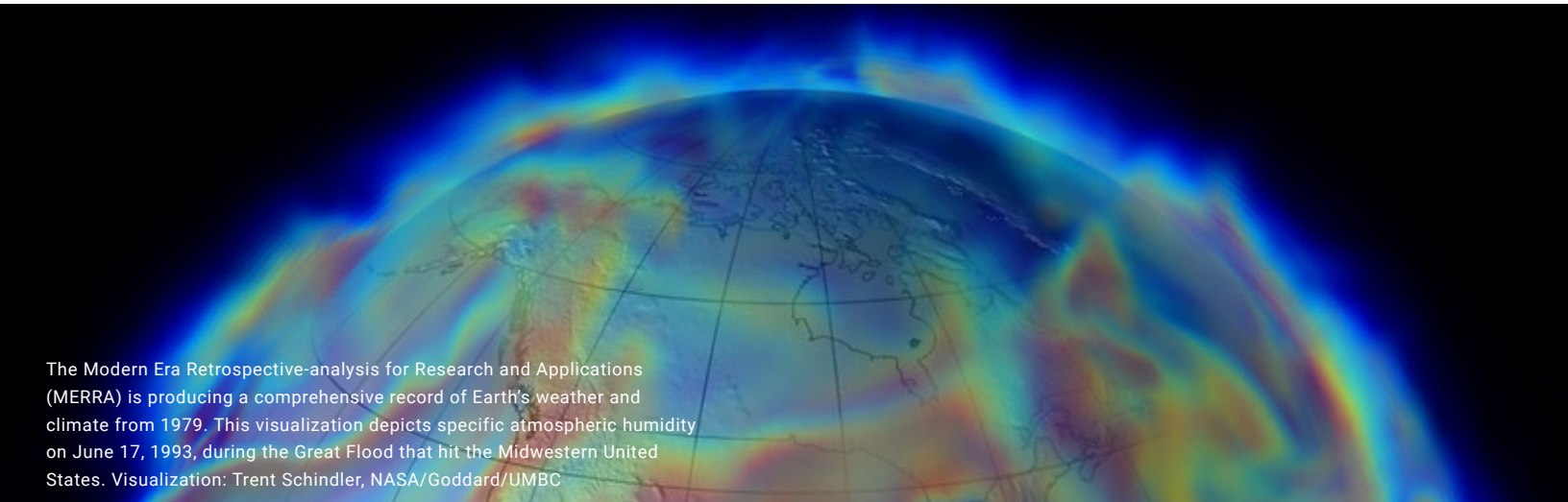
data for climate scientists and other groups who pull kernels of interest from the mountainous towers of information. Recently, they have focused on one of NASA's more interesting but less-well-known datasets: The Modern-Era Retrospective Analysis for Research and Applications (MERRA).

At about a petabyte in size, the MERRA dataset is massive. It contains a global, hour-by-hour simulation of Earth's weather over the past 40 years and contains hundreds of descriptive variables such as wind direction and speed, temperature, humidity, precipitation, sunlight, and cloud cover. MERRA is produced by the Goddard Earth Observing System, Version 5 (GEOS-5) numerical modeling framework, a computer program which uses the decades of information NASA has accumulated to create this remarkably rich record of Earth's climate.

To the average person, MERRA represents a crushing cascade of numbers, but a patented technology called MERRA Analytic Services (MERRA/AS) seeks to improve access and unleash treasure troves of Earth insights for scientists and CEOs alike. Just last year, a new network of entrepreneurs and student innovators has licensed the technology to explore its application in the Caribbean tourism industry.

"Climate touches so many things in life, and any dataset that describes the complexities of climate over long periods of time inevitably is going to be very large," Schnase says. "Unless you have tools that allow you to pick out the parts of that data you want and do it quickly, it is useless data. And that's the problem we're seeking to address."

For more of this story, stay tuned for the Winter 2020 edition of *Tech Transfer* magazine.



The Modern Era Retrospective-analysis for Research and Applications (MERRA) is producing a comprehensive record of Earth's weather and climate from 1979. This visualization depicts specific atmospheric humidity on June 17, 1993, during the Great Flood that hit the Midwestern United States. Visualization: Trent Schindler, NASA/Goddard/UMBC



# Goddard Tech 12

Each month the Strategic Partnerships Office tells the story of successful spinoffs at NASA's Goddard Space Flight Center and shows how these technological breakthroughs are brought from the labs to our lives. To see the full series, [click here](#).

N A S A • U S G S



**LANDSAT NINE**

K S C • G S F C • E R O S

## Landsat Data Advances Science and the Agriculture Industry

Since the 1970s, the Landsat program has collected spectral information from Earth's surface, creating an archive of scientifically valuable and awe-inspiring images. Landsat 8 launched in 2013 and captures 700 Earth images each day. The next iteration, Landsat 9, will continue the program's mission of understanding and managing the land resources needed to sustain human life. This ninth mission, with higher imaging capacity, allows for more valuable data to be added to the global land archive.

With Landsat technology, GeoVisual Analytics seeks to help farmers reduce production uncertainties and increase profits by monitoring fields with airplanes, satellites and mobile phones. Through numerous SBIR contracts with Goddard and Stennis, they are using a NASA-funded artificial intelligence algorithm to achieve that goal.

Early on, GeoVisual developed an algorithm that could analyze Landsat images pixel by pixel and assign a vegetation index number and land-cover classifications to each dot. The finished algorithm, Computer Learning Imagery Platform (CLIP), is able to take satellite or aircraft imagery and classify land types using multispectral imagery.

Goddard helped lay the groundwork for CLIP with satellite imagery, but in commercializing the algorithm, GeoVisual pivoted to higher-resolution imagery that can be achieved from aircraft imaging. Taylor Farms, the world's largest producer of fresh-cut vegetables, was the first customer to use CLIP. The software enabled monitoring of crop health and the stage of growth, allowing Taylor Farms to predict yields throughout the season. In the near future GeoVisual is focused on becoming the leading computer vision platform in the agriculture industry.



# Recent SPO Activities

## NASA COMMERCIALIZATION TRAINING CAMP

On Feb. 12-14, the Strategic Partnerships Office helped facilitate the NASA Commercialization Training Camp at NASA's Johnson Space Center in Houston, Texas. Ten professional athletes with the National Football League Players Association participated in presentations, tours, panels, and one-on-one conversations about NASA technology. The training camp featured guest speakers who explained how athletes could infuse NASA innovations into an existing business or new startup idea. Guest speakers included Super Bowl champion, entrepreneur, and NASA technology licensee Femi Ayanbadejo, members of the Texas startup community, and other former NFL players who retired from football and started their own businesses. Attendees left the training camp with fresh insights about NASA technology and how it can help them create new products and services to address unmet needs in various markets that interest them.

## 25TH ANNUAL NEW TECHNOLOGY REPORTING PROGRAM

SPO hosted its annual celebration of Goddard innovators on Feb. 27 in the Building 8 Auditorium. The program highlights the Goddard innovator community's contributions to NASA's technology transfer activities. SPO presented Code 550 and Code 610 with traveling trophies for submitting the most New Technology Reports (NTRs) in the past fiscal year. SPO Chief Darryl Mitchell then awarded the James J. Kerley Award to Wanda Peters, Sharon Straka, Mark Hasegawa, and Kenneth O'Connor – the team responsible for inventing a Goddard technology called Lotus Coating. The Kerley Award, presented at Goddard since 1994, recognizes innovators who demonstrate extraordinary commitment to technology development and commercialization. James Kerley was a Goddard innovator with a passion for technology transfer, and the award bears his name to honor his memory. The program also included remarks from the Kerley family and from special guest speaker Obafemi Ayanbadajo, a NASA technology licensee and founder of HealthReel, Inc. At the end of the program, Goddard's Office of Patent Counsel presented patent plaques to Goddard innovators who received patents for their technologies within the past fiscal year.



Training camp participants and NASA personnel at the Johnson Space Center.  
Credit: NASA/Johnson Space Center/Bill Stafford



Matt McGill accepts the New Technology Reporting Award for Science on behalf of Code 610 for reporting the most NTRs in Code 600 during FY2019.  
Photo Credit NASA Goddard/Samantha Kilgore



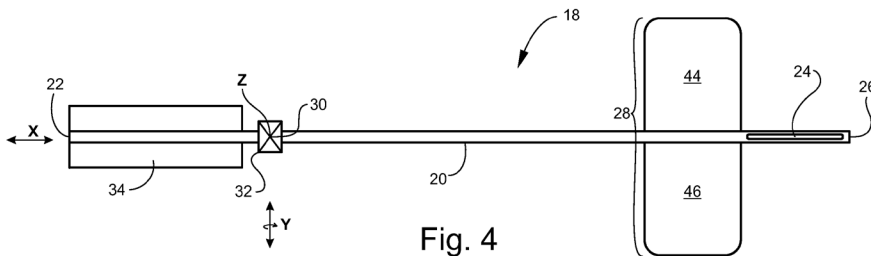
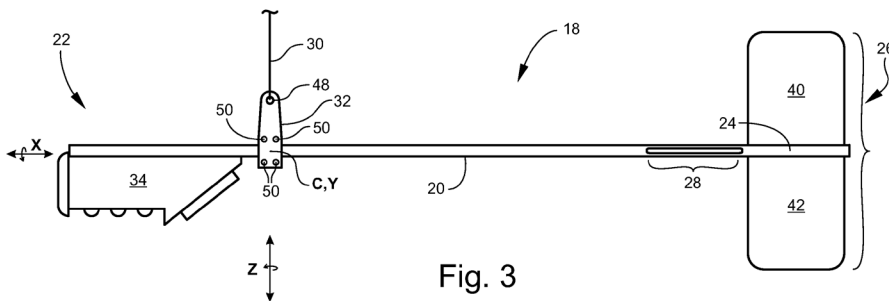
Caption: Cynthia Simmons accepts the New Technology Reporting Award for Engineering on behalf of Code 550 for reporting the most NTRs in FY2019.

# Guess The Patent Drawing!

HERE ARE YOUR CLUES:

- 1 This invention was patented in 2012.
- 2 It's being used in partnership with universities and other educational institutions.
- 3 It was invented by NASA innovators Geoff Bland and Ted Miles.

CAN YOU GUESS THE INVENTION? [CLICK HERE](#) FOR THE ANSWER.



## Tech Transfer Trivia

- 1 When did NASA first start printing Spinoff, an annual publication that highlights technology transfer success stories?  
A. 1969 B. 1972 C. 1976 D. 1980
- 2 True or false: inventors can be involved in the license negotiation process.  
A. True B. False
- 3 What does "SBIR" stand for?  
A. Standard Business Innovation Routines B. Simply the Best Inventions on Record  
C. Starting Businesses In Robotics D. Small Business Innovation Research

[Link To Answers](#)

# Upcoming Events

## GODDARD MEMORIAL SYMPOSIUM

Postponed - Check website for updates

Tommy Douglas Conference Center, Silver Spring, MD

SPO will participate in the annual Robert H. Goddard Memorial Symposium in Silver Spring to chat with members of the Goddard community and share information about how Goddard innovators can participate in the technology transfer process. The symposium's theme this year is "Innovation and Sustainable Exploration." Panel discussions include "Avoiding the Tragedy of the Commons: Commercialization for Sustainability." For the full list of events and registration, visit the American Astronautical Society's [website](#).

## CAFETERIA MEET AND GREET

March 26, 2020

Building 1 Cafeteria

11 am to 1 pm

Spend your lunch break with SPO! On March 26, we'll be in the Building 1 cafeteria handing out information on NASA's technology transfer efforts and how you can participate in the process. You can ask questions about NTRs or software release, learn more about Goddard's Technology Transfer Office, and get involved with Goddard's Master Innovator Program. Come by and see us!

## TECHNICAL MANAGEMENT TRAINING

April 21, 2020

Wallops Flight Facility, Wallops Island, VA

Join SPO leadership for a presentation about the Technology Transfer Program at Goddard and how you can interact with our office to further your research and leadership objectives. SPO will be sharing information along with other presenters as part of the annual Technical Manager's Training.