THE INNOVATION CATALYST

MAY 2023

IN THIS ISSUE:

TECH TRANSFER TIP

with Technology Manager Hossin Abdeldayem:

To expedite licensing of your innovation, provide the SPO technology manager with the contact information from the company that is interested in your technology. The greater the company commitment, the faster the license agreement can be put in place.

UPCOMING EVENTS:

- **INNOVATOR HOUR**
  TUESDAY, MAY 09, 2023
  1:00 - 2:00 P.M.

- **COFFEE BREAK**
  Feat. SPO's Darryl Mitchell on Royalties
  WEDNESDAY, MAY 17, 2023
  1:00 - 2:00 P.M.

STRATEGIC PARTNERSHIPS OFFICE

NP-2023-4-044-GSFC

New Center Director Brings Science and Engineering Knowledge and Years of Experience to Goddard

After about two weeks on the job, it appears that Dr. Makenzie Lystrup has settled into her new position as NASA Goddard's center director. At a Town Hall meeting on April 20, Lystrup introduced herself to the Goddard community. She described herself as "deeply passionate about science and space exploration, and all the work that goes into making that happen." Characterizing herself as "honored and humbled" to be Goddard's new center director, Lystrup shared with the audience her priorities to "advance our collective [science] knowledge, grow commercial space, discover the unknown, and inspire future generations."

Town Hall attendees, Photo Credit: N4 Solutions

"Makenzie is absolutely the right person for this job," said NASA Associate Administrator Nicky Fox, who joined the Town Hall via conference call. "She does read, eat, and sleep science. I had the pleasure of working with her for a number of years while she was at Ball Aerospace and

Dr. Makenzie Lystrup, Goddard's new center director, Photo Credit: N4 Solutions

she knows all about NASA missions and she knows all the inside scoops on the NASA missions as well. I cannot be more thrilled that she is with you guys and will lead you on to greater things. We are so proud to have her as part of the NASA family."

Before becoming center director, Lystrup was vice president and general manager of Civil Space at Ball Aerospace in Boulder, Colorado. In that role, she was responsible for the company's portfolio of civil space systems spanning all science fields, operational weather and Earth observation, and advanced technologies development objectives.

Lystrup led Ball's contributions to several NASA missions, including the James Webb Space Telescope, the Imaging X-ray Polarimetry Explorer (IXPE), Landsat 9, and the Nancy Grace Roman Space Telescope. "But," she emphasized, "I have always been interested in the policy and management side of science. Basically, how we get excellent science done. My career has been devoted to helping enable people and teams to achieve really critical science, engineering, and technology outcomes."

In her new position, Lystrup described Goddard as a "national treasure and an asset that we need to maintain." To that end, after attending a space symposium earlier in the week, she described how attendees were talking about how "relevant and important" Goddard is to the science and the space community today and how critical this agency is to the scientific achievements of this country.

"I see that as part of my role to work with all of us at Goddard to continue to get us there," she said. "I don't want to do less; I want to do more of what Goddard is great at. To do that we have to be at the forefront of things, and we are the ones pushing forward the science and the technology."

Lystrup said she plans to use the first 90 days on the job as an opportunity to listen to Goddard employees, in addition to the agency's internal stakeholders, and external partners. That includes conducting listening sessions with employees across all directorates and six Goddard satellite sites and getting to know all the people, facilities, and labs at Goddard. Rather than coming in with a set agenda, Lystrup explained that she "really wants to understand the lay of the land and where we all see Goddard going in the future. This is for all of us to work out together."

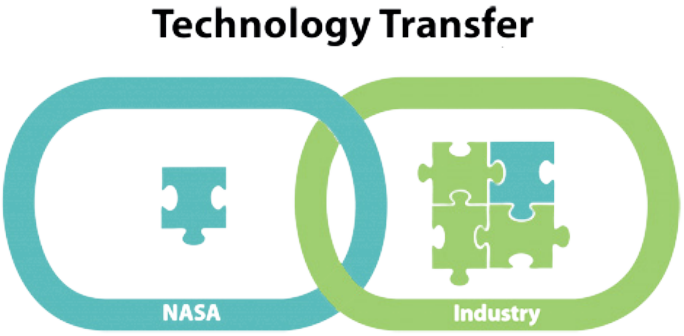
Lystrup said one of her first priorities as center director is getting the resources needed to improve facilities at Goddard. Another early priority is seeking ways to improve partnerships with outside industry by finding ways through technology transfer, to make it easier for them to partner with us.

"I feel a real sense of service about being a good steward of this organization," said Lystrup in conclusion. "I hope that my leadership and experience is useful, and value added to Goddard at this time. I feel that this an opportune time for all of us to work and come together."

Goddard attendee asks a question, Photo Credit: N4 Solutions

Tech Transfer, Moving Ideas from the Lab to Market

Some years ago, Goddard's Strategic Partnership Office (SPO) created its monthly newsletter, *The Innovation Catalyst*, to help Goddard employees gain a better understanding of technology transfer and the part they play. Before retiring in December 2022, former Center Director Dennis Andrucyk said, "developing new technology and getting it commercialized is a key part of our role at Goddard."



To help understand technology transfer and why it is important to the work that engineers and scientists do at Goddard, let's start at the beginning. According to the National Institute of Standards and Technology, the governing body for the federal Technology Transfer Program, technology transfer is "a way to describe the overall cycle of bringing knowledge and technologies to society through actions such as commercialization and publication." Simply stated, bringing new technologies out of government labs and into the marketplace by partnering with universities, businesses, or state and local government will - among other things - help improve the economy, society, and national security, to make all our lives better.

From electric car batteries, airport screening devices, lifelike artificial limbs, and vaccines that protect humans from diseases are all examples of the thousands of technologies developed by inventors and researchers in federal laboratories like NASA Goddard every year, which positively impact lives and the planet. So, what part do inventor(s) of technology play?

It takes a village

An invention in the laboratory can't make it on its own. It needs a little help. For inventions to reach people who can use them, inventors need help from businesses and other organizations with expertise in things like manufacturing, distribution, sales, and communications. Tech transfer makes all that possible. However, it takes the right partner or partners to transform a federal invention from a good idea into a great product or service that potentially can create new jobs, new markets, and new revenue streams.

What is important to understand is that technology partnerships are mutually beneficial. Inventions and research developed in federal laboratories can lend technical expertise to help businesses improve their products, services, and manufacturing processes. Savvy entrepreneurs and businesses have benefited from federal inventions and resources by commercializing these technologies, which help grow their business and the economy.

Benefits of tech transfer include:

- Bringing federal innovations to the commercial marketplace
- Building partnerships with the private sector to manufacture, distribute, and sell federal innovations
- Contributing to economic development with groundbreaking technologies
- Creating new industries, businesses, and jobs when federal innovation is brought to market through private sector partnerships
- Advancing science and technological discoveries through taxpayer funded R&D
- Enhancing lab recognition among federal agencies
- Increasing awareness of federal innovation among the public
- Highlighting the benefit of working with the federal government

NASA TECHNOLOGY TRANSFER PROGRAM

Making tech transfer happen

One of the goals of tech transfer is to help inventors partner with commercial industry so that their technology can reach its full potential. That process is facilitated at Goddard by forging connections with private sector businesses. This occurs with technology managers at SPO making patented technologies developed by Goddard inventors available to commercial industry partners through licensing agreements. And, if parties are so interested, SPO technology managers will also craft legal agreements with potential partners to collaborate on further research and development.

Product development

If a license agreement is reached, the licensee will continue the advancement of the technology and make other business investments to develop the product or service. This step may entail further development, regulatory approvals, training, and other activities. The inventor's role in product development can vary depending on the level of interest and involvement related to the licensing agreements. Additionally, inventors are available to provide subject matter expertise and if of mutual interest, collaborate to further advance the technology.

The payoff

Technology transfer is a fascinating, worthwhile, and rewarding process. Aside from the potential for a personal share of royalties, inventor(s) may collaborate with commercial industry. Inventors can also enjoy the satisfaction of knowing their invention is being developed for societal benefit and the public at large.

Technology transfer also has broad economic impacts. According to the National Institute of Standards, companies that have partnered with federal laboratory technologies contributed up to $83.6 billion in gross industry output and up to $41.3 billion to the gross domestic product from 2008 through 2015. During that same period, there were 26,037 invention disclosures, 11,064 patents issues, and $944 million in income generated from active licenses across the federal government.

Gateway to Data

Goddard's Heliophysics Science Division Creates a Heliophysics Library

Back in the 60's, 70's and 80's, if you wanted access to heliophysics data, you had to travel to a NASA center where the information was archived and gain access to the scientists directly working with the data. Later, in the 90's and into the 21st century, scientists started to post information on the Internet, but as the volume of data continued to grow, it got to a point that it was too large an amount to be collected and posted online.

As a result, access to heliophysics information had often been poorly inter-linked to one another, making it challenging for researchers to integrate information, mature their understanding, and incorporate more complex ideas and relationships into their analyses. These challenges directly led to a drop in the availability of relevant heliophysics knowledge by researchers.

To address these challenges, it became clear that researchers needed an online digital library resource for heliophysics researchers. Astrophysicist Dr. Aaron Roberts and Deputy Project Scientist Dr. Brian Thomas, both scientists at NASA Goddard's Heliophysics Science Division, established an active library and archive for both solar and non-solar heliophysics data called the NASA Heliophysics Digital Resource Library (HDRL). All the information on HDRL is publicly available at any time.

Dr. Aaron Roberts (left) and Dr. Brian Thomas (right), Photo Credit: Dr. A. Roberts/NASA

HDRL provides easy, uniform, and comprehensive access to both NASA and other private industry heliophysics datasets. HDRL can be found online and accessed by anyone in two ways. The first is the general portal at https://hdrl.gsfc.nasa.gov. The second is https://heliophysicsdata.gsfc.nasa.gov, which is a general search engine for retrieving data and for understanding how to get the data.

"HDRL is not just a collection of data, but it is a collection that is uniform, which we designed to be used by researchers the same way you search through a library catalog, where everything is cataloged by the Dewey Decimal or Library of Congress systems," said Roberts. "So, for example, you can do a search on the general HDRL search engine site by checking a title or an author."

"To summarize the problem that we are addressing with HDRL and why we have pushed beyond just a very simple library paradigm, is NASA's Heliophysics System Observatory (HSO) that is currently in orbit and flying over 100 missions with some very complex datasets," explained Thomas. "There has been recognition over the past couple of decades of the importance of doing holistic heliophysics science. So, therefore, it is not enough to just study the surface of the Sun; if you want real understanding and have the ability to understand what is happening in the heliosphere, it is important to be able to achieve data collection from multiple missions across multiple HSO timescales, energetics, wavelengths, etc., and that is not easily done."

Roberts stressed that a major thrust of HDRL is to assure that the data retrieved by researchers is high quality and well documented. HDRL, he said, was built from data systems driven by heliophysics community needs and guidance and founded on community-based standards. Consistent with this approach, data providers and data users share responsibility for the quality and proper use of the data for research. All the data in HDRL has been funneled to the site by heliophysics scientists themselves from both public and private industry. Uploaded data to the site is automatically and uniformly formatted and then properly filed.

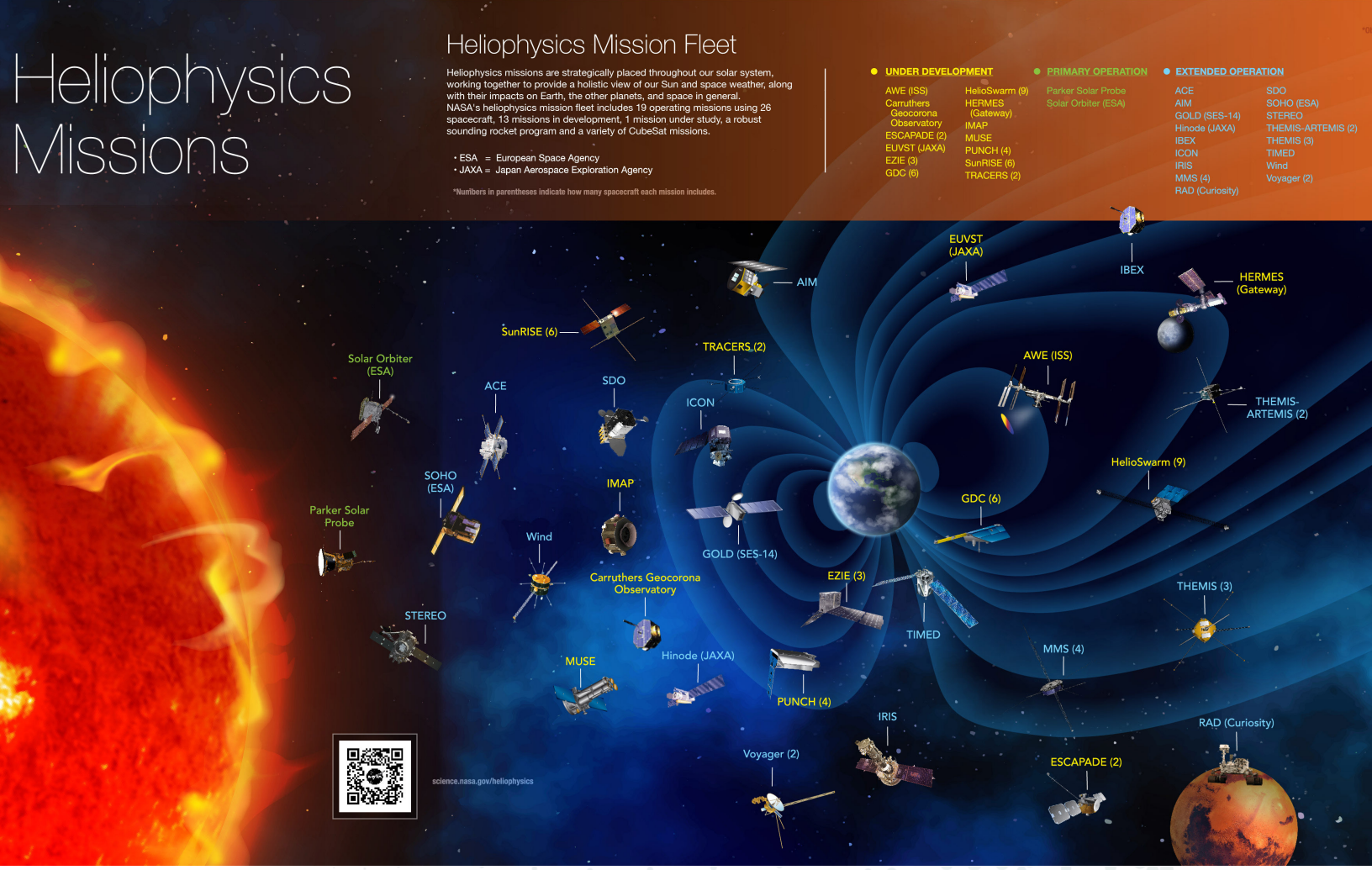


Chart outlining NASA's Heliophysics System Observatory, Image Credit: NASA

"Every new HSO mission that goes into orbit has data products that go out to our archives and those are completely open, and anybody can get them," said Roberts. "However, it is not enough to just have uniform standards in the data, it is not enough to have accessible and searchable data, it is now becoming important for us to better convey the research that has been done with that data. We now believe our role is to provide the heliophysics community the necessary tools and infrastructure to understand this science to make the data on HDRL transparent and usable. Which means the future direction of HDRL will be determined by the heliophysics community and by NASA headquarters."

Originally called the Heliophysics Data Environment or HDE, it started several decades ago. But only about a year ago it evolved into its present HDRL iteration where Roberts says, "it has expanded to include new services for larger, bigger datasets which supports science research with software, research data, and data from a wide variety of platforms, big and small." In addition to information made available from public and private industry in the U.S., it also has data available from the European Space Agency, the Japan Aerospace Exploration Agency, the National Oceanic and Atmospheric Administration, and Goddard's Community Coordinated Modeling Center.

Both Roberts and Thomas believe that HDRL has been quite successful and well utilized by the heliophysics community. "We are always interested in who is using our data and how much of our data is in use," noted Roberts. "We've had hundreds of terabytes of data flowing out of this system every day and that number is growing daily. So, we believe HDRL has been an enormous success. There have been millions of searches done during the past year alone."

"With HDRL, we provide literally tons of petabytes of data, and that is something that you are not wanting to download on your laptop," summarized Thomas. "The question then becomes how you find the few needles you need in this very large haystack. These are non-trivial challenges for our researchers, but this is why we are growing and why HDRL exists. The paradigm that we have carried out with HDRL has allowed us to develop an infrastructure and operating model that allows scientists to participate and collaborate on data collection and analysis, creating a better and more reliable search engine for finding heliophysics data."

Participants take off at the start of the Fun Run, Photo Credit: N4 Solutions

Spring Weather Provides the Perfect Backdrop for Fun Run

Last month, Goddard employees got a reminder of the benefits of getting outside for some fresh air and exercise as part of leading a healthy lifestyle. At noon on April 19, about 350 engineers, scientists, and administrative staff gave up their usual lunchtime routine of eating at the food truck or cafeteria for the 95th Annual Goddard 2-Mile Fun Run.

Most of the participants ran, some jogged and walked along the course, which took them over the entire west side of the campus. All managed to enjoy the mid-day sunshine and lovely 74-degree weather to eventually cross the finish line. For many taking part, the event underscored the importance and fun of exercise.

"It's a fun thing to do," said Tom Winkert, president of the Goddard Running and Orienteering Club, which organized and coordinated the Fun Run. "It's good to get out and support the idea of exercise."

Many agreed. Winkert said they had at least 100 of the 350 people register on the day before the event, which was the last chance to register and participate. As the runners made their way around the course, volunteers handed out bottles of water, oranges, Gatorade, and smelling salts to anyone in need of refreshment or aromatic stimulant.

Maksym Petrenko, first to cross, finishing with a time of 11:39, Photo Credit: N4 Solutions

"Actually, a lot of people who participate are on teams," noted Winkert. "Some are contractors or whole divisions come out and they form teams to build morale. They have a lot of fun by participating by making team t-shirts and having a picnic afterwards. There are other people who train for months just for this race. So, they are trying to get their best time."

One of those people who trained for this race is Maksym Petrenko, a senior software engineer in the Space Weather Laboratory in Code 674. Born in the Ukraine and employed at Goddard since October 2009, he won the race with a time of 11:39.

"I have been trying to win for years; I always seem to finish second. Today, I finally got it," said an exhausted Petrenko, who has participated in the race since 2010. "I have been taking part in the Fun Run to basically go outside and get some exercise."

Caitlin Kohli, a deputy project manager in the Flight Projects Directorate in Code 426 was the top female finisher with a time of 13:48. Due to an injury, Kohli has not formally participated in an organized race for at least five years. She has worked at Goddard since 2020, and this was her first Goddard Fun Run.

Caitlin Kohli, top female finishing with a time of 13:48, Photo Credit: N4 Solutions

"I am just coming back from a knee injury," said Kohli following the race, "but I really enjoyed running with my colleagues. I think I can speak for everyone who participated by saying, we hope people came out to have a fun time and exercise."

Maksym Petrenko and Caitlin Kohli, receive their trophies from Tom Winkert, President of the Goddard Running and Orienteering Club, Photo Credit: N4 Solutions

For a complete listing of official Fun Run results, please visit, https://gewa.gsfc.nasa.gov/clubs/groc/results/2020s/2023%20Spring%202%20Mile%20All%20Teams.TXT

THE STRATEGIC PARTNERSHIPS OFFICE (SPO) PRESENTS

INNOVATOR HOUR

Have questions about protecting your innovation?
Want to learn more about how to submit New Technology Reports?
Have general questions about technology transfer and partnerships?
Sign up for a one-on-one 20-minute timeslot with a SPO representative.
Meetings will be held virtually via Microsoft Teams.

NEXT SESSION: **TUESDAY, MAY 09, 2023**
1:00-2:00 P.M.

Available Timeslots
1:00-1:20 P.M.
1:20-1:40 P.M.
1:40-2:00 P.M.

How to Sign Up

To register for the upcoming session and secure your timeslot, complete the registration form.