Spotlight on Dr. John Cooney

“I don’t think many people would have expected me to end up working at NASA,” said John Cooney, NASA Postdoctoral Program (NPP) fellow at Langley Research Center (LaRC) in Hampton, Virginia of his elementary and middle school years. “I wasn’t always a good student. At one point in middle school, I had a D in science. I couldn’t focus. I had issues organizing. The homework that I did, I lost, or I didn’t show my work.”

Thanks to the help of one special teacher who showed him how to approach analytical problems, and the support of his family, he brought that D up to a B by report card time.

“My parents made sure that I had access to any resources that might help me succeed. They were very helpful and made sure that I got focused and worked on my homework as well as organization,” Cooney said. “They bought me these huge binders for each class that were very helpful for organizing. Not everyone is so lucky. I don’t know how I would have turned out without my parents and their hands-on mentality. They helped me work to better myself as well as to better figure out ways to learn. I think that was essential for me.

“It was in eighth grade that I had that teacher, and every year after that my grades improved, everything started improving. I went from struggling for B’s to having a nearly perfect GPA as a doctoral student. That was something I didn’t expect. It’s been a blessing.”

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Fellow Awards

**James Webb Space Telescope (JWST) Cycle 1 Theory Grant**

**L.Y. Aaron Yung**  
*Goddard Space Flight Center*  
*Advisor: Jonathan Gardner*

Dr. L.Y. Aaron Yung has been awarded a JWST Cycle 1 Theory grant for his proposed research on understanding the seeding and growth of the first black holes forming in the extremely early universe. This research aims to provide theoretical explanations for the physical origins of high-redshift quasars expected to be observed by the highly anticipated flagship observatory. Read more about the program and investigation at [https://www.stsci.edu/jwst/science-execution/program-information?id=2108](https://www.stsci.edu/jwst/science-execution/program-information?id=2108).

**2020 International Astronomical Union (IAU) PhD at-large Prize**

**Raissa Estrela**  
*Jet Propulsion Laboratory*  
*Advisor: Mark Swain*

Dr. Raissa Estrala was awarded the 2020 International Astronomical Union (IAU) PhD at-large Prize for her PhD thesis "Exoplanets Atmospheres and Habitability". The IAU PhD Prize recognizes the outstanding scientific achievements of astronomy PhD students around the world. One winner is awarded in each of the IAU’s nine divisions. The PhD at-large Prize is an extra prize jointly awarded in agreement of divisions for the most remarkable work in the year 2020. All recipients will receive airfare, registration fee and accommodation to attend the next IAU General Assembly, to be held in 2022 in Busan in South Korea, where certificates will be awarded, in addition to other prizes. Fine more information on the award at [https://www.iau.org/news/announcements/detail/ann21034/?utm_source=Facebook&utm_medium=social&utm_campaign=Orlo](https://www.iau.org/news/announcements/detail/ann21034/?utm_source=Facebook&utm_medium=social&utm_campaign=Orlo).

**Materials Research Society’s Best Oral Presentation Award**

**Maxwell Wood**  
*Jet Propulsion Laboratory*  
*Advisor: Jean-Pierre Fleurial*

At the Spring Materials Research Society’s 2021 Conference Dr. Maxwell Wood was nominated and selected for a best oral presentation award for his work entitled The Effect of Multi-Band Transport on Thermal Conductivity Seen in Yb14Mg1-xAlxSb11. This work described a new model for heat conduction in materials being designed for NASA’s radio isotope thermoelectric generators, which may allow for JPL to better engineer and increase the efficiency of their deep space power systems.

**International Space Science Institute (ISSI) 2021 Proposal Award**

**Remya Bhanu**  
*Goddard Space Flight Center*  
*Advisor: Mei-Ching Fok*

Dr. Remya Bhanu is the team lead for the recently awarded proposal submitted to the "International Space Science Institute (ISSI) - 2021 International Teams in Space and Earth Sciences". This is a two-year project for an international space science team to better understand the role of ElectroMagnetic Ion Cyclotron (EMIC) waves in the radiation belt dynamics with respect to the storms and storm phases during varied solar cycle activity. View the award announcement at [https://www.issibern.ch/program/teams](https://www.issibern.ch/program/teams).
Spotlight on Dr. John Cooney

UP IN THE CLOUDS

One part of Cooney’s research deals with the study of overshooting tops, where convective cloud updrafts punch through the anvil in severe thunderstorms, which looks like an atomic bomb explosion with a wide dome-like protrusion in the lowest layer of the atmosphere, extending into the stratosphere. Overshooting tops are often associated with the most hazardous storms on Earth. Overshooting tops that penetrate the stratosphere can impact atmospheric chemistry, dynamics and Earth’s radiation budget. His findings have been recently published by the Journal of Geophysical Research.

“I was comparing Geostationary Operational Environmental Satellite’s (GOES) detection of those events with Next-Generation Radar (NEXRAD) based detection,” said Cooney. “As an extension to that paper, we are using machine learning to detect those overshooting tops as well as resulting plumes. I’m enjoying this a lot. I’ve never had a project with machine learning. It’s interesting and fun to learn something new every day, and something I believe will be instrumental for our future in the field of atmospheric science. We are getting some good results right now, so I’m happy with how things are turning out. That’s keeping me excited. We are finding that the model can detect these events that are associated with severe storms which should be extremely beneficial to forecasters, climate researchers, aircraft safety and people on the ground.”

With this being his first machine learning project, Cooney has had some help.

“Charles Liles, who works in the Office of the Chief Information Officer at LaRC, has been amazing and is always available to help when it comes to our machine learning project,” Cooney said.

He would also like to express his sincerest gratitude to Kyle Wodzicki at Texas A&M and Kevin Smalley, an NPP fellow at Ames Research Center.

“I didn’t know Python before [this fellowship],” said Cooney. “My machine learning project uses Python, which is a programming language. I was able to get some basic knowledge from a code academy course but having their help immensely sped up my learning curve. Even now I still ask questions. It helps to have colleagues and friends who are willing to give me some tips of the trade.

NOT THE DISH SOAP

“The second project I’m working on involves a relatively new instrument called Doppler Aerosol Wind (DAWN). It’s a lidar that can measure wind speed as well as direction based on motions of aerosol particles in the atmosphere. [My team was] able to have a field campaign prior to me coming onboard so I’ve worked to understand how well DAWN performed.

“We are going to have a bigger, multi-faceted field campaign in August of this year called Convective Processes Experiment-Aerosols and Winds (CPEX-AW) where my team is going to study the importance of winds to convective initiation, intensity and decay as well as the viability of a Doppler wind lidar for space. The European Space Agency already has a similar spaceborne instrument, the Atmospheric Dynamics Mission (ADM) Aeolus. How well it performs will be assessed during CPEX-AW. More knowledge will give NASA an idea if they want to put something like this on a satellite, which I think is cool. My work could be the basis of an instrument in space.”

WORKING FROM HOME

Even during COVID Cooney has enjoyed his time as an NPP fellow.

“I actually don’t mind working at home,” said Cooney. “My dad worked from home my entire life. I feel very focused and productive working from home. It’s nice to have my computer here. I’m able to start programs any time of day. If I have an idea, I can just walk into the other room and apply it to see what happens. I feel like I’m doing really good work so that’s made me happy.

“My advisor Kristopher Bedka has also been amazing throughout my time here and has made NPP an incredible experience.”

Cooney describes Bedka’s approach as helpful when he needs help but backs away when he is working. Cooney enjoys bouncing ideas off of Bedka and appreciates that he steers him in the right direction.

THINKING BIG

“I think the research I’m doing, and have done while at NASA, is some of the most exciting work that I’ve ever done,” said Cooney. “It allows me to be at the forefront of my field studying topics that could really benefit people around the world.”
Lukasz Sterczewski

What are you doing now?

I am an assistant professor at Wroclaw University of Science and Technology in Poland. My research focuses on laser spectroscopy for detection of organic molecules. While on Earth it is important for air pollution monitoring, in space it may play a key role in the search for extraterrestrial life.

How did you get from NPP to your current position?

As an NPP fellow, I applied for a prestigious Marie Sklodowska-Curie Fellowship to the European Commission. It is aimed at helping researchers integrate with a new institution, establish an independent research group and support mobility.

How did NPP help you?

For a foreign national, NPP was one of the very few ways of fulfilling one of my greatest dreams – to conduct research in a NASA Center, or more specifically at the Jet Propulsion Laboratory (JPL). One of the unique lessons I learned from my experienced JPL colleagues is goal-oriented long-term planning. Instead of being temporarily excited about volatile yet time-consuming research ideas, I now spend more time developing a strategy that builds on my prior techniques and instruments rather than that requiring me to start from scratch at each step.

What career lessons/advice would you share with current postdocs?

I think it is essential to establish collaborations with several complementary research groups within the first few months of the fellowship. It really helps to make research progress even in limited lab access conditions. It is also important to present research to a wider audience. When our ideas are exposed to criticism from people outside our field, we are more likely to adapt our visions to the needs of potential customers or users. In my case, I greatly lowered the size and complexity of the instrument I was planning to develop during my NPP tenure thanks to feedback I received from chemical engineers at Caltech.

What do you know now that you wish you had known during your fellowship?

I wish I had known how quickly time goes by. Small side projects are exciting, but they distract from holding on to our bigger vision. On the other hand, research flows in a turbulent rather than laminar fashion.

Check out Sterczewski’s website at https://sterczewski.com/.
What do you know now that you wish you had known during your fellowship?

Use your time wisely, engage, start collaborations, etc. I wish I’d had known that it is not uncommon to change your research field at this step. Research lines evolve based on many different things (interests, opportunities, budgets, etc.) so be open to new ideas and possibilities; even if they don’t fit your current research focus, they might be the key to your next position.

Other thoughts/comments

Publish or perish still rules. Quality over quantity (but you’re expected to have both). And yes; there is light at the end of the postdoc!

What are you doing now?

I’m part of the Deep Space Climate Observatory (DSCOVR) satellite team under the Goddard Earth Sciences, Technology and Research (GESTAR) program with USRA.

Generally, I work with satellite images to study patterns in diurnal evolution of clouds and other products.

How did NPP help you?

During my NPP, besides my proposed tasks, I started working in parallel with DSCOVR data. While I continued doing the tasks on my NPP proposal, I learned as much as possible about DSCOVR and submitted a paper with some initial results. My NPP advisor is also my GESTAR advisor so the transition was natural. We continued what he had been doing for two years.

How did NPP help you?

The NPP allowed me to come to Goddard and get in touch with people working with other instruments or in other fields. There are many opportunities to collaborate and start new projects that, eventually, might be a pathway to your new position. The NPP is a lot of freedom. You have your stipend, your travel budget, and no constraints. Unlike positions in academia, you have 100 percent of your time for your research and that helps a lot in terms of having time for doing research and publishing.

What career lessons/advice would you share with current postdocs?

My NPP was completely unrelated to the work I do nowadays. The best advice I would share is to engage as much as possible with your lab. Learn from them. The NPP is the last “learning step” of your career. After the postdoc, you obviously must continue listening and learning but you are expected to move into research roles with clear ideas.
Research Highlights

Astrophysics

Laurie Chu
Ames Research Center
Advisor: Yvonne Pendleton

Using infrared observations and newly developed software, NPP fellow Dr. Laurie Chu has developed some of the highest spatial resolution 3D maps of dust in dense star-forming clouds. This information has constrained the density of dust required for the onset of complex organic molecules to form, greatly enhancing our understanding of the early conditions within planetary systems.