Spotlight on Dr. David Dubois

Nala, the five-month-old, fetch playing Tabby leaps onto the desk as her owner David Dubois, NASA Postdoctoral Program fellow at Ames Research Center in Mountain View, California explains his project. His Lion King-themed companion has become his office mate during COVID. Like most fellows who started at the beginning of the pandemic, Dubois was forced to take matters into his own hands and modify his plans to do lucrative work on his lab-based project from home. He has persevered and has even found a silver lining during the disruption.

TITAN

Dubois’ research is focused on understanding the negative ion chemistry of Titan’s upper atmosphere. He is seeking to find the role of negative ions, or anions, in the incorporation of the upper atmosphere of Saturn’s largest moon as well as their contribution to larger molecules and solid particles, called aerosols, and extrapolating his findings to include other moons and planets in the solar system.

“[Titan] is the only moon in our solar system to have its own atmosphere,” Dubois explains. “When we talk about atmospheres we think about Earth, Mars, Venus, Jupiter—all of these planets. We don’t immediately think about moons, and Titan is the only moon to have its own atmosphere.”

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Research Highlights and Awards

Heliophysics
Athiray Panchapakesan
*Marshall Space Flight Center*
*Advisor: Amy Winebarger*

Athiray Panchapakesan performed X-ray calibration of the Marshall Grazing Incidence X-ray Sounding Rocket Experiment (MaGIXS) sounding rocket experiment using the X-ray and Cryogenics Facility at Marshall Space Flight Center, and derived instrument calibration products. These results significantly helped in the analysis of flight data from MaGIXS, which was launched successfully on July 30, 2021, and observed soft X-rays (6-24A) from two targeted active regions on the Sun. Link to paper: [https://arxiv.org/abs/2109.01720](https://arxiv.org/abs/2109.01720)

Young Scientist Best Paper Award
Woubet G. Alemu
*Goddard Space Flight Center*
*Advisor: Christopher S.R. Neigh*

Woubet G. Alemu presented his research work, entitled "Desert Locust and Drought Cropland Damage Assessment in Ethiopia in 2020" at the 9th International Conference on Agro-Geoinformatics on July 26-29, 2021, held virtually. He received second place among the Best Young Scientist Paper Award Winners [http://agro-geoinformatics.org/young-scientist-award/](http://agro-geoinformatics.org/young-scientist-award/) and was selected for full article publication in the special issue of “Progresses in Agro-Geoinformatics” of Remote Sensing (ISSN 2072-4292) at MDPI.
Spotlight on Dr. David Dubois

“My NPP project is to study the upper layer of the atmosphere, the very top of the atmosphere where you have the limit between interplanetary space and the actual atmosphere itself. It’s a very important region to study because it’s the initial steps of the chemistry and the physics that is heavily influenced by the outer space, mainly space radiation, solar radiation and radiation coming from Saturn’s magnetosphere and how that influences the chemistry.

“When we talk about chemistry, in the case of Titan, organic chemistry, there are outsider types of molecules called negative ions.

“Negative ion chemistry has, since the NASA/ESA Cassini mission, been revealed to be important in the initial steps of the chemistry that produces larger molecules [with added complexity]. Now, we are certain that the involvement of negative ion chemistry in the overall arrangement of these molecules is quite important, but because of the limited amount of data we don’t know to what extent or what chemical processes are leading to the formulation of these molecules.”

THE COVID IMPACT

“My project is in three different chapters,” said Dubois. “One predominant aspect is to experimentally study these molecules at a low temperature in a Titan-like environment in the Cosmic Simulation Chamber (COSmIC) at NASA Ames Research Center using mass spectrometry to probe the negative ions produced from plasma chemistry. The second part is to theoretically understand and study the reaction pathways that produce these types of molecules. The final chapter of my proposal is to analyze the observational data and the data that comes from the Cassini mission.

“Back when I was writing the proposal and defining the schedule over the two years it became pretty obvious that the experimental part in COSmIC would be the bulk of the project. It needed to be performed first because when working in a lab you never know how things will go. We would be running negative ion mass spectrometry experiments for the first time in the COSmIC experimental setup to get preliminary results that we could later compare to the numerical model to better understand the chemical processes involved.

“When COVID happened, a few months after I started my NPP, NASA Ames Research Center closed. I didn’t have access to the lab anymore.

“The first question was how to fill that gap. A numerical model had been developed by a colleague at Harvard to simulate the plasma chemistry occurring in the COSmIC experimental setup. I immediately got in touch with him to discuss the different ways we could collaborate and how I could switch over to using the model. It combined a little bit of planning and luck because it turned out that I was able to use the model on my computer at home. I was able to work directly on the model and get preliminary results rapidly. Using this numerical model, I can simulate the reaction pathways leading to the formation of complex molecules and the plasma conditions in the NASA Ames COSmIC experimental setup. We are hoping that these results will give us some insights as to what we can expect from the laboratory experiments we will conduct in the future, whenever we get to go back to the lab.

“It’s been kind of a big silver lining, and in many ways, a blessing in disguise, because I’m figuring out, and realizing, and working on things that I hadn’t planned. Seeing how the model is shaping itself into something more updated is nice. This way, when we get to go back to the lab and run the experiments that I had planned we have a whole new set of data that I can use as predictions. It wasn’t the way I planned things, but in the end, it’s turning out to be pretty productive.

THE NASA EXPERIENCE

“I really like California and the environment here, and my colleagues especially. It’s a very international group from three or four different continents. Sometimes we speak in English, we speak in French and some of us speak in Arabic. It’s a nice group of people. We meet on a regular basis, and we talk about science, we talk about life, we talk about many things. I really enjoy being part of this group because it’s not all about science, but when it is about science, we have a good time.”

The COSmIC Laboratory is led by Farid Salama. Dubois’ NPP Advisor, Ella Sciamma-O’Brien, is a member of the COSmIC Laboratory, along with Salma Bejaoui and Lisseth Gavilan, a third year NPP fellow.

OUT OF THE (HOME) OFFICE

When he is not working, you can find Dubois practicing one of his passions: martial arts or the piano. He may be giving a lesson in either one or taking a lesson in Arabic, which has been his weekly practice for two years. He is also an avid reader, currently bookmarking time with some of his favorite Russian classics.

Science and doing research have left a lasting impression on Dubois that he carries with him no matter what language he is speaking or what book he is reading.

“One thing that is a daily lesson from science and from doing research,” Dubois said, “has been to teach me how to think skeptically and critically, not only in the context of science but the world in general. Using what we learn in science, which is to approach skeptically and analyze what we see or hear, has helped me. The ultimate goal is to strive for the truth. It’s also a humbling task because you’re always reminding yourself that what you know and what you say at a given time is still, in many ways, incomplete. I think it’s a good reminder that sometimes [we should] realize and accept that we don’t know everything.”
Future Directions

NPP Alumni of 3 months, 2 years and 4 years provide guidance for current fellows

You asked, we listened. We caught up with four former NPP postdocs and are reporting back on where they are now, how they got there and what they learned along the way. We have the scoop on how they transitioned from their postdoc to their current positions, how they were able to successfully use the experience and knowledge they gained as an NPP in their respective careers and are serving it up along with their valuable advice on how to make the most of the NPP fellowship in order to help guide you along your way.

Jason Welsh

What are you doing now?
I'm a Science Systems and Applications, Inc., (SSAI) Research Scientist working at NASA Langley Research Center. I work on the NASA Global Learning and Observations to Benefit the Environment (GLOBE) Community science project Leveraging Online and User Data (CLOUD) Team. Our project is called CLOUD Globe and Zooniverse Engagement (GAZE) platform we developed on Zooniverse https://www.zooniverse.org/projects/nasaglobe/nasa-globe-cloud-gaze/. My work focuses on developing data quality flags that can be applied to our NASA GLOBE CLOUD GAZE data.

In addition, I have the added pleasure of being able to interact with citizen scientists from all around the world to answer questions or just engage with them on different science-related topics. It’s such an honor and a pleasure to be part of an important project here at NASA!

How did you get from NPP to your current position?
I applied for the NPP program and was able to secure a research project with Xu Liu working on his Principal Component Radiative Transfer Model (PCRTM). I thoroughly enjoyed the research while working as a postdoc, but I missed teaching. I decided to apply to the position I’m currently in and it allows me to both teach and do research, which is the best of both worlds for me! I couldn’t be happier with where I am in life and the exciting journey that lies ahead of me!

What was the transition like?
The transition was easy because I already had a lot of contacts at NASA. While in my internship and postdoc, I developed collegial relationships that helped me in identifying what I wanted to do. Our branch head, Bruce Doddridge, was very instrumental in helping me to determine the direction I wanted to take. There were others who helped along the way too.

What career lessons/advice would you share with current postdocs?
The one piece of advice I can give is to never give up and always have a sense of perseverance when pursuing what you want to do in life. Perseverance—and a lot of support from family and friends—has led me to accomplish many things in life. Remember that every single person you encounter may become your colleague or boss one day. This will help you realize the vast network that you have at your fingertips. With COVID...
that’s hard to do, but it can be done with deliberately connecting with others on a regular basis. Also, it’s good to go to every single meeting and activity you can because it will give you exposure to both people and the different projects at your Center. Exposure to these projects and people could help you land your future job! Lastly, make sure you take the road less traveled in your career. This means not copying everyone else but inventing your own career and getting creative with how you approach job searching. There are lots of jobs but only one will fit your career aspirations as a scientist or engineer.

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

Honestly, I wish I had known how to have fun! I think as we have fun and relax our careers will develop into themselves. When we play, our creative side comes out and we tend to come up with brilliant ideas! Also, as you might have already heard, make sure you publish or at least see if you can get your name on different publications that are happening in your area of expertise. You’ll gain valuable contacts and get your name out there for future job opportunities. I’ll leave you with this, you may have failed at something a million times, but the second you get it right you’ve become an expert in that area and know the subject very well!

**How did you get from NPP to your current position?**

During the third year of my NPP fellowship, I was looking for new opportunities. A new faculty position at ETH Zurich caught my interest and I applied. While waiting for the outcome, I was hired into a scientist position by my group leader at JPL. When I also got a positive response from ETH, I had to make the most difficult the decision of my life. I eventually decided to give up the scientist position at JPL to build my own research group at ETH with the goal to become a tenured professor.

**What was the transition like?**

It was a crazy time since it happened during the first COVID-19 lockdown. It was difficult to leave California since flights were repeatedly cancelled and I had to re-book my flights four times until I finally got one that brought me to Switzerland. I started in home office, meeting most of my colleagues several months later. While the start was difficult, the situation improved, and I was finally able to successfully establish my new research group.

**How did NPP help you?**

The experiences I got during my NPP turned out very helpful in securing long-term positions in science. The NPP was essential to get a scientist position at JPL and also being competitive in applying to other job opportunities in academia. The freedom to work on your own project and the generous travel budget are key aspects of the NPP fellowship in my opinion.

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

Use the travel budget efficiently to visit multiple conferences a year and build a strong network in your field. Also, short-term scientific visits to other institutes can be very productive. At the same time, try to get to know your peers at your NASA Center and start some internal collaborations. This way, the chances of getting hired are much higher.

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

At the beginning, the new environment (especially for foreign nationals) can be quite daunting. It helps tremendously to connect to fellow postdocs since many are facing the same issues as you are. There is also great support from the Center Representatives and other administrative personnel.

**Other thoughts/comments**

I’m very lucky to have had the opportunity to work within the NPP and I’m very grateful for all the support. It has resulted in so many great experiences and finally allowed me to bring my scientific career to another level.
pollinating. A great place to be! In addition to networking, NPP enabled me to pursue my scientific passion without any financial worries. This financial security is extremely valuable from the perspective of raising two daughters, who I hope can be proud of their mom for having been a NASA fellow when they grow up.

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

NPP provides an excellent platform for developing your science and allows you to thrive both professionally and scientifically. Use this time to think about what you want to do in the next phase of your career. In addition to working on your own research, I would highly recommend investing in your personal skills, such as grant writing, mentoring, and engaging with the public through outreach activities. Also, it’s important to engage in discussions with diverse groups of people. I strongly suggest going to conferences and workshops, using the extremely generous travel funds that NPP provides. Use this time to learn new skills – it’s always useful to enrich your personal toolbox as preparation for the next steps.

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

Two years fly by so quickly. Make every moment count and don’t forget to enjoy the journey!

**What advice do you have that is unique to your perspective as a two year NPP alumni?**

Enjoy this period of your life and know that an exciting future awaits around the corner. Patience is crucial.

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**Johan Lindberg**

**What are you doing now?**

I am a Research Engineer at ESAB, a Swedish company founded in 1904 by one of the inventors of modern electric welding and today one of the world’s largest producers of welding equipment and consumables. I work in a small cross-disciplinary team that carries out innovation and development projects in the cross-section between the equipment and consumable segments of the research & development (R&D) organization.

**How did you get from NPP to your current position?**

Towards the end of my NPP I applied to various postdoc and researcher positions as well as research funding within my field (astrochemistry), but for family reasons I wanted to return to my hometown of Gothenburg, Sweden, and thus those opportunities were relatively limited. For this reason, and to try something new, I went on LinkedIn to look for positions in the industry. ESAB was hiring for a research engineer, and even though I didn’t know anything about welding, the advertisement piqued my curiosity since it asked for someone with a natural sciences background with competencies in statistics and programming. I applied for the job and apparently my background in physics and engineering was a good fit for the company since they hired me! I started the position once I settled back in Sweden about a month after returning from the United States.

**What was the transition like?**

In the beginning, it was a bit odd transitioning into the private sector. I had the feeling that as a researcher I should be working towards the greater good of pure Science rather than benefiting a private company, but I enjoyed learning a completely new field. Even though many projects are shorter in timespan than in academia, I feel that I get the time to test new things and drive projects forward with my colleagues, whom I enjoy working with. As for the greater good, optimizing welding materials and processes may allow for more climate-friendly constructions and lighter vehicles, using less steel for the same strength and durability.

**How did NPP help you?**

The time at NASA was immensely helpful and useful. Everything from getting to learn what was, to me, a completely new programming language, to taking part in the teamwork designing research projects together, to - through the generous travel budget - getting the chance to present my work and meet colleagues at so many different conferences. It has all shaped an advantageous skillset that also helps me in my current position.

During my application process to my current job, and other jobs that I didn’t end up taking, I got the impression that having NASA on my CV was a door opener and conversation starter.

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

Don’t Do whatever you find to be fun and interesting, and don’t be afraid to try new things. If you feel that you currently work in a field that is barely applicable anywhere in the industry (thus far, I have failed to find a company hiring an astrochemist) don’t despair. In my experience, if you can show that you have actively taken the initiative to learn new things and have broadened your competencies, that is gold to a private-sector R&D manager.

**Other thoughts/comments**

Some people who switch to the private sector, do so with an outspoken, or secret, wish to return to academia within a year or so. I also had that thought when I left academia, but the more time that has passed, the more I appreciate my decision. It has given me a better work-life balance and the opportunity to learn something completely different while also contributing to my group with both the mindset and the methods that were refined during my years at NASA. The chance of finding a new position in the same city once I feel like transitioning to something new is also considerably larger than if I were limited to positions within academia.