

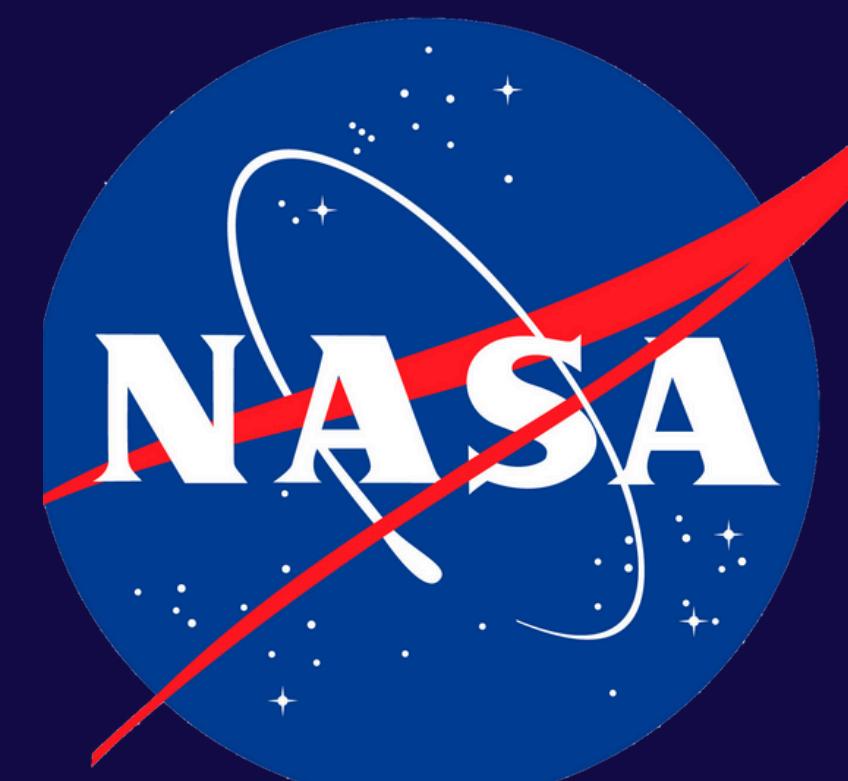


MAKING ASTRONOMY RESEARCH ACCESSIBLE FOR SECONDARY STUDENTS

E. Pfahler¹, L.M. Rebull², J. Benter³, S. Jones⁴, C. Edwards⁵

C. Lund¹, S. Seymour¹, S. Tennent¹, R. Werthmann¹, E. Hurliman³, H. Shine³, L. Wilkinson³, J. Meliani⁴, E. Otis⁴, K. Benter⁶

¹Falmouth High school, ²Caltech, ³Tri-Valley High School, ⁴FCS Innovation Academy, ⁵Chicago Public Schools, ⁶Le Roy High School



INTRODUCTION

With an abundance of astronomy resources available in education, an often-missing piece is a way for teachers to take part in the research process itself. The NITARP experience has brought together four educators from across the country with various backgrounds and disciplines and has helped them become a true research team. Each member of the team has had a unique experience and returns to their home districts to share what they have learned with others. From activities such as professional development (PD) presentations with other educators, directly instructing their students in conducting research, to conducting public talks and discussions with their communities, these educators plan to share with others not only the excitement of astronomy, but the importance astronomy has for everyone.

This work was conducted as part of the NASA/IPAC Teacher Archive Research Program (NITARP), which receives funding from the NASA ADP program.

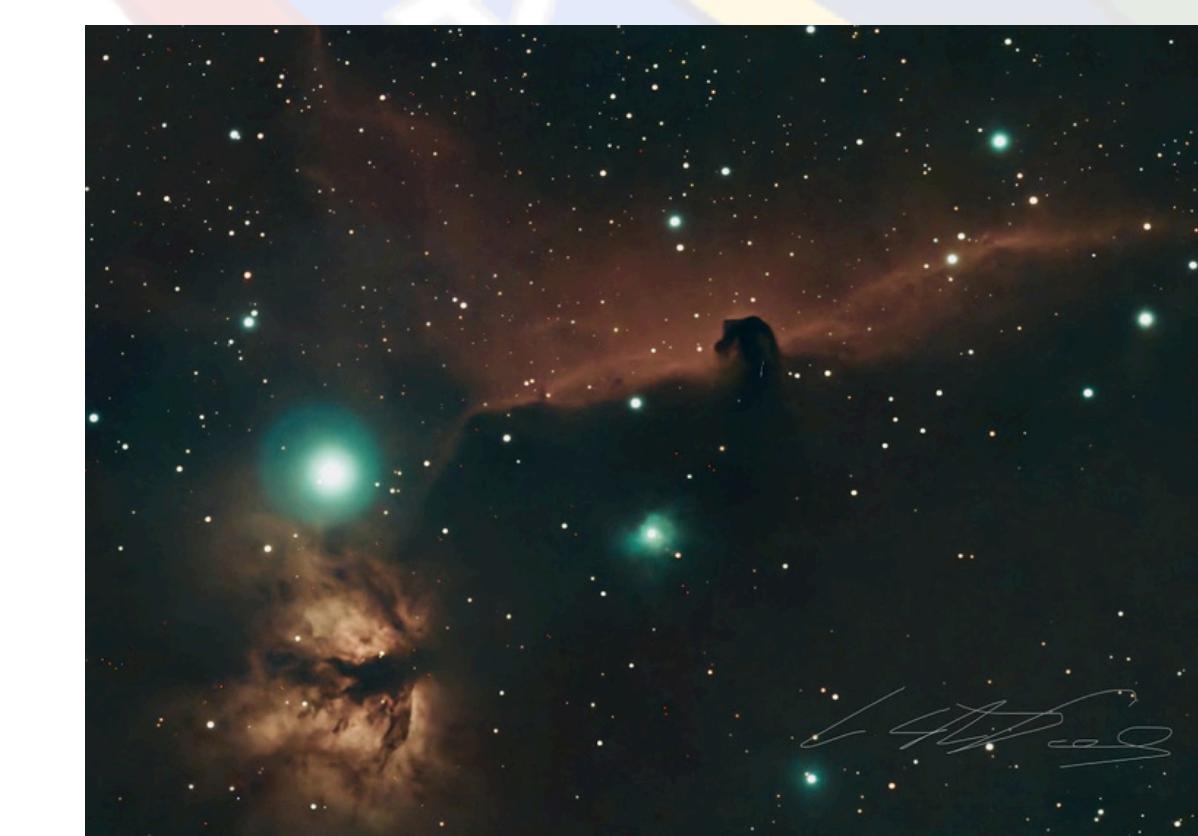
STEVE JONES

Astronomy has always been a passion of mine. When I suggested starting an astronomy program at my current school, I was looking to share my enthusiasm with my students and inspire them to keep looking up.

Our school has an emphasis on research, and I am one of the research teachers where I mentor over 100 students/year in conducting their own research. When the opportunity to apply for NITARP came available, I jumped at the chance. I wanted to be able to model for my students how research is being conducted in "the real world," and to show them that what I was teaching them in class was what I was currently engaging in.

Being a part of NITARP has been an amazing experience. I have been exposed to a side of astronomy that is normally not covered in a traditional high school astronomy class. I have been pushed to learn things I have never been exposed to before!

Now that I have had experience working with the IPAC resources I feel I have a tool that I can use in my research classes to help those students with similar stellar passions to my own find the data they need to make the next great discovery.



JEFF BENTER



NITARP has been the most engaging and enriching professional development I have done in my 25 years of teaching. By doing authentic astronomy research under the thoughtful and passionate tutelage of expert astronomers, I have gained the knowledge, skills, and confidence to bring a sampling of real astronomy back to my own classroom in my small, rural, central Illinois school far from the usual halls of astronomy. Specifically, I have already:

- Enriched my existing curriculum by regaling my students with new, in-depth, and engaging astronomy content and developments in the field
- Renewed my efforts to have students collect and interpret actual data in the pursuit of doing actual science, rather than simply learning about science
- Trained nearly a dozen students in collaboration with the Pulsar Science Collaboratory (PSC) of West Virginia University to interpret radio telescope data to look for pulsars
- Become a part-time planetarium presenter at a local community college
- Taught a 3-hour course to adults on introductory astronomy and stargazing topics at a local community college
- Engaged in additional professional development that I learned about through NITARP, including workshops sponsored by the Vera C. Rubin telescope project, various webinars on advanced astronomy topics, and analyzing live data with my students to look for signals from the lost Lunar Trailblazer spacecraft

After my current NITARP season ends, I hope to continue my professional development in astronomy and to bring new opportunities to my students. NITARP has shown me what's out there: in the cosmos, in astronomy education, and in the great relationships and collaborations to be had within the astronomy community.

CLAYTON EDWARDS

NITARP has reshaped my understanding of professional development. Too often, professional development is compliance-driven, and disconnected from authentic disciplinary practice. This year-long experience conducting astronomy research with NASA archival data (via IPAC) and a renowned astronomer led me to an important conclusion. When given time, access, and mentorship teachers can contribute to active scientific research. This kind of engagement matters. It connects real research practice to classroom instruction and expands what students can imagine themselves doing in science.

Moving forward, I plan to:

- Present our team's research through science posters and conference presentations, including national venues such as the American Astronomical Society and local/regional STEM events in Chicago.
- Conduct outreach within Collins Academy High School, CPS networks, and community-based STEM organizations to raise awareness of NITARP and similar teacher-research pathways.
- Provide district-level professional development and conference-style presentations that translate the NITARP research experience into accessible models for CPS educators.
- Develop and share practical templates, annotated workflows, and example datasets that help teachers and students access NASA archival data (IRSA, MAST) and engage in authentic research at an appropriate scale.
- Advocate for teachers as legitimate research collaborators, emphasizing careful methodology, reproducibility, transparent uncertainty, and collaboration with professional scientists.
- Mentor other educators who are interested in astronomy research but may lack institutional access or support.
- Remain active in the NITARP alumni community and contribute to collective efforts (such as BINAP-style initiatives) that extend and democratize teacher-driven research.

NITARP shows that teachers can do more than teach science. With intentional mentorship, equitable access to tools, and respect for the research process, we can actively participate in its creation and extend access to authentic scientific work within our schools and communities.

EDEN PFAHLER

NITARP has changed my perception of what professional development (PD) looks like for a science teacher and how they can be a contributor in authentic research beyond studying education practices alone. Instead of participating in passive workshops, this year-long program conducting authentic astronomy research using NASA archival data (hosted by IPAC) with a professional astronomer has shown me that research and professional development can be both educational and purposeful to the science community.

Moving forward, I plan to:

- Present our team's results with a poster and when possible, present at the Maine Science Teachers Association conference and other regional STEM events.
- Do outreach within my school community and Maine educator networks to raise awareness of NITARP and similar teacher-research opportunities.
- Provide the professional-development and ambassador-style sharing that NITARP expects from participating educators (district-level PD plus conference-style talks).
- Develop simple resources and templates that help other teachers access NASA archival astronomy datasets and engage in genuine, standards-based research experiences.
- Advocate for teacher-researchers as authentic research contributors by emphasizing reproducibility, careful claims, and collaboration with each other and professional astronomers.
- Mentor other educators interested in astronomy research by sharing what I've learned about tools, workflow, and expectations.
- Stay involved through the NITARP alumni community, including efforts like BINAP that support alumni and create shareable materials based on NITARP experiences.

NITARP has shown that teachers can do more than teach about science; with the right mentorship and standards, we can participate in its advancement.