



Authentic Astronomy Research Experiences for Teachers: The NASA/IPAC Teacher Archive Research Program (NITARP)



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ABSTRACT: How many times have you gotten a question from the general public, or read a news story, and concluded that "they just don't understand how real science works"? One really good way to get the word out about how science works is to have more people experience the process of scientific research. The way we have chosen to do this, since 2004, is to provide authentic research experiences for teachers using real astronomical data. (The program used to be called the Spitzer Teacher Program for Teachers and Students, and has been reborn as *NITARP*, the NASA/IPAC Teacher Archive Research Program.) We partner small groups of teachers with a mentor astronomer, they do research on a current astronomical topic as a team, write it up, and present it at an American Astronomical Society (AAS) meeting. The teachers incorporate this experience into their classroom, and their experiences color their teaching for years to come, influencing 100s of students per teacher. Applications are solicited annually in the Spring, due in the Fall, subject to availability of funds. Please Google "NITARP" to find our website for more information:
http://coolcosmos.ipac.caltech.edu/cosmic_classroom/teacher_research/

•OUR GOAL is to give teachers an *authentic research experience* using real astronomical data on a current astronomical topic.
•WE USE *real astronomical data* from archives housed at IPAC (Spitzer, IRSA, NED, NStED, etc.) and each team does a *new* project.
•WE SELECT teachers from a national competitive application process; teachers must already be familiar with the basics of astronomy (e.g., what is a magnitude) and astronomical data (e.g., what is a FITS file). Most of the educators are high school teachers, but we have recently expanded to 8th grade and community college, as well as non-classroom educators.

MAIN PROGRAM COMPONENTS

- Group of teachers teamed with a scientist mentor; work to develop a science research program, do it, write it up.
- Teachers (& scientist mentors) attend a *start-up workshop* at a winter AAS (next: Jan 2011).
 - Workshop includes intro to infrared, tools, etc.
 - Learn about how AAS meetings work.
 - Start to define project that addresses a current astronomical topic, exchange contact information.
 - (We pay for teacher travel.)
- Work long-distance with the team to write a proposal. (next: due Feb 2011.)
 - Must use data from Spitzer, IRSA, NED, and/or NStED.
 - Use telescopes, internet-based resources such as our wiki, etc.
 - Proposal is reviewed! Rewrite proposal, if necessary, in response.
- Meet for *3 days at IPAC* to work on the data and understand how science works (next: Summer 2011).
 - Each team decides on a mutually acceptable date.
 - Each teacher may be able to bring up to 2 students to this visit; students must be heavily involved in the project.
 - (We pay for teacher/student travel.)
 - (Work remotely before and afterwards, using online resources.)
- Present results* of the project in AAS posters (next: Jan 2012).
 - At least 2 posters: Science and Education.
 - Again, each teacher may be able to bring students; students must be heavily involved.
 - (We pay for teacher/student travel, up to 2 students per teacher.)
- Teachers serve as NASA/NITARP ambassadors.
 - 12 hours' worth of professional development workshops, talks, etc. over 2 years.
 - We help provide some of the tools to use.
- Teachers report back to us all the cool stuff accomplished in connection with this project. (Covers a wide range of results!)
- Teachers serve as mentor teachers to the rest of the NITARP community of teachers and students. Now have ~40 teachers who have been through the program, and almost uniformly they want to do more; they don't want to stop after just 1.5-2 years!

CASE STUDY: Brand new Lynds team teachers at Jan 2008 AAS meeting.



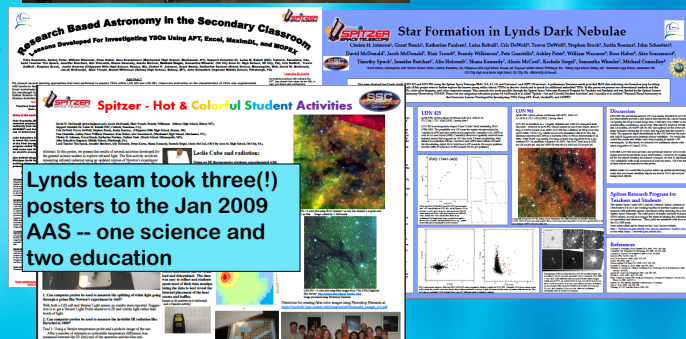
Lynds team teachers+ students+ mentor scientist L. Rebull at IPAC, June 2008. Note more relaxed than 2008 AAS -- they are becoming confident that they know what they are doing!



Lynds team teachers+ students at Jan 2009 AAS, in front of their poster (plus B. Elmegreen who was just stopping by to learn about the poster). Note that this is an incomplete group shot; many more students from this team attended the AAS.



Lynds team took three(!) posters to the Jan 2009 AAS -- one science and two education



PROGRAM ACCOMPLISHMENTS

(from previous incarnation as the Spitzer program starting in 2004 through NITARP, as of Oct 2010)

- 46 teachers trained (or training) in real astronomy research.
- 40 science or education posters presented.
- 12 research articles published, including 3 in major refereed astronomical journals.
- 102 students (high school, middle school, college) visited IPAC and/or attended AAS meetings.
- 1200+ students used data through the program.
- More than 100 students report that the program has influenced them to pursue careers in science or related fields.
- Teachers and students have delivered nearly 200 presentations, reaching over 14,000 people.
- At least 100 newspaper, radio, and tv reports (plus numerous internet articles) reported on various aspects of teacher and student involvement.
- At least 43 high school students using their experiences in this program have received several regional and international science awards.

WHAT'S NEXT

- All four of this year's teams will be presenting science and education posters at the Jan 2011 AAS. Please look for them!
- The kickoff workshop for the 2011 class of teachers (just newly selected in Oct 2010) will be the Sunday before the AAS, in Seattle.
- Watch us work! We have a wiki on which we collect materials we've developed (which you can use too!), and the current teams share data, analysis, and drafts. <http://coolwiki.ipac.caltech.edu>
- Please come see our posters at the AAS, and/or apply to participate!
- Applications for the 2012 class are expected to be solicited in May 2011 and due in Sep 2011.
- Google "NITARP" to learn more, or go to: http://coolcosmos.ipac.caltech.edu/cosmic_classroom/teacher_research/

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