

# The NASA/IPAC Teacher Archive Research Program (NITARP) is Recruiting New Educators!

## High-level summary

The NASA/IPAC Teacher Archive Research Program (NITARP; <http://nitarp.ipac.caltech.edu>) gets educators involved in authentic astronomical research. We partner small groups of educators with a mentor professional astronomer for a year-long original research project using NASA's vast archives of astronomical data from space- and ground-based telescopes. In exchange, we ask educators to leverage this experience by providing professional development for their colleagues in their local school districts. It involves several trips for educator participants and their students to collaborate with scientists and present the research results, all of which are paid for by the program.

We anticipate that we will select 6 new educators for NITARP 2015.

## Background

The NASA Infrared Processing and Analysis Center (IPAC) and the Spitzer Science Center (SSC) are soliciting applications from educators with experience in astronomy and bringing scientific research into the classroom or into other educational venues to conduct research with a team of educators and a mentor scientist.

The purpose of this program is to provide educators with an authentic research experience in astronomy using data housed at NASA's Infrared Processing and Analysis Center (IPAC) at the California Institute of Technology in Pasadena, California.

The intensive work in the program runs January to January. Since we only have a year to complete an original research program, we require some baseline astronomy knowledge of all our participants. Educators who are part of programs such as NOAO RBSE [Research-Based Science Education], HOU [Hands-On Universe], and SOFIA [Stratospheric Observatory for Infrared Astronomy], and other similar experiences are ideal candidates for us; please contact us if you have questions about your background.

Historically, we have targeted grade 9-12 teachers, but 8<sup>th</sup> grade and community college educators have also participated, as have non-traditional educators such as museum educators, or amateur astronomers who do a lot of outreach. Educators not currently in the classroom but working in other venues such as planetariums or observatories are encouraged to apply! Again, please contact us if you have questions.

The NASA/IPAC Teacher Archive Research Program (NITARP) has been around since 2004, albeit under a different name from 2004-2009. The program used to be known as the Spitzer Research Program for Teachers & Students. Participants now are encouraged to use data from any NASA archive of astronomy data, not just Spitzer Space Telescope data.

The NITARP teams use archival data from (see end of this document for links.):

- Data housed at the NASA/IPAC Infrared Science Archive (IRSA), such as:
  - Spitzer Space Telescope (one of NASA's Great Observatories)
  - Widefield Infrared Survey Explorer (WISE)
  - Planck
- Data housed at NExSci, and the NASA Exoplanet Archive, such as:
  - Kepler
  - CoRoT
- The NASA/IPAC Extragalactic Database (NED)
- and/or other NASA astronomy archive holdings.

## Program components

The main program components involve multiple trips (for which NITARP pays) and a commitment from the teachers to educate others about their experiences, both of which are conducted over a minimum of 18 months to 2 years. The specific program components (explained in more detail below) are: 1. Attending a NITARP workshop at an American Astronomical Society (AAS) winter conference to meet the science mentor, learn about the research project, and learn about scientific meetings. 2. Working long distance on the research project. 3. Meeting for 3-4 days in Pasadena, CA to work on the data for the project. 4. Attending the subsequent AAS winter meeting and presenting the results. 5. Serving as NITARP ambassadors by giving 12 hours of professional workshops. 6. Serving as mentor teachers.

1. **Attending a NITARP workshop** held in Seattle, WA, at the American Astronomical Society (AAS) meeting in January 2015. The purpose of this workshop is to meet your team, meet your scientist, learn about the basics of the NASA archives to be used, and start to define the research project to be conducted. The reason for attending the AAS meeting (and not just returning home immediately after the workshop) is to understand how AAS meetings work and to learn about current astronomy research and how research is presented in posters; time will also be spent continuing to work with your team to define your project. Your project may be something that you or another teacher in your group initiates, or it may be something that your scientist mentor suggests, or some combination of the two; your team will discuss it in person.

The AAS meeting starts the evening of Sunday January 4, 2015 and goes through Thursday January 8. Our NITARP workshop is currently scheduled for Sunday, January 4.

On the assumption that the workshop will be Sunday, you are expected to attend the AAS from Sunday January 4 through Tuesday January 6, 2015, but you are encouraged to stay through the end of the meeting on Thursday, January 9, 2015 if your schedule permits. Travel would then be conducted on Saturday January 3<sup>rd</sup>, returning Wednesday the 8<sup>th</sup>, Thursday the 9<sup>th</sup>, or Friday the 10<sup>th</sup>. *You must attend this meeting. Applicants who state that they cannot attend the AAS meeting will not be accepted, even if the conflict is related to science fairs or sports coaching commitments.*

2. **Working long distance** with each other on a research program that uses data from any of the IPAC holdings, including but not limited to IRSA, NED, and/or the NASA Exoplanet Archive, in conjunction with NASA scientists, using telephone conferences (telecons) and internet-based resources such as email and a wiki (where everyone with an account on the system can edit pages, post images or proposal drafts, ask and answer questions, etc.). *You must be comfortable collaborating over phone and email.*

3. **Meeting for 3-4 days** in Pasadena, California at Caltech (specifically IPAC and the SSC) to work on the data and to understand the process of doing your science. Each team will decide when to meet (dates TBD by your team, probably – but not necessarily – in the Summer of 2015). This program is primarily for educators, but in order to support your educational efforts, we anticipate that, contingent on availability of funds, you may have the opportunity to bring up to 2 students per educator to IPAC. If you choose to bring students, they must be heavily involved in the project; more details will be available to the teachers in the program to guide in student selection.

4. **Attending the AAS meeting** in Kissimmee, FL in January 2016 to present results of your project, both from a scientific and educational perspective. Again, we anticipate that, contingent on availability of funds, you may have the opportunity to bring up to 2 students per educator to the AAS.

Travel costs associated with all three of these meetings (trip to AAS meeting to get started, trip to IPAC to work on project, and trip to AAS to present project results), within reason, are covered by NITARP. Due to the fluid fiscal situation with NASA funds, we may have a changing budget during 2015. If we do not believe we have funds to cover your travel, we will not send you on the trip in the first place, *so you will never be left hanging with unreimbursed reasonable travel expenses.*

5. **Serving as NASA/NITARP ambassadors** who give 12 hours of professional development workshops in their home school districts. Each educator will be expected to give the equivalent (in hours) of 3 half-day professional development workshops in their district, or neighboring school districts, and at least 3 talks on the project (e.g., local, state, regional, or national teacher conferences) over the first 18 months to 2 years of your time in the program. The professional development workshops can focus on just one aspect of your project (e.g., infrared astronomy).

6. **Serving as mentor teachers** in the community of NITARP teachers. The *first year* that you are in NITARP, you spend most of your program time learning about infrared, Spitzer, IRSA, NED, the NASA Exoplanet Archive, the relevant software, the relevant science, etc. As a “first year” NITARP teacher, you attend an AAS meeting and a meeting at IPAC to further these goals.

Your *second year* commences with the second AAS meeting, and extends at least through the end of that school year. As a “second year” NITARP teacher, you are more experienced and spend most of your program time working with your students on the project, conducting professional development workshops, writing articles, sharing your NITARP experience, and interacting with other teams, e.g., on the NITARP wiki. Since, as a second year teacher, you are

attending your second AAS meeting at the same time as it is anticipated that new first year teachers will be attending their first meeting, explicit mentoring of these new teachers is encouraged.

*Third year* and later teachers, known as “NITARP alumni teachers,” are still encouraged to be part of the NITARP community. (All of the previous Spitzer teachers are now regarded as alumni teachers.) Alumni teachers may be asked to join new teams explicitly as mentor teachers for new teams. Some funding may be available to bring alumni teachers (even those not explicitly part of new teams) to subsequent AAS meetings. Some funding and opportunities may be available for additional ground- or space-based follow-up observations to further investigate questions raised by your research project. Additional activities are planned to create a sense of community among all alumni teachers; some alumni teachers may be asked to help lead these activities.

Educators are asked to submit regular reports to us at IPAC describing project-related activities (workshops, etc.).

**Important notes** – If you are selected for this program, and accept our offer of participation in the program...:

- (1) ... We will select educators for NITARP 2015 in Fall 2014. Because of the fiscal uncertainties with NASA funds, there is a possibility that we may not be able to send you on all of the planned trips, or we may not be able to pay for students to accompany you.
- (2) ... We will use your name in conjunction with media events (such as press releases) associated with the entire program. If you have concerns regarding the use of your name as associated with this program (e.g., your institution would not approve, or you wish not to be seen as affiliated with NITARP), this may not be the program for you. Please contact us at the address given below if you have specific questions.
- (3) ... You will be traveling for the government as part of the program. As such, complex and potentially non-intuitive travel restrictions may apply. *In some instances, you will be asked to float a balance for your travel expenses (like your hotel bill) over a credit card billing cycle before your reimbursement can be processed.* We cannot cover substitute charges, but the per diem rates are generous and are likely to cover most if not all of such fees. **We cannot pay salary.**
- (4) ... Students may be involved: (a) any students you bring need to be heavily involved in the program, and (b) you are *not* obligated to bring two students on the two trips with student participation. It is just fine to bring just one, or none, if you believe that your participation is best served by such a decision. This program’s goal is first to give *you* the experience, and secondly (really, *through* you) your students. On the other extreme, if you raise your own money, depending on your team, you may be able to bring more than 2 students on the trips, but more than 4 is strongly discouraged. You may involve as many students as you want at your home institution. **We may only be able to pay for 1 student per trip, or possibly none. Updates will be forthcoming for the selected teachers.**
- (5) ... Most of your interaction with your team will be over email and phone teleconferences, because you will not necessarily all be co-located in the same area or even the same time zone. If you are not a regular user of email for communication, it will be extremely difficult to accomplish the necessary tasks during your first year of intensive work.

## Summary and High-Level Timeline

1. **June 2014:** Release of this application
2. **1 August 2014:** Application website opens to accept applications.
3. **22 September 2014:** Deadline for application submission.
4. **Late September/early October 2014:** Applicants notified of application status (acceptance/rejection) and assigned to teams with mentor astronomer.
5. **January 2015:** Go to the American Astronomical Society (AAS) meeting in Seattle, WA to meet the astronomer you will work with, meet your team, and get a sense of how astronomy research is done and presented.
6. **Spring 2015:** work remotely by e-mail and telephone with your astronomer to write a proposal to use archival astronomical data to address a specific astronomical question.
7. **Summer 2015:** Travel with up to two students to Pasadena to the Infrared Processing and Analysis Center (IPAC) at Caltech for 4 days to train in analyzing the data for your science.
8. **Fall 2015:** Use the knowledge gained at IPAC back at your school to analyze the data and write a poster presentation about your scientific results.
9. **January 2016:** Present your results at the AAS meeting in Kissimmee, FL.
10. **Rest of 2016:** Give 12 hours of professional development workshops in your community based on your experience in NITARP.
11. **Beyond 2017:** Stay as involved as you wish with the program with the possibility of becoming a mentor to share your experience with another team of NITARP teachers.

For more detailed milestones over a given NITARP cycle, please see our website (links given below).

## Evaluation Criteria

The application is below and consists of short-form answers to questions (see p. 7). When we read your application, we are trying to assess the following criteria:

- Are you reasonably up-to-speed on the astronomy, math, and computers you will need for this program? We only work with you intensively for a year, and we don't always have time to "start at the beginning" on all of those three topics. **You should be reasonably comfortable with the basics of all three of those topics**, because many aspects of the program will feel like the deep end of the pool.
- Are you comfortable working in groups, remotely, even with people you have just met? Most of the work in this program is over email, wikis, and teleconferences. If you can't work remotely with your team, this program will be very hard for you, and for the rest of your team who is depending on you to pull your weight. **You need to be able to read and reply to email regularly.**
- Is our investment in you going to be well spent? We need you to get out there and **share what you have learned** with your environment, whether that be any combination of the following: your peer educators, amateur astronomers, your community, and/or more students; locally, regionally, and/or nationally; in print, online, and/or in person.

(Especially if you are a non-classroom or non-traditional educator, this component is weighted more heavily.)

- What skills are you already bringing to the table? Maybe you have experience with databases. Or you spent a lot of time looking at images, asteroid hunting. Or, you have experience with astronomy in a wavelength not explicitly included in IRSA databases (such as radio or gamma-ray astronomy). All of this is important to get into your short-form answers. If you don't have an advanced degree in science, you're actually our primary audience. If you already have a lot of experience with astronomy research (e.g., you already have a MS or PhD in it), you are not our target audience, because we are trying to expose more people to the process, and you've already been more than exposed to it. In any case, please **make all of this clear in your application.**

## The Application

**Applications are due by 3pm Pacific time (6pm Eastern time) Monday September 22, 2014.**

***The program is likely to be oversubscribed and all teachers qualified for this program will not be selected.*** Expected funding levels will allow us to select 6 new educators.

All US-based educators (formal or informal) are eligible. Teachers are expected to know the basics of astronomy and computers (e.g., what is a magnitude, what is a FITS file and how to use it, how to install software on your computer, etc.). Fairly recent vintage laptops will be required for the IPAC visit, as well as the ability to install software on said laptops. This program is primarily aimed at 9<sup>th</sup>-12<sup>th</sup> grade teachers but 8<sup>th</sup> grade teachers and/or community college professors, and/or non-classroom or non-traditional educators are also encouraged to apply.

The NITARP teacher application consists of a series of short answers to questions, submitted as a PDF file to a website. (PDF files can be created from Word using the file print---save as PDF command.) The questions are below. Please include the various question headings before each of your answers (note that you can copy-and-paste from this PDF file). **There is a 3-page limit, 12-point font, 1-inch margins. The application should be submitted to the website <https://cat.ipac.caltech.edu/nitarp/> (note https, not http) by the deadline.** This website will be open and available to accept applications starting **August 1.**

Selection will be conducted by a committee composed primarily of representatives from IPAC, including the scientists who will mentor NITARP teams in 2015. Additional external representatives from other astronomy education programs are likely to also be involved, depending on the numbers of teachers applying from those other programs.

Educators who have applied before but did not get selected are encouraged to apply again, taking into consideration the feedback given. All applicants will be notified of the status of their application within 3-4 weeks of the application deadline.

### **The web form includes:**

Name

School  
School Address  
School Phone Number  
Grades Currently Taught  
Subjects Currently Taught  
Mailing Address for Correspondence  
Email address for Correspondence  
And a place to upload your PDF.

**Your PDF should include short essay answers to the following questions** (note that you should include the headings but need **not** copy the entire question into your answer):

*1. Educational Background-General*

Describe your educational background, degrees, and subjects studied. Relate how this background sets a foundation for being part of an astronomy research team. Why did you become a science teacher?

*2. Educational Background-Specific*

Describe your specific background in physics and astronomy, if applicable. Describe your experience with scientific research in general and with astronomy in particular. Be specific about any analysis of astronomical data in which you may have participated. Be specific about your involvement in projects and how it might relate to being a NITARP teacher. Describe your involvement in any NSF or NASA-funded education projects or scientific research projects. Describe any grants you have received or leadership roles you have assumed.

*3. Experience with Student Research and Productivity*

Describe your role in encouraging student research. (Hint: we do not mean sending your students to the library.) Describe how you currently use research projects in the classroom or other educational settings. Do you use inquiry-based learning in science labs in the classroom? Describe in general how you have made good use of experiences that attempt to bring research into your classroom or your educational venue.

*4. Ability to participate*

Describe your ability to participate in a long-term research project. Describe support of school district and administrators for your involvement in this project and ability to miss school. Be as specific as possible about the level of support and flexibility of your district. Are you able to attend all of the program dates set so far (i.e., the AAS in January)? If not, please explain.

*5. Ability to share the experience*

Describe very briefly your general plan for your 12 hours of professional development presentations/workshops associated with this project. We realize the details of your plans may change once you get into this, but one of the main strengths of the NITARP program is the ability of our graduates to take the experience into the education and wider communities and inspire the next generation of scientists. How will you bring your NITARP experience back to your local environment?

*6. You and your NITARP team*

Describe your aptitude for astronomical research and why you want to be part of a team of NITARP teachers. What educational or scientific strengths do you bring to the team? How will you integrate the NITARP experiences with your teaching? Are you able to function on a research team that may be under some pressure to meet deadlines? Do you have any ideas for research that can be conducted using Spitzer, IRSA, NED, and/or the NASA Exoplanet Archive?

*7. Advertising*

How did you hear about us? (We are always trying to improve our advertising and recruitment.)

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If you have any questions, please contact us via our central email at [nitarp@ipac.caltech.edu](mailto:nitarp@ipac.caltech.edu) -- email is likely to result in the fastest response, but if you would like to have a phone conversation, please contact us:

Dr. Luisa Rebull, NITARP Director, 626-395-4565

- or -

Dr. Varoujan Gorjian, 818-354-2068

More information on the program (including projects past teams have completed) can be found at <http://nitarp.ipac.caltech.edu/>

The wiki on which previous teams have shared the resources they have developed is here:

<http://coolwiki.ipac.caltech.edu/>

Other sites of interest:

IRSA <http://irsa.ipac.caltech.edu/>

Spitzer <http://ssc.spitzer.caltech.edu/>

NED <http://ned.ipac.caltech.edu/>

NASA Exoplanet Archive <http://exoplanetarchive.ipac.caltech.edu/>

*Please note that we generally try to write personalized email to you informing you of either acceptance or rejection. Please do read the whole email, even if you are rejected; we may be able to point you to other programs or opportunities that we feel may better suit your needs at this time.*