NITARP, the NASA/IPAC Teacher Archive Research Program

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Have you ever wanted to get into astronomical data? I mean REALLY into astronomical data? The NASA/IPAC Teacher Archive Research Program (NITARP)[1] gets teachers involved with real astronomy data and research. We partner small groups of (largely) high school educators with a professional astronomer mentor for an original research project. The educators incorporate the experience into their classrooms and share their experience with other teachers. The program runs for a full year, January through January. Applications are available annually: posted in May and closed in September.

Since the advent of NGSS, educators have been asked to support authentic science experiences in high school and middle school, an experience that they themselves may never have had.[2] NITARP provides an authentic science experience for teachers. We work primarily with educators specifically because of the leveraging effect—by changing the way a teacher thinks about science, scientists, astronomy, data, etc., we impact the students they have this year, next year, and through the rest of their careers. We reach students through our teachers.

The program echoes the entire research process, from proposal to presenting the results at a professional conference.[3] Participants get three trips paid for by the program. The first trip is attending an American Astronomical Society (AAS) winter meeting in January to meet their team and start learning about their project. The second trip is four days at Caltech/JPL in Pasadena, CA, during the summer to intensively work on their project as a team (the program also pays for up to two students per teacher to participate; teachers can raise money to bring two more). The third trip is to attend a second AAS meeting (in January of the next year) to present their results; again, the project pays for up to two students per teacher to come as well. The teams work remotely for the duration of the program. Educators then share the experience with at least 12 hours of PD/workshops held locally, regionally, or nationally.

Each team consists of three to four new educators, a mentor teacher (who has been through the program before), and a mentor astronomer. Most educators who have gone through the program have been high school classroom educators, though we have also had middle school, community college, planetarium, and informal educators participate.

As far as we know, we are unique in providing the following combination of qualities:

- Our program is aimed at educators (not students), though participants are encouraged to involve students in the entire process. In practice, most—but not all— participants start working intensively with students a few months into the program, in preparation for the summer visit. Some teachers feel they learn better when not side by side with students, which is fine. Others involve students as early as possible in the program.
- We select participants from a nationwide application process.
- Our program involves educators for about a year (January- January). (Long-term interactions have been shown to have more impact than short-term interactions; see discussion in Refs. 4 and 5.)

• Our participants do real research. NO cookbooks! And our participants are not just "along for the ride"—they do the analysis and are involved in the entire process, from writing the proposal through presenting the results.
• Our participants present results in the same AAS sessions as professional astronomers, and must "hold their own" in that domain.

Teachers come to NITARP because they are looking to learn and grow[4] (in Ref. 5 at least 80% tell us that this is a primary motivation). Unprompted, 14% of our alumni used the words "life changing" when describing the impact of NITARP on their lives.5 Some of this change means "rethink[ing] my entire approach to science education" because real science has no cookbooks, and some of this change comes from being exposed to new educational opportunities and/or jobs outside the classroom.

We typically have more than five applicants for each open position, so competition is fierce. This demand is probably because the NGSS asks a lot of teachers, and, as a result, teachers seek out professional development opportunities like this.

As a result of the pandemic, NITARP did not solicit applications for new teams in 2021. While much of the work is done remotely (and is therefore 100% compatible with distance learning), the trips are an integral part of the experience, and we did not want to accept new teams without knowing whether they could travel. As of this writing, we are running normally in 2022. Look for applications for the 2023 class in May 2022.

References

1. See http://nitarp.ipac.caltech.edu .
2. See, for example, these articles and references therein: L. Rebull, "Authentic research in the classroom for teachers and students," Rob. Telesc. Stud. Res. Educ. 1, 21 (2018), https://ui.adsabs.harvard.edu/abs/2018RTSRE...1...21R/abstract; J. Krim et al., "Models and impacts of science research experiences: A review of the literature of CUREs, UREs, and TREs," CBE Life Sci. Educ. 18 (4), (2019), https://doi.org/10.1187/ cbe.19-03-0069; D. Hemler and T. Repine, "Teachers doing science: An authentic geology research experience for teachers," J. Geosci. Educ. 54 (2), 94-102 (2006), https://doi.org/10.5408/1089-9995-54.2.93.
3. L. Rebull et al., "The NASA/IPAC Teacher Archive Research Program (NITARP)," Rob. Telesc. Stud. Res. Educ. 1, 171 (2018), https://ui.adsabs.harvard.edu/abs/2018RTSRE...1..171R abstract
4. L. Rebull et al., "Major outcomes of an authentic astronomy research experience professional development program: An analysis of 8 years of data from a teacher research program," Phys. Rev. Phys. Educ. Res. 14, 020102 (2018), https://doi.org/10.1103/PhysRevPhysEducRes.14.020102.
5. L. Rebull et al., "Motivations of educators for participating in an authentic astronomy research experience professional development program," Phys. Rev. Phys. Educ. Res. 14, 020248 (2018), https://doi.org/10.1103/PhysRevPhysEducRes.14.010148.