

NASA/IPAC Teacher Archive Research Project (NITARP)

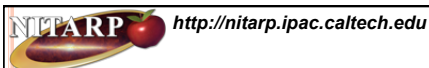
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Spitzer Science Center, Caltech

AGU, Session ED33C


7 Dec 2011



DATA IN THE CLASSROOM

- Four categories, with different audiences, challenges, goals:
 - Reproductions of simple or done projects, using real data (professional quality or really good amateur).
 - Essentially reproductions of done projects, using new data (or a combination of new+archival data).
 - Looking for new things in old data (e.g., citizen science).
 - Original research, professional quality new or archival data.
- Each is valid and worthy and important; each has a different footprint and reaches a different audience of educators and students and the public.
- ...But the last bin is kind of...empty. Reaches fewest people, requires most of participants.




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NITARP IN ONE SLIDE

IPAC = Infrared Processing and Analysis Center, at Caltech; center for Spitzer, Herschel, WISE, Planck; we are part of the IPAC Communications and Education Team (ICE)

- NITARP = NASA/IPAC Teacher Archive Re: American Astronomical Society
- NITARP is designed to give teachers an *auti* (AGU for astronomers) using *real data and tools*.
- A group of teachers are paired with mentor astronomer, write a proposal (peer reviewed!), do research, write up results, take it to AAS → model entire research process.
- Three trips: (1) Jan AAS to start (kickoff workshop), (2) visit Caltech/JPL for 3-4 days in Summer, (3) Jan AAS to present results
- (Can bring up to two students per educator on the second 2 trips.)
- Educators then conduct PD/workshops locally/regionally/nationally – spreading the wealth.
- Aimed at high school teachers; middle school, community college, informal educators may also benefit.
- Teacher application available Spring, due Fall; any US-based educator can apply.


 Google NITARP to learn more! Or <http://nitarp.ipac.caltech.edu>

3

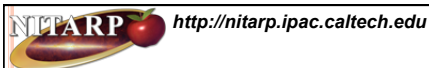
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PARTICIPANT REACTIONS

- “I always thought just from programs on TV and in the classroom that astronomy was more or less completely figured out. **Learning that it isn’t is pretty exciting.**”
- “Becoming empowered in the language and nature of inquiry and investigation was also **life changing** for our participants.”
- “It invigorated me to become **part of the greater message**, which is the story of space- and ground-based observatories.”
- “Being there with my students was the most **amazingly cool experience**. I saw [them] explode in their willingness to ask questions and express an opinion.”
- “I kept **wishing this program had been available** when I was a kid.”



4

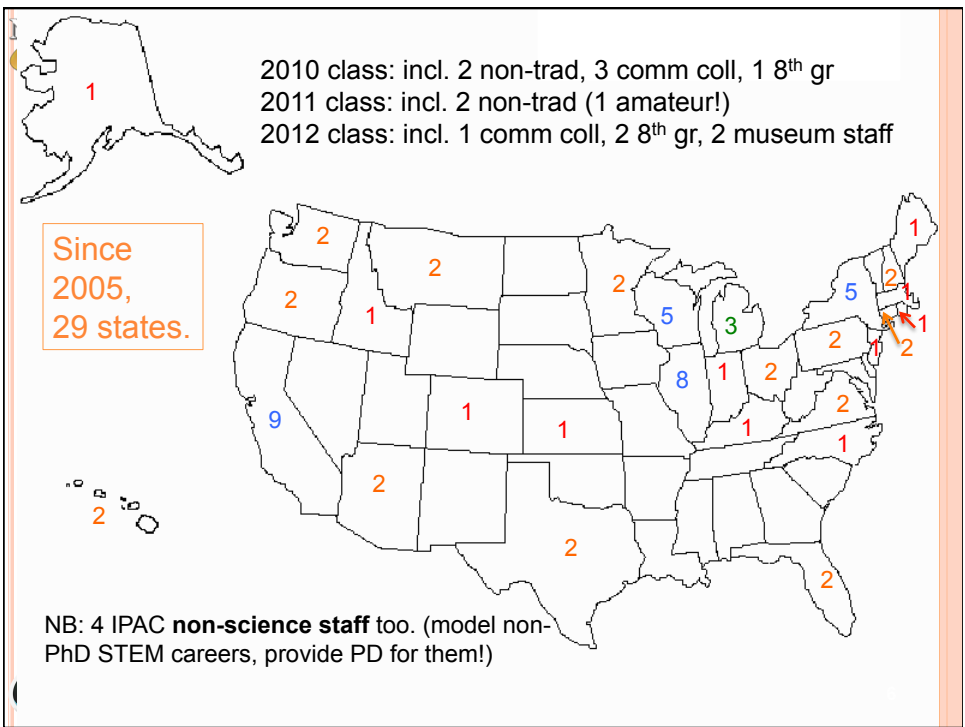


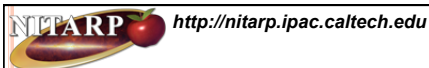
CHALLENGE 1 (NOT UNIQUE TO US)

- Finding the right teachers. (recruitment)
- We depend on them to be :
 - Very **savvy teachers** (already capable of involving students in research-like experiences).
 - Somewhat savvy astronomers before we get to them, but **no experience in real research**.
 - Willing to commit to **fluctuating time commitment** over 13+ months, for **free**. (Need to figure out how to pay them.)
- National application process. (Due **September!**)
- This year, did very well – we had **~4x as many applicants as spots**.
- Will it persist next year? (Is this discouraging?)



5



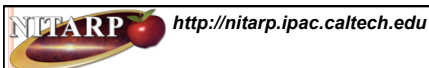


CHALLENGE 2 (NOT UNIQUE TO US)

- *Finding the right scientists.* (recruitment)
- We depend on them to be :
 - Very **patient**. These educators are not undergrad students.
 - Able to help team come up with a project that **MUST** be done **within a year**, no deferrals.
 - Willing to **step in** and rescue team (quickly finish reducing data, code something up, etc.), if team becomes too frustrated.
 - Willing to commit to **fluctuating time commitment** over 13+ months, for **free**. (Need to find \$ at 10-20% level.)
- Each team has a **mentor teacher** (who has been through program before) to act as deputy lead, translating for both camps, which helps everyone.
- All essentially local, experienced scientists (so far).
- Have let scientists work independently, manage their teams, with support if they want it.
- If we expand, how to train, support new scientists?



7



AAS MEETING 1 – JUST ONE TEAM



2008 class



8


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AAS LAST YEAR – JAN 2011

2010 class finishing up; 2011 class getting going!




 9

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CHALLENGE 3 (PROBABLY UNIQUE TO US)

- *Getting all the travel logistics sorted out.* (x3 per class!)
- These folks **don't** necessarily normally **travel for business**, and they are invited to **bring along minors**.
- Government travel rules require some outlay of cash; we can't pay for everything directly, and it must be reimbursed → **stress on teachers**.
- (Each school has different **chaperone** rules; we let the educators work that out.)
- We need to **find \$** to pay administrator, manager for all of these details.

 10



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CHALLENGE 4 (NOT UNIQUE TO US)

- *Working remotely, across time zones.* (important throughout year.)
- We have a **wiki** on which people can share information – text, discussions, instructions, examples, images, files. (Other long-distance collaboration tools blocked by schools!)
- **School email breaks** often – attachments vanish or entire mail vanishes. (Fall back to gmail [et al.] if any problems.)
- We strongly encourage **regular telecons**, via Skype or tollfree number. If they don't do this, team often dysfunctional.



11



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CHALLENGE 5 (NOT UNIQUE TO US)

- *Software installation.* (Summer visit/Fall)
- Many schools **prohibit software installation**, or make it really hard.
- We try to use **commonly available programs** (e.g., Excel) rather than things requiring installation.
- **Web-based programs** are probably ultimately the answer, but not particularly easy to implement with no money.
- **Free professional packages** available for a variety of platforms, or standalone Java-based (more platform-independent) software.
- (I hate Windows...)



12


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ONE TEAM'S SUMMER VISIT




2011 -
Bright
Rimmed
Clouds

 13

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PARTICIPANT REACTIONS

- “..this experience definitely **changed the way I thought** about astronomy and astronomers. I didn't realize that some of the calculations and applications were as **accessible** as they were. I also didn't realize how **collaborative** of a job it is...”
- “I never realized how much **computer programming** is done in astronomy. I think this will help me reach out to students who might not be interested in "science." These students may not realize that their programming skills are vital for analyzing astronomical data.”
- “*Real astronomy is making little mistakes that cause you to check all the data again.*”
- “I kept thinking about **how much I couldn't wait to share** all I was learning with my Astronomy students this coming school year.”
- “I actually felt like I was able to **accomplish something** that would have some meaning to the scientific community.”
- Astronomers are **normal, friendly people!**

 14

CHALLENGE 6 (NOT UNIQUE TO US)

- *Brain Drain* – Forgetting everything they learned in the Summer by the time they get to Fall.
- Hopefully it **sticks better** the 2nd (3rd, 4th) time around!
- Offered 4th day of visit in 2011 as “**training wheels**”, e.g., you guys work without scientist in the building but also not far away, modeling what you will do at home. (Rave reviews, will repeat.)

A
2010
team




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(Most of a) 2010 team





 17

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CHALLENGE 7 (NOT UNIQUE TO US)

- *Getting them to tell us what they did.*
- Generally can't stop them from sharing ☺, but **closing the loop** is hard.
- They know about our **12 hour PD obligation** going in, and have to write up tentative plans as part of their application.
- But, we know these **plans will change** in a year, and thus we are very flexible in what we 'accept' – basically, want them to share the experience:
 - Workshops/Lectures (school, local, regional, national)
 - Articles (they write, or are interviewed for)
 - Anything else ...
- Many alumni have moved up and out of the classroom into **higher-level administration**, taking our experience with them!




 18



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CHALLENGE 8 (UNIQUE TO PROGRAMS LIKE OURS)



- *Measuring this experience.*
- It is **open-ended** by design. Each team, each year, has different chemistry, **measures 'success' differently**. (e.g., null result is still valid, still a poster, still real science!, but probably not a journal article.)
- Each team **studies something different**, possibly using vastly different techniques and wavelengths (2012: optical, IR, submm – 5 orders of mag in wavelength!).
- **Formal assessment tough**; working with Claremont evaluation grad students to come up with evaluation plan.
- Can count some things, anecdotally assess others. (We have placed a lot of what we have on our website.)

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NITARP ACCOMPLISHMENTS (2005-DATE)

- **67+ educators trained/about to train in real astronomy research.**
- 53 science or education posters presented.
- **4 refereed articles published in major astronomical journals.**
- 109+ 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 ~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.


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CHANGING THE CULTURE




3 went to AAS; 8 think differently about astronomy and science.

 21


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CHALLENGE 9 (NOT UNIQUE TO US)

- *Finding funding.*
- We are **currently funded** out of IPAC Archives and Spitzer EPO money, plus some NASA HQ discretionary money.
- We **influence the classroom**, but because each team, each project, each teacher, each classroom is unique, few “lesson plans”. With few educational products, & small footprint, we are **not particularly competitive** in EPO calls.
- We are doing **real, legitimate science**, but not of the highly competitive caliber that would allow us to compete on the open market for archival research money.
 - Timescale for such calls >1 yr.
 - Competitive proposals focus on one question; we have one question per team, the sum of which is diverse indeed.
 - We produce more publications (==posters+articles) per year than most archival projects, and certainly more media coverage!

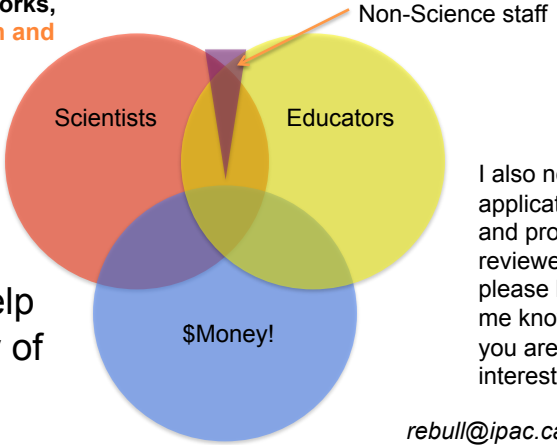
 Where can we find funding?

22

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NITARP'S FUTURE

Lots of stuff to tweak, but fundamentally **this works**, **we get real research and real data into the classroom**, and this model should work beyond just astronomy.



Non-Science staff

Scientists


Educators

\$Money!

Can you help us with any of these?

I also need application and proposal reviewers; please let me know if you are interested!

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23