How Do Astronomers Know That?

Educating Teachers, Students & the Public on HOW You Discover Young Stars





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ABSTRACT

Every day amazing astronomical facts are taught to thousands of curious people. Students learn them in the classroom. Museum visitors hear them in a Planetarium show or lecture. When it's time for questions, many intuitively ask, "how do you know that?" NITARP helps close this gap in astronomy education. NITARP stands for NASA IPAC Teacher Archive Research Program. NITARP brings together an astronomer with a small group of teachers and students to do real astronomical research. After the year long program is completed, the education and experiences gained by the teachers are brought back to their classrooms and museums across America. Our NITARP group researched apparent infrared (IR) excesses to identify Young Stellar Objects (YSOs). We concentrated our search in the Bright Rimmed Cloud (BRC) 27, located in the constellation Canis Major. Our main focus was to use data from the Wide-field Infrared Survey Explorer (WISE), along with other archived infrared data such as Spitzer and 2MASS. Thus, our NITARP group was called C-WAYS—standing for Cool, WISE and Young Stars.



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TOP 10 EDUCATIONAL DISCOVERIES

- 10. Science is collaborative! Astronomers, teachers and students all work together.
- 9. One telescope never tells the whole story.
- 8. Frustration is a reality sometimes—but the journey is still worth it.
- 7. Looking at telescope images is still important to make key decisions!
- 6. Yes, units matter!
- 5. Science is a proces there are no answers at the back of the book.
- 4. Making mistakes can lead to greater understanding!
- 3. Students & teachers are motivated to do REAL research!
- 2. You have to read the literature—lots of literature.
- 1. It's confirmed—MATH is important in astronomy research.

WHAT? Our NITARP Team discovered 60 new, likely YSOs-- Young Stellar Objects. Please see our science poster: Novatne et al 256.22

- Telescopes: WISE, Spitzer, 2MASS, & Palomar
- Tools: APT Photometry, IPAC, IRSA, Excel
 Time: Weekly telecons, assignments & Caltech







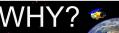
- Location:
- Other Names:
- **Constellation:**
- Coordinates:
- Distance:
- BRC 27 in CMa R1
 Seagull Nebula, IC 2177
 Canis Major—near star Sirius
 07h 03m 39s -11d 23m 43s
 4,000 light years away, or 1.2 kpc

5 teachers, 20+ students & 3

Next Steps:

Teach new students & the curious public on









We came from the stars. When we look across the vast ance to BRC 27, we are discovering our origins