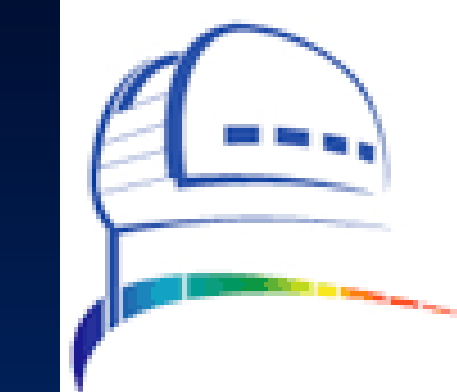


THE SPITZER SPACE TELESCOPE RESEARCH PROGRAM FOR TEACHERS AND STUDENTS AS A POTENTIAL COMPONENT OF SOFIA'S OUTREACH EFFORTS



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WHO WE ARE

The Spitzer Science Center (SSC) and the National Optical Astronomy Observatory (NOAO) have designed a program for teacher and student research using observing time on the Spitzer Space Telescope. Our educational plan addresses the NASA objectives of improving student proficiency in science and improving science instruction. Our program accomplishes this by giving a team of teachers and their students the chance to use Director's Discretionary Time on the Spitzer Space Telescope for educational observations, thereby getting scientific research into the classroom.

WHAT WE'VE BEEN DOING

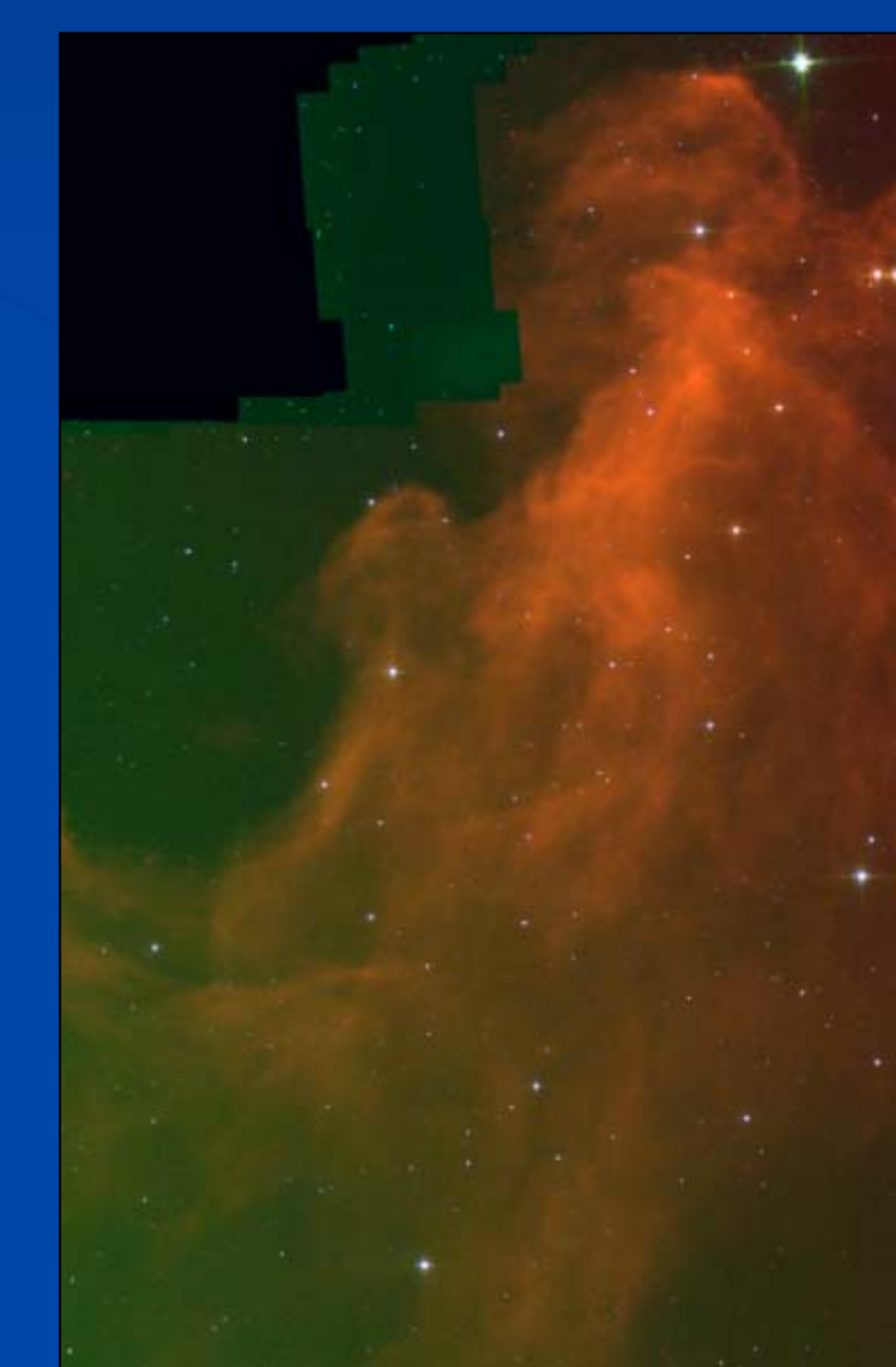
We offered this program to teachers in the Teacher Leaders in Research Based Science Education (TLRBSE), an ongoing NSF-sponsored well-established teacher professional development program at NOAO. The TLRBSE program touches the formal education community through a national audience of well-trained and supported middle and high school teachers. For the Spitzer program's first year (2004), we selected 12 teachers from the 37 TLRBSE teachers who applied. Volunteer scientists were recruited to mentor the teams. NOAO organized workshops to provide these Spitzer teachers with the background information that they needed to start work on this project, and the first round of teachers met with their scientist mentors at the Jan 2005 AAS meeting. The teachers wrote Director's Discretionary Time (DDT) proposals for observing time, including a substantial educational component. B.T. Soifer (SSC director) selected and approved the winning programs. After their data were acquired, each team came to visit the SSC at least once. In subsequent years, some teams have continued on from prior years, and additional teachers have been selected for new teams. Finding volunteer scientists turns out to be the limiting factor in forming new teams. All of the programs' proposals, progress, results, developed materials, and a listing of the team members are available on the web, linked from our "Cool Wiki" at <https://coolwiki.ipac.caltech.edu/>.

OUR SUCCESSES, AND THE SOFIA LINK

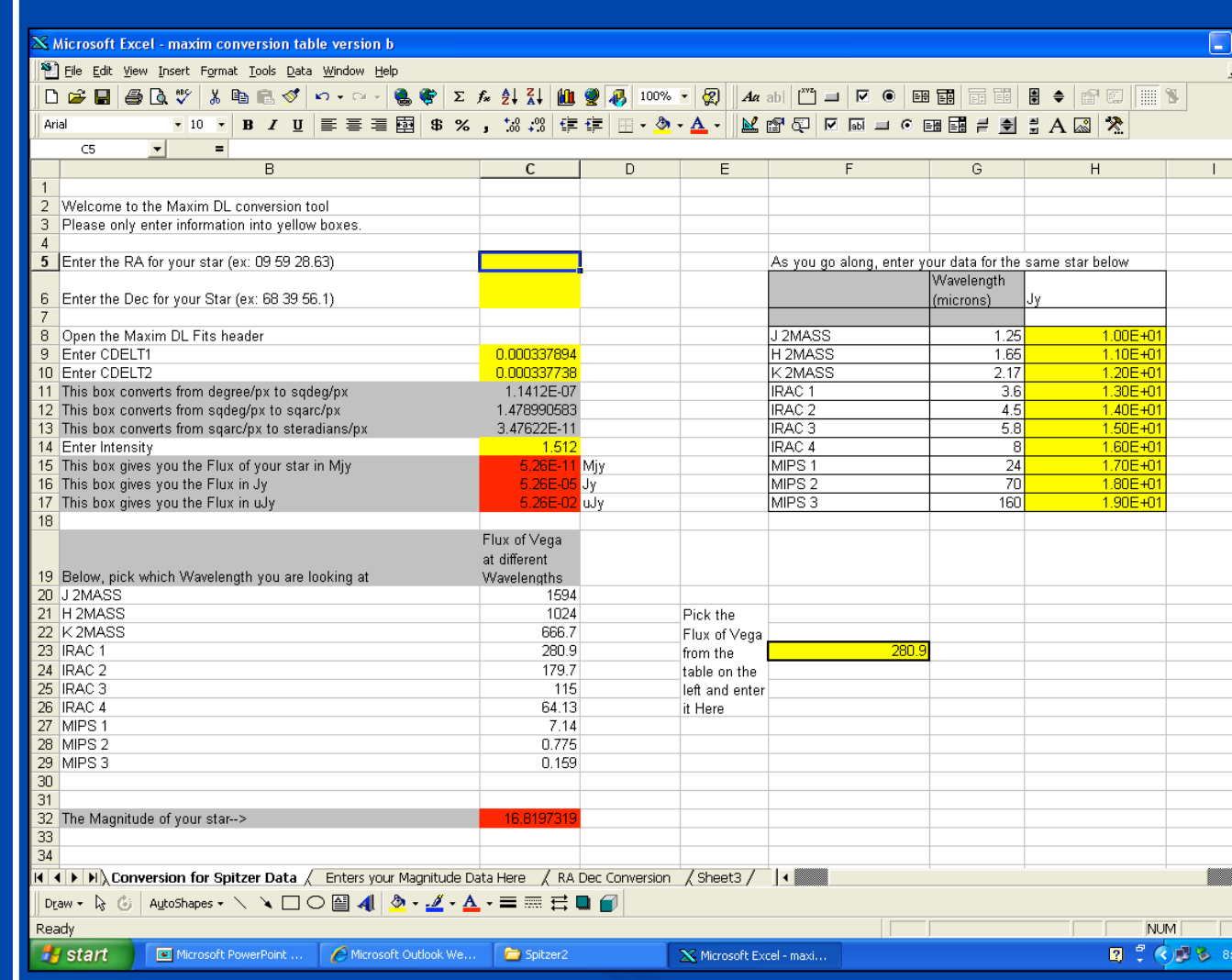
Our success continues to be affirmed on many levels. *More than 15 conference posters or journal articles have resulted from this project, with more being presented at the Jan 2008 AAS meeting.* Several students have placed highly in international science fairs. We won a NASA group achievement award in 2007. This program has provided a model for the outreach efforts planned for WISE, an upcoming NASA mission. We believe that it provides a model for other projects as well, including SOFIA, where plans are already underway to put educators on flights. SOFIA's Airborne Astronomy Ambassadors (AAA) program will select teams of 2-4 educators from their proposals regarding plans to use the SOFIA experience to improve education in their home communities. These educator teams will be paired with astronomy researchers who have received observing time on SOFIA and have agreed to having educator partners. The educators will receive training to understand the scientific experiment being conducted, but at least in the initial phases of the AAA program, they will not be full collaborators with the astronomers in the sense of writing proposals for scientific observing time. The format of the Spitzer research program for teachers is the next logical step as the SOFIA AAA program matures. The cadre of Spitzer teachers we have trained are in a great position to take advantage of these opportunities on SOFIA, and could serve as mentors to other teachers.



Left: teachers and scientists at the Jan 2006 AAS meeting

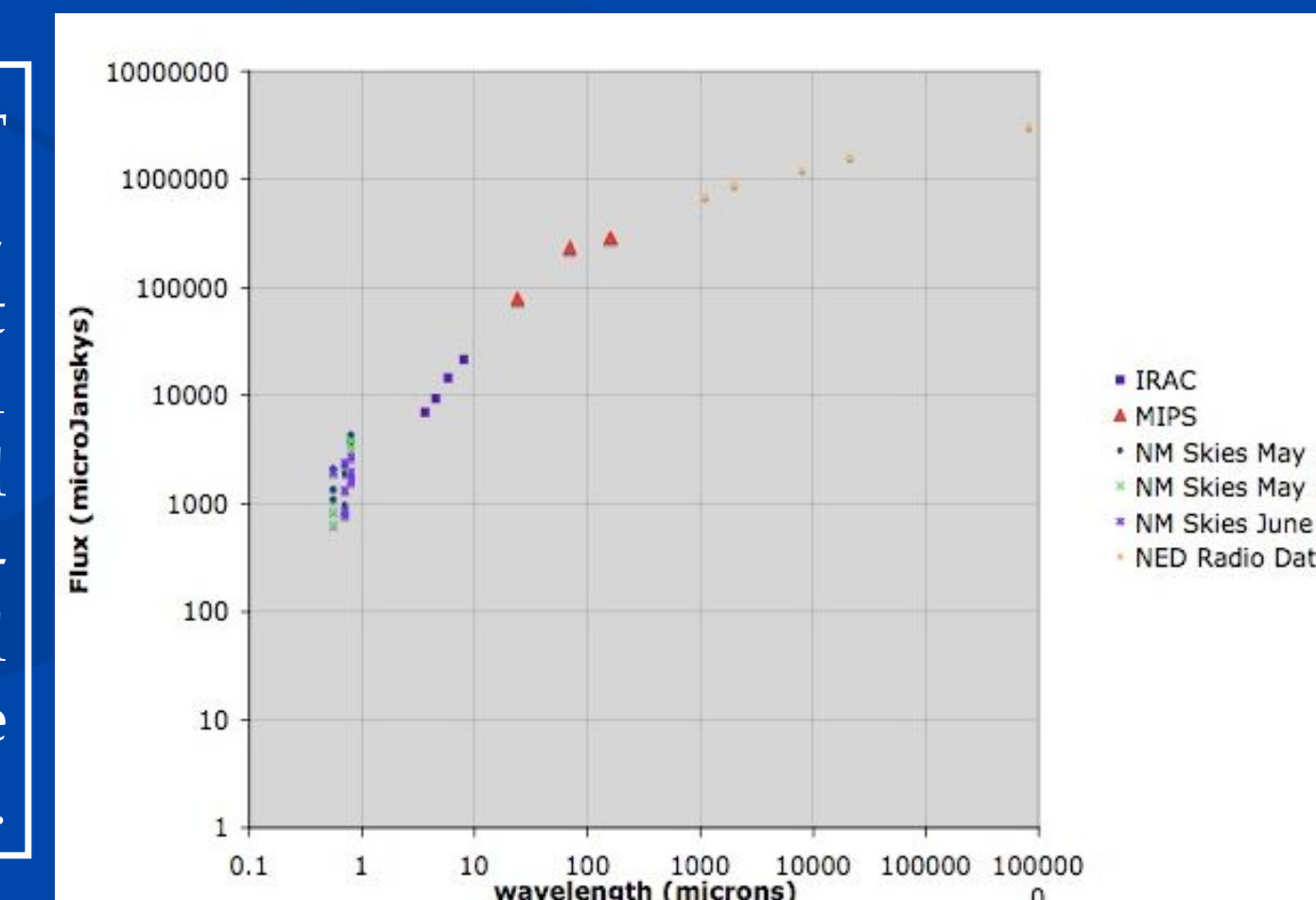


Right: IC 2118 3.6 μm (blue), 5.8 μm (green), 8.0 μm (red) tri-color composite generated using MaxIm DL. (By students M. Heath, N. Kelley, P. Morton, M. Walentosky, S. Weiser – Oil City High School, Oil City, PA)



Left: Spitzer images arrive calibrated in surface flux densities, or Mega-Janskys per steradian (MJy/sr). This means that photometry routines developed for use on optical data will not work (e.g., return reliable numbers)! On the left is a screen snapshot of an Excel spreadsheet developed by teachers (Roloefsen Moody et al.) to enable conversion of the numbers measured by MaxImDL (using traditional photometry routines) into calibrated flux units.

Right: Spectral distribution of GLAST Global Telescope Network target 4C29.45, from Adkins et al. They concluded that this spectrum matches the standard model of infrared emission from a torus around an AGN, with no additional synchrotron-driven radiation. This project has resulted in a student-driven DDT proposal; those observations are being scheduled.



THE WIKI, AND WHERE WE PLAN TO GO NEXT

New this year, we have started a wiki (<https://coolwiki.ipac.caltech.edu/>) on which all of the teachers and scientists can share the materials they developed within their teams, as well as share their results. Plans are underway to get students (and teachers) from across the country interacting on the wiki. We hope that other TLRBSE (and SOFIA!) teachers (not necessarily just those selected for the Spitzer program) and their students can also learn from and use the materials on the wiki. Multiple teachers from this project have presented or are planning on presenting a workshop on these materials at National Science Teachers Association meetings. We are planning to have another class of teacher teams meet scientist mentors in January 2009. If funding permits, we shall continue this program into the post-cryo Spitzer Warm Mission. WISE, and hopefully other NASA-sponsored missions such as SOFIA, will follow this model.