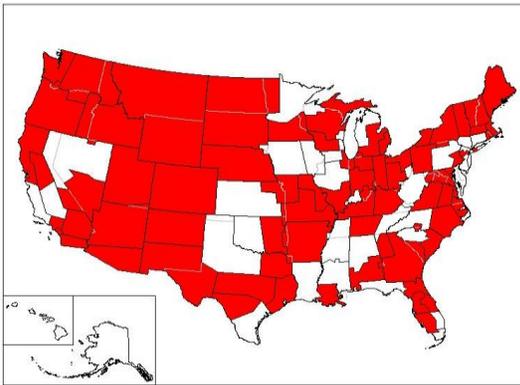


**BRINGING ASTRONOMY ACTIVITIES AND SCIENCE CONTENT TO GIRLS LOCALLY AND NATIONALLY: A GIRL SCOUT AND NIRCAM COLLABORATION.** L. A. Lebofsky<sup>1,2</sup>, M. L. Higgins<sup>1</sup>, D. W. McCarthy<sup>2</sup>, and N. R. Lebofsky<sup>3</sup>, <sup>1</sup>Girl Scouts Southern Arizona, 4300 E. Broadway, Tucson, AZ 85711 (lebofsky@lpl.arizona.edu), <sup>2</sup>Steward Observatory, University of Arizona, Tucson, AZ 85721, <sup>3</sup>University of Arizona, Retired.

**Introduction:** In 2003, the University of Arizona's (UA) NIRCAM (Near-Infrared Camera) E/PO team (NASA James Webb Space Telescope) and the Sahuarro Girl Scout Council (now called Girl Scouts of Southern Arizona, GSSoAZ) began a long-term collaboration. This collaboration brings STEM (Science, Technology, Engineering, and Mathematics) activities and concepts to Girl Scout leaders, staff, and volunteers and, in turn, to their councils and girls, i.e., to train the trainers. Nationally, our goal is to reach leaders in all 112 councils. To date, this program has reached 208 adults from 71 councils in 41 states and the District of Columbia (plus Guam and Japan), bringing together adult Girl Scout staff and volunteers, UA graduate students, and NIRCAM scientists and science educators to experience Arizona's dark skies.



Locally, our goal is to bring STEM education to girls of all ages throughout southern Arizona. To accomplish this in astronomy, we have additional ongoing collaborations with the Planetary Science Institute (PSI), the National Optical Astronomy Observatory (NOAO), and, most recently with the Amphitheater School District and other individual schools.

One of the programs that we have been recently emphasizing is Family Science and Astronomy Nights. These programs can be run at our local Girl Scout facility or can be incorporated into programs that we are running in local schools. Our plan is to provide a series of interconnected activities that can be done in classrooms, in afterschool programs, as part of the Family Science and Astronomy Nights, or in summer astronomy camps.

**Adult Camp:** In the three-day camps, adult Girl Scout volunteers and staff are provided with hands-on activities to bring back to their councils. The participants are also provided with science content background about the planets, stars, galaxies, and the formation and evolution of the Universe.

Participants also receive a monthly newsletter that provides them with timely information about the night sky and includes a relevant sky story. This provides a network of participants who can keep us and each other informed about what they are doing themselves and how their efforts are leveraged in their councils.

The first evening, before going out to observe the night sky, the adult volunteers and staff are taught how to navigate the night sky with a planisphere. They are told sky stories from cultures around the world. They also use a Human Orrery to "observe" the constellations and planetary positions in the sky that night. All evenings emphasize telescope equipment, observing the night sky, and planning star parties back home. The last evening is spent at the Kuiper 1.54 m telescope at the Catalina Observatories on Mt. Lemmon.



**Girl Scout Family Nights:** Family Science and Astronomy nights are held several times a year at our 17-acre Hacienda facility, the same location where we hold our adult camps. All family members get to participate in a variety of hands-on activities, telescope observing, and sky stories related to the evening constellations. These events are supported by our PSI and NOAO partners.



**Local School Activities:** Through an agreement with the Amphitheater School District, we are now doing STEM activities in several elementary schools. Our programs include going into individual classes, doing STEM-related activities for whole grade levels, after school programs for girls, and Family Science Nights.

**Our Network:** We keep in touch with camp participants, as well as teachers from some of our other programs, with a monthly newsletter, astronomical puzzles, links to articles of interest, and updates on astronomical topics of interest.

*Newsletter.* Our newsletter provides participants with information about what is up in the sky as well as a sky story that is appropriate for that time of the year. The stories are archived on the Astronomy Camp website. In turn, participants send us updates on what they are doing in their councils and other venues. We are also able to answer participants questions that come up now and then. Because the newsletters are disseminated by participants to others in their councils, we frequently get requests from others for materials for use in their outreach efforts, which we gladly provide.

*Programs around the country.* Contact with our Camp participants helps us to see how individuals are using our activities as well as how well participants have disseminated our activities to others in their communities. Programs that use our activities include: classroom visits, family night events, overnights, community programs, and programs with Boy Scouts, just to name a few of the ways our activities are being used beyond our council. Here are some recent emails: “It was touch and go with viewing through the scopes, but we managed to view Jupiter and it’s four moons when the clouds dispersed. We also had three stations where the girls learned the history and mythology of some constellations and astronomy vocabulary through two matching games.” “During those three days, I ran a station that taught the children about the Moon, the constellations, and the distance of the planets. I did a

lot of work with the Daisy and Brownie Scouts (age 5 to 8) on the Moon. I shared about how the stars are in the sky all the time and other basic concepts. It was amazing to watch and hear the girls’ response to my questions. It was even more interesting to hear the GS Leaders and parents be amazed by the information I was sharing with the girls.” “I taught the Sky Search badge to a Junior Troop. We are looking at spectra of Jupiter and all 4 of its moons. Another member of Rappahannock Astronomy Club provided the diffraction grating and video on his setup.”

**Other Collaborations:** Thanks to the success of our program and the national attention that we have received, other collaborations have been created:

*Arizona SciTech Festival.* The festival, in collaboration with Arizona’s Centennial Celebration, is Arizona’s 2012 platform for fueling public excitement and understanding of Arizona’s world leadership in science, technology, and innovation. GSSoAZ will be participating in events in Tucson and Phoenix and leading some of its own events during this 4+ week festival.

*21<sup>st</sup> Century Explorer.* This past summer, we were funded by NASA’s Johnson Space Center to run five summer camps in southern Arizona for nearly 200 girls. The program is designed to introduce third to fifth grade girls STEM and NASA space exploration concepts. We will be running another camp this coming summer in Tucson.

*National Girls Collaborative Project (NGCP).* GSSoAZ was chosen to lead the Collaborative in Arizona. Arizona is now one of 18 Collaboratives serving 30 states. To quote the NGCP website; “**Building the Capacity of STEM Practitioners to Develop a Diverse Workforce** will strengthen the capacity of girl-serving STEM organizations to reach and serve under-represented girls and provide high quality resources for K-12 school counselors to address the barriers to girls’ engagement in STEM.” We hosted the leadership conference in December and are now moving forward to build our Collaborative throughout Arizona.

**Near-Term and Long-Term Goals:** Our near-term goals are to provide experiences for girls that they might not otherwise get in school and get them to appreciate the night sky. Through these programs and our existing and future summer camps, our long-term goal is to empower girls ultimately to become leaders who are excited about the night sky and can take lead roles presenting activities and facilitating astronomy nights.

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