

Questionnaire Responses Website Version

Since 2004, 265 adults have attended the NIRCcam Girl Scout Astronomy Camp. Of these, 195 are still receiving our monthly Astronomy Camp Newsletter. In the spring of 2015, we sent out a Questionnaire to 184 Girl Scout adult leaders who had attended Girl Scout Astronomy Camp from 2004 through 2014 (11 attended Camp in April 2015, after we sent out the Questionnaire). We received 46 responses. Three no longer work for Girl Scouts (their Council no longer supports STEM, but one gave an extensive response to the first question as she is still heavily involved in STEM) and another, stated that their Council now uses “STEM experts.” The responses represent 28 Councils in 19 states and in some cases there is extensive on-going local collaboration among Camp participants.

We asked the following questions:

1. How has our training affected your life, goals, and your approach to STEM education?
2. Describe any cases where girls in your troops continued their STEM education as a direct result of the training and materials we provided you? If possible, include specifics along with quotes from any girls and adults who were especially affected by your programming.
3. Have any of the girls in your troops decided to pursue STEM majors in college as the result of an activity you provided using materials from one of our NIRCcam/GSUSA workshops?

Below is a summary of the responses (sorted by the year they attended):

1. [Attended 2004]—I participated in the first astronomy camp when I was a volunteer Girl Scout leader. At the time I was interested in sharing math and science with the girls in my troop, and to others in my community, however, I had limited knowledge about outreach. When I attended the camp I learned about the need to provide science and math learning experiences to girls that incorporated accurate information. I learned that many misconceptions about science continued to be taught to learners, even through Girl Scout material. But, the most inspirational experiences I had at the camp were the discussions and debriefs around the hands-on activities. It amazed me how the facilitators could have such a deep conversation about abstract and theoretical concepts in such a relaxed atmosphere. As a participant, I felt that they were sharing the secrets of the universe with me with the expectation that I was smart enough to comprehend what I thought only scientists could grasp. They believed that I was capable of understanding and led the conversations in such a way that I could participate in a meaningful way. That was a pivotal point in my career. I wanted to share science and mathematics with others in the same way. I wanted my audience to know that I believed they were smart enough to participate in the learning of abstract concepts, even if they did not believe in themselves or see themselves as being capable. I returned to several astronomy camps and was able to practice my science facilitation skills. This helped me tremendously and gave me the courage to do STEM outreach as a career. I have since been involved in STEM outreach for nearly 10 years, providing opportunities for girls of all ages to have an opportunity to try something new; to know that it is OK to struggle before understanding happens; and to decide for themselves who can "do" science. I am now furthering my academic career in a degree in educational psychology. With a background in mathematics and physics, I am now interested in researching how learners create their identity in mathematics and how this identity can affect their access to math education. I have not had any girls from my troops enter STEM directly from materials I received from your camps that I am aware of. However, I have facilitated several of the activities at family science nights, including the sorting activity, the H--R diagram and red shift. **Note:** Now working at UA STEM Center and SARSEF and has just been admitted to Grad School in Education Psychology.
2. [Attended 2004, 2006, & 2014]—The training I received from participating in the Girl Scout Leader Training transformed the program at our council. By getting specific training about the science the missions of the Spitzer and James Webb Space Telescope has or will be doing opened my eyes to the idea and importance it is to promote the missions of NASA. Needless to say, there exists little understanding by the public, especially the young, have with respect to infrared astronomy. Most people are familiar with the classic telescope and the images of the Hubble, but rarely do they think about the electromagnetic spectrum and what they can't see until the unfortunate time when they need a medical x-ray. The focused training on this field with hands-on activities for youth is not just limited to young girls. We use the activities, training and information with adult groups to inspire them about astronomy and most notably infrared observing. These venues include Boy and Girl Scout camps, local observatories and even a retirement complex for my mother. We have found that kids really come out of their

shells when they have activities with tangible learning experiences using their mind, eyes and hands. Something as simple as showing them how a remote for their television uses infrared energy to find their show. The program at the University of Arizona is unique and special. Without this program and training, thousands of young ladies would most likely never hear of the James Webb Space Telescope, infrared astronomy, look back time, discovery of exo-planetary systems and stars, other than the short blurb on the evening news during launch and deployment. The girls we serve the majority of time are not more than 9-10 years of age and up. It is a wonderful opportunity for them to be introduced in this science, space, astronomy and NASA. Thank you for supporting this program. You're making a difference in the future of space science.

3. [Attended 2004, 2006, & 2014]—Astronomy has never been a strong subject for me. That is why when I had the opportunity to attend the NASA sponsored Astronomy Camp at the University of Arizona I had no hesitation to sign up. My husband, Joseph Wright and I teach Astronomy for Girl Scouts of NE Kansas and NW Missouri Council. We are always looking for ways to improve our program to help the girls and parents understand and have relevant concepts to Astronomy. My husband has the stronger background in Astronomy so any knowledge I can learn to assist him better in providing a good program is all the better. Since attending the camp, I can definitely see a better understanding from the girls after doing the activities we learned at the camp. Especially from the distance program, where we have the girls place photos of different places on earth as well as space objects in closest to farthest. To see their minds grasp how close space really is and to understand how vast it is too. It is so gratifying to hear the girls say: "Thank you for a fun and wonderful evening. And that they will definitely go to an Observatory when they are able." "This was a lot more fun than I thought it would be." They cannot believe their eyes when they just look up and see the night sky but when they look through the scope. All the "Oohs" and "Wow" you hear. Or when they tell their leaders "Can't we stay longer." That is when we know we had a good night. We started our endeavors in teaching Astronomy with Girl Scouts in 2003. Because of the knowledge that I have learned, I have been able to use it in my interactions with school science nights. This is where our Astronomy club takes out scopes and Astronomy related information to share with the parents and students. The training I received has helped me speak more knowledgeable and confidently in the information I am passing on. I still have so much to learn but because of Astronomy Camp it has opened my eyes to my past misconceptions and ignorance to facts. Before I was content to just assist where ever but now I want to make sure everyone has a chance to see and try to understand the beauty of the universe. My husband and I will be expanding our classes to the older girls in our Council. Apparently before they felt there was no desire for our program from that age group. But from our inquiries we have found this to be inaccurate. So we will be providing an expanded and more challenging program for them this coming spring. If this is well received, we will be possibly looking into coordinating an Astronomy Camp of our own for Older Girls. Upon retiring my husband and I have spoken about creating a nonprofit Astronomy endeavor to provide Astronomy classes to more rural areas – schools and public. That would be our ultimate goal but for now we are just proud to continue the Astronomy education to Girl Scouts and the general public. I hope NASA will continue to fund such programs as Astronomy Camp so many more leaders may lead in knowledge and confidence.
4. [Attended 2005]— Shortly after my trip to AZ I did an event for about 75 girl scouts using some of the materials from my camp. In about three weeks I will be doing another event for about 175 girls. I am a Math professor, so STEM is a major part of my life. I do several different STEM events every year with Girl Scouts. Several Girl Scouts that I have worked with have gone into science in college. I cannot say which of the many activities I have done with them influenced them the most. I do FLL robotics, Techbridge, Design Squad, etc. With the girls along with the astronomy activities. The course provided by NASA & University of AZ truly sparked interest in my troop. The girls chose Greece for Thinking Day because the Greeks and Romans named the stars and they thought that was cool. We reproduced many of the classroom tools you gave to us: The phases of the moon, the rotation of the planets. Instead of the light spectrum we made kaleidoscopes but they didn't turn out so well! Its the experience of doing this endeavor. Not just the end result. The girls used the sky guide on my iPad and we wore glow in the dark necklaces & bracelets. The event wasn't what I wanted but it was a start. Our community coordinator likes to do the same thing year after year <yawn>. We are scheduled to go to the Southwest MN State University for a special program that is based on studying the heavens. They cannot wait! The other girls at the event did a spin off about the NOAA because they chose Australia for their country. The focus of this year's event was the broader sense of science. Thank you for everything. I wish I could go thru this again. I know that I will

never realize my dream of teaching leaders how to be leaders if I don't do my homework. I can describe four activities/ events that I have done with Girl Scouts since I was in Arizona: 1. Shortly after I was there. Two overnight camps the same weekend for Brownies and Juniors. As I remember - the activities done were the Play Doh Worlds in comparison, the bottles filled with sand comparing weight on different planets, Pony-bead bracelet - distance from earth to moon, and a constellation activity. We had the college's 10 inch telescope and viewed Saturn and other things as long as the girls were interested (it was several hours). About 50 girls per night, for a total of 100 girls and their leaders. 2. We have had the telescope out a several other Girl Scout camping events during the past 10 years. All ages - Daisies through Ambassadors. 3. Fall 2014, Girl Scout FIRST Lego Leagues team. 9 girls - Juniors, Cadettes, and one Brownie. This year's theme for FLL was to find a better way to learn something.... The girls brainstormed ideas for their project and narrowed it down to Black Holes (which beat out Japanese Anime). We spent a good bit of time coming up with ways that rural kids in a relatively low income area could learn about astronomy. The girls emailed numerous planetariums and museums asking for ideas (responses were mainly to go to the NASA webpage), contacted the local college, and the local Middle School (to see if they has a local Young Astronomers club). They received information about the Canary Island telescope and each girl programmed that telescope to take a picture for them. They borrowed Galileoscopes from the college and used them at home for a month. They contacted two recent graduates of the local High School that are currently in graduate school studying astronomy ([one] at University of Washington and [another] (my son:) at University of North Carolina (he is working in the group that is building the Everscope and also studying exoplanets). The FLL team then made a brochure listing all the options they discovered to learn astronomy better and distributed it to local teachers. They also decided that we needed to have an event about astronomy for the local Girl Scouts. They presented their ideas at the FLL competition in November. While they did not get an award for their project, they did receive the outstanding robot design award. Their team name was Galaxy Girls. 4. March 2015: The FLL girls desire to have an astronomy event led to their planning our annual YMCA event (4 hour event we have had every Girl Scout week for 25 years). We had several sessions about astronomy that the FLL girls selected - the Play Dough World in Comparison session, a constellation session, a distance to moon session (made bracelet and had to scale moon and earth globes - the girls guessed the distance between to two then the leaders of the session showed them the "actual" distance using a string) and a planet game (totally nothing taught but the order of the planets but it was fun). We also had the telescope out in the parking lot (not ideal because of lights) and the girls were able to view Jupiter and eventually the moon when it rose above the trees. They also had a swim time. All the session at this event are girl led, so the older girls (6th grade and up) actually lead the sessions. We had 160 younger girls (Daisies, Brownies, and Juniors) at the event, 30 older Girl Scout session leaders, and 60 adults leaders. The reviews of the event were great and we have great interest in having some more telescope nights at a better location.

5. [Attended 2006]— I am sorry I did not respond to the first email. I was released from Girl Scouts due to position cuts. I did not have an opportunity to create and present the program to the girls. I have started working with our after school program and I am using some of the activities we did while I was at Camp. I have always been interested in this and am looking forward to continuing introducing our students to activities I learned at Camp. Our students are in grades K through 6 so it is a challenge as I work with all grades at one time! They seem to enjoy anything we do. We will be making constellation viewers from Pringles cans and "slides" from tag board. This is the beginning of our solar system unit. Thanks for all you do. The Camp was one of the highlights of my Girl Scout training and I am so thankful I can now put what I learned to good use. The students are looking forward to the planned activities! Also, this gave me the opportunity to let you know that I still enjoy the memories of my training at Camp and also the emails I receive regularly from you. I know this will not help with your funding although I do want you to know.
6. [Attended 2007]—Astronomy Camp has had a tremendous effect on my life. As a female educator, it empowered me with knowledge, activities, and methodology in finding more science related information to share with and teach young people. I have become focused on finding STEM based learning activities for my students. I have searched for programs that connect girls to science and have enabled students beyond my classroom to participate in STEM programming at local universities. I have become driven to connect myself and in turn my students and students in my school district with STEM learning. Astronomy Camp was a catalyst for me professionally, as since then, I have participated in a Polar Science educator workshop, which involved NASA imaging of the poles among

infinite other scientific research regarding the poles. I will be participating in another inquiry based learning training to further my understanding of data collection and science education. My colleague and I have set up a STEM lab for our kindergarten students. I focus building and play on engineering products with given materials. The thought process of my students and what they create is exciting. Outside my classroom is a "READ" poster. It depicts me with My Book of Planets and a kindergarten student (now in 4th grade) looking through a telescope. For **years** after I visited a GS summer camp and did an afternoon program related to planets and their relative distance from the sun, a student from my school asked (every time she saw me), "When can we do that again? It was so much fun!" One of the girls from my troop contacted me to let me know that she was taking an astronomy course in college. She said that she understood the material well based on her exposure to astronomy through our troop activities. She is a ski instructor and has looked at and named constellations with her ski students. (Orion is visible for our evening ski season.) She attended troop meetings at open astronomy nights at a nearby university as a scout. She participated in the astronomy weekend organized by 3 astronomy camp leader alumnae. The telescope went to troop camp when she was in scouting. All of those activities were a direct result of leaders attending astronomy camp. This young lady's success in her college level science was enhanced by her participation in astronomy activities through scouting. She is studying to be a teacher and will carry her passion for science into her classroom, thus sparking STEM knowledge and interest in more of our youth. She is one of many young people directly affected. I must mention that this young lady was also able, through generous funding, to participate as a student in the astronomy camp as a middle school student which she would not have done had I not been a camp participant as a leader. Astronomy Camp is life changing with a "domino effect". I am considering furthering my own education by pursuing coursework or perhaps a degree in STEM education. I would like to increase the STEM focus in my approach to teaching. I have observed science get pushed to the back burner by colleagues and administration as so many focus on benchmark testing in ELA and math. I believe that ELA and math can be taught through science and look to further my own understanding of science concepts so that I can use creative scientific methodologies. All this stems from Astronomy Camp. Every time I get on an airplane, I think of the jet ride home from Astronomy Camp and the thought of propulsion, expansion, and the drive that the universe has. Astronomy Camp offers insight to infinite possibilities and learning potential. The only thing holding me back is the need for funding to cover college course costs. Today, when I wrote the word "cold" on our kindergarten weather news board, I wrote it in red because red stars are the colder stars. Today and every day I look at my world through a perspective that was enhanced by Astronomy Camp. I have sent copies of your newsletters to my daughters' science teacher when she was teaching a high school astronomy course.

7. [Attended 2007]— We really enjoyed our experience at the training and appreciated the opportunity for professional development! We found that incorporating kinesthetic activities in our program when talking about orbital paths, distance between planets, etc. is key with most girls. We now include some physical component to all our STEM activities. So often the girls attend overnight STEM activities with the thought of "just star gazing" as the only activity. We have used materials and ideas from our training to make the typical telescope time into something more. For example, we had one group make the night sky cameras out of disposable cameras. Two girls had photos developed on their own and shared with us. Both continue to use and experiment with night time photography. In addition, we provide training to our adults on how to use a telescope. We incorporate a galaxy match up game and give the adults a simple version to use with their girls. We have seen a progressive increase in the number of girls attending STEM programs in the last five years since I attended the training. The activity guide and sample activities have really allowed me to diversify our program and attract more girls to STEM. Many plan on attending college and pursuing careers in STEM thanks in part to their participation in GSSI STEM program.
8. [Attended 2008 & 2014]—I don't have direct troop involvement (I mainly volunteer as a facilitator for Gateway Council). I have had opportunity to attend Girl Scout leader's camp once with the regular session and once with an advanced version of the class that was recently offered. The camp has inspired me to do more in Astronomy for others as well as myself. I hold my classes in a similar style as the observing sessions in the U of AZ GSUSA camps and use a lot of the materials they provided. One of the tools I like to use is a scale model of the Earth and Moon, connected by a string. It helps to illustrate just how large the universe is. Dr. Lebofsky also inspired me to include the moon more in my personal and public observing agenda by making one small statement - "remember, the moon is our nearest neighbor". Dr. McCarthy inspired me to incorporate more mathematics, in a non-intimidating way, to my programs. The camp gave me opportunity to expand my Astronomy knowledge, as well as

use equipment normally not available to amateur astronomers, and all they ask is to "be a steward of the knowledge". In addition to Girl Scouts, I also bring the material from camp to: - **Boy Scout camps**; - **School outreach** programs for Alachua County Florida; - **Public outreach** through Alachua Astronomy Club including "Starry Night at the Museum" and "Hickory Farms Ranch" (a fundraiser for Paynes Prairie Park), both of which attract thousands of viewers in a single night. In the most recent "Starry Night", I had a line at my telescope looking at Uranus for 3 hours & 20 min! Also, that event is on University of Florida campus and I help Astronomy students with their lab work during my viewing session.

9. [Attended 2008]—This greatly expanded my interest in Astronomy and STEM education. It's the hands on approach that works so well for me as an adult and of course the girls love it too. I can't count the number of girls that I have shared and worked with over the years - there have been too many. We've built Council kits for Brownies and Juniors with lots of fun stuff to do. Oops! They may actually learn a thing or two along the way! I have done yearly partnerships with my local planetarium where the girls and I do hands on projects with our kits and they also get to see a show. I have done weekend events for 50 to 100+ girls using hands on projects and some stargazing. Our Council has a portable StarLab that I've had sooo much fun with over the years. The girls especially like comparing the myths and stories from different countries and cultures relating to the constellations. Locally, my service unit has expanded to explore other sciences. We have an annual science badge day. One girl who found STEM as her passion. She organized one of our Science Badge Days as her Silver project. She then started a junior Robotics club at the local middle school for her Gold project. She is currently studying engineering in college.
10. [Attended 2008]— The training made me a more confident leader, and provided me with the proper resources to successfully teach my Girl Scouts the importance of STEM. The training, ideas and take-always, made it so easy to share this knowledge with my troop. This camp was truly a lifetime opportunity to really experience what I was trying to teach my troop. As a result of this hands-on experience, I was able to enthusiastically regurgitate what I learned at camp. Knowledge and passion together equal engaged learners. Though my troop is not as active as we once were when the girls were younger, I have three high school girls that have chosen clear career paths in STEM fields. I have one who is taking AP courses in biotechnology, another who is taking AP courses in veterinary medicine, and my daughter who is in the International Baccalaureate program and plans to study biomedical engineering. I have been their leader since kindergarten, and always stressed the importance of science, especially. I have no doubt that these girls began an early love of STEM because of their experiences with Girl Scouts and their troop. The experience that I gained in Astronomy camp flowed directly from me into the minds of these young girls. To this day, all I have to do is mention infrared telescope and they all know exactly what that is. My daughters especially have developed a love of the night sky. I don't think this would be if it weren't for the knowledge that I took away from Astronomy Camp. As mentioned above, my daughter is still in high school, but is planning a career in biomedical engineering. I am confident that activities such as when we tried to construct our own infrared telescope, played a role in her decision to pursue a career in STEM. Through your ideas and help, you helped me make STEM learning fun and engaging. In turn, this fostered a love of STEM.
11. [Attended 2008]—I attended Astronomy Camp in April 2008. I always enjoyed learning about Astronomy but Camp started a passion for me. I shared this with my husband and then we both wanted to teach others about Astronomy. We are Girl Scout Volunteers and have done most of our programs with our Girl Scout Council. Three Astronomy themed weekend Camporees for Girl Scout Service Units. The first had 200 girls K-12 and 40+ adults. We learned very quickly what we could and couldn't do with a large group and when the sky wasn't cooperating, we had to improvise and develop a couple new activities until the sky cleared a little. The second had about 100 girls K-12 and 25 adults. The third had about 50 girls K-6 and 15 adults. We showed our first indoor slide presentation because the sky wasn't clear. For all of these we had similar activities: We had several stations to explore for badge work and for fun: Solar System activities (from Camp), Women Astronauts and Astronomy Scientists, Telescopes – what they are, how to use them and space telescopes, Activities to explore what is in the Universe. Some of the Large Group Activities: Acting out the rotations of the Earth and Moon and their orbits around the Sun, Acting out how the Constellations “move” around the Earth, When we can't see the Constellations, we have small groups of girls to take a map of the stars in a particular Constellation and place themselves so that they each represent a star and we guess which Constellation they are, Looking at celestial objects through the telescope and/or binoculars. We Developed and held a 3-part patch program for Girl Scouts of all ages

to be done on 3 different Saturdays (1/2 day) for about 30 girls. I did Daisies and Brownies in the mornings and Older Girls in the afternoons. (Galaxies, Planets and Stars! Oh My! – 3 pie-shaped patches when put together formed a circle). The first session we explored the Earth, Moon and Sun. Favorite activities were to act out how the Earth, Moon and Sun move (how that causes the seasons, eclipses and phases of the Moon) and learning about impact craters where we dropped different size rocks into a tub of flour to see how craters are formed. The second session was about the Solar System. Favorite activities were Planet Comparisons with Play Doh, Space Weight and the Toilet Paper Solar System. After that each girl got to decorate a large cookie as a new planet. The third session was about the Universe – galaxies, stars etc. The favorite activities were film canister constellations and magic stars (where you use a white crayon to draw stars and other celestial objects onto a white piece of paper and then paint the whole page with black tempera paint. When it dries the stars show through the paint. Every year for the last 4 years I have taught a 1-hour course to share Astronomy with girls of all ages at a Training Day for Adult Leaders. I average 8 participants for each session. I use mostly the activities we did at Astronomy Camp along with some others I have found online. I set up about 30 stations for adults to explore with their fellow leaders. I start with an introduction and then set them loose. I offer tips and other ideas how to adapt the activities to different age levels. We also do one of the group activities together. I especially like the Toilet Paper Solar System since we are inside a school and girls love the activity. I give each of the participants a folder with the list of activities, a glossary, books and websites of interest, an article by Sky and Telescope on getting started in Astronomy and a CD that has pdf files of every activity that was presented and the resource documents in the folder. Most are interested in the session when they walk in but are not expecting too much. When they leave, though, they are excited to have so many activities that are easy to do with their girls so that they can explore Astronomy together. I have had some leaders who already enjoyed Astronomy but didn't know how to involve their girls but with the workshop they now had ways to do so. I also give them a business card with my contact information so that they can contact me if they would like us to come to their troop or Service Unit to do a program. We have gotten a lot our program opportunities this way. Several Star Parties for Service Units or Troops with 4 – 80+ girls at each event (At first, many were cancelled because the sky was cloudy. We have now developed an indoor program so that we can have a Star Party no matter what the weather is like.). Badge Workshops – we use as many activities from Camp as we can and implement others to fulfill the badge requirements. Most of these have been at Camporees but we have worked a few times within a troop setting. The last one we did was in January with 4 Older Girls. They didn't know a lot about Astronomy but as we talked with them and worked on the badge together they got more and more excited about what they were learning. They assumed that we were professional astronomers and were surprised to find out that we did this just for fun and that they could, too. They seemed to take an interest that they might pursue Astronomy further. Astronomy station at a Service Unit overnight Lock-In - Girls would drop in during their free time to do a few activities: Astronaut Table: Blast Off Boutique – Astronaut Gear (from NASA), Astronaut posters, books and information; Solar System Table: Planet Bottles, Space Weight, Worlds in Comparison; Stars and Constellations Table: Film Canister Constellation, March Star Finder (from NASA); Misc. Table: My, What Big Eyes You Have (from NASA showing how the bigger the telescope, the more light it collects), Galaxy Classification. We are scheduled to do a 4-part Astronomy program starting in March (one for each season) to look at the differences in the sky at different times of the year and explore a different area of Astronomy each time. This is for a Service Unit with 75+ girls. We will spend about 2 hours looking at the sky using the telescope and just our eyes, doing activities appropriate for the topic of the night, including a craft and a snack. We try to select a craft that is able to be used at home to continue the girl's exploration. We have invited neighbors and friends for Star Parties and watching Eclipses at our home many times. We have an open invitation to people to come on Friday evenings to look at the sky during the summer. We have presented programs and Star Parties for an elementary school class and science club using program materials from Camp. I led a 6-week 1-hour Astronomy time with a class and had 2 Star Parties with the Science Club. We ended up moving to a new home farther into the country with a much darker sky so that we could share Astronomy with more people. We even took our telescope on vacation. We planned our trip to coincide with the Grand Canyon Star Party and shared our passion with the visitors who came there. We are looking at developing programs to take to elementary schools and possibly after school programs. **Anecdotes**: The first story I have to share happened during Astronomy Camp. The first night we went out to just look at the sky and see what we could discover. I think it was Don that mentioned about the Big Dipper having a double star. He pointed it out to us. I had brought my binoculars and I spent most of the time

looking at Mizar and its star system. I was ecstatic to discover this. I never knew about multiple star systems before and I often share about Mizar with participants in our programs. I have since learned that there are more stars in that system but Don just told us that it was a double star because he knew that that was just enough information for the time being. And it was! It got me hooked. The second story: One girl about 8 was afraid to look through the telescope at night. She had already looked through it during the day when we led a session about the telescope, how it worked and how it was used. She was terrified that she was going to see an alien on Saturn, the object at which we were looking. We assured her that she wasn't going to see an alien but still she didn't want to look. Her friends finally convinced her that there wasn't an alien. She cautiously went up to the telescope and looked through it. She got so excited and happy because she could see Saturn and its rings. Looking through the telescope took away one of her fears and sparked a curiosity about Astronomy. Third story: One fourth grade boy who has ADHD and was often getting in trouble participated in one of our Star Parties. We had about 10 elementary students that night. It was in October and getting too cold to stay out longer. We had already been looking at the sky for 1 1/2 hours (at the constellations and at objects through the telescope.) This boy did not want to quit. He kept asking if we could stay out longer and look through the telescope. His grandfather who is rearing him was also there and the boy desperately wanted his grandfather to get a telescope so that they could look at the sky at home. His grandfather was thrilled that something had caught his grandson's attention that was positive. Fourth Story: On two different camporees when we were looking at the sky with girls and the sky was not cooperating well, we saw a moon halo. We have also looked at the International Space Station and Iridium Flares with groups. Everyone who has seen the Space Station is excited to make the connection with the astronauts there. Fifth story: Several times we have had girls or boys come to us and express their excitement about Astronomy and their plan to continue exploring it on their own. We try to give resources to help them in their discovery. Sixth story: The Astronomy Newsletters and emails about Astronomy current events have been invaluable in giving us more ideas to use with groups, more constellation stories to share and knowing when to invite others to share in the Eclipse, Comet or whatever event is happening. Seventh story: We always take time to share about telescopes. We look at the different parts and what each part does. We also talk about how astronomers use ground telescopes and space telescopes. Everyone is always excited when they see something through the telescope. We try to look at more than just the Moon or a Planet. We like to share Multiple Stars, Star Clusters, Galaxies and Nebulae depending upon the group and the sky. Eighth story: We look at the Constellations that are visible and show how to find them. We also tell stories about the Constellations to help the participants remember them. When we point out a Constellation and someone sees it for the first time, they shout out, "I see it! I see it!" they then take that accomplishment and confidence with them. Persona: I didn't enjoy learning about science until I was an adult. Learning about Astronomy has led me to learn more about physics and chemistry which I never liked before. All of the knowledge and activities I brought home from Camp gave me tools to begin to share easily my new passion about Astronomy. I am not a good teacher or lecturer so the activities are a good way for me to use STEM education in a way that is fun and yet the participants are still learning. I have continued to learn about Astronomy through courses and reading. I am always learning something new in STEM education that I can share with future participants. A personal note: I have to tell you about our Girl Scout Council. When we (there were three of us) signed up for Astronomy Camp our council was very glad to have us trainers go and bring back new programming for our girls and adults. We knew that we had a 5-year commitment (at that time) to share what we learned with our council. We came home from Camp excited to do just that. That very day was the Annual Meeting for our newly merged and much larger council. We were able to talk with the executive director about what we hoped to do. She put a smile on and acted glad but we could tell she really didn't care and didn't want us to do anything. The part of the new council she was from already had a science center with a telescope and a staff person in charge of all of the programming about Astronomy. She wasn't interested in us being a part of that. Consequently, it has been very difficult to get started using our training. I have now been able to do several programs but it took a couple of years to let people know what was available. One of the other trainers is a high school science teacher and she has used her training teaching her students and at some local Girl Scout events. I have lost touch with the other one and don't know how she has used her training. I was extremely disappointed to be so excited to share my newfound knowledge and be told that we don't want you and by the organization that I was trained to help. By the way, she is still the executive director. If you have anything that you would like to say to her, let me know and I

will get you her contact information. Thank you for all that you have done and are doing to help teach about Astronomy! It has changed my life!

12. [Attended 2009]—Attending this workshop exposed me to a topic that was new to me and I left the camp very excited to implement programs at my council that not only was STEM related but to expose girls to role models who work in STEM related industries. I also left with the idea to partner with my local university which I have. I have used many grad students to facilitate programs and they are a great resource to me. I've also partnered with MOSI (Museum of Science and Industry) who have a planetarium and partnerships with local astronomy clubs. I know of one girl who actually attended a UA Astronomy camp after attending a weekend program we held called "New Moon" and she enjoyed it very much. We have many girls that entered STEM fields because of programs they attended as Girl Scouts.
13. [Attended 2009]— My time at the Astronomy Camp further encouraged me to "return to my roots." As a geology major but one who had been out of the field since I "retired" to raise my children. I had just been getting back into the sciences with my Girl Scout council but my time in AZ really got me excited to start doing science with the girls again. My council has a Star Lab Planetarium which I had been working with but honestly never branched out beyond the same workshops the council had always been doing. After the new ideas and lots of new activities I picked up at camp, I began to expand the classes to other aspects of what the Star Lab was capable of. I chair a large event for Girl Scouts held every other year at our local mall. I was finally able to convince the rest of the committee this was the year of STEM. We have asked troops to do activities based on STEM. We have tables we know so far doing three stages of water; eggs in bottles; magnet maze; how far are the planets apart; how does our sun compare to others; what's that animal in the sky?; we also will have 5 organizations that work with STEM coming to do presentations. I will be pulling out the resources from camp and have lined up a troop of girls willing to go through the information I brought back and set up some activities based on information from the camp. One of my girls started her Gold Award based on the James Webb telescope. As part of her presentation she used the cookie cutter we received to make snacks and used the paper model for the kinesthetic learners. That was a huge hit. Unfortunately she did not finish her Gold Award due to some health issues. After a year off school she was able to start college at the U of Dayton majoring in Mechanical Engineering which she plans to use to get a masters in Aerospace Engineering. One of the girls taking one of the workshops decided to volunteer at the Carnegie Science Center in Pittsburgh. She ended up majoring in Astronomy at I believe U of Wyoming although last I heard she was looking to transfer to a school closer to home.
14. [Attended 2009]— I attended Girl Scout Astronomy Camp in October of 2009. I used what I learned to establish an astronomy club for the Girl Scouts of Citrus Council in Orlando, Florida and became their astronomy advisor! We were able to partner with two local amateur astronomy organizations - the Central Florida Astronomical Society and the Brevard Astronomical Society - and used their volunteers and equipment to set up a series of star parties and STEM events over the next few years where we reached - quite literally - hundreds of girls. We invited distinguished women speakers such as Charlie Blackwell-Thompson, the first woman to launch a Space Shuttle; astronaut Nicole Stott, veteran of three shuttle missions and space station crew member, and NASA engineer/astrophysicist Kathleen O'Brady, to share their knowledge and experiences with the girls. All of these were big hits and generated great interest in astronomy. We were able to purchase telescopes for the astronomy club and teach the girls how to assemble and use them. We explained the differences between refracting and reflecting telescopes, talked about Hubble and JWST, and showed the Girls that the Girl Scouts were going out to space on the JWST instrument table. We also expanded our astronomy activities to include stargazing events for parent volunteers and even held a stargazing activity at Boy Scout camp. Your camp did more than kick-start the astronomy program at our local council, it expanded into talks and other STEM activities on rockets and robotics. I do have one anecdotal story of a girl scout who went on to study STEM. My own daughter, Rachel, who became my assistant at these events, is now a freshman studying biology at the University of Central Florida. To my delight, she signed up for an astronomy class and applied for an internship with NASA working in astrobiology! Thanks for getting the ball rolling for us.
15. [Attended 2009 & 2014]—The Astronomy Training Camp was literally life changing for me. Before I attended, I really had little interest in astronomy, the stars, or outer space. I was, however, interested in learning anything new that would be challenging for my girls. They had been very interested and enthusiastic when we went to Girl Scout Days at Kennedy Space Center. I learned so much and so many great hands on projects to do with the girls. I came

home and used my information to teach my daughter's REACH (gifted) class a lesson on planet distances (I used the string model and also used math to figure out how many times they would have to walk around their track to get to the moon) and then planned a weekend long Astronomy Camporee for 200 girls. It was very well received by the girls and parents. It made my interest and curiosity about all things galactic increase tenfold. I was excited to be able to deliver program to girls of all ages that included STEM ... they loved it and begged for more. Me ... the social worker ... teaching astronomy. It was truly empowering to me and has been eye opening to what little STEM teachings are out there for girls. I have done three different astronomy campouts since I attended the training as well as several school and personal activities. One of my girls, found the projects and information fascinating. She loved the material so much, that she helped plan and facilitate activities for younger girls at Camporee. She also wanted to attend the Beginning Teen Astronomy Camp offered at UA. She had to wait three years to do that and had to take Algebra and Geometry as advanced classes. She did so and has remained two years ahead in math and science since then. Although she is only in 10th grade, she has investigated astrophysics as a possible college curriculum. I used the activity of taking apart a disposable camera to teach about light and how lenses work, and relating that to different kinds of telescopes and binoculars. The girls were enthralled and listened to every word. They even kept the broken pieces of their camera and took them home. One of my girl's mom is a elementary school math teacher. She was so impressed with our activity, she posted on Facebook that "she learned things from Gabby and was so happy that the girls learned something useful ... BRAVO to the facilitators who got these girls so excited over science!" I am aware of several of my older girls who are taking honors and AP classes in science and math to enable them to continue that path in college. I have one girl on a medical career track, one on a science/pre-law track, one who is taking math and science honors and AP classes and has signed up for Astronomy for next year. My girls are only in 10th and 11th grade.

16. [Attended 2010]—Attending the camp, prepared me to guide girls and adults in the science of astronomy. I gained the confidence needed to prepare and teach this course to others. I also came away from camp with lesson plans, great ideas, and other adults with which to collaborate on new and better star gazing and astronomy classes. This class was a spring board for me to grow from just astronomy to Lego robotics and engineering for girl scouts and my 5th grade classroom. My goal is to expose girl in girl scouts as well at my 5th graders to jobs in these fields. Each year I host Girl Scout classes for girls and adults on astronomy as well at the robotics. On another note, I guide everyone to the NASA site to check out the activities they can find. I also, ask them to look at the web site for the James Webb space telescope. I also introduce leaders to all of the different star apps that they can use on their smart phones and tablets. I just really want to thank you and NASA for this program. It has touched 100's of girls and adults in Girl Scouts in Rural southeast Georgia over the years I have used the program and information I gained at this camp. I did not stop with the program you provided but I continue to add things and look to see what NASA has on their site that I can use for the various ages I work with. I also spend 3 weeks of class time in 5th grade using your information in my lesson plans preparing and accelerating 5th graders for Astronomy in 6th grade.
17. [Attended 2010]— Camp reinforced my goals for sharing astronomy with Scouts. The biggest difference in my life is not in the importance of astronomy or Scouts - I was already a big fan of both - but that I receive many more requests to do astronomy with Scouts, and spend more hours a month doing events for Scouts (Girl Scouts, Boy Scouts, and Cub Scouts). I had only heard about STEM before coming to Astronomy Camp, and had little to no formal background in teaching. The program has formed my knowledge and approach to what is possible to do with youth. [My] Council sent me to become a council resource. I went to all of the twice-a-year leader training weekends that my council had for several years (they have since been cut out of the budget). My astronomy workshops and star parties at council events always drew a dozen leaders. Many troop leaders told me variants on "I could never learn enough to do this with my girls." I have tried to push hard the insight that you don't have to become an expert to look up and share a sense of wonder just looking at the stars. I have shared stories of the stars and the hands-on activities you taught me at Astronomy Camp. I put all of my training materials on my own astronomy club's Web site to make it easily available to leaders who don't come to the council training events. That includes materials you sent home with me that you gave me permission to post. One positive result that I hope I influenced was when leaders returned from one of my workshops and put on a star party for their service unit north of Richmond, VA. I went out to the council summer camp and trained their camp staff in doing astronomy with girls. Unfortunately I haven't been able to inspire enough interest in the camp directors to make that an ongoing outreach. As a result of the council supporting astronomy in STEM and publishing my availability as a resource,

individual troops contact me regularly to come out to the monthly star parties my own astronomy club puts on. Commonwealth Girl Scout Council first found me because the club had me listed on the Web as our Scouting coordinator. I encourage local clubs as a support resource for Girl Scout leaders.

18. [Attended 2010]—I constantly look for what's happening in the sky & what's happening at NASA & use this to educate the girl and encourage them so seek the education they need in middle & high school to pursue those cool careers. Girls see there is a future for them in STEM world mostly dominated by males. They are taking more science course and look forward to your news letter monthly. They try to follow the sky as instructed. They then teach younger girl scouts at our camps on what is happening in the sky for that month. It has a snowball effect. My girls are excited to teach the younger girls. I had one girl graduate 2 years ago & attends the University of Texas at Austin, Texas in the engineer program. I have one girl who will be attending Texas A&M in engineering program. One girl will be attending the University of Houston, Texas with an undecided science goal. The rest of my girls are in high school taking advance science courses & planning for college.
19. [Attended 2011]—Thanks, as always, for all your newsletters and updates. I've been in touch with the California council about their Journey incorporating astronomy for Cadettes and plan to run a training or event in the DC area when I can. Our council is running a "maker fair" in the spring and most of the resources are dedicated to that. I have incorporated many of the astronomy camp activities into both my science teaching and Girl Sout activities. Since my Scout troop is older (I have alums now in college and girls in 10-12 grade), and the GS badges for this age don't include astronomy, we've only done some astronomy activities as enrichment, but we have done a lot of science. Of the 12 girls now in college, one is taking astronomy courses, two are majoring in engineering, two are majoring in health and public policy (maybe pre-med) and the others, as far as I know, are not doing anything science. But that's five out of twelve... Pretty good, I think! I know this isn't Girl Scouts, but I've introduced the James Webb space telescope to my 5th graders in school. They are fascinated by everything astronomy, from how their shadows change over the course of a day, moving significantly even over an hour, to the beauty of supernovas, and how we can learn about stars by their light. The space telescope captures their imagination as they imagine it unfolding in space and anticipate the images it will produce.
20. [Attended 2011]—The training received at the camp I attended has given me a new appreciation for astronomy. I find myself sharing moon information, pointing out constellations, etc. to people randomly and as conversation starters! Prior to the training it had been MANY years since I was in school - and I found out that some of the things I learned long ago were wrong, and much of it had been forgotten. The hands on learning atmosphere has helped me keep my new knowledge and made it easy to share it with others. I have shared several of the simple activities with younger Girl Scouts and Cub Scouts. On a Girl Scout outing we spent the evening star gazing, and making up our own stories for constellations. With Cub Scouts I did a brief moon phase activity. Most that I have shared with are still rather young, however I do know that many of them talked about our activities at school after a fun and successful astronomy weekend.
21. [Attended 2011 & 2014]—Just awareness of all the possibilities out there - career-wise, academically. All my Girl Scouts (right now, 13, ranging in age from 6-15) know about the major constellations, stories and the different exercises relating to size/mass/distance of planets/space. My older girl scouts are still only 8th grade but 1 plans to be an astronomer, another (my daughter) an engineer. They know it's OK to be smart and do their best in school because it will pay off in the long run, not just career-wise - they know no matter what to decide to do ultimately, that they can succeed with hard work and smarts. Side note: my 8th grader is one of just 3 girls (of 20+ students) in her Intro to Engineering class this semester. The teacher actually asked her (and the other girls) at the beginning of the semester and asked if they REALLY wanted to be in this class because it "wasn't a requirement". She loves the class and is excited about all they are learning. If I had it all to do over again, I would have liked to attend a university and take more STEM-type classes. I ended up attending Private for-profit schools and have a BS and MA degrees, and am happy with that (financially and career-wise that was best for me at the time), but as I get older I realize all there is to learn and know ! I hope my girls can see the possibilities.
22. [Attended 2011 & 2014]— My training at the astronomy camp in Arizona in 2011 was life changing. I have recently purchased one telescope and was given another by a neighbor when he saw my excitement over astronomy. I joined the astronomy group for Girl Scouts of Eastern Oklahoma and we have implemented 6 annual daytime programs for Brownie, Juniors, Cadettes and Ambassadors where we create planispheres, use solar cookies to explain the sun, teach the phases of the moon, show the relative distance of planets in our solar system and much

more by using the demonstrations from camp. Last year our council purchased 8 telescopes and we are now using these at overnight summer camps. We did 3 sessions with an average attendance of 15 girls per event. Our daytime events have increased from about 25 girls to close to 60. We are including a new training for adults with the telescopes so troops will be able to check them out for overnight events. We have had 2 different areas in our region reach out to join us and double our efforts. I share what I learned at camp with everyone I know - girl scouts, parents, friends and family. My 23 year old daughter took a fabulous picture of the moon for me for my birthday. My 7 year old daughter (Brownie) got up at 3 am to watch the eclipse of the moon with me. I couldn't get her to go back to bed because she was so excited about seeing the entire eclipse and then watching the sun rise. She also explained to another first grader that the sun was not a planet, but actually a star (very proud moment for me). My 13 year old daughter (Cadette) shares astronomy knowledge with her fellow classmates. She was particularly stunned by a friend who had thought that the moon was the backside of the sun. We have added two overnight camps that are strictly astronomy based for Juniors/Cadettes and Ambassadors/Seniors. I created a facebook page for the alumni from the astronomy camp where can all share and collaborate with ideas. I have personally collaborated with graduates from Florida, Colorado and Pennsylvania on events and how to better our program and group. We have shared what we do and what works and doesn't work. This would not have been possible without this camp. We are planning a large group gathering for the eclipse in 2017. I deal with much younger girls - kindergarten to 7th grade - so none of them have had an opportunity to continue their education beyond the classroom. However, all of them ask me to bring my telescopes so we can observe the sky after our meetings. We use the template from astronomy camp to make the paper planispheres in our Girl Scout astronomy events. I have a Cadette in my troop that attended our Junior event and now comes to my house on clear nights to help me set up and use my telescopes. She is a very quiet reserved girl who usually won't participate in group settings but is very excited to come help us with events. She has helped in two events in the past 6 months, and plans to help with all of the events she can. I will say that this camp has had a profound effect on my outlook for my future. It has made me want to share the knowledge with younger girls and give them as many opportunities as possible. I would not be teaching girl scouts or anyone any of this information had I not attended the camp. If I had a mentor at my younger age I do think I would have made better career decisions. I would have studied astrophysics if I had known it was a possibility. This camp is more far reaching than we can express. I have five girls who are interested in attending the summer camps when they get old enough. I don't know exact numbers, but I can estimate that the astronomy group of Girl Scouts of Eastern Oklahoma has reached over 100 adults and more than 300 girls over the past 3 years because of the training our volunteers received at camp in Arizona. Our group of 3 volunteers has grown to 7 and we have 3-5 more adults who are interested in joining us. Our goal is that each of our service units has an active astronomy group that will lead programs for the girls throughout the year and at each overnight camp.

23. [Attended 2011 & 2014]—As a former Girl Scout leader, current Boy Scout leader, church youth leader and educator, I always embraced STEM education but was too afraid to embark upon the subject of astronomy. Astronomy appealed to me due to its vast scope and sense of wonder, but who was I to teach anything about it? Astronomy camp took an underlying interest that had been embedded somewhere deep within and brought it to a surface level. I discovered a new passion and a drive for teaching this subject that I had previously felt was not within the realm of possibility. Don and Larry made astronomy accessible to me with their materials. These gifted teachers taught me how to use my gifts. At my particular camp, I was the only one to formulate a lesson plan for daisy girl scouts (The others formed plans to teach older scouts). I believe there are ways to ignite the passions of the youngest girls and boys so that they can access STEM curriculum from early ages. I work with special needs children and have a speech disorder myself. Giving kids access to curriculum has been my life story. Since I am not eloquent in speech, I have also learned to tap into other modalities I possess to learn and convey information. While at astronomy camp, I consistently found myself thinking about how I could present astronomy to people in all different modalities. My approach is multisensory and encompasses such different activities as cooking (universe trail mix), art, literature, etc. It is a real integration of the arts and the sciences as I believe STEM education is not isolated from the arts. Many of these activities were inspired by camp through Don, Larry, graduate students and fellow campers. While at camp, I learned specifics about the JWST and was captivated. I am on a mission to revise the astronomy merit badge for BSA (Boy Scouts of America). I have allied myself with fellow astronomers and BSA leaders in the quest to get the JWST integrated into the badge curriculum. It is my hope that boy scouts will be leaders in the dissemination of information about the JWST as they hold talks in their

- communities, mostly at local schools. Additionally, I desire for the badge to delve into more foundational concepts so that the boys understand what they are observing and why they are observing it. Examples include the infrared spectrum and common astronomical fallacies such as “The sky looks blue because light reflects off the ocean.” I want our young people to be armed with correct information and be equally as captivated as I was at camp. I have been afforded the opportunity to show the scouts a partial solar eclipse by using a pinhole camera and also helped them observe the transit of Venus. It is fun to share stories from other cultures about the constellations and our galaxy. I love to tell the kids how they are seeing things that already happened! Finally, at camp, we closed our eyes, turned out the lights and let Michael Crawford take us away into The Music of the Night to evoke our senses and acclimate to the dark for observing. As a violinist, this appealed to me and I still use that music today for teaching. Another result of Astronomy Camp is that I have a group of colleagues who challenge me. I can pose questions to them or share things I have learned. We encourage each other and inspire each other to teach. One very knowledgeable camper spent hours with me observing lunar features. I enjoyed finding each feature he would give me. I even located a new feature that seemed to confound everyone and we thoroughly enjoyed investigating it. Camp afforded me knowledge mixed with the art of teaching. It changed the scope of my life (Pardon the pun).
24. [Attended 2012]—Astronomy Camp has definitely made a lasting difference in the way I do Astronomy with my class(es) and in the way I approach STEM education. I continue to find ways to integrate Astronomy into my curricula at any and every opportunity: the students show so much excitement and enthusiasm when this happens. The activities we did and the information we received at Camp have proven to be resources that are engaging, authentic, and meaningful to my students, especially the girls, a few of whom have asked their parents to buy them telescopes! I have also had girls express interest in Astronomy and STEM careers. In addition, the binder of information we received has proven to be quite a valuable resource for more activities and learning. I also really enjoy being kept up-to-date with the NIRCAM newsletter, and often share information and images with my students and colleagues, who find it just as intriguing as I do!
25. [Attended 2012]—Astronomy Camp for GS Leaders in 2012 renewed my commitment to STEM education for Girl Scouts in my Troop, Service Unit, and GSEOK Council. I learned about so many different scientific aspects of the James Webb Telescope project and about ways to adapt STEM education to fit within the Girl Scout Journey Program. My goals grew to help develop an Astronomy Program for the Council along with 3 other Astronomy Camp alumni.... My approach to STEM programs with the girls has relaxed somewhat, because I believe the girls are motivated to learn in a hands on fun environment (just as we adults were at camp). At the same time, I have developed a standard that is higher than before I went through training. In anything I present, I always remind myself not to "dumb it down". The girls surprise and inspire me. We formed the Astronomy Group of GSEOK, developed level appropriate badges, implemented programs for Brownie, Junior, Cadette, Senior, and Adult Girls Scouts including overnight camp experiences. Currently, without duplicating letters from others, we are networking with community Astronomy Clubs in Eastern Oklahoma. Personally, I take every opportunity to involve my granddaughters, their schools, and my community in learning about astronomy. I will be helping with the STEM nights at several Broken Arrow Elementary Schools this spring, specifically helping my 11 year old granddaughter run telescopes and helping a community astronomy group with a booth. On Feb 2, 2015 I became an original incorporator for Oklahoma Astronomy Education & Outreach Association, Inc. Our goals are to develop and build a science center in Broken Arrow with a planetarium and resources for the blind, provide STEAM (arts included) events and training for students, and serve as a resource for the school system and GSEOK. We have a good core group of individuals that can each contribute to the success of this venture. While it will take some time to reach our goals, this is the next step of my STEM Education Journey. I plan to organize a program related to the MAVEN mission using the GS Breathe Journey with Cadettes utilizing Simone's program (GS Northern CA). Girls in my Troop have all attended Astronomy Badge sessions, and perhaps the most surprising response I received from one of my girls was that she wants to focus on her mathematics classes and skills so that she can go to college to become an astronomer. This was a girl struggling with math and prior to the event had not interest in science, as a matter of fact she resented that I had scheduled the event for the Troop. Many of the other girls were inspired and keep up on astronomical happenings like Moon Phases without prompting from me. The girls recognize and point out constellations and stars in the night sky to me. They continue to be inspired to want to participate in any science related event our GS Council offers. Others have shared some of the inspirational comments by girls in GSEOK, so I won't duplicate those. It is fantastic to be a part of making science exciting to the girls! This afternoon, my 6th

grade granddaughter is leaving to go to NASA Johnson on the GSEOK 6th & 7th grade trip. It is so exciting for her to have this opportunity and SHE is excited beyond words. GSEOK has really been instrumental in promoting STEM Education for girls. We currently have LEGO Robotics Teams, and I networked with two GS Leaders to have my own team next year. While engineering was not a focus at Astronomy Camp, I understand the need for engineers in the success of projects like JWST. We have to have the tools that work in space to bring us all of that wonderful information!

26. [Attended 2012]—We have made extensive use of the tools and techniques learned during the astronomy camp in teaching girls about astronomy in general and our solar system specifically. We have conducted five astronomy camp sessions, four as daytime sessions and one nighttime. Our astronomy camp sessions have generally been directed to younger girls, typically girls in the second, through fifth grade. As part of the daytime component of the sessions, each girl has built a spectrometer, assembled a star chart, and learned about the distance between the sun and the planets as well as the earth and moon through both adaptations of the play-do experiment and string experiments. The girls have used their spectrometers both at camp and at home, and in some cases have used them to teach other girls about the spectrum of light. During the nighttime components, we have used telescopes to observe the moon and to learn about its surface and the possible steps in its creation. Additionally, we have examined various planets and stars to compare and contrast their visible features. Additionally, we have had one group of girls observe meteor showers through binoculars, and another group observe a “blood moon” through each of its phases. We continue to use many of the techniques taught at the camp, but we have also made some changes. An illustrative example of one of the changes is the use of the Kepler Star Wheel. The Kepler Star Wheel is a great tool to help young girls visualize the constellations transit across the night sky. However, for the nighttime component, we have found that applications, such as “Sky Map” from Mobius Entertainment for the iPhone are particularly useful as the girls can see a real-time overlay of the night sky along with names of the specific stars and constellations they are viewing. We have doubled the number of available telescopes for our girls to use, and would like to continue to add additional units to expand the number of stations for specific astronomic bodies viewed by the girls as part of our lectures. Additionally, we are hoping to move into digital photography/videography to provide a more dynamic real-time visual presentation for the girls.
27. [Attended 2012]—The training was a great opportunity that I had in my life it provided me with a lot information I was not aware of it, and it help me to see a broader aspect of STEM education. Also, the training provided me with great tools that have helped me to have the right information to run STEM programs. Because of the training I received I being able to run STEM programs with Hispanic and African-American girls from low socio-economic status. We have done astronomy parties, where girls come at night and observe stars. In addition, we have gave the opportunity to girls to observe the sun with proper solar glasses, and create their own spectrum. All of these has encourage girls to seek for more information about STEM education. Some of them now see that they could get into college and pursue a career in the STEM field. Lastly, having more STEM programs has helped us to reach to other type of volunteers, volunteers who are involved in STEM education.
28. [Attended 2012]—During my experience at Astronomy camp I was exposed to methods of teaching STEM curriculum in an outdoor camp setting. This experience led me to examine the intersection of formal and informal STEM learning. The methods and materials presented were engaging, dynamic, and relevant to my job as Girl Scout Camp Director and in my role as STEM/Outdoor program specialist. Astronomy Camp led me to a greater understanding of how youth and adults of all ages and skill levels can learn complex scientific principles experientially and collaboratively. And in this experiential learning they retain more of what they learn and are more likely to continue in their scientific exploration. After attending Astronomy Camp I considered the STEM programs our council was currently offering and found ways to enhance them based on what I learned at Astronomy Camp and using the resources provided and connections made there. This reinvigoration of astronomy programming led GSACPC into our STEM initiative. Due to the launching of the 2013 STEM Initiative supported by organizations such as APS, AVNET, and the Arizona Center for Afterschool Excellence (just to name a few) GSACPC now offers 50% more STEM programming throughout its jurisdiction. The initiative has provided opportunities for partnerships with associations such as the Arizona Pipefitters Apprenticeship Guild, Carrington College, and Embry Riddle. Partnerships with organizations such as these offer programs where girls explore potential careers by gaining hands on experiences like building pipe systems, using medical science in practical situations, and even flying planes. Most notable is how Astronomy Camp inspired me to completely re-designed

GSACPC's Astronomy Program at Camp Maripai, where we once had only a small telescope that occasionally got used to look at the stars during sleep outs, now we have a Council's Own *Camp Maripai Astronomy Patch Program* combined with the "*STEM lab for Girls*"; STEM Lab for Girls enables Girl Scouts to capture the minds and passions of an already engaged audience: Arizona girls ages 5-17 at camp. The STEM Lab enables girls to explore their STEM interests at a critical point in their lives when they are beginning to think about their futures and often lose interest in math and science. The STEM Lab for Girls offers an introduction to STEM via a general science curriculum, including attention to the environment, and through astronomy education and exploration. Since its launch in 2013 Camp Maripai has served more than 2,200 campers through the STEM Lab, utilizing equipment, curriculum, and expertise provided by qualified science and astronomy instructors. Below are examples of some of the camp sessions that focus on Astronomy, *note that all campers attending Camp Maripai since 2013 participate in science/astronomy and nature exploration as a weekly program offering.* **STARLIGHT, STAR**

BRIGHT: Every star has a story; explore the clear night skies at Maripai, learn the stories of the constellations and make some of your own. We'll follow the moon, learn how to use a telescope, and navigate by the stars. Take a night hike, or watch a midnight movie on the field! Participate in one horseback riding lesson. Enjoy the traditional camp activities during the day, but at night this camp is all *yours!* *Work on Camp Maripai's Astronomy Patch.* **MIDNIGHT MADNESS**: Want to stay up late and sleep the morning away?! Experience a whole new Maripai when the sun goes down. Use your telescopes to explore the Milky Way or maybe find Saturn! Play flashlight tag or glow-stick touch football, take a night hike, or make a midnight snack to go with your midnight movie! Participate in one horseback riding lesson. Enjoy the traditional camp activities during the day, but at night this camp is all *yours!* *Work on Camp Maripai's Astronomy Patch.* "Badge Blast & Imagine Engineering" at the College of Technology and Innovation – ASU, was held in January of 2014, and is on the calendar as an annual event for years to come; this event is unique in that the planning and implementation was largely girl led. A Cadette troop consisting of five, 6th – 8th grade girls took the initiative to secure a partnership with Intel and WiSE to provide activities, curriculum, and volunteers. Due to our successful collaboration with AISES on Imagine Engineering, GSACPC is currently working with AISES again to design a series program for girls in the Gila River Indian Community. An example of the impact this program has had on its participants comes from the Imagine Engineering camp that took place at Camp Maripai during the summer of 2013. One of the workshops was facilitated by two Girl Scout First Lego League (FLL) Robotics Teams. At the end of the weekend some of participants, both girls and parents, expressed an interest in FLL. Those girls, led by parent volunteers, successfully completed their first FLL regional competition on December 7, 2013. The team, "The Robo-Peeps;" won the Judges award for Robotic Design. This team has gone on to mentor new FLL teams in 2014 and in 2015 girls from the Robo Peeps will advance to FTC (high school level First Robotics) and VEX Robotics teams. It is unknown if it was a direct result of participation, but one of my high school aged campers in 2013 (her name is Emily) was interested in engineering and was thinking about pursuing an engineering major in college, she was a counselor in training that summer and focused primarily on assisting with our science and astronomy programs, I had her facilitate a breakout session during an Imagine Engineering weekend, she excelled at this and the younger girls loved the way she delivered the curriculum. Emily went on to earn her Gold Award by teaching girls about careers in science, technology, engineering and math. She is currently attending ASU majoring in Chemical Engineering and was awarded academic honors in fall of 2014.

29. [Attended 2012 & 2014]— *I probably need to say at the beginning that we had a program for about 4 years going into my first exposure to the camp.* Some time ago, I elected to devote part of my life to making STEM more enjoyable and accessible to young women. Working with Girl Scouts has reduced the administrative part of that effort and allowed me to reach more girls. Seeing you guys in action helped me to realize I wasn't the lone ranger in the project and gave me some great ideas as to how to go forward as well as the inspiration that going forward was a good thing to do! One girl first came to become certified to use the GS telescopes at camp. She then came back to help us in PA mode. She now is old enough to have her own GS troop, helping out as her mother didn't want to lead it any more. Her work with us definitely influenced her interests although her major desire to be a leader probably will temper the depth of the STEM involvement she will have in college. One wee one, probably too young for the program but who came along with older sisters and her mother the troop leader was quiet and attentive during the class portion of the program. She was always being edged to the back of the line at the telescope. When she finally got her turn she needed a short ladder. I set the scope on the Moon and she stepped up to look. She

was quiet for too long I thought. I asked if she could see the Moon and the dark spots on the Moon. I was concerned that the telescope might no longer be pointed properly. She reached up, repositioned the telescope as we were showing them to do and replied to me: "Those dark spots are the Maria." Some do listen and learn! She likely will be back when she is older! Other comments are special. "I didn't know stars could be so interesting" was a comment after seeing M-13. More than once a youngster will approach me in a store, usually with her mother and let me know she still has her clay lunar crater. The take home stuff helps keep the topic in their minds I think. Like I said, we have not seen any girls elect majors yet, so that is to be seen. One PA when I asked how she was enjoying the program said. Oh I like it but I'm not a science person as I enjoy music. I told her about Brian May with Queen. She was stunned, looked it up on the phone and has since become a devoted PA who seeks to combine the math of astronomy with the math of music. We wish her much luck!

30. [Attended 2012]—You guys really do a great Job! I attended the Astronomy Camp in October of 2012. I had heard about it from another leader a few years prior. I thought about it off and on, then in early 2012, I saw something in the news about the James Webb telescope, and it jogged my memory. I looked up the information and decided to contact Don about the possibility of attending the weekend Camp. I filled out the forms, and was excited to hear that I had been selected to attend. At the time of the camp, I had been a Girl Scout leader for 5 years, and Service Unit Manager for 2. There is not much support for STEM activities in our area of our council. Most STEM based activities are planned up near the main offices which are about 2.5 hours away. My troop, and other troops I have worked with through camps, always got excited when doing Science and Technology based activities. I thought this may be a good way to learn something that I can bring back and share with not only our area, but the entire council. I have always been interested in Astronomy, but I've never pursued it to any big extent. I do remember, as a kid, laying out in our back yard, just staring up at the night sky, and being mesmerized with all the stars and planets. I never learned many constellations. Even before this camp, the only one I really knew was Orion. But I couldn't name any of the stars. Then that weekend happened. I really didn't know what to expect, other than remembering the leader that had previously attended saying, "You are constantly learning from breakfast to bedtime." That was a little intimidating, but also made me even more excited. She was right! What amazed me the most is how I felt during the days, and nights. My attention was always on the topic. When we took breaks, I was excited to see what was coming next. The team Larry and Don put together was able to fit more information into one long weekend than I would have guessed I would have ever been able to learn. When I got back, I was so excited to share what I had learned with my family, my troop, and other troops in our council. Shortly after I got back, the Leonid Meteor shower was expected to give a good show. We didn't get clear skies till Sunday, and the peak wasn't supposed to be early in the morning. I think I remember deciding that it would be a good experience to get everyone up at 2:00am. My wife wasn't on the same page as me, but humored me anyway. We have 3 daughters, at the time they were 10, 8, and 6. All had school the next day. We got up, put on coats, hats, gloves and went outside to lie on the trampoline and watch the show. For about an hour we had a great time watching and counting the meteors. Our troop talked about and did activities from Astronomy Camp for the next several months. I made a presentation to the other leaders in my Service Unit, discussed what I learned, and let them know that I would be available to come talk to their troops and setup activities. I led a training session called "Look Up To The Stars!" at a weekend long mega training event that our council holds every May. For this training I made a Human Orrery on a tarp, and showed them the revolution of the planets. I borrowed a telescope from our Library to hopefully get some time outside, but it was overcast. We also talked about Constellation stories, Look Back time, and made the Solar System on a cash register tape. I was able to use this knowledge to help with a summer day camp. The girls chose a planet, and we went outside to see if we could create a scale of our solar system using a 4-square ball as the sun. They were amazed to find that we ran out of room when we tried to place Saturn. We made cd box spectroscopes, used the human orrery to explain why you can only see certain constellations at certain times of the year. We used Styrofoam balls on a stick and a flashlight to show the phases of the moon. They seemed to really enjoy the day dedicated to Astronomy. This was the last day of the week long day camp that happened to be an overnight on this final day. I was able to find a local gentleman that is into Astronomy, and he was able to bring his telescopes out to host a star party. He had 4 different types of telescopes, and the girls enjoyed seeing the different stars and planets that were visible at the time. Another thing that I did right when I got back from

Astronomy Camp was that I dug out my old Bushnell single lens telescope. It was a big disappointment. After using the 10 inch telescopes at camp, and going to Mt. Lemon, my little Bushnell wasn't going to work. So I started a quest to find a telescope I could afford, but give me a decent view. I had saved for a bit, and about a year after attending Astronomy Camp, I found a used 8" Celestron telescope that I purchased. It is even signed by Thomas Bopp. With this telescope I have been able to have the Girl Scouts out and look at the planets and clusters. I have learned a lot to now be able to answer their questions about the stars and planets and I try to answer them as best as I can. Many times I have to just say, I don't know, but let's look that up. Which is a great thing because we both learn something. I participated in the International Observe the Moon Night that Larry offered in 2013 and facilitated it in our council. We had more than 125 girls participate which is twice as many as I expected. The feedback was very positive, and I had several troops ask about it in 2014. Unfortunately, I was not able to put anything together last year, but hope to do something in 2015. I also look forward to the NIRCам newsletter sent out by Larry. I would share this information with other troops interested in Astronomy. It was a nice reminder of what to expect in the sky the upcoming month. The Sky Stories was one of my favorite sections, telling stories of the constellations from different parts of the world. I was disappointed when the NIRCам newsletter was stopped for a short time. I even e-mailed Don to see if it was only offered to Astronomy Camp students for 1 year. Luckily it was brought back, and is always something I look forward to reading each month. I believe that STEM is an important part of a child's education, but even more so for girls. They tend to be pushed aside when it comes to math and science in school for some reason. Even though girls test better in those subjects early on in school, they tend to fall back as they get older. So I feel it's important to let them know that it's OK to be smart at math, science and technology. I've used code.org to teach them programming. We utilize diy.org to do projects like making a motor. And since our area does not have many STEM based programs, I drive them to places like Notre Dame in South Bend for events. Our troop went there to a Nuclear Science workshop where they learned about atomic particles, and were able to see particle accelerators up close. The Society of Women Engineers is also doing an event at Notre Dame for the Girl Scouts to show girls that women can be engineers, and that it's not all about crunching numbers. We will be attending that event as well. As long as the girls continue to enjoy learning about Astronomy and STEM based subjects, I will continue to focus on these areas. I have, and will continue, to make announcements of an upcoming meteor shower, Blood Moon occurrence, or other news story that I feel that they will benefit. I would have never guessed this long weekend would have changed the way I approach my troop meetings, our service unit activities, or even the activities I do with my own family. Right now, the girls in my troop are Cadettes (6th & 7th grade), so they have not yet attended college or decided on a career path. Hopefully over the next several years, I will be able to steer them in that direction. From what I have observed, is that the girls that haven't had much of a technical interest, do seem more engaged with the projects that we do that are STEM related. I have seen this in my troop as well as in other troops.

31. [Attended 2012]—First and foremost, girls that have gone through our programs (we are at 3 programs, Moon, Sun, and Stars) enjoyed them so much that they are some of our best Program Aides and regulars to our programs. I was watching two of our PAs the other night and they presented the content with such excitement and so thoroughly...it made me excited and proud to see that the program has not only stimulated girls into STEM, but also into future leaders and examples to the younger girls they are presenting the information to for the night. I know [another Camper] has been in more communication with you all over the past two years since we came out there to participate in your Arizona program, but for me personally it still encourages me to present to the girls and help with the local program. 1) When I started to work with [him] on changing the program 5 years ago, I could only pick out Orion and was intimidated by knowing what was going on in our night sky. My goal was to learn more about space (because I really do love the stars!). I have far surpassed my goals. I actually added to my goals that as a female, it is my responsibility, in a way, to encourage other females into STEM fields. I work with computers and I use that as part of my introduction that I'm not just an instructor, but I enjoy STEM in my work and home. I can still remember going to the telescope on the top of the mountain in your program, seeing the green flash (for the 1st time), the ISS (for the 1st time) and I have the list of every star, nebula, galaxy we viewed that night, which I have researched to learn more on my own. We still pull out our binders to see what else we can add to our program, or to make as an "Astronomy in a box" activity for when troops go camping, that they can continue to learn and love the sky. I can't speak to all the girls that have been through our program, but we've gone from barely getting 10 girls to come out, to 50+a large waiting list. I think it's fair to say that the girls that are coming are

hearing from the ones that have gone through program in a positive light. As I stated earlier, I love watching girls that I know came through the program, come back to help us teach the younger girls about Astronomy and the STEM behind it. The only quote I have to offer, was from a PA that had gone through the original program (pre-Astronomy Camp for [he] and I), she told me "I really like what y'all have done to the program since I went through. I enjoy helping with all the new activities, they really seem to capture the girls attention and teach them some real science." Honestly, I do not know how many girls have gone on to college and pursued a STEM field that came through our program. I know our current PAs talk about what they'll study (STEM) when they go to college...how they enjoy their Science and Math classes more in school...I can see them continuing their study in STEM programs in my mind...but I cannot quantify it specifically. I know we've made a difference to the girls we have taught. Whether they continue to study it in college or take it up as a hobby later in life with their children, is truly a mystery. Sometimes we don't know the impact we have on others, but when we do the right things, for the right reasons, we have to believe that it will stick with them and manifest in their life in some form or another. Maybe we aren't training the next Rocket Scientist, or Astronaut, but maybe we're raising a mother that helps her daughter to be one...the possibilities are as endless as the universe...

32.[Attended 2012]—The training I received at camp changed the way I see the miracle that is above us. It opened my mind to the immense and grand world above. It is VERY hard to explain how it has changed my life because it is always changing therefore I change and move with its grace. My goals are to continue to invest myself into STEM education as much as I can fit into my schedule. I continually invest as much time as I can into education and contribute where I am needed. And how has it affected my approach to STEM education, well I take every opportunity I can to teach with my scouts. I don't always have a plan but when a situation presents itself I am right there teaching the girls.

33.[Attended 2012]— It is greatly appreciated what you have done for our Astronomy Group here in the Girl Scout Council of Eastern Oklahoma. I believe at least 4 members have come through your program and we have a couple more that we hope to get there. Without this we would definitely been floundering at times but the base of which you have provided has given us a great boost and really sparks some girls when they find out they we have actually done some real astronomy work at your workshop. I have been involved in Boy Scouts with my son since he was a cub and has just one year ago received his Eagle. Now a senior in High School, I see those days with him and those activities growing fewer. I needed another outlet to become involved in and although I have several organizations that I volunteer for, it gives me a chance to use my science base more extensively and provides me a platform to continue to learn more about Astronomy. I have a BS in Biology and a BS in Environmental Chemistry and work as a Chemist. All aspects of Science interest me and Astronomy is such a dynamic field to be involved. It provides another avenue for me to keep learning. It has provided us another opportunity using the STEM approach to involve some other Girl Scout Leaders into our area that were already STEM driven with their girls. We now have some time to be able to start connecting the dots for these girls and bring them into other areas they may have not had any prior interest or knowledge but may develop after exposure to our Group. Although we have not had our program running as long as some, we have already made some things happen for GSOK. As a result of our growing, we were able to procure 7 new telescopes with a grant from IBM to help our program to grow. We have had them less than a year and but after a couple of summer sessions at camps using our new scopes the interest has grown. At our last Saturday Astronomy Day Time Program, to introduce the younger girls to our program, we had nearly 120 girls which was the largest group that I know of to date (these had been from about 15-40 in the past depending on the ages). We also had 2 older girls whose interest has been sparked help at our event with the younger girls. These are the young women we hope will benefit in the future and grow into the STEM programs. One of the young women has been known to "never miss when the telescopes come out with her leader and is there to help put them together every time".

34.[Attended 2012 & 2014]—Attending the camp was exciting for me, but also a challenge. As a financial analyst, I used a totally different part of my brain, while at camp. I learned, not only about the science of astronomy, but also how to teach science to various age groups. You and Don did a fantastic job conveying the importance of STEM education. I was totally hooked. I had never seen the "pipeline" graphic showing the number of girls who do not consider careers in science and education. In my career, I have experienced the glass ceiling and have overcome the stereotypes that exist in a male dominated profession. After the Astronomy Camp experience, I felt trained and motivated to pass along the importance of STEM education to others. When I returned home, I was able to

convince the leaders in my service unit to change a tradition that had been around for decades. Each year, we have seen tremendous growth in attendance. The girls love it. The 5 year olds come and observe, the high school students run experiments and the elementary and middle school girls investigate all kinds of interesting science topics and display their findings. This year, we already have 200 girls registered! Many thanks again to you and Don. You have touched many lives.

35. [Attended 2014]—I have always been a STEM field lover! Mostly Science and Math. The camp really helped bring another perspective on how to share that love with my Girl Scout Troop and others. We've done some of the "Home Scientist" experiments in the past as a troop and now are slowly doing some of the hands on activities that the camp gave us. I am looking forward to doing the clay activity that shows the scale of the Earth to the Moon with the girls so they can truly "see" the scale.
36. [Attended 2014]—The Astronomy camp has made a major impact on my life. It made me realize that I could help inspire young girls to chase and catch a life of science. My troop meetings have always had some scientific aspect, but it was usually geared towards a portion of a badge. I try to show my girls how things work, like teaching daisies about making bubbles and why different solutions work differently. But now, I have meetings built around a science topic just for the science. One meeting was all about distance and how to measure it in different ways. Just after attending Astronomy camp, I took my second grade brownies camping, many for the first time, and we used binoculars to look at the moon in the early morning. They looked at everything with new eyes. In December, I was invited to my daughter's second grade class to talk about the moon. In only a half hour I talked about the structure of the moon, the difference in the sizes of the earth and moon and how far apart they are in space. We talked about eclipses and reflections. It was amazing. The camp blasted me with questions. They asked about lava and rivers, how to look at a solar eclipse and about how far away was the next planet. Wow, they had great questions! I left them with little earth shaped candy and the desire to look up that night. To be able to take what I learned and share it with a room filled with seven and eight year olds was life changing for me.
37. [Attended 2014]— I can't stress enough how much your camp has inspired me. My husband even bought me a telescope for Christmas! The training at Astronomy Camp has revived a long lost passion, one that I am now able to share with all of the people in my life. Every day I pass on some little tidbit to a co-worker, my own kids, and especially my Girl Scouts! I work part time at a crafts store, where I recently assisted a 7th grader with her solar system model. I gave her information about the size comparisons of sun and planets and even talked to her about the orrery. STEM is something I feel very strongly about, but my personal expertise is more arts based. I often left STEM based activities up to other leaders, and I am not the only one! After this camp, I feel much more prepared to present the STEM activities in Astronomy to a wide range of girl scouts and I am excited to do so! I can now coach other adult volunteers in developing STEM activities for their girls. Having activities presented to us that are designed for kids is extremely helpful to troop leaders that may not otherwise know how to teach these topics. Our council is actively pushing for more STEM programs for girls. My experience in Astronomy Camp has given me the tools I need to help them reach that goal through camp & event programming. The members of the camp session I attended have created a Shutterfly website that we use to keep in touch and share our ideas and information. This site and the Astronomy Camp Facebook page have been great resources for ideas, images and information that I may not have found otherwise. We have even discussed plans for a web based launch party for the JWST! My experience in the Astronomy Camp is very recent, and as of yet I have not been able to fully expand on the materials given. I have shared some activities with my own troop, and they have decided to create a "Make Your Own" badge in astronomy this spring. They would first like to focus on the stars & constellations, and I have so much I can teach them now! I work with girl scouts from all around our community on a Girl Led Events Committee. These girls are really looking forward to planning our Astronomy camp in the fall of 2015. They are eager to learn from me (and other local resources) so that we can carry out programming together for other girl scouts. I know that my passion will inspire them! I have younger girl scouts, grade levels K-6, so I am still watching them develop their interests. I have over the years watched girls move away from always doing crafts (for example) and really delve into learning new things, especially in science and technology, so I know that I will see this develop over the next few years. My own daughter decided last year that she is terrible at math, especially algebra. In chatting with her about the distance between the Earth & the moon, the size comparisons in the solar system, and other systems, she started to recognize how the math really helps us make sense of these things we don't see with the naked eye. It was thrilling to see her develop a more positive attitude about math by learning

- these little bits of astronomy. As a member of the newly formed Outdoor Education Committee in our council, I am working to make sure Astronomy is part of that programming as well. In this way, Astronomy Camp will be extended to our council of 19,000 girl scouts! I have set a date in October 2015 to hold our first 3 day Girl Scout Astronomy Camp! My goal is to see it become a recurring program during the year and continue for years to come.
38. [Attended 2014]—The training offered through your program has really brought STEM activities to the forefront of my Girl Scout programming. I've offered several astronomy related events for the scouts here in Anchorage as well as some for the leaders- the interest is really growing and I think we're getting quite a little astronomy community here in the Girl Scouts of Alaska. Personally, the training in Tucson has really reinvigorated my interest in astronomy- to the point of me questioning going back to school. I have really enjoyed sharing this newly rediscovered passion with my small children. I do not deal directly with the girls, for the most part I am more of a support piece to the leaders. That being said I offered a little session about astronomy for leaders at a leader training event we do in November. In the training we showed them specific little activities, provided from your training, for the leaders to take back to their troops. The idea was to have very tangible items they could bring back and be work. I think that is what the training you provided did best, provided a way for information about astronomy to be brought into the troops and for the girls at a level that was accessible to them and manageable for the troop leaders. After that session one of the attendees asked me to share that some of those activities with the leaders at her service unit. Since I have done that I've had many people call me asking to borrow my resources in order to bring those activities into their troop meetings.
39. [Attended 2014]—I thoroughly enjoyed the opportunity to attend the camp. Since my return in October I have purchased a laser for star gazing especially on our first troop campout that the girls enjoyed. I am currently working on a presentation that I will be presenting to our council in March. I have to say I am quite nervous but so thankful for all of the extremely useful information that you guys provided. I am now on the STEM team for my council and will be working with the rest of the team to obtain grants, materials and equipment for council use. My girls were so excited to hear about what I learned and think I am so super smart:) We are in the process of putting our team together to offer training, etc.
40. [Attended 2014]—Just wanted to drop you a note and let you know of the AWESOME activities that [two other Astronomy Camp attendees; 41 and 42] orchestrated [for their] Girl Scout Service Unit last weekend. [One of them] was kind enough to invite my family to come over to participate, and we had a great time! I've attached a few pictures as well. [The other] came down from Columbia, SC with her van packed full of STEM activities for the girls -- the e-planetarium, model rocket kits, and straw "rockets" for the kids to launch inside. About 80 Girl Scouts participated. All of the girls were so excited to see how far their straws would launch, particularly if they varied the angle and made sure there was no air escaping their straw. They stood in line and went round and round for an hour launching their rockets down the hall! Some went as far as 35 feet! We went outside where [one of the Camp attendees] took the older girls through the steps to launch their model rockets they had just spent an hour building. The younger girls were happy to chase down the rockets after they blasted off into the sky. My son (kindergartner) told me that he can't wait to join Boy Scouts because he just knows that they are going to do stuff like this, too. My daughter was just thrilled that [the other Camp attendee] selected her to launch the Pencil Rocket, since she's only 8 and hadn't participated in the rocket-building class. Such fun and so inspiring for everyone! Harriet had set up a human orrery inside the building and [she] had brought a model orrery with her. I wasn't there when they demonstrated it, but wanted you to know that we were using what you taught us! All three of us talked with the girls about the JWST program and how Girl Scouts was involved with it. We all plan to do more to integrate activities like these into our GS programs as excitement builds about the launch of the JWST. Thank you for helping us to inspire and lead our girls!
41. [Attended 2014]—[One of the other Camp attendees] sent in information about our Girl Scout gathering on last weekend. [Another Camp attendee] is sending in more info with pictures regarding the orrey. As a teacher working at the Challenger Learning Center. I have been able to talk to the Girl Scouts about the actual mission of the JWST and I am able to discuss astronomy using the e-planetarium. Students are getting an opportunity to learn about constellations, galaxies and satellites like the International Space Station. I am also able to discuss how the brightness of the various satellites makes a difference in how well you can see them. As a result of the camp, I am able to tell the girls about the partnership NASA has with the girl scouts. We have been able to build and launch rockets as the learning activity that helps connect how the JWST will travel to space. The girls have truly enjoyed

learning about space and are already looking forward to working more in the e-planetarium and launching different types of rockets.

42. [Attended 2014]—Larry, I am so impressed with [another Camper's] letter. I hope you will include that with your report. I am sending more pictures of our event at the school on Friday and a Super comment from one 5th grader! We were discussing the Astronomy Day on Friday and how that was a little different from the one I had December 18th. Becky in the 5th grade said she loved all we were doing with astronomy and space. She thought it was all interesting. Before Christmas Clemson extension brought their e-planetarium and several programs for from k4 to 7th grade. The girls and boys loved the stories of the constellations and the night sky views and the planets and more. We have 30 girl scouts spread out from 4k to 7th grade. About 1/3 of our total population is female. To add a new dimension to our study [one of the Campers] from the Challenger Learning Center and I agreed to add the rocket component to this most recent event at the school. On Thursday we had a Science night and an outside viewing of the International Space Ship that went from West to North for about 2 minutes at 7:13pm. The kids and parents are still raving about this event. In the spring we will have our GS Camporee in Awendaw with probably 250 girls camping. My troop plans to continue with our astronomy lesson and have another night viewing. I sure hope we have the ISS passing over again. The Girl Scouts of East Cooper 650 Mt. Pleasant, SC have several other STEM programs that we are working on and are totally committed to adding to their knowledge of Astronomy, Space, and Science, technology, Engineering, Mathematics.
43. [Attended 2014]—The course provided by NASA & University of AZ truly sparked interest in my troop. The girls chose Greece for Thinking Day because the Greeks and Romans named the stars and they thought that was cool. We reproduced many of the classroom tools you gave to us: The phases of the moon, the rotation of the planets. Instead of the light spectrum we made kaleidoscopes but they didn't turn out so well! It's the experience of doing this endeavor. Not just the end result. The girls used the sky guide on my iPad and we wore glow in the dark necklaces & bracelets. The event wasn't what I wanted but it was a start. Our community coordinator likes to do the same thing year after year <yawn>. We are scheduled to go to the Southwest MN State University for a special program that is based on studying the heavens. They cannot wait! The other girls at the event did a spin off about the NOAA because they chose Australia for their country. The focus of this year's event was the broader sense of science. Thank you for everything. I wish I could go thru this again. I know that I will never realize my dream of teaching leaders how to be leaders if I don't do my homework. :)

Quotes from girls (and Associates)

Just wanted to share this with you- we're taking the family camping tonight if the girls sell 200 boxes of cookies in the neighborhood. The first thing my daughter did when she woke up was ask if it was going to be cloudy tonight. Then she ran upstairs and grabbed the star chart she made in the brownie astronomy workshop. She also made a copy of her star chart and helped little sister cut it out so she'd have her own star chart. We laid out during the campout and [she] tried to teach her sister which constellations were which. She also had sooo many questions for us- we saw a couple of satellites and even a shooting star (sparked a whole discussion of meteorites, meteor showers, heat of reentry for the space shuttle, etc. While this is anecdotal, it suggests that when we light a spark in one girl, that spark can be passed on to another... This was all without any prodding from me- I just wanted to share that the short three hour workshop has definitely sparked an interest!!!

One of the girls in my troop replied: Working with the Astronomy team through Girl Scouts has helped my interest in being outside after dark and learning more about what we can see within our universe and without.

[She] has really enjoyed the astronomy PA program. She has not only learned a great deal but has improved both her math and science grades at school along with her leadership skills. When she went for the training at first she was not that interested in astronomy, but has now attended every Girl Scout Astronomy session this year. [She] has even looked for other stem opportunities to be a part of. Although she is unsure of her future career there is no doubt that this program has assisted her in both gaining knowledge and being exposed to STEM, Astronomy, leadership which will all serve her well in life.

A while back (September and October if I recall) we did a poll looking for topics that might interest the girls and leaders. I say 'and' because we have seen that if the leaders don't think much of the program name or topic, one

won't get registrations. This has gone out to about 50 so far. Responses have been favorable, meaning we get replies and they show a full range of strongly want to absolutely don't want, that being my test of validity. Girl responses have mostly been from older girls, as I've just not tried to poll the 4th to 6th graders. We proposed a number of topics and asked them if they liked, didn't care, or disliked the topic. We also let them add topics if they wanted and so far none have added anything. The big winner was Constellations - Stars and Myth. 100% liking, no neutral or dislikes. I know you don't favor it, but I say that could help with programs, one just has to use bleach to launder the old Greek legends! Building models that allowed us to view our constellations from other parts of the galaxy came in strongly, as did designing your own space mission to another world or planet. Kathy didn't predict this would do well, but attempting to decipher the Tang Dynasty Dunhuang Star map rated 3rd in this particular poll! I guess girls just like jewelry and the UV bracelets came in 4th in popularity with only 2 dissenters. Working with a Crookes Radiometer, mapping a plaster model in a shoebox (we called it What if we can't see), mapping a room in general and what causes the colors of sunrise and sunset came in next with equal amounts of likes and dislike. Where the pole star has wandered in antiquity, making and using a DVD spectrometer were also in the middle of the pack. From there on out topics like barycenters, megalithic yard, space missions in general, why NASA went to certain parts of the Moon, lunar geology, meteor rights and wrongs fared poorly. Anything that seemed math intensive was almost universally panned. Some of the polls shortcomings are obvious. Despite the poor ratings, the Faux Moon Rocks and the Meteorites have been this years big hits. Perhaps proving that my explanations were not the most interest generating??? During a solar program I had the girls coloring an image of the structure of the Sun. I didn't tell them the colors to use as we don't know what these parts look like. That was problematic. But the real issue I was taken to task for was that enough of them had done that exercise with a sugar cookie decorated with sugar icing and then got to eat it, and the felt short-changed by the paper image. Not sure I'm going to do cookies, but for dang sure I'm not using that paper model anymore!

Our council has been thoroughly reorganized the last 18-months or so following the retirement of the CEO who had been there for a great many years. So some of what I write is no longer true, and perhaps none of it was true of GSUSA as the last administration and staff were VERY passive-hostile and promised help, advertizing, and promotion of our programs were NEVER really enacted. There was a very strong-armed push to conserve volunteer efforts, get more done with less effort kind of thing and specifically I was told that the astronomy program needed to serve more people, several hundred per event and use less dates. I was cut from 8 dates in a school year to 3. Organizers were not heeding my issues which were weather, more dates increases chances of successful viewing, and I didn't have enough volunteers to serve that many at a time, and our programs offer hands-on education and we don't move on until they all 'get it' or we realize they are not going to be able to get it. We could not possibly serve a group of 'several hundred.' Seriously I was on the verge of throwing in the towel. I was not going to become the ring master of a damn astronomy circus. But the old departed and the new CEO started cleaning house. The rest as they say is history. I deduced but have not had it confirmed that the push was started in GSUSA. The all important metrics must somehow have been rewarded or at least reviewed? I also felt that the reduction in dates was so that the facility I used could be rented to others for higher amounts than I was bringing in, although at the time we were charging 6 bux a head to attend. It is now 7. I was never sure but could the organizational dynamics have overcome the 'desire' on the part of GSUSA to have STEM programming, or is the STEM push from GSUSA just something that is cool as long as it doesn't interfere with their real agenda, which I've not deduced but making money certainly seems a bigger part then serving girls who by regional preferences have different needs? My numbers now rival aquatics, their biggest seller, so perhaps the dynamic has not changed and they see the numbers and greed prevails. That my friend I am unable to see around?

I have 2 quotes. One is from a 6th grader: "When I learned about stars, constellations, phases of the moon, etc...You could say it wasn't the most exciting. I thought that this was something we were supposed to learn in school, not here at camp. But it turned out to be a really fun and helpful experience that I would use for future in school". From a current 8th grader: "Humankind as a whole is by nature fueled by curiosity and desire to know and understand. There are nearly 8 billion people on this earth and undoubtedly 8 billion people have a desire to understand the universe in which they live. 8 billion with an inborn curiosity and desire to know and understand.

I've seen the stars in their eyes as they look up into the sky and wonder. I've seen those stars sparkle and I've seen them blink out when those same people lose their opportunity to explore and know and understand. To lose the stars, not only in the eyes of the curious and those who desire knowing but the stars in the sky, is to kill something inside. It is to lose the innate curiosity and wonder of human nature".

Here is another quote from a current 6th grader: "When I to camp I had no idea what I learned would help me in school a few years down the road. It helped me on my tests and gave me the upper hand that others did not have. I loved learning about the constellations on our night sky watch. My mom is my Girl Scout leader and because of that we went to Arizona and got to look through a big telescope. I saw planets and constellations that I would never get to see here in Indiana. And these really cool connecting stars."