Schuk Toak District Day

Katy Garmany

First, a brief primer for readers who are not familiar with the Tohono O’odham Nation: The Nation consists of 11 districts, nine of which are contiguous. Kitt Peak National Observatory is located in the Schuk Toak district. Each district is self-governing somewhat in the manner that states in the US are. This year, the observatory was invited to set up a booth at the Schuk Toak District Day, April 26. So early Sunday morning, Nanette Bird, John Glaspey, and Katy Garmany headed out for the Schuk Toak district headquarters, about five miles west of the Kitt Peak turnoff. We wanted to make sure we were set up in time to see the parade, which begins the day. We succeeded, although not without help and duct tape from neighboring booths!

Our booth had a panel of favorite images from various Kitt Peak telescopes, as well as a series of historical photos that John has been unearthing in planning for the 50th anniversary celebration. For the occasion, we had folding flying disks printed that we gave to everyone, a solar telescope, and various handouts about the Kitt Peak Nightly Observing program. We brought along a Meade 8-inch telescope, which we pointed at the Mayall 4-meter telescope, about 7 miles to the southeast.

Close to 200 people stopped by the booth. The Chairman of the Tohono O’odham Nation, Ned Norris, came by, as did Schuk Toak District Chairwoman Phyllis Juan and Miss Tohono O’odham, Amy Juan. Everyone enjoyed looking at the telescopes on Kitt Peak through our telescope, and all were surprised to see that they were upside down. This led to fun discussions about what direction is up in astronomy.

The day was a great deal of fun (not to mention the fry-bread, or popovers as they are referred to by our O’odham friends). Next year, we will bring duct tape.

Clockwise from top left: Nanette and some visitors look for sunspots, but alas, none today! Eliano Francisco, age 7, checks out the 4-meter on Kitt Peak about seven miles away. Miss Tohono O’odham Nation (right), Amy Juan (a relative of Kitt Peak Mountain employee, Alfredo Zazueta), reminded the crowd of Ioligam, the O’odham name for Kitt Peak. Miss Tohono O’odham Rodeo Queen and her attendants rode in the parade. We were busy all day.
The student telescope kits developed by the US team for the International Year of Astronomy 2009 (IYA2009) are now in production thanks to the hard work of the Galileoscope team: Doug Arion of Carthage College, Rick Fienberg of Phillips Academy, and Stephen Pompea of NOAO. The manufacturing effort is led by Thomas Smith of Merit Models of Racine, Wisconsin, the manufacturing partner for the project. The achromatic refracting telescope provides a magnification of 25x with the Plössl eyepiece and 50x with the included Barlow lens, which can also serve as an eyepiece when the telescope is used in the Galilean configuration.

The development process started nearly two years ago, with much of the initial work done by volunteers of the US Telescopes Kits and Optics Challenges Working Group in coordination with the international Galileoscope task group, headed by Rick Fienberg. The final optical design and the stray light analysis of the telescope were done by working group members Scott Ellis and Rich Pfisterer of Photon Engineering LLC of Tucson in collaboration with NOAO. Photon Engineering is well known to the astronomical community for their design and analysis work on the Large Synoptic Survey Telescope, Advanced Technology Solar Telescope, the Apache Point 3.5-meter telescope, and the Optical System for Imaging and Low-Resolution Integrated Spectroscopy for the Gran Telescopio CANARIAS.

The educational program for the Galileoscope builds on the NSF-funded NOAO/SPIE/OSA Hands-On Optics program and a similar program for Boys & Girls Clubs funded at NOAO by the Science Foundation Arizona. NOAO’s Rob Sparks led the work on the assembly instructions, the optics education activities, and the observing guide, which are posted online and being translated for use worldwide. The Galileoscope has been received with great interest by many countries celebrating the IYA2009 and has received excellent reviews for its optical quality and educational usability. More information on this IYA2009 cornerstone project can be found at www.galileoscope.org.
Education & Public Outreach

GLOBE at Night Reaches a Record Number of Dark-Skies Observations

Connie Walker (NOAO) & Doug Isbell (US IYA Single-Point-of-Contact)

The global citizen-science campaign GLOBE at Night 2009 recorded 80 percent more observations of the world’s dark skies than the program’s previous record—including double the number of digital measurements—thanks in large part to active participation and publicity from the network of 140 countries currently celebrating the International Year of Astronomy 2009 (IYA2009).

Now in its fourth year, GLOBE at Night encourages people everywhere to observe the prominent constellation Orion at least once over a two-week period and compare the number of stars that are visible using their unaided eyes with a series of charts that show how Orion would appear in skies ranging from very dark to very bright. The program is designed to aid teaching about the impact of excessive artificial lighting on local environments and the ongoing loss of a dark night sky as a shared natural resource for much of the world’s population.

The 2009 campaign, held from March 16–28, garnered 15,300 geographically “mappable” measurements of Orion, nearly 7,000 more than the previous record of 8,491 that were contributed in 2007. Only one percent of the 15,456 observations in 2009 were “flagged” as not mappable. The percentage of flagged observations was reduced markedly this year thanks to a new online tool that helps identify the country from which the observation originated.

Measurements were received from more than 70 countries in the 2009 campaign, with 17 countries reporting more than 100 Orion measurements. About 73 percent of the total measurements came from the United States (approximately 11,270 observations), including all 50 states and the District of Columbia, followed by Chile (about 900), the Czech Republic, and the United Kingdom (both over 200). Other countries reporting more than 100 observations were Argentina, Australia, Canada, Colombia, Finland, Germany, Macedonia, Mexico, Poland, Romania, South Africa, Spain, and Turkey.

In addition, 19 countries contributed another 1,474 “mappable” digital measurements using hand-held Sky Quality Meters (SQMs). Two-thirds of the SQM measurements were from the US, with nearly 200 from Chile. Romania and Mexico followed with over 70 and 60 SQM measurements, respectively.

The full data set will be posted soon for download and local use at www.globe.gov/GaN/analyze.html; a map viewer that can compare GLOBE at Night data across the years is already available there.

GLOBE at Night is a collaboration between the National Optical Astronomy Observatory (NOAO) in Tucson, AZ; The Global Learning and Observations to Benefit the Environment (GLOBE) Program, in Boulder, CO; the Environmental Systems Research Institute, Inc. in Redlands, CA; the International Dark-Sky Association in Tucson, AZ; and the Centro de Apoyo a la Didáctica de la Astronomía in Altovalsol, Chile. For more information on GLOBE at Night, see www.globe.gov/GaN.

GLOBE at Night is a centerpiece of the Dark Skies Awareness cornerstone project, which is one of 11 global cornerstone projects of IYA2009. The Dark Skies Awareness cornerstone project is being led by NOAO. For more information on a variety of IYA2009 dark-skies awareness programs, including its three primary star-hunting projects, a planetarium show, a presence in Second Life, and joint programs with US national parks, amateur astronomers and some of the greatest environmental photographers in the world, see www.darkskiesawareness.org.

KPNO REU
Students Going to Graduate School

Ken Mighell

Five of our former KPNO Research Experiences for Undergraduates (REU) students will start graduate school next fall. Our hearty congratulations to:

- Tim Arnold (Ohio State University, REU 2008), who will be going to the University of Arizona.
- Tiffany Meshkat (University of California at Los Angeles, REU 2008), who will be going to the University of Leiden in the Netherlands.
- Rosalie McGurk (University of Washington at Seattle, REU 2007), who will be going to the University of California at Santa Cruz and received an NSF Graduate Research Fellowship.
- Josiah Walton (University of Arkansas at Fayetteville, REU 2007), who will be going to the University of Illinois at Urbana-Champaign and received an NSF Graduate Research Fellowship.
- Matthew Zagursky (University of Maryland, REU 2008), who will be going to the University of Hawai‘i.

Ken Mighell
Technology Skills for Arizona Teachers: The AstroBITS Program

Katy Garmany

Do you remember learning astronomy in school? Quite probably not. Many people receive little instruction because astronomy is not a typical curriculum subject, yet the magic of astronomy can be a powerful motivator for students. Students today are surrounded by examples of technology such as digital picture phones and cameras, computer games, and medical imaging tests and the list goes on. But with no experience in understanding this technical world, it is difficult for students to aspire to careers in technical fields. To address this challenge, the EPO group at NOAO applied for and received a multi-year grant, Building Information Technology Skills through Astronomy (AstroBITS), from Science Foundation Arizona to help Arizona teachers learn how to incorporate the excitement of astronomy into their science classes. Science Foundation Arizona (SFAz), an organization funded by both state and private sources, is seeking new ways to bring information technology and science into Arizona classrooms and to help build a highly skilled workforce. EPO is well-suited to address this challenge as a result of the experience we have gained running a very successful national teachers program, Research Based Science Education (RBSE), for over 10 years.

The most effective way to reach students starts with their teachers, so this program recruits middle school and high school science and math teachers from around the state of Arizona. Building on the rich astronomical data sets and image processing tools currently in use by teachers in the RBSE program, AstroBITS stresses that without measurements there is no science. And while the particular skills and experience are related to astronomical imagery, they can be expanded to include medical imagery, optics, biology, geology, and other fields.

The teachers selected for AstroBITS have come from a cross section of Arizona schools, including the Tohono Oodham Nation, a rural school in Dewey, Flagstaff, and Tucson schools serving primarily Native American populations.

The workshop begins with the teachers spending two nights on Kitt Peak where they are introduced to the observatory and the night sky. They first observe visually, using the visitor center telescope under a roll-off roof—the warm nights of June are ideal for this experience. Then the CCD camera is attached, and they take images through different filters of objects they have chosen. During the afternoon, they visit other telescopes. We appreciate our colleagues who have generously shared their time and programs with us!

The group meets the following week at the NOAO offices; teachers are fascinated to walk the halls and see what astronomers post on their doors. At this time, we supply everyone with a laptop (supported by SFAz) to enable them to work both during the workshop and while at home. We introduce them to the free image processing program ImageJ and explore what constitutes a CCD image. Visits to different departments on the campus of the University of Arizona demonstrate how much of modern astronomy, and indeed all science, relies on accurate measurements.

Figure 1: Arizona teachers enjoying their observing run at Kitt Peak.

Astronomy offers an ideal opportunity to model collaborative work via telecommunication. We have modeled this for the teachers, showing them how to access and reduce data from their home or school. They return to NOAO every other week during the summer for several days of increasing exposure to astronomical science and data analysis. Using the lure of astronomical images, the teachers develop classroom projects, based on various suggestions from the AstroBITS staff, but also allowing for their own creative ideas. The primary connection is through image processing; digital imagery is ubiquitous in technology these days, and learning that the basis of this is all in mathematical manipulation of images is the first step.

We stay in close contact with our teachers during the school year and encourage them to chat frequently with us and with each other in the summer workshop. Many teachers and school administrators have expressed a desire to make this program available to a larger audience, and as a result, we are in discussions with Science Foundation Arizona about expanding the program this summer to include more teachers.