



ASTRO BEAT



Top: Students in Uganda see the Sun for the first time as they view a partial solar eclipse in 2013. Opportunities like this are rare in many parts of the world.

Bottom: Students at a school in Kigali, Rwanda view the Sun for the first time during the solar eclipse of 2016.

Reaching Underserved Communities Worldwide through Astronomy

By Mike Simmons (Astronomers Without Borders)

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Technology now connects virtually everyone on the planet, even in traditionally underserved communities, allowing us to reach those who are isolated or lack access to resources.

But while the digital tools may be there, a broader, more inclusive view is needed to truly capitalize on these 21st century capabilities. Astronomers Without Borders (AWB) programs are mostly worldwide, though some are intended specifically for underserved audiences.

Resources we often take for granted in developed countries are unavailable to most of the world. Even when money isn't a problem, stores for astronomy items and online ordering are unavailable in many countries. Through AWB Resource Sharing Programs, astronomy enthusiasts can share with those in less fortunate circumstances. Sharing is a big part of astronomy; what other science has volunteers conducting regular public outreach events?

AWB's BIG (Big Impact Giving) Campaigns crowdfund for relatively small items needed by existing programs. For example, for the first Girl's Astronomy Camp in Nigeria, organized by AWB members with daytime jobs as scientists and engineers at the African nation's space



Activities open Nigeria's first astronomy camp exclusively for girls. Organized by women scientists and engineers from the country's space agency, the workshop is designed to show attendees that they have a path to STEM careers. Supported by the IAU's Office of Astronomy for Development, crowdfunding AWB OneSky telescopes augmented the program.

agency, crowdfunding provided four small telescopes for less than \$500 total. The telescopes are treasures that are now used in many new educational programs. The girls who attended the camp were not only underserved economically but also face serious gender bias. They now know they have paths to STEM fields: science, technology, engineering, and mathematics.



Students in Puerto Rico learn the sky on a Spanish-language planisphere donated by David Chandler Co. An AWB OneSky telescope, acquired through crowdfunding, sits on the table behind. Educational resources were also donated by ASP.

In Puerto Rico, 20 schools in poor areas that were severely impacted by 2017 hurricanes received telescopes from AWB (again purchased thanks to donors through crowdfunding) to bring hands-on STEM education into their classrooms. The schools are managed by a non-profit organization, and teachers are being trained by members of the Puerto Rico Astronomical Society. Local organizations use the telescopes and Spanish-language educational resources (provided by ASP) in a much-needed, comprehensive program that can be scaled up to include additional schools. Real-world realities still intervene despite the online tools, though; moving physical items remains a challenge that must be resolved on a case-by-case basis.

The 2017 eclipse in the US awed millions of viewers, hopefully inspiring schools and students to focus more on STEM classes. In Africa, in schools lacking science labs, recent eclipses were science labs coming to them. AWB crowdfunding programs sent tens of thousands of safe solar viewing glasses to schools across the continent. The rare opportunity to see the Sun elicited a comment from Tanzanian students that indicated the importance of the experience – “Now we’re scientists, too.”

The need was great across the US in 2017 as well, where millions of glasses were donated through school and library networks. As great as that historic effort was, countless others in the world’s third most populous country were left out. AWB focused on those lacking access to the networks through which resources flowed, sending glasses donated by Google, Big Kid Science and others to children’s cancer hospitals, nursing homes, schools for troubled children, towns recovering from hurricanes and tornadoes, inner city teen parents working towards GEDs, youth prisons, first responder



The AWB Global Community observes together during Community Programs. Here observers in Oman take part in SunDay, a day devoted to showing the public our star.

organizations, even a US Navy vessel off the Pacific coast. I handed out glasses to the cleaning staff in the Wyoming hotel where I stayed for the total eclipse. They had worked hard for the many visits but were themselves neglected. When one worker asked if he could take glasses to the halfway house he lives in I handed over the entire lot to him. Where else would they get them?

As it turns out, the US eclipse will also be a boon for underserved schools in South America. Carrying forward the excitement that captured the US in 2017, thousands responded to AWB’s call for used and leftover eclipse glasses for schools across the continent next in line for a total solar eclipse -- two eclipses, in fact, with a rare pair of total eclipses gracing the continent in successive years in 2019 and 2020. With three million glasses donated so far, AWB will be able to send glasses to Asia for the annular solar eclipses there in the same years. Most of Earth’s population will fall under the Moon’s penumbra (where a partial eclipse is seen) during these Asian eclipses. People in the US were pleased to have the

chance to pass on the excitement of an eclipse. Not wanting to waste something still useful was another reason cited for taking part in this continent-to-continent sharing program.

Formal education programs may reach fewer participants but their impact can be far-reaching.

AWB's Telescopes to Tanzania program, begun during a church mission by retired Lutheran pastors (who were also amateur astronomers), aims to introduce astronomy into the national curriculum and train teachers to teach it. Astronomy can introduce almost all STEM fields and, ironically, the astronomy "lab" overhead at isolated schools (where actual labs are nonexistent) is superior to what urban schools in developed countries have, due to light pollution that washes out the night sky.



A blind child follows along with a planetarium program narrator using The Sky in Your Hands planetarium program developed by the University of Valencia, Spain. Image Credit - Calouste Gulbenkian Planetarium, Lisbon, Portugal

The need for more science in schools in the US is a hot topic as well, and AWB's 2017 Building on the Eclipse STEM Education Program sought to leverage the inspiration of the eclipse to encourage schools, especially those in underserved communities, to teach STEM. The program was based on a spectroscope kit developed by the Stanford Solar Center for the outreach office of the Solar Dynamics Observatory (SDO) solar astronomy satellite mission, with 140 activities adapted for it organized by grade level and type of institution (alternative educational institutions such as boys' and girls' clubs, libraries, day camps, and others were encouraged to take part). Professional development webinars were provided for teachers. AWB is now looking into extending the program to South America and Asia to expand the teaching of astronomy in underserved schools, communities, and countries.

The International Astronomical Union's (IAU) Working Group for



Equity and Inclusion (<http://sion.frm.utn.edu.ar/iau-inclusion/>) maintains a comprehensive repository of materials for a segment of society long excluded from many activities – the physically disabled. Astronomy resources for the blind and visually impaired have been a major focus of many institutions, including tactile books and 3D printing of models, a tactile planetarium program, and even telescopic observing of high-contrast objects like the Moon for those with severe visual impairment. New signs for astronomical terms have been introduced into sign languages for the deaf. Blind and deaf professional astronomers are involved, providing direction and serving as role models for the students. The intent is always to include the disabled in the activities the rest of us enjoy, rather than providing alternative programs that just exacerbate a sense of isolation.

Astronomers Without Borders was founded on the vision that by using the universal interest in astronomy we can connect people around the world so that people can learn about each other through sharing of our common passion for studying the Universe. Though the initial goals were cross-cultural understanding and peace-building, the connections offered something more to those in developing countries – hope.

Technology has the ability to connect everyone but the world remains segmented. There needs to be a reason to connect, a common interest, and astronomy does just that. The newsletter of the Amateur Astronomers Association of Kurdistan in northern Iraq summed it up best in bold letters after I visited them with astronomy equipment donated by US amateurs – “We Are Not Alone Anymore!”.

During the International Year of Astronomy 2009, the 100 Hours of Astronomy Cornerstone Project engaged tens of thousands of amateur astronomers in one night – not in separate events but in one worldwide star party – with perhaps a million people viewing the heavens together over 24 hours. Astronomy can provide a sense of unity. Together we look outward to the cosmos as citizens of Earth, as part of something greater than ourselves or our planet.

Astronomy is unique in this regard. The sense of kinship it bestows can bring us together to share, just as we share the wonders of the Universe with others. And everyone can be included.



Mike Simmons with a group of amateur astronomers at an astronomy conference in the oasis town of Tozeur in southern Tunisia, about to head off into the Sahara Desert. They visited a *Star Wars* set and did some observing for half the night.

About the Author

Mike Simmons has been an amateur astronomer for 40 years and loves sharing the sky with others. Mike has been the President of the Los Angeles Astronomical Society and the Mount Wilson Observatory Association. Mike's outreach efforts in astronomy broadened in 1999 when he traveled to Iran for a total solar eclipse. In Iran he found an enthusiastic astronomy community lacking the resources easily found in the West. Seeing astronomy as a universal interest that transcends cultural differences, Mike founded Astronomers Without Borders in 2006. He now serves as President of this effort to unite astronomy and space enthusiasts around the world through those common interests.

Mike is also a writer and photographer who has contributed to publications including *Scientific American*, *Astronomy* and *Sky and Telescope* where he is a Contributing Editor. He regularly gives presentations, both in the US and abroad, on his experiences and interests, and on his outlook on international relations through astronomy.

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