

# **Globe at Night:** Turning Awareness into Action through Citizen-Science

Constance E. Walker (*cwalker@noao.edu*), Elliot Kisiel and Mark Newhouse NSF's National Optical-Infrared Astronomy Research Laboratory, Tucson, AZ USA

Citizen-science is a rewardingly inclusive way to bring awareness to the public on the disappearance of the starry night sky, its cause and solutions. Globe at Night (GaN) encourages citizen-scientists worldwide to record the brightness of the night sky. During ten-days per month of moonless evenings, children and adults match the appearance of a specific constellation with seven star maps of progressively fainter stars found at www.globeatnight.org. They then submit their choice of star map insitu using the "webapp" on a smart device. In thirteen years of the program, 192,000 observations from 180 countries have been contributed to the light pollution map.

The GaN (open) database is a source of research projects. For example, students conducted research to understand the lesser long-nosed bats' avoidance of city center at night. With its analytical tools, Fieldscope can be a conduit for comparing GaN to other databases. On-the-fly mapping enables citizen-scientists to see observations immediately. There are four ways of taking measurements. The online app for data reporting is in 28 languages. STEM activities for young children and problem-based learning activities for older students were created to experience real-life scenarios: role-playing sea turtles hatching (misdirected by lights on shore) or analyzing an ISS image of Houston to estimate the wasted energy, cost and carbon footprint. In-situ and on-line workshops have been given on using GaN and its activities.

#### Globe at Night: 6 Simple Steps at www.globeatnight.org/webapp/



Our Facebook page exists to encourage dialogue and bring cutting edge news. To foster interest, we had monthly newsletters and serial podcasts starring the "Dark Skies Crusader". GaN has been part of special campaigns; for example, the National Park Service, the National Geographic BioBlitz and Tucson in 2011. In 2009 and 2015, Globe at Night was an official citizenscience campaign for the United Nation-sanctioned International Years of Astronomy and of Light, respectively, setting record numbers for participation. We have built a community of practitioners in various ways worldwide and have metrics on behavioral changes. To maintain the community and create new partnerships, we have teamed with SciStarter to track participants via a dashboard, with the Girl Scouts and SciStarter in "Think Like a Citizen Scientist", and with STARS4ALL's Light Pollution Initiatives. For 2019, Globe at Night has been a partner in the International Astronomical Union's 100<sup>th</sup> birthday celebration.

Globe at Night has provided the public with a variety of ways to teach children how to be stewards of the night skies. Globe at Night is a flagship program of NSF's National Optical-Infrared Astronomy Research Laboratory (OIR Lab, formerly NOAO). The Association of Universities for Research in Astronomy, Inc. operates NSF's OIR Lab under a cooperative agreement with the National Science Foundation (NSF). Globe at Night has received funding from the European Union's Horizon 2020 under grant agreement No 688135 (STARS4ALL).

### Globe at Night: An Effective Worldwide Citizen-Science Program



What: Invites citizen-scientists to measure their night sky brightness and submit their observations to a website from a computer or smart phone: www.globeatnight.org

Who: people aged 8 and up

## Globe at Night: A Powerful Educational Tool

- Offered every month all year
- Four methods of data taking
- Translations into 28 languages report page
- Translations into 26 and 22 languages, respectively, for the activity guides & postcards
- Platform independent
- On the fly mapping
- Infographics
- Evaluations



#### Joint Program: Globe at Night, National Geographic BioBlitz and National Park Service



natural cultural heritage, our starry night skies. Join the "Dark Skies for All" global project, sponsored by the International Astronomical Union for its 100th birthdav

 Become a dark skies ambassador Share and be inspired by ideas and resources on the website Share and download educational materials to use in your community

WWW.GLOBEATNIGHT.ORG Get Out and Observe the Night Sky! Engage people worldwide in serving the nighttime sky Encourage students and families participate in citizen-science with nands-on learning activity. Gather light pollution data from a nternational perspective to moni sky brightness and its effects. Can you see the stars?

When: 10-day campaigns each month (no Moon in late evening)

**Where:** Anywhere; everywhere!

How: 192,000 measurements from 180 countries in the last 13 years.

> Undergrad Project: Impact of Lights on Lesser Long-nose Bats



Thousands of SQM measurements went into this contour map which shows 13 bats avoiding city center  $\rightarrow$  protect the "corridor"?

#### Measurements used in Monitoring for Ordinances



For dark and starry skies!

Over 200 km from Berlin to Leibniz



Girl Scout Project with SciStarter and Globe at Night: Think Like a Citizen Scientist: Measuring Light in the Night

#### Communities that Measure Over a Thousand Points Yearly



1800 pts/yr from Poland; 1200 from Astrobaza (astro clubs at different high schools)

# Summer -----

## Undergrad Project: Behavior of Night Sky Brightness over Time



https://scistarter.org/darksky-index/globe-at-night-darksky-index



Using Sky Quality Meter (SQM) stations (with housing) for over 1 year every minute each night.