

Summer night sky citizen science with Globe at Night

BY JILL NUGENT

Today, seven out of ten people in the United States are unable to see the Milky Way Galaxy (see Figure 1) when looking into the night sky from where they live due to light pollution. The Globe at Night international citizen science project aims to increase awareness of the growing global issue of light pollution by engaging citizens in measuring the night sky's brightness in their geographic location. Globe at Night has participants across all 50 United States and in over 115 countries worldwide. The program is associated with the National Optical Astronomy Observatory, the National Science Foundation, and the Association of Universities for Research in Astronomy. The program data are used to compare year-over-year trends and to compare with other data sets (such as bat feeding behavior data) to explore possible connections between light pollution and ecosystem impact. By implementing Globe at Night into your science classroom, you can help students begin to “see the light” on this important 21st-century issue. After immersing them-

selves in this issue, your students may be able to propose local solutions to address light pollution challenges.

Project goal: To raise global awareness about light pollution.

Your task: Measure and report the brightness of the night sky in your geographic location.

Science discipline: Earth and environmental science

Lighting makes up a quarter of the world's electricity consump-

tion, and light pollution is costly. In addition to monetary costs and energy waste, light pollution can also have adverse effects on organisms, including humans. Exposure to excess light can impact animal (and plant) physiology. For humans, this includes impacts to circadian rhythms, the sleep-wake cycle, and melatonin levels. Wildlife are also impacted by light pollution, especially nocturnal wildlife behavior (such as animal movement, migration, and predator-prey dynamics); in fact, many beachside com-

FIGURE 1: Image of the Milky Way Galaxy as seen from Earth. Today most people are not able to see the Milky Way from the area they live in due to light pollution.



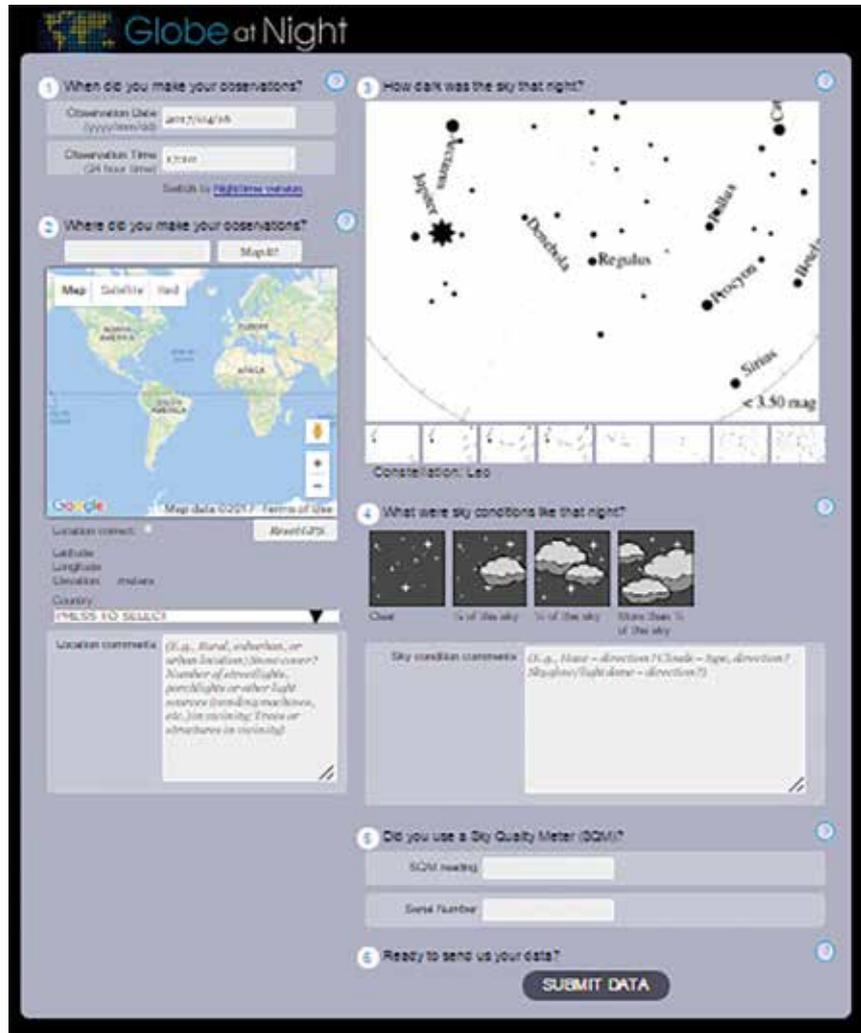
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munities now turn off beachfront artificial lights on evenings when sea turtle hatchlings are emerging from nests. (In the presence of inland artificial night light, sea turtle hatchlings crawl inland toward the artificial light, where they dry out and perish.) This is an example of communities coming together to solve a local wildlife challenge related to light pollution (see “Additional Resources” for related activities and curriculum connections, and “Helpful Project Links: Dark Skies Rangers” for Globe at Night lessons, activities, and educator resources).

Globe at Night offers exciting monthly constellation observation campaigns to get students involved in measuring and reporting night sky brightness. Students across the globe focus on observing a constellation and reporting what they see. Here are five steps to get involved and report observations (see “Observe: 5 Easy Star Hunting Steps” and “Report Observations”):

1. Use the Globe at Night website to help find your constellation in the night sky.
2. Use the Globe at Night website to find the latitude and longitude of the location where you are making your observation.
3. Go outside more than one hour after sunset. The Moon should not be up. Let your eyes adjust to the dark for 10 minutes before your first observation.
4. Match your observation to one of the seven magnitude charts provided on the Globe at

FIGURE 2: Globe at Night online data reporting page



5. Report the date, time, location, the chart you chose, and the amount of cloud cover at the time of observation (see Figure 2).

Materials you will need:

- Your eyes turned toward the sky (be sure to wait to observe until your eyes have adjusted to the dark, usually

about 10 minutes)

- Internet access to report your observation

If you live in the Northern Hemisphere (such as the United States), the constellation Hercules is part of the Globe at Night monthly campaign challenge during the dates of June 16–25, July 15–24, and August 14–23, 2017. Conversely, if you are in the Southern Hemisphere (such as Australia) during June and July,

you will focus on the constellation Scorpius during the dates of June 16–25 and July 15–24, 2017. Globe at Night posts the dates and associated resources for the monthly constellation observation challenges, which take place throughout the school year.

The topic of light pollution can easily be extended into a project-based learning unit. Through the Globe at Night website, students have access to historical light pollution data and maps for research and exploration (see “Maps and Data”). Students may also be interested in researching local light

pollution issues as well as disseminating data they have collected during Globe at Night to local officials and agencies in order to raise community awareness. Students may be interested in reviewing historical data in the context of a local wildlife species or issue. For example, Globe at Night historical data have been helpful in providing insight into bat migration corridors and geographic bat feeding patterns in Arizona. In addition, Students Discover, a North Carolina-based group focused on innovative teaching through citizen science, has collaborated with

Globe at Night to create a middle school learning module entitled, “Starry Night: Engineering a Solution to Light Pollution” (see Additional Resources for “Students Discover: Starry Night Lesson Plan”), which is available for download online.

By participating in Globe at Night, students have the opportunity to immerse in locally engaged, globally connected citizen science, and your students may generate innovative science and engineering solutions to address the growing 21st-century global light pollution challenge. ●

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GLOBE AT NIGHT AT A GLANCE:

When: Throughout the year. Globe at Night runs one campaign each month [monthly constellation challenges]. [See “Observe: 5 Easy Star Hunting Steps” for the campaign dates.] Observations take place at least one hour after sundown.

How: After you have completed your observation of night sky brightness, you can report data directly to the Globe at Night website [see “Report Observations”]. Globe at Night observations can also be made with an app to report data from a mobile device. [See “Project Home” for related and available phone apps.]

Where: Anywhere [global].

Time needed: Variable. Roughly 30 minutes per observation.

Special equipment needed: None.

Cost: Free.

Contact for more information: globeatnight@noaa.edu; if interested, you may also sign up for the Globe at Night e-mail list via the contact page, www.globeatnight.org/contact-us.php.

NGSS Connections: MS.LS2.5, MS.ESS3.3, MS.ESS3.4

Safety: As with any science lab, classroom, or field activity, always ensure that you are following



recommended safety practices; as the Globe at Night citizen science project takes place at night, always ensure that your surroundings are safe. For more information on safety in the science classroom, visit www.nsta.org/safety.

HELPFUL PROJECT LINKS:

Dark Skies Rangers—www.globeatnight.org/dsr
 Maps and data—www.globeatnight.org/maps.php
 Observe: 5 easy star hunting steps—www.globeatnight.org/5-steps.php
 Project home—www.globeatnight.org
 Project link on SciStarter—<https://scistarter.com/project/169-Globe-at-Night>
 Report observations—www.globeatnight.org/webapp

Summer Northern Hemisphere:
 Finding Hercules—www.globeatnight.org/finding/hercules
 Summer Southern Hemisphere:
 Finding Scorpius—www.globeatnight.org/finding/scorpius

ADDITIONAL RESOURCES:

American Museum of Natural History
 light pollution activity “Beyond the Glare”—<http://bit.ly/2q4qiq0>
 International Dark-Sky Association—www.darksky.org
 Light pollution—www.darksky.org/light-pollution
 PBS sea turtle activity “Which Way to the Ocean?”—www.pbs.org/pov/citydark/lesson-plan
 Quality lighting teaching kit—www.noaa.edu/education/qltkit.php
 Students Discover: Starry Night Lesson Plan—<http://bit.ly/2oHNGoF>

This column is the result of a partnership between SciStarter and the National Science Teachers Association. For more information about SciStarter and other citizen science projects, please visit www.scistarter.com.

