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Dark Skies Awareness through the GLOBE at Night Citizen-Science Campaign

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Abstract

The emphasis in the international citizen-science, star-hunting campaign, GLOBE at Night, is in bringing awareness to the public on issues of light pollution. Light pollution threatens not only observatory sites and our "right to starlight", but can affect energy consumption, wildlife and health. GLOBE at Night has successfully reached a few hundred thousand citizen-scientists during the annual 2-week campaign over the past 6 years. Provided is an overview, update and discussion of what steps can be taken to improve programs like GLOBE at Night.

1. Introduction

The emphasis in the international star-hunting campaign, GLOBE at Night, is in bringing awareness to the public on issues of light pollution. Light pollution threatens not only observatory sites and our "right to starlight", but can affect energy consumption, wildlife and health. The GLOBE at Night campaign has been run each spring for the last six years by the National Optical Astronomy Observatory (NOAO) in Tucson, Arizona. The program invites citizen scientists to measure their night sky brightness and submit their observations to a website from a computer or smart phone. GLOBE at Night has become the most successful light pollution awareness campaign to date. It has reached a few hundred thousand citizen-scientists over the last seven 2-week campaigns. Citizen-scientists from more than 100 nations have contributed 66,000 measurements. What steps can be taken to improve efforts to engage the public?

2. The 2011 Campaign Results

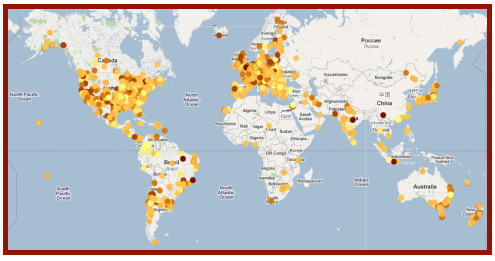
The total number of measurements during the 2011 GLOBE at night campaign was 14,249. The largest number of countries (115) participated in this year's event. The top dozen contributing countries accounted for 85% of all GLOBE at Night measurements in 2011. Nearly half of all the measurements were from the United States (49 states plus the District of Columbia). 10% of all measurements (or 1400 measurements) were from Arizona. The country with the next largest contribution of measurements was Poland (with over 1200). India came in third with over 700 measurements.

Every 3 out of 5 measurements of limiting magnitude gave a value of 3 or 4 mag, which is typical of measurements contributed by medium to larger sized cities. 82% of the measurements (or slightly more than every 4 out of 5 measurements) were taken in light polluted areas and less than 18% (less than every 1 out of 5 measurements) from areas where you could see the Milky Way Galaxy.

3. Increase Campaign Promotion

Utilizing popular social media, NOAO staff created on-line communities on Facebook and Twitter for this year's GLOBE at Night campaign. See www.facebook.com/GLOBEatNight and twitter.com/#!/GLOBEatNight. During the campaign there were close to 1000 visitors per week to the Facebook site.

A survey to examine the effectiveness of the GLOBE at Night program and its accompanying set of hands-on "Dark Skies Rangers" activities has been developed by external staff and is about to be launched, as well as tutorial videos for the activities.



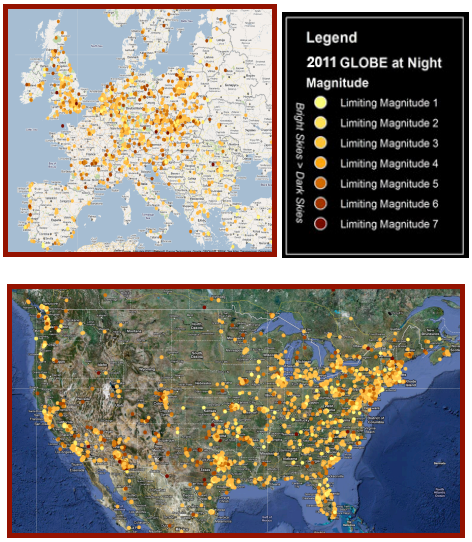


Figure 1: GLOBE at Night 2011 results: a) worldwide; b) in Europe; c) in the United States. The legend shows that the brighter the data point, the lighter the night sky and the darker the data point, the darker the night sky.

4. Increase the Opportunities for Participation in the Campaign

For the first time, the GLOBE at Night data was submitted in real time using smart mobile devices (or a computer). Children and adults submitted their sky brightness measurements in real time with smart phones or tablets using the web application at www.globeatnight.org/webapp/. The web application automatically registered the location, date and time. For those without smart mobile devices, user-friendly tools on the GLOBE at Night report page were reconfigured to determine latitude and longitude more easily and accurately.

Also for the first time in 2011, NOAO offered two annual campaigns instead of one. As a result, new materials were developed and translated for on-line interactive tools, star charts, limiting magnitude charts, mythologies and other resources for two new constellations (Leo and Crux). Eventually NOAO is contemplating offering the program year-round for seasonal studies.

5. Increase the Opportunities for Using the Data

During the 2011 campaign, a "call-to-action" was issued inviting Tucsonans who wanted to take more than 1 measurement to "adopt-a-street". The aim was for people to adopt different major or semi-major streets and take measurements every mile or so for the length of the street. The grid of measurements would canvas the town, allowing for comparisons of light levels over time (hours, days, years) or search for dark sky oases or light-polluted areas. The successful proto-type program will be expanded in future years to other cities.

Recently, NOAO and the Arizona Game and Fish Department started a project with GLOBE at Night data and bat telemetry to examine a dark skies corridor in Tucson where the endangered bats fly 30km from roost to foraging area. The goal of this project is to beta-test comparing GLOBE at Night data with datasets on wildlife, health, and energy consumption. For the 2nd consecutive summer, a "Research Experiences for Undergraduates" student is participating in the research.

6. Increase the Opportunities for Partnerships

For GLOBE at Night 2011, new partnerships were also formed with prominent U.S. national groups like Girl Scouts of America and environmental centers like the Cooper Center for Environmental Learning and continues with the U.S. and international Galileo Teacher Training Program.

Further details on the GLOBE at Night campaign can be found at www.globeatnight.org. It is the act of participating in, contributing to and taking ownership of addressing issues like light pollution that provides a cultural revolution for the benefit of all. We look forward to your joining the campaign in 2012.

Acknowledgements

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