2007 GLOBE at Night Analysis Summary

www.globe.gov/globeatnight

March 8-21, 2007

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What do the 2007 GLOBE at Night data tell us?

During March of 2007, thousands of people of all ages from 60 countries worked together to measure the amount of light pollution around the world. By going outside in the early evening, they were able to observe the constellation Orion; and by comparing the visible stars to the limiting magnitude charts, they measured their local light pollution. The map below (Figure 1) shows the 8,491 observations made during March 8-21, 2007. Each observation is represented by a colored dot, with the darker dots representing darker skies (with fewer lights at night) and brighter dots representing brighter skies (with more lights at night).

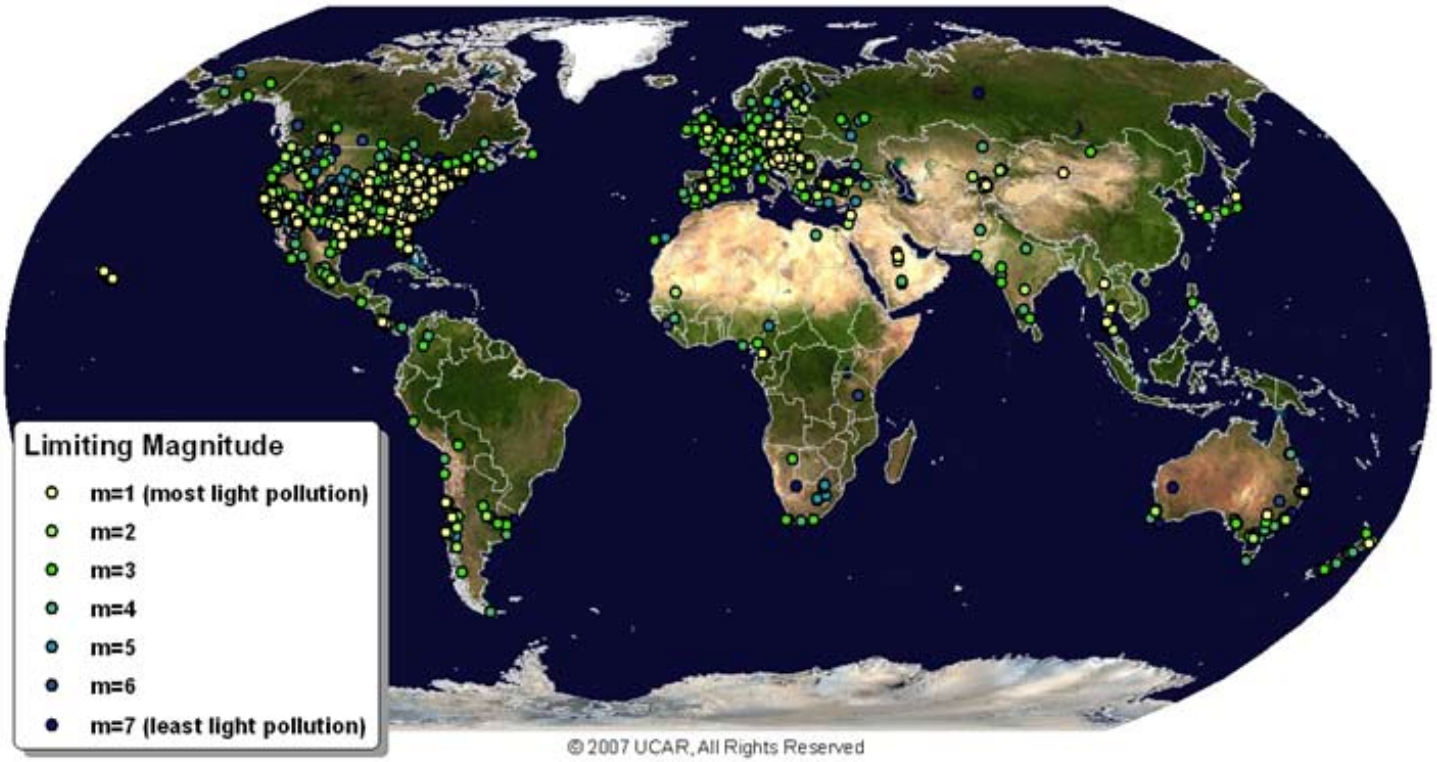

Figure 1. GLOBE at Night Observations for March 8-21, 2007

As you can see, there are many more bright dots than dark ones. This makes us think that most of the observations were taken by people who live in areas with at least some light pollution. To astronomers, biologists, and other scientists who study light pollution, this is not surprising. One question that you might ask is, "What do the GLOBE at Night data tell us about the geographic location of the observations?"

What do the 2007 GLOBE at Night data tell us? (continued)

The easiest way to answer the question is to count the number of observations that matched each limiting magnitude chart. Remember that magnitude is a term astronomers use to describe the brightness of an object. Magnitude 1 stars are brighter than magnitude 7 stars, so they can be seen even in light-polluted skies. By looking at the bar graph in Figure 2, you can see that 467 observations were made with a limiting magnitude of 1 (brightest skies, most light-polluted skies) while only 250 were made with a limiting magnitude of 7 (darkest skies, least light-polluted skies). According to Figure 2, most observations were made under limiting magnitude 3 and 4 skies. This tells us that most observations were taken in places with some light pollution. If you entered an observation, how does your location compare with others? Were your skies brighter or darker than most others?

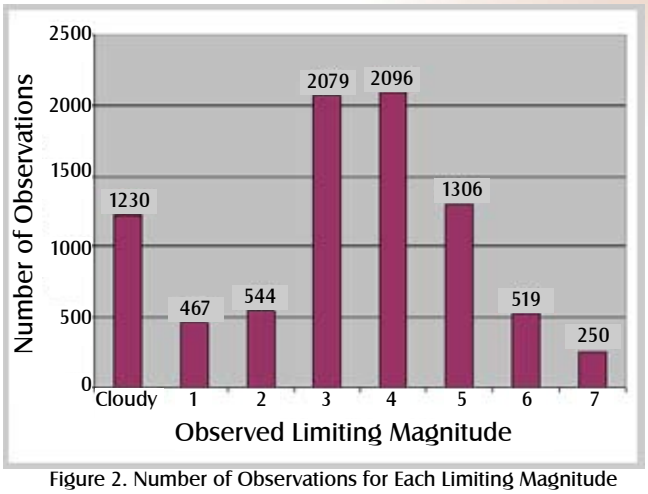

Figure 2. Number of Observations for Each Limiting Magnitude

Another way of answering the question, "What do the GLOBE at Night data tell us about the geographic location of the observations?" is to compare each observation with how many people live at or near that location. The best way of doing this sort of comparison is to use a measurement known as "population density." Population density is defined as the number of people that live within a standard area, usually one square kilometer. The population density in a remote area might be just 3 or 4 people per square kilometer, while in the center of a large city there might be more than 10,000. The map in Figure 3 shows a portion of Michigan, United States, as an example. The population density is shown by the shades of yellow in the background—darker colors represent areas with more people per square kilometer.

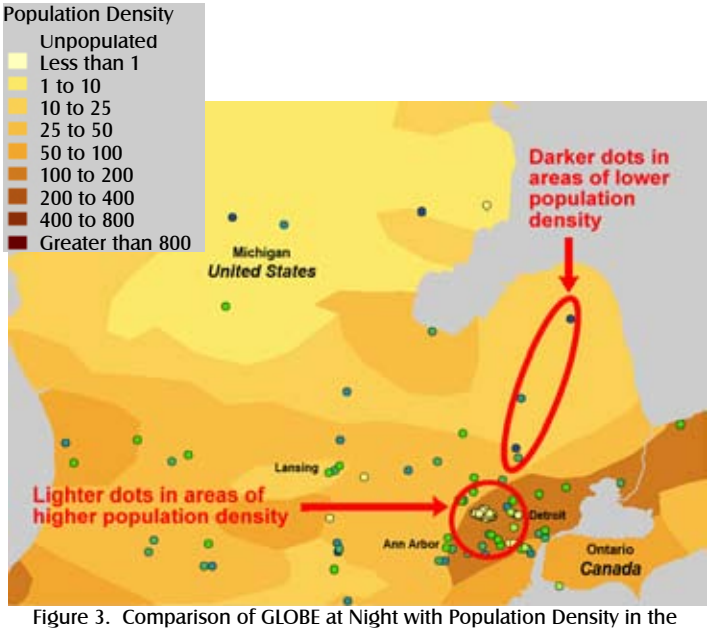

Figure 3. Comparison of GLOBE at Night with Population Density in the Lower Peninsula of Michigan, United States

Since light pollution is caused by the lights that people use, you might guess that areas of higher population density would have brighter skies and more light pollution. In my analysis, I compared the 2007 GLOBE at Night data with the population density around the world and found that the brighter dots reported during 2007 GLOBE at Night are located in areas with higher population density.

The summary of my analysis is that the 2007 GLOBE at Night data show brighter skies in areas with more people. By submitting your observations to GLOBE at Night, you are helping scientists studying light pollution, population patterns, and energy usage.