



2006 GLOBE at Night Map Viewer Exploration Guide

www.globe.gov/globeatnight

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Introduction:

The GLOBE at Night Analysis Summary (available at www.globe.gov/GaN/analyze.html) discusses various ways that your observation data have been analyzed. This exploration guide will provide a starting point for analyzing the data yourself with the GLOBE at Night Map Viewer. In 25 steps, you will be guided through opening and exploring the various datasets available, as well as thinking about what the data tell us. Each step in the instructions has a picture showing what the Map Viewer looks like for that step.

Objectives:

Upon completion you will be able to:

- Open the GLOBE at Night Map Viewer
- Select the desired dataset(s) to be displayed
- Zooming in and out on the map
- Display a map legend
- Explore the attributes of each observation
- Print the current map
- Save a hyperlink to the current map
- Discuss the relationships between the GLOBE at Night observations, population density, and Earth at Night imagery

Instructions:

1) Open the GLOBE at Night Map page (www.globe.gov/GaN/analyze.html) using an Internet browser (such as Internet Explorer or Mozilla). Click on the world map to launch the GLOBE at Night Map Viewer. After a few moments (depending on your connection speed), a popup window will open. (You will need to allow popup windows from your browser.) Take a few moments and explore the Map Viewer's button bar. As you hover your mouse over each button, a text description will appear that describes its function. We will explore the purpose and use of many of these buttons.

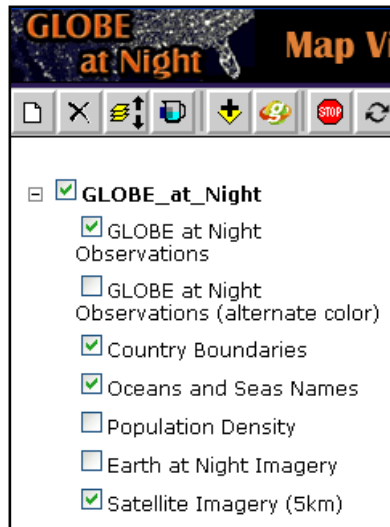
The screenshot shows the GLOBE at Night Map Viewer interface. At the top, there is a 'Button Bar' with various icons for navigation and map control. On the left side, there is a 'Table of Contents (TOC)' with a list of datasets and their corresponding checkboxes. The main area is a 'Map' showing a world map with observation data points. The interface also includes a 'REFRESH MAP' button and a 'LEGEND' button at the bottom left, and a scale bar at the bottom right.



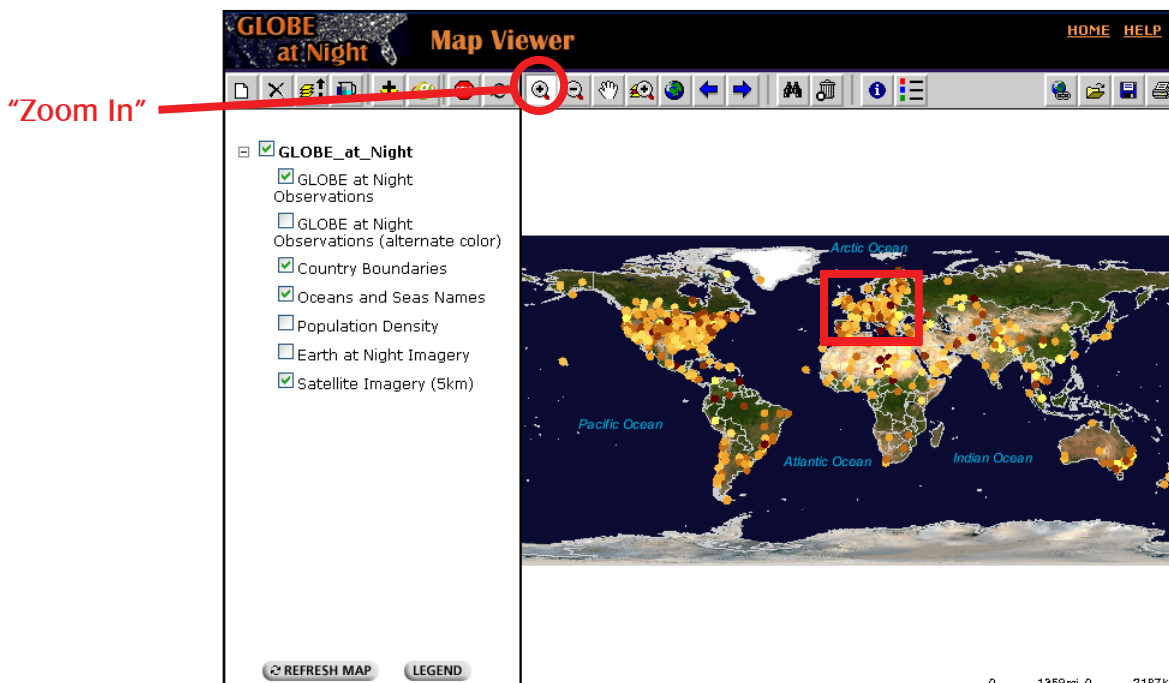


Map Viewer Exploration Guide (continued)

2) Another important area is the “Table of Contents,” or TOC, that lists all of the datasets available for viewing on the map. You should see a list that closely matches the example. The datasets or layers currently being displayed on the map are marked with a check. The layers available but not displayed on the map don’t have a check next to their name. As you will see, not only can you turn layers off and on using the checkboxes, the number and type of data layers available will change as you zoom in and out.



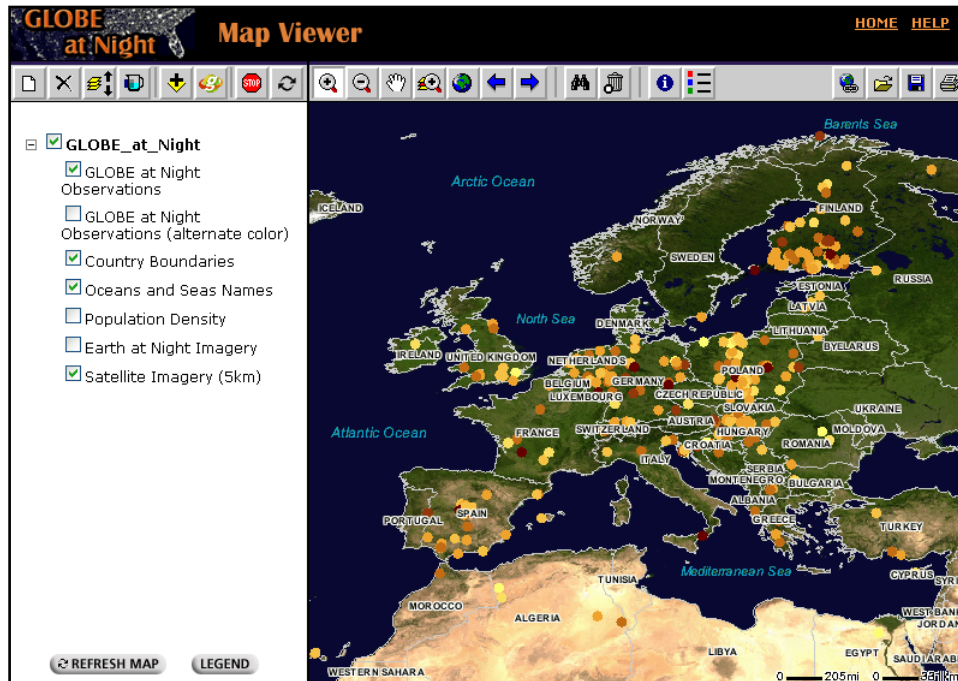
3) Let’s use the “Zoom In” button to take a closer look at Europe. Make sure the “Zoom In” button is selected and with your mouse, click and drag a box around Europe.





Map Viewer Exploration Guide (continued)

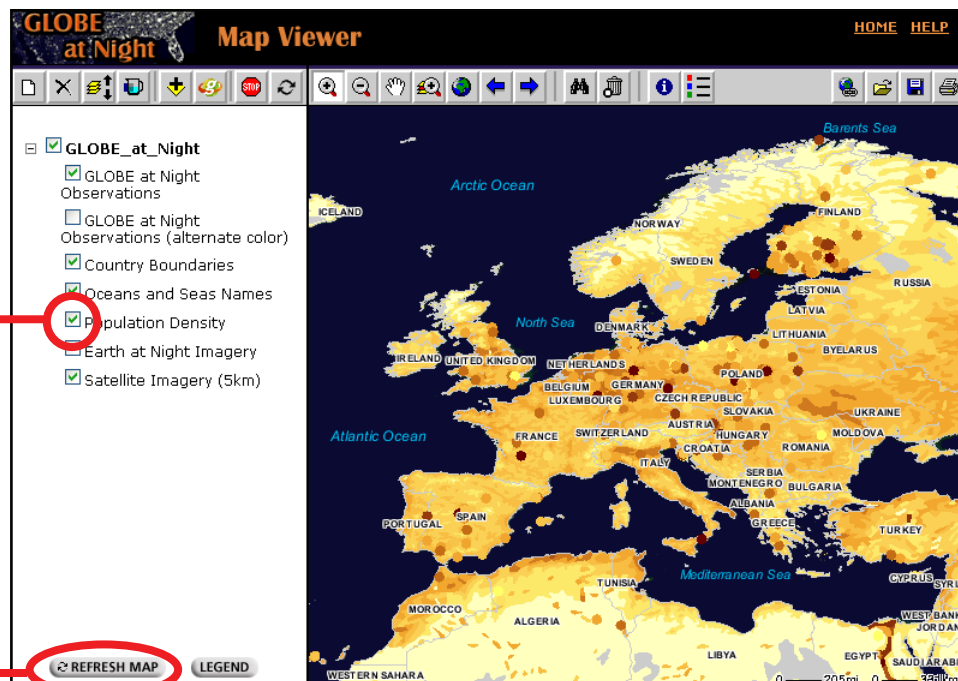
4) Once you have the box sized the way you want it, release your mouse and the Map Viewer will zoom into the selected area of the map. Notice that the layers in the TOC have not changed.



5) You can see hundreds of observations in the map of Europe, but what does that pattern tell us? We'll use one of the extra data layers to take a different look at this region. In the TOC, click the checkbox next to the "Population Density" layer to select it. Then click the "Refresh Map" button.

"Population Density"

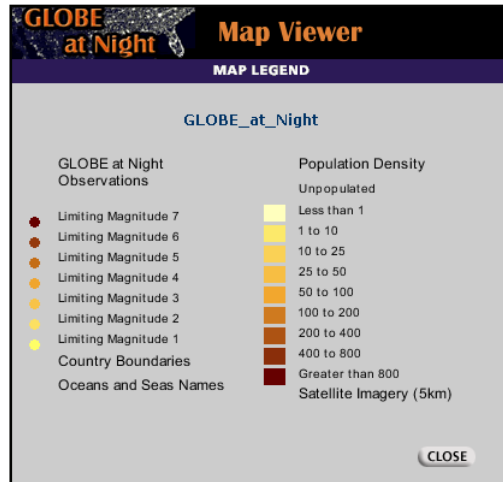
"Refresh Map"





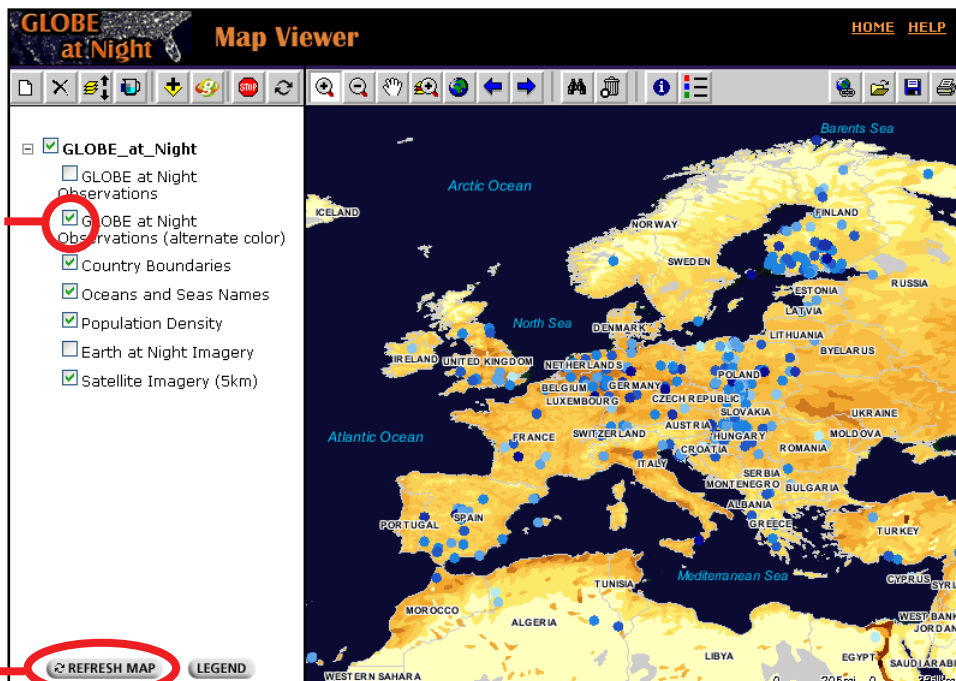
Map Viewer Exploration Guide (continued)

6) The map now shows not only the GLOBE at Night observations, but the population density for the region. But what do all the colors mean? Click on the “Legend” button in the bottom right of the TOC to bring up a popup window with the current legend. As you can see from the legend, the population density map covers a range of less than 1 person per square kilometer to more than 800.



7) The map we’ve created by adding the population density layer is not very easy to read—the GLOBE at Night observations are shown in the same colors as the population density. Not only is this confusing, but it makes the GLOBE at Night data very hard to see. We’ll use another data layer to clear things up. In the TOC, click on the checkbox next to “GLOBE at Night Observations” to de-select it. Next, click the checkbox next to “GLOBE at Night Observations (alternate color)” to select this layer and click the “Refresh Map” button. This map is much easier to read—the observations are in shades of blue and the population density is in shades of yellow.

“GLOBE at Night Observations (alternate color)”



“Refresh Map”





Map Viewer Exploration Guide (continued)

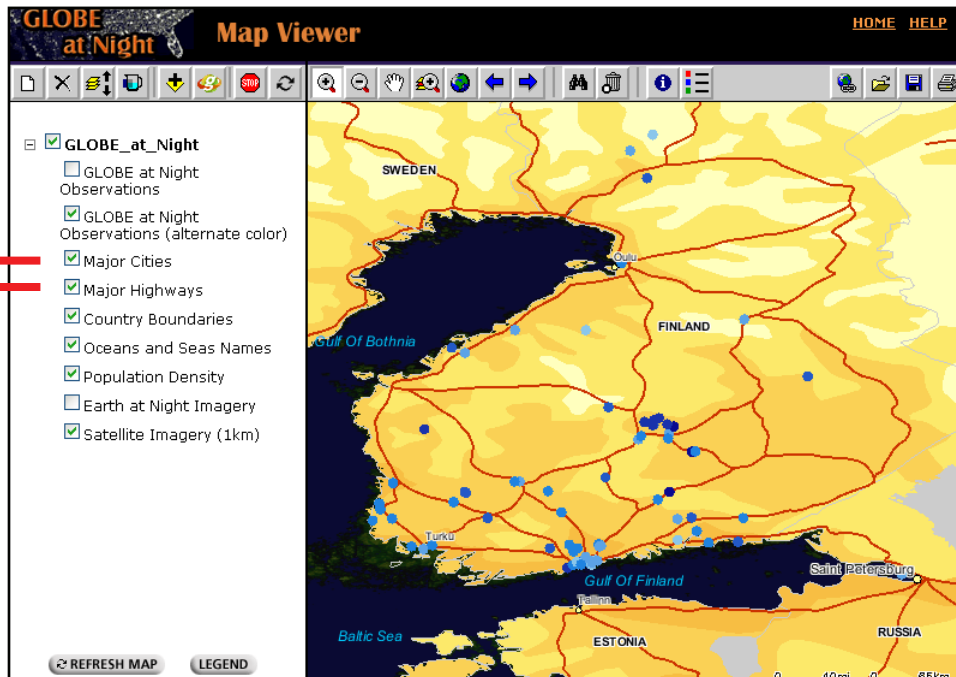
8) You might have noticed that the window containing the legend closed when you refreshed the map. If you want to see the updated legend, click the “Legend” button or the “View Map Legend” button in the button bar.



“View Map Legend”

9) Let’s take a closer look at Finland. Use the “Zoom In” button to click and drag a box around Finland. Notice that the TOC has changed and two new data layers are now available and displayed on the map: Major Cities and Major Highways. Do you notice anything about the location of the GLOBE at Night observations? For the most part, they are either around cities or along the major highways. This makes sense because that is where most people live. How about the color of the observations? Where are the light-blue dots compared to the dark-blue ones? Remember, the light-blue dots represent locations that have light-polluted skies, while the dark-blue ones represent darker skies (less light-polluted).

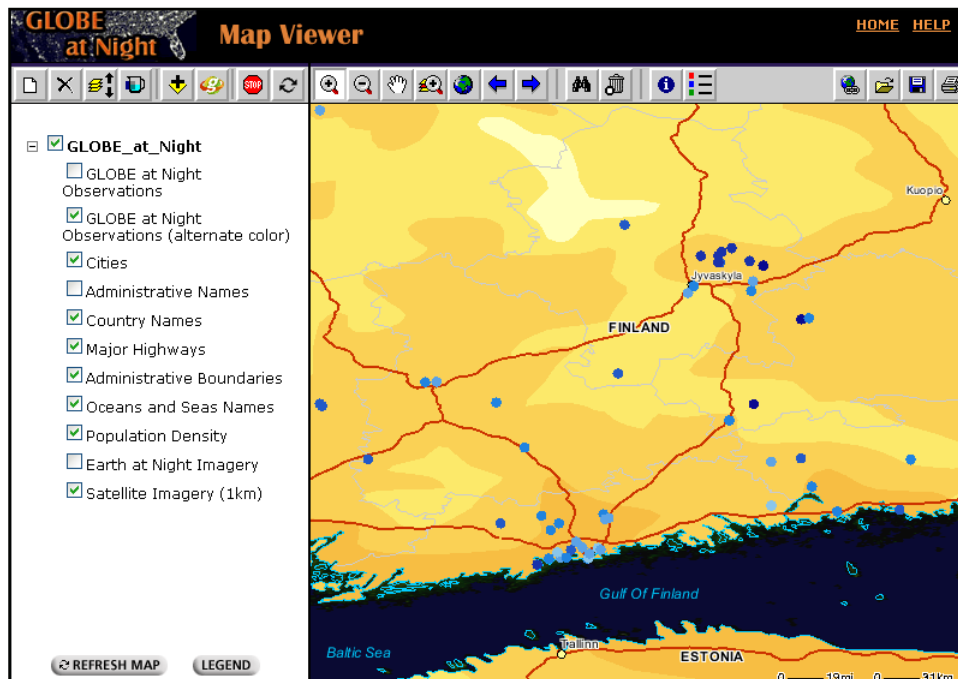
“Major Cities”
& “Major Highways”





Map Viewer Exploration Guide (continued)

10) Zoom in one more time to take a closer look at southern Finland. The light-blue dots are clustered in areas where the roads come together and the population density is higher, in other words, in the cities. The dark-blue dots are generally further away from the city, which is what we expect to find—skies that are less light-polluted are usually farther away from cities.



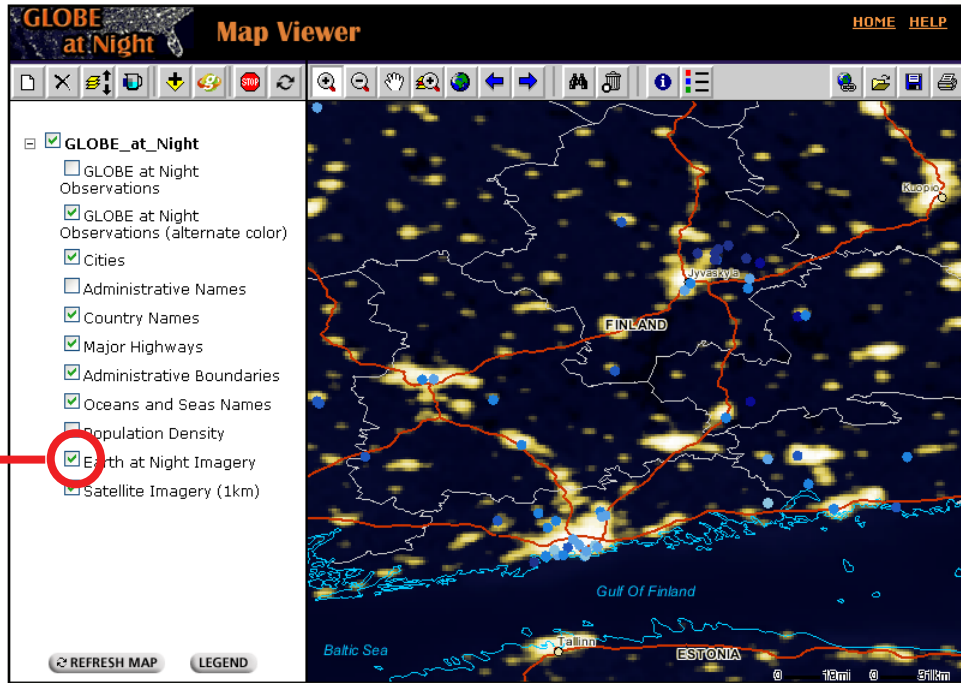
11) Now let's compare the GLOBE at Night observations to another dataset. In the TOC, de-select "Population Density" and select "Earth at Night Imagery". Click "Refresh Map" to see the changes. The Earth at Night Imagery is made up of images of the Earth that shows what it would look like if it were nighttime everywhere (no sunlight shining anywhere). Since the Sun always shines on half of the Earth, this image is made up of many individual images taken from satellites in space when they are over the Earth's night side. This "Earth at Night" image shows areas with more lights as white dots. Look at the area near Jyväskylä. The light-blue GLOBE at Night dots are within lighter areas of the "Earth at Night", where there are cities. The dark-blue GLOBE at Night dots are in the darker areas of the "Earth at Night". The similarity between the GLOBE at Night data and the "Earth at Night" image helps us to know that the satellite information is reliable in observing light pollution.





Map Viewer Exploration Guide (continued)

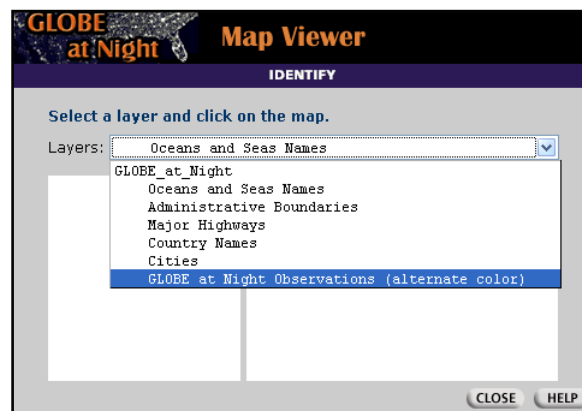
"Earth at Night Imagery"



12) You can use the "Identify" button on the button bar to find out more information about each specific observation.



13) The Identify window will open. Click on the dropdown box to select "GLOBE at Night Observations (alternate color)."





Map Viewer Exploration Guide (continued)

14) Leave the Identify window open, and click on one of the observation data points on the map. An example is shown. In this example, you can learn that there was no cloud cover at that location, which is along the shore of a large lake in the country. Take a few moments to explore other observations and read any comments that describe their specific location.

FIELD	VALUE
LOCATION	x 25.1697 y 61.585
LATITUDE	61.56667
LONGITUDE	25.18333
DAY	1143331200000
PICTURE_MAGNITUDE	5
CLOUD_COVER	0
COMMENT_SKY	a bit light pollution few degrees above horizon
COMMENT_LOCATION	The location is in a shore of big lake in countryside
COMMENT_OTHER	null
OBJECTID	22227
AREA	0
LEN	0

15) Click on the "Zoom To Full Extent" button to view the whole Earth.

16) You should see the full global view, where you were in step 1).

- GLOBE_at_Night
 - GLOBE at Night Observations
 - GLOBE at Night Observations (alternate color)
 - Country Boundaries
 - Oceans and Seas Names
 - Population Density
 - Earth at Night Imagery
 - Satellite Imagery (5km)

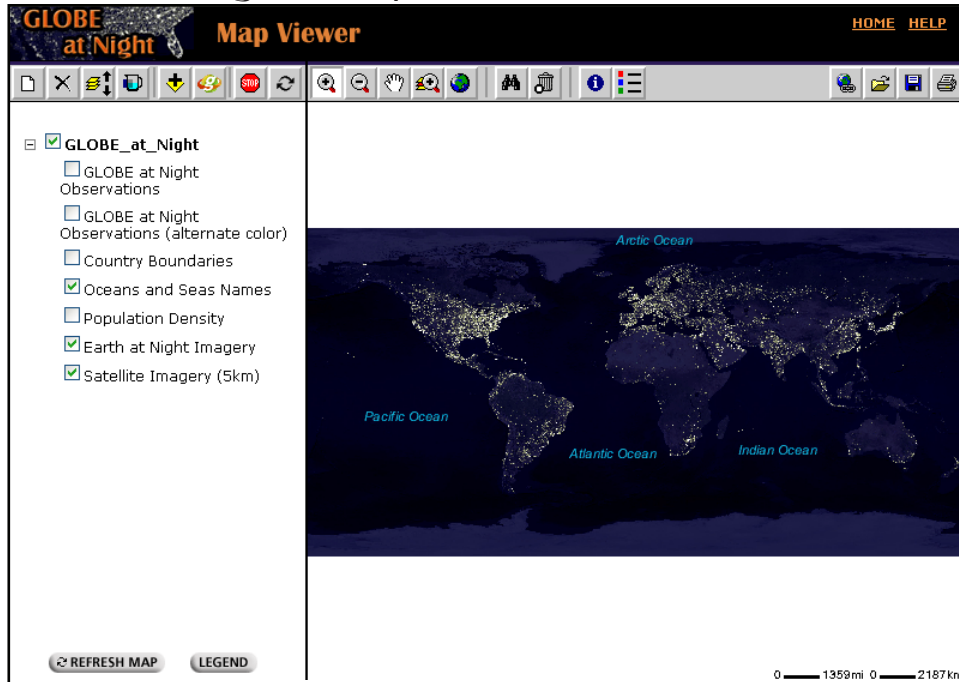
0 1353mi 0 2187km



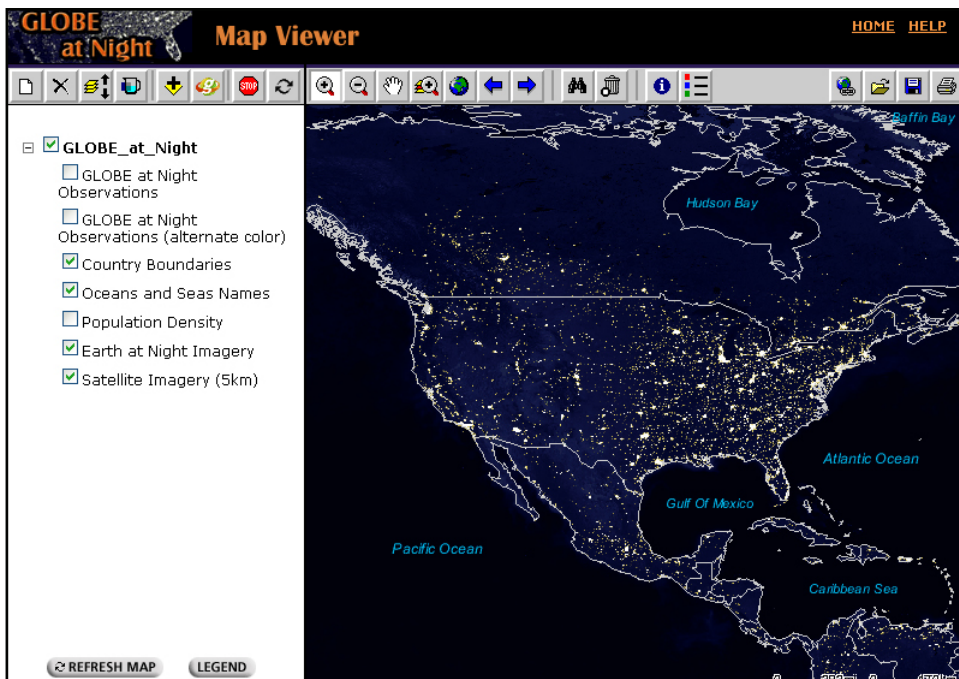


Map Viewer Exploration Guide (continued)

17) Unfortunately, the dots representing the observations pretty much cover the “Earth at Night Imagery”, so de-select the “GLOBE at Night Observations (alternate color)” layer. Also de-select the “Country Boundaries”. Click the “Refresh Map” button to reveal the “Earth at Night” image, a view of artificial lights around the globe. Can you still make out the general shape of some countries?



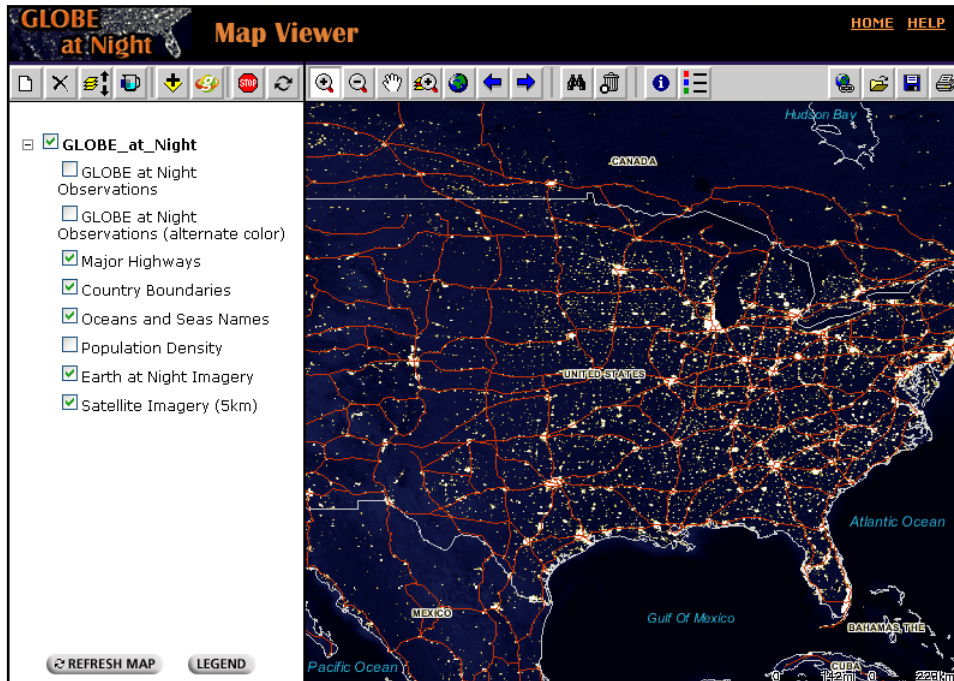
18) Use the “Zoom In” button to show only the continental United States. Select the “Country Boundaries” layer if that helps. Can you find any major cities, such as Los Angeles, Denver, Chicago, Detroit, Dallas, or New York?



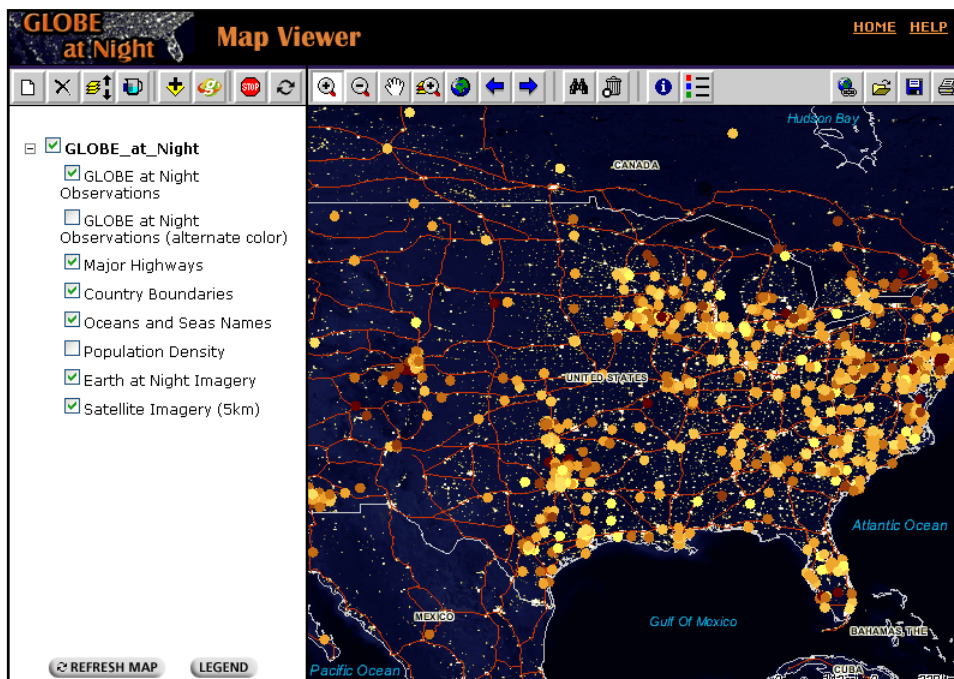


Map Viewer Exploration Guide (continued)

19) If you zoom into the middle of the map, you will even be able to follow the interstate highways from city to city.



20) Select the “GLOBE at Night Observations” layer. Again notice that the light-yellow dots are generally closer to the bright areas of the “Earth at Night”, while the dark-yellow dots are farther away. Does this make sense, based on what we’ve seen in Finland?





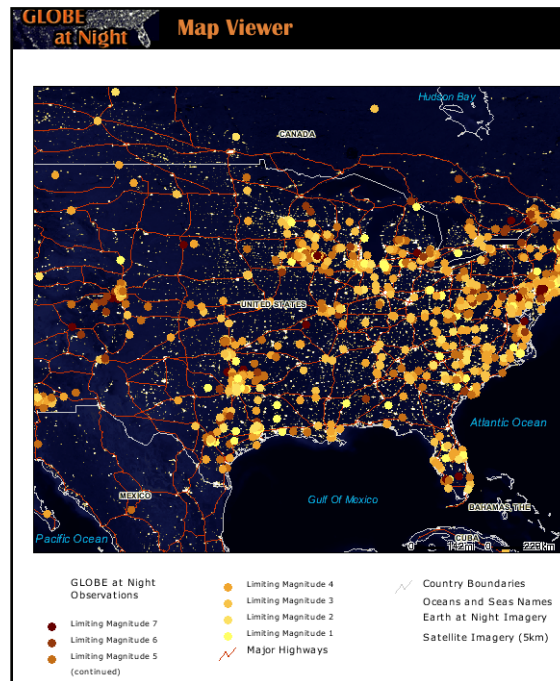
Map Viewer Exploration Guide (continued)

21) The Map Viewer button bar also contains a button that will open a web page suitable for printing, "Open Print Page."



"Open Print Page"

22) Click the "Open Print Page" button, a new browser window will open, containing the current map along with the appropriate legend information. You can use the print command or button on your browser to print this web page on your printer.



23) What if you have zoomed in on the map and realize that you want to save the view or share it with someone else? The easiest way to do this is to click on the "Create Link To Map" button. Once you click on the button, a new window will appear, containing a snippet of html that you can either add to a web page or a document. When you or someone else opens the link, the map will be recreated exactly as it was.



"Create Link To Map"



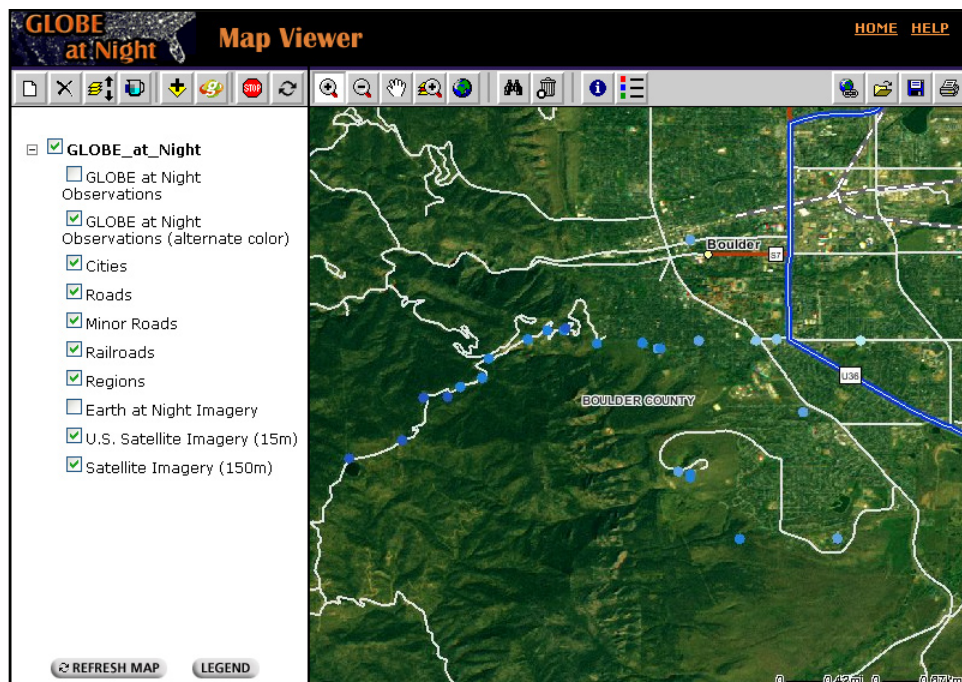


Map Viewer Exploration Guide (continued)

24) Here is an example of such a link:

http://www.geographynetwork.com/arcexplorer/arcexplorer.html?origid=Globe_Night&link=20060503094940090_GLOBE_at_Night

Clicking on this link will open a map that is centered on Boulder, Colorado, USA. Take a look at the series of blue dots that begin near the left edge of the map. Use the "Identify" button to view the details for the first dot. You'll see that this observation was made at Kossler Lake in the mountains above Boulder, and that the sky's limiting magnitude was 5. Follow the series of dots toward Boulder and notice what happens to the limiting magnitude as the observers traveled closer to town. The nice dark sky became more and more light-polluted, until the sky had a limiting magnitude of 1. Do you think that this change was entirely caused by artificial lighting? Why or why not?



25) Now that you are familiar with how to use the Map Viewer, explore other parts of the world and look for patterns in the data points. Enjoy your explorations!

