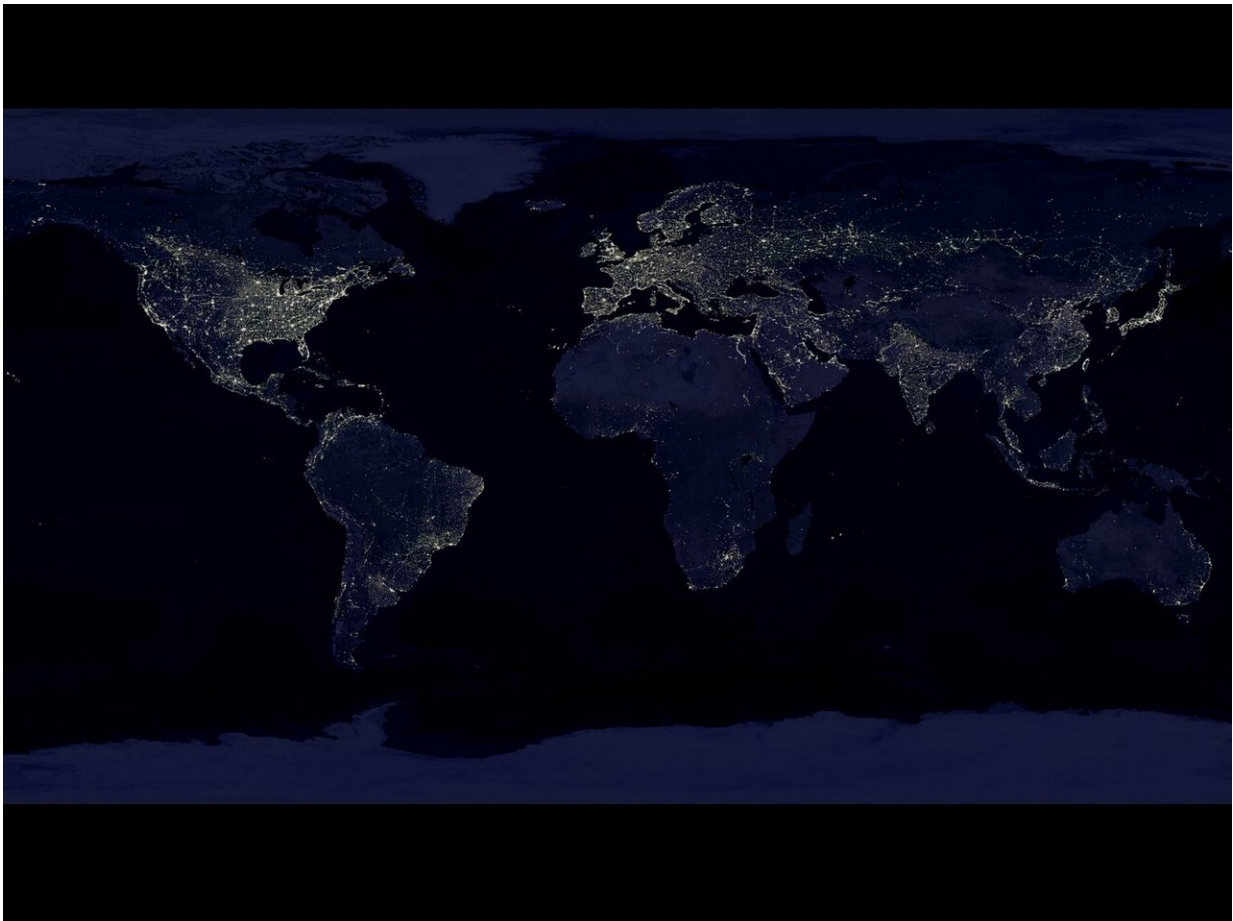


'Radiance Light Trends' shows changes in Earth's light emissions

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This composite image, which has become a popular poster, shows a global view of Earth at night, compiled from over 400 satellite images. NASA researchers have used these images of nighttime lights to study weather around urban areas. Credit: NASA/NOAA

Many scientific datasets from satellites are in principle available for free, but that doesn't mean that they are actually accessible to the wider public. A new web application aims to change that, at least for satellite imagery of Earth at night. An app called Radiance Light Trends allows anyone with an internet connection to quickly select a region or a site and analyse the trends in light emissions observed by satellites since 1992. The development of the web app was guided by Christopher Kyba from the GFZ German Research Centre for Geosciences in Potsdam.

Satellites produce a great deal of data, so simply downloading the data can pose a challenge. "Before this app was developed, if someone new wanted to analyse trends in [light emissions](#) for a specific region, I expect it would take them at least a full day to do it," says Christopher Kyba. "In addition to downloading the data, specialist knowledge of geographic information system software would be needed to select a region and analyse it." With the Radiance Light Trends app, it is now possible for someone with no special training to produce a chart showing [light](#) trends in under a minute.

"Users can have the development of light pollution calculated for nearly any site or region in the world," Christopher Kyba explains. "For example, take an area around Berlin, start the analysis and you will see how much brighter it has become in recent years. New [satellite](#) data is automatically entered into the database and taken into account for the calculation. This is particularly useful for interested citizens, environmentalists, or journalists, but also for municipal administrations and companies planning lighting measures. The app might be useful for the analysis of natural hazards and the planning or the rebuilding of infrastructure, too."

Greenhouse lights up, airport dims lighting

Changes in lighting which can be tracked by Radiance Light Trends have

a variety of causes, according to Christopher Kyba. One example he points to is Tucson International Airport in Arizona, where hundreds of outdoor lights were replaced in August to October of 2014 in order to reduce energy consumption and light pollution. A clear drop is visible for that location in Radiance Light Trends. Another example is light leakage from large greenhouses, which often introduces new light to areas that used to be quite dark. For instance, a large greenhouse about 350 kilometres southwest of Moscow has lit up the night with escaping light since 2015.

The data underlying the app comes from two satellite instruments run by various government agencies in the U.S. over the last several decades. For 1992 to 2013, data comes from the Operational Linescan System of the Defense Meteorological Satellite Program (DMSP) satellites. From 2012, the source of data is the day/night band of the Visible Infrared Imaging Radiometer Suite instrument (VIIRS DNB). There are several options to choose from for displaying the [satellite data](#) in Radiance Light Trends: A colour-coded projection onto a map of the Earth with annual or monthly data, or a polygon drawn around an area of interest to see a timeline of light data over several years on a monthly basis, for example. The data can also easily be exported in multiple data formats.

Christopher Kyba suggests that other satellite datasets could be made similarly accessible: "There's no reason that a similar application couldn't be produced for measurements of temperatures, or Arctic sea ice, or any of a host of other environmental variables. With that in mind, we are planning on releasing the code underlying the web app under a license that will allow others to reuse it."

More information: "Radiance Light Trends" website:
lighttrends.lightpollutionmap.info

GEOEssential project www.geoessential.eu/

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