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# Measuring Light Pollution

**GLOBE AT NIGHT 2020**

[WWW.GLOBEATNIGHT.ORG](http://WWW.GLOBEATNIGHT.ORG)

Get Out and Observe the Night Sky!

Engage people worldwide in observing the nighttime sky.

Encourage students and families to participate in citizen-science with a hands-on learning activity.

Gather light pollution data from an international perspective to monitor sky brightness and its effects.

**Can you see the stars?**

January 16 – 25	July 12 – 21
February 14 – 23	August 10 – 19
March 14 – 24	September 9 – 18
April 14 – 23	October 8 – 17
May 14 – 23	November 7 – 16
June 13 – 22	December 6 – 15

NSF's National Optical-Infrared Astronomy Research Laboratory

IDA INTERNATIONAL DARK-SKY ASSOCIATION

AURA

Globe at Night campaign dates for 2020

Due to light pollution, the night sky over many of our cities is hundreds of times brighter than a natural, starlit sky. This skyglow hides the stars from our sight and prevents us and all life

development.

An important part of solving the problem of light pollution is to have a thorough understanding of its magnitude, and a great way to do that is to measure the brightness of the night sky. Thankfully, it is relatively easy to make such measurements, and you can help.

### **Become a Citizen Scientist**

Participating in the [Globe at Night](#) citizen-science campaign is a great way to help our understanding of skyglow and its impact. No special tools are required and observations can easily be reported by smartphone, tablet or computer.

It's also possible to use your smartphone to make night sky brightness measurements. [The Dark Sky Meter app](#) makes use of the iPhone camera to record the brightness of the night sky, while the [Loss of the Night](#) app walks the user through the sky as measurements are made with a different sensitive tool – the human eye. It's available for both [Android](#) devices and [iPhones](#). And now, thanks to the [MySkyatNight](#) project, you can also do your own analysis of all this available data.

Another way you can help is by participating in the [Cities at Night](#) project, which relies on citizen scientists to map and identify photos of cities taken from the International Space Station. This valuable information helps researchers better assess light pollution across of the globe.

In addition to the smart phone apps and the Globe at Night project, more rigorous, long-term monitoring is also being conducted. The section below describes standards for collecting and reporting skyglow measurements.

### **Community Standards for Reporting Skyglow Observations**

The introduction of the [Sky Quality Meter](#) and the [International Year of Astronomy Lightmeter](#) have led to a large number of permanent online skyglow monitoring stations. At the same time, a number of individuals and groups have developed their own non-commercial devices for measuring skyglow.

While these developments are excellent news for those interested in monitoring light pollution, there isn't yet a common standard for recording measurements from these devices. This has greatly hampered efforts to compare measurements from different

world.

At the Cabauw Lightmeter InterComparison (CLIC) workshop in May 2012, a group of light pollution researchers defined a proposal for a new standard format to be used for recording skyglow measurements (see links below). The goal of the standardization is to make comparisons of future measurements easier, regardless of whether the measurements were taken using currently available detectors or by new detectors. For this reason, the community has designed a format that hopefully anticipates the needs of potential future devices (e.g., multiple channels with different filters or opening angles), but without making the format so open as to not actually be helpful.

After a four-month period of public comment, the new standard was officially adopted at the 12th European Symposium for the Protection of the Night Sky held in 2012. Although the public commenting phase is officially over, if you notice something in the format or documentation that should be changed, please contact Christopher Kyba at [kyba@gfz-potsdam.de](mailto:kyba@gfz-potsdam.de). The format has been endorsed by [Unihedron](#) (makers of the SQM) and by the makers of the [SQM Reader](#) program. Both companies have pledged to release new versions of the readout code that conform to the community standard. The format is explained in detail here:

### [Sky Glow Definitions](#)

Example files for the SQM device is here:

```
# Community Standard Skyglow Data Format 1.0
# URL: https://www.darksky.org/wp-content/uploads/bsk-pdf-manager/47
# Number of header lines: 35
# This data is released under the following license: ODbL 1.0 http://
# Device type: SQM-LE
# Instrument ID: Dahlem_tower_le
# Data supplier: Christopher Kyba / Freie Universitaet Berlin
# Location name: Germany-Berlin-Dahlem
# Position (lat, lon, elev(m)): 52.4577, 13.3107, 91
# Local timezone: Europe/Berlin
# Time Synchronization: GPS
# Moving / Stationary position: STATIONARY
# Moving / Fixed look direction: FIXED
```

```

# Filters per channel: HOYA CM-500
# Measurement direction per channel: 0., 0.
# Field of view (degrees): 20
# Number of fields per line: 6
# SQM serial number: 1687
# SQM firmware version: 4-3-21
# SQM cover offset value: -0.11
# SQM readout test ix: i,00000004,00000003,00000021,00001687

# SQM readout test rx: r, 18.73m,0000000004Hz,0000130978c,0000000.28
# SQM readout test cx: c,00000019.69m, 0000300.000s, 023.2C,00000000
# Comment: SQM installed on a tower.
# Comment: last cleaned on 20120511
# Comment:
# Comment:
# Comment:
# blank line 30
# blank line 31
# blank line 32
# UTC Date & Time, Local Date & Time, Temperature, Counts, Frequency
# YYYY-MM-DDTHH:mm:ss.fff;YYYY-MM-DDTHH:mm:ss.fff;Celsius;number;Hz;
# END OF HEADER
2012-05-10T22:00:04.000;2012-05-11T00:00:04.000;31.2;130978;4;18.73
2012-05-10T22:00:09.000;2012-05-11T00:00:09.000;31.2;130978;4;18.73
2012-05-10T22:00:14.000;2012-05-11T00:00:14.000;31.2;130978;4;18.73
2012-05-10T22:00:19.000;2012-05-11T00:00:19.000;31.2;130978;4;18.73
2012-05-10T22:00:24.000;2012-05-11T00:00:24.000;31.2;130978;4;18.73
}

```

Examples for the IYA Lightmeter device are here.

```

# Community Standard Skyglow Data Format 1.0
# URL: https://www.darksky.org/wp-content/uploads/bsk-pdf-manager/4

```

```
# This data is released under the following license: CC-BY 4.0 http://creativecommons.org/licenses/by/4.0/
# Device type: IYA Lightmeter (Mark 2.3)
# Instrument ID: DE_BERLIN_4
# Data supplier: Christopher Kyba / Freie Universitaet Berlin
# Location name: Germany-Berlin-Dahlem
# Position (lat, lon, elev(m)): 52.4577, 13.3107, 91
# Local timezone: Europe/Berlin
# Time Synchronization: NTP
# Moving / Stationary position: STATIONARY
# Moving / Fixed look direction: FIXED
# Number of channels: 1
# Filter per channel: None
# Measurement direction per channel: 0., 0.
# Field of view (degrees): 180
# Number of fields per line: 4
# IYAL serial number: n/a
# IYAL firmware version: n/a
# IYAL readout test: 23.3.2012;15:24:58;27,6;Â°C;2984760;0;0;ok;
# Comment: The shadow of our building falls on the lightmeter around
# Comment: contact: christopher.kyba@wew.fu-berlin.de
# Comment:
# Comment:
# Comment:
# blank line 27
# blank line 28
# blank line 29
# blank line 30
# blank line 31
# blank line 32
# UTC Date & Time, Local Date & Time, Temperature, Counts
# YYYY-MM-DDTHH:mm:ss.fff;YYYY-MM-DDTHH:mm:ss.fff;Celsius;number
# END OF HEADER
2012-03-23T15:24:59.000;2012-03-23T16:24:59.000;27.5;2984520
2012-03-23T15:25:01.000;2012-03-23T16:25:01.000;27.5;2984640
```



2012-03-23T15:25:03.000;2012-03-23T16:25:03.000;27.6;2984520  
2012-03-23T15:25:04.000;2012-03-23T16:25:04.000;27.5;2984760  
2012-03-23T15:25:05.000;2012-03-23T16:25:05.000;27.6;2984640  
2012-03-23T15:25:06.000;2012-03-23T16:25:06.000;27.6;2984760  
2012-03-23T15:25:07.000;2012-03-23T16:25:07.000;27.5;2984760  
2012-03-23T15:25:08.000;2012-03-23T16:25:08.000;27.5;2985000  
2012-03-23T15:25:09.000;2012-03-23T16:25:09.000;27.5;2984880  
2012-03-23T15:25:10.000;2012-03-23T16:25:10.000;27.5;2984880  
2012-03-23T15:25:11.000;2012-03-23T16:25:11.000;27.6;2984760

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