

The value of TEMPO observations of artificial light for night research

TEMPO DART Team Meeting

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June 17, 2026

RUB

Advantages of TEMPO over other observations of Earth at night in the visible band

- Spectral information
- Ability to observe at different times of night



Spectral information



LEDs and DNB observations

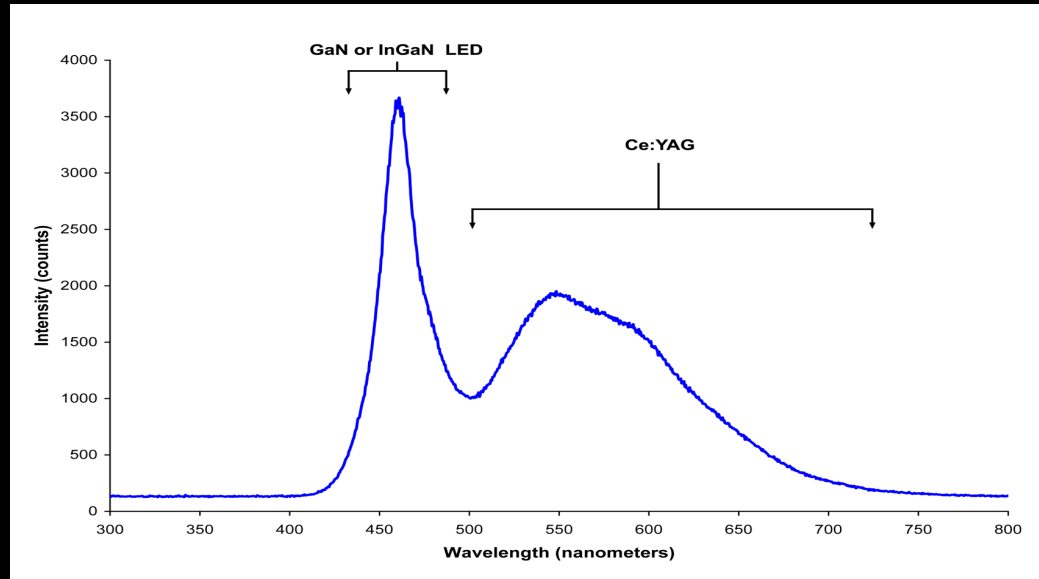
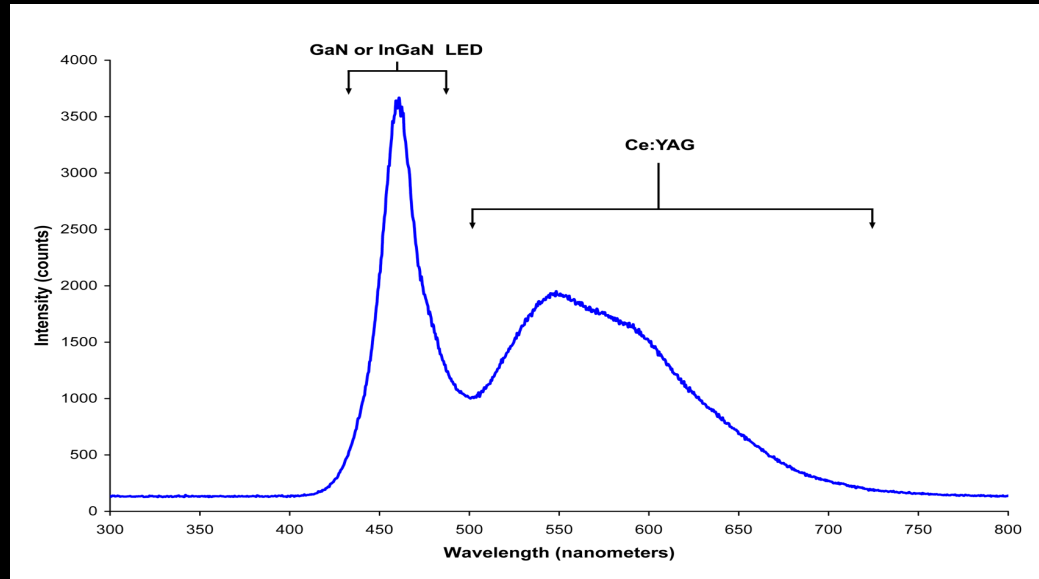


Image by Deglr6328,
Wikimedia Commons

Blue

Red

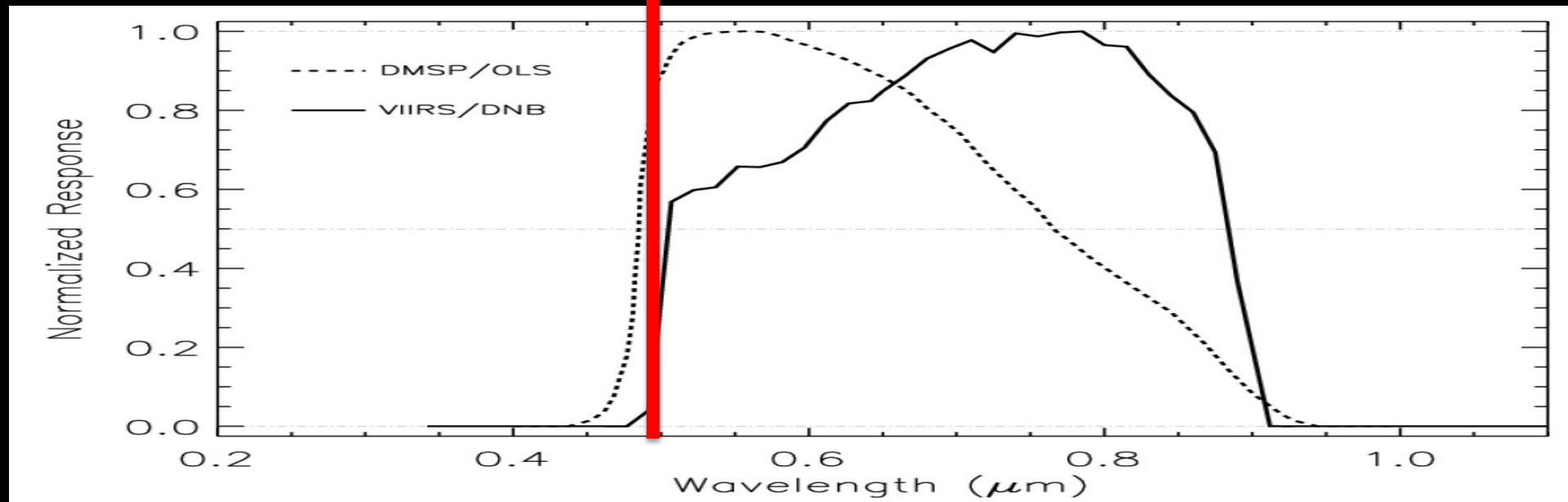
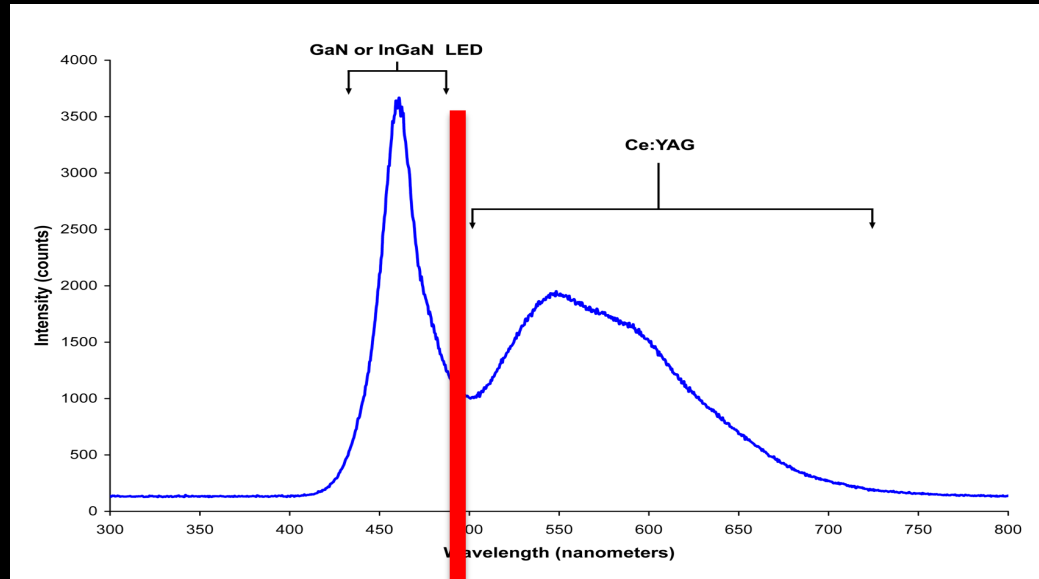
LEDs and DNB observations



Blue **Red**

Satellite sensitivity (VIIRS DNB)

LEDs and DNB observations



LED conversion in Milan, Italy

Photo 2012

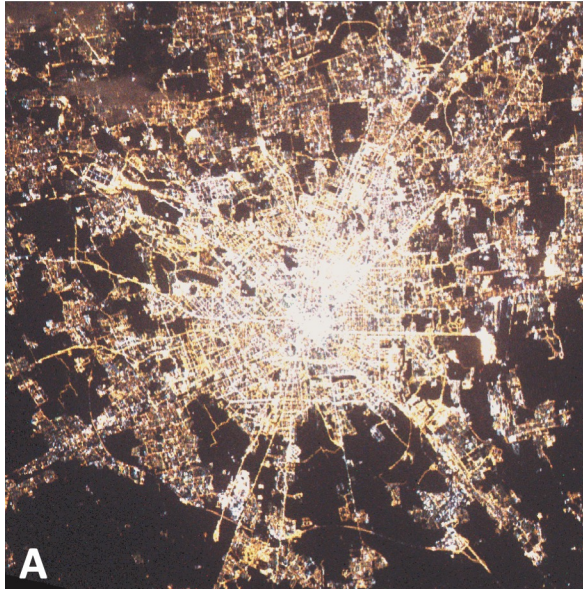


Photo 2015

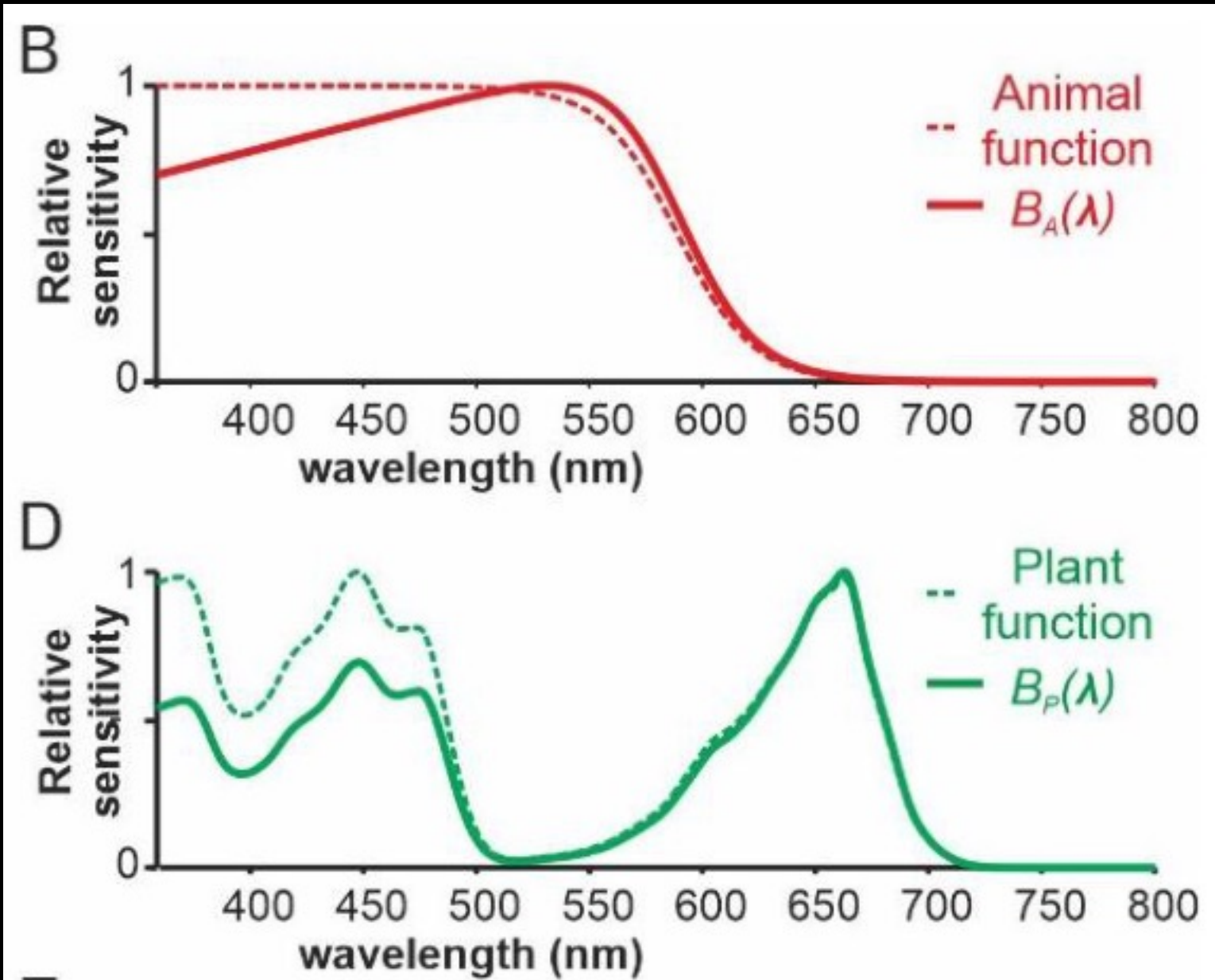


Satellite change 2012-16

Milan, Italy

0 5 10 15 Kilometers





Rate of change in light emissions

Looking down:
+2% / year



Li et al. Nature (2026)

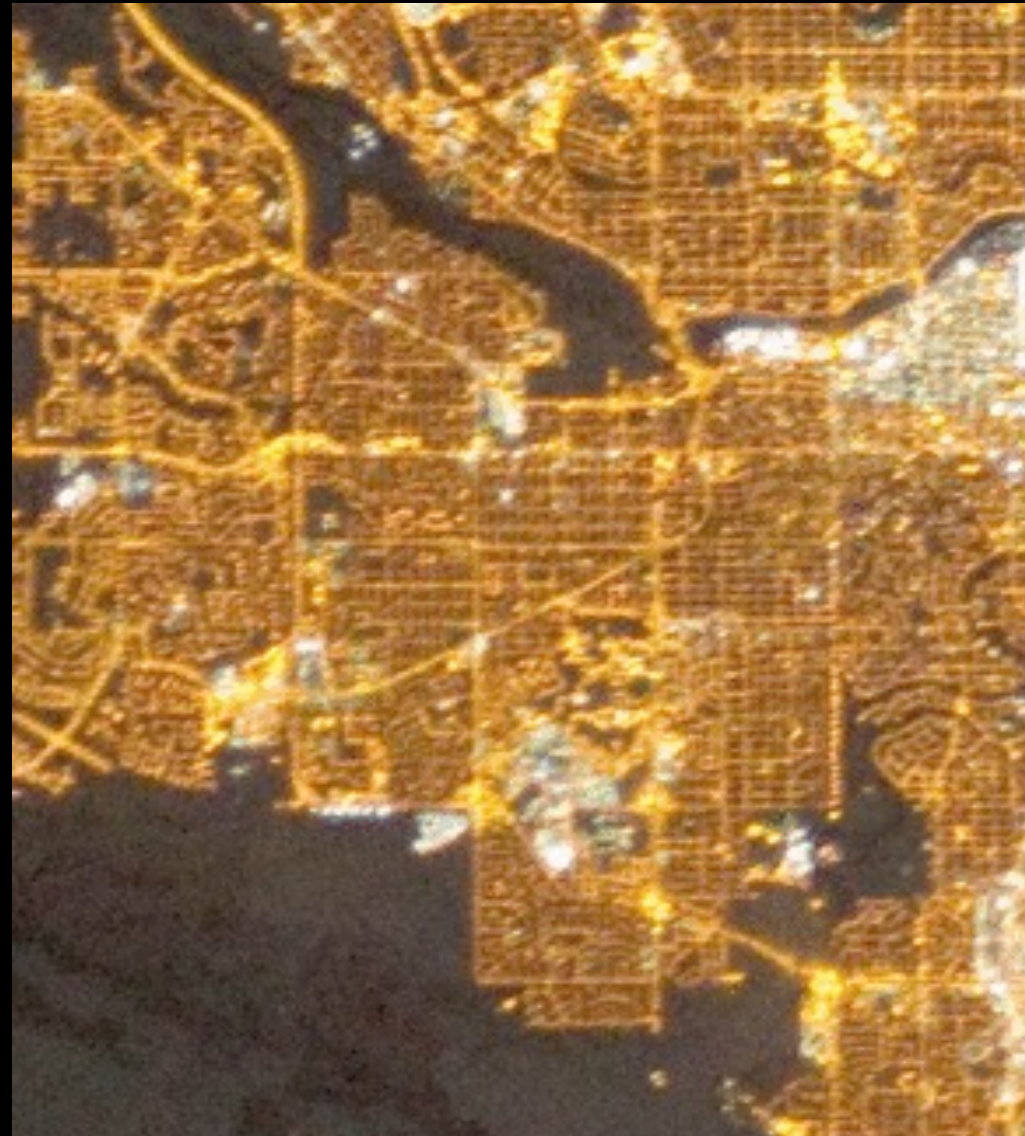
Looking up:
+7% to +10% / year



Kyba et al. Science (2023)

GFZ

Helmholtz Centre
POTS DAM



Calgary,
Canada
ISS photos
2012-2015



Streetlights are only one source of light emissions!





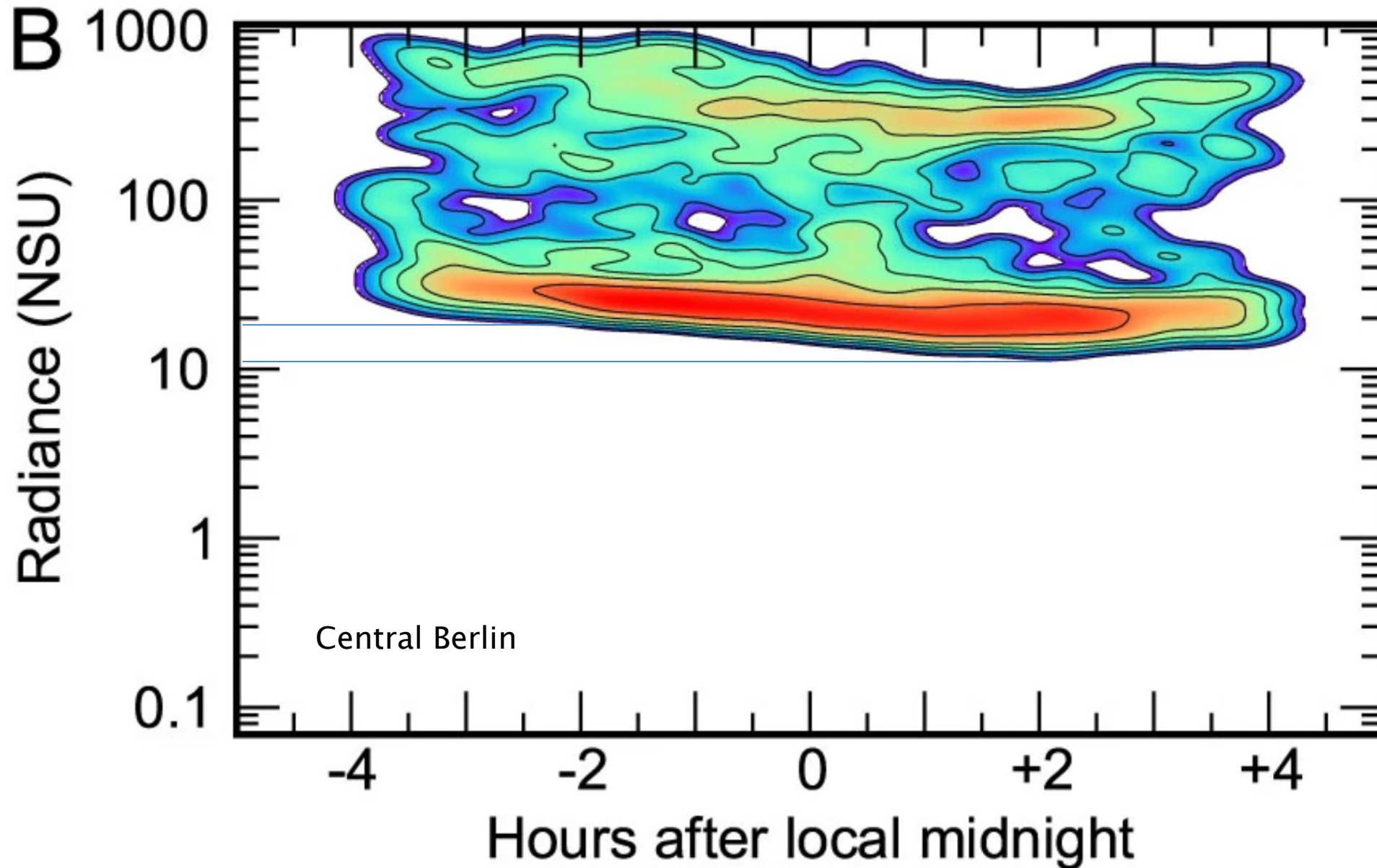
Majority of artificially lit Earth surface associated with the non-urban population

D.T.C. Cox ^a  , A. Sánchez de Miguel ^{a b}, J. Bennie ^c, S.A. Dzurjak ^a, K.J. Gaston ^a

Temporal information



Skyglow and time of night



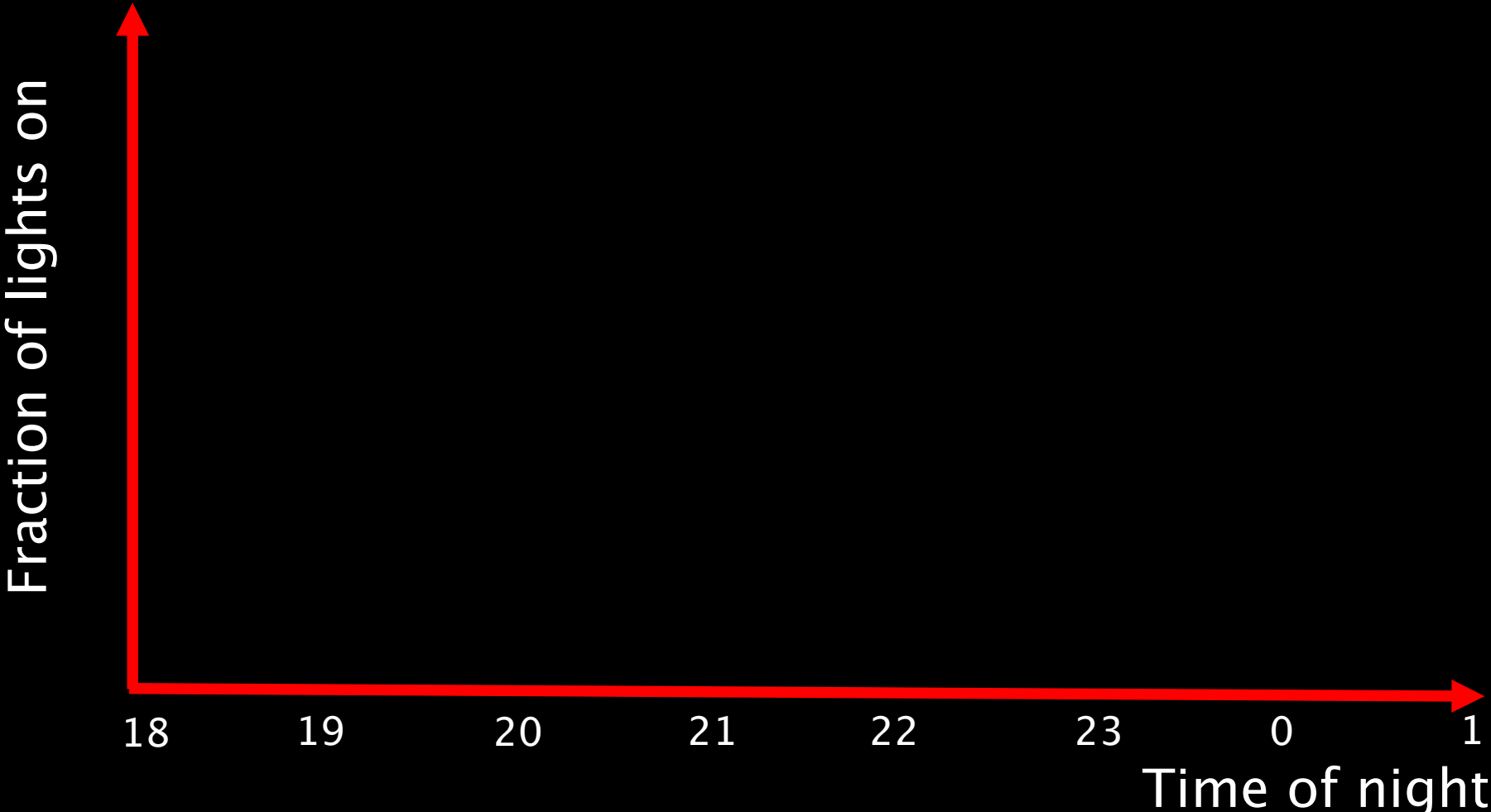


hermanns

Handwritten sign on the left side of the street, possibly advertising a bakery or cafe.

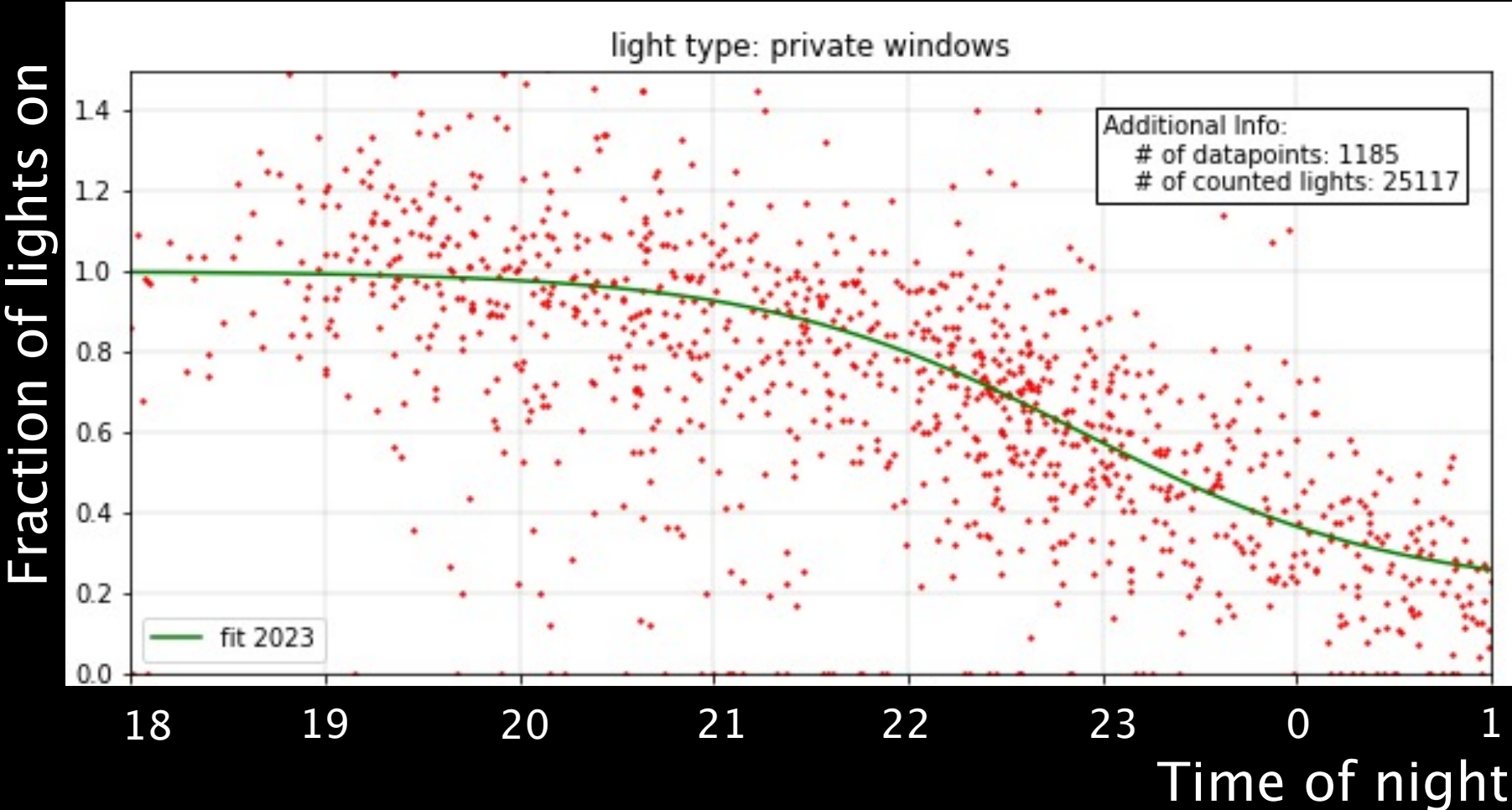
Einmal mehr über
400 Jahre hinweg
hier hat sich ein Stück
Stadtleben zum Museum
7.11.

Fraction of lights on vs time of night



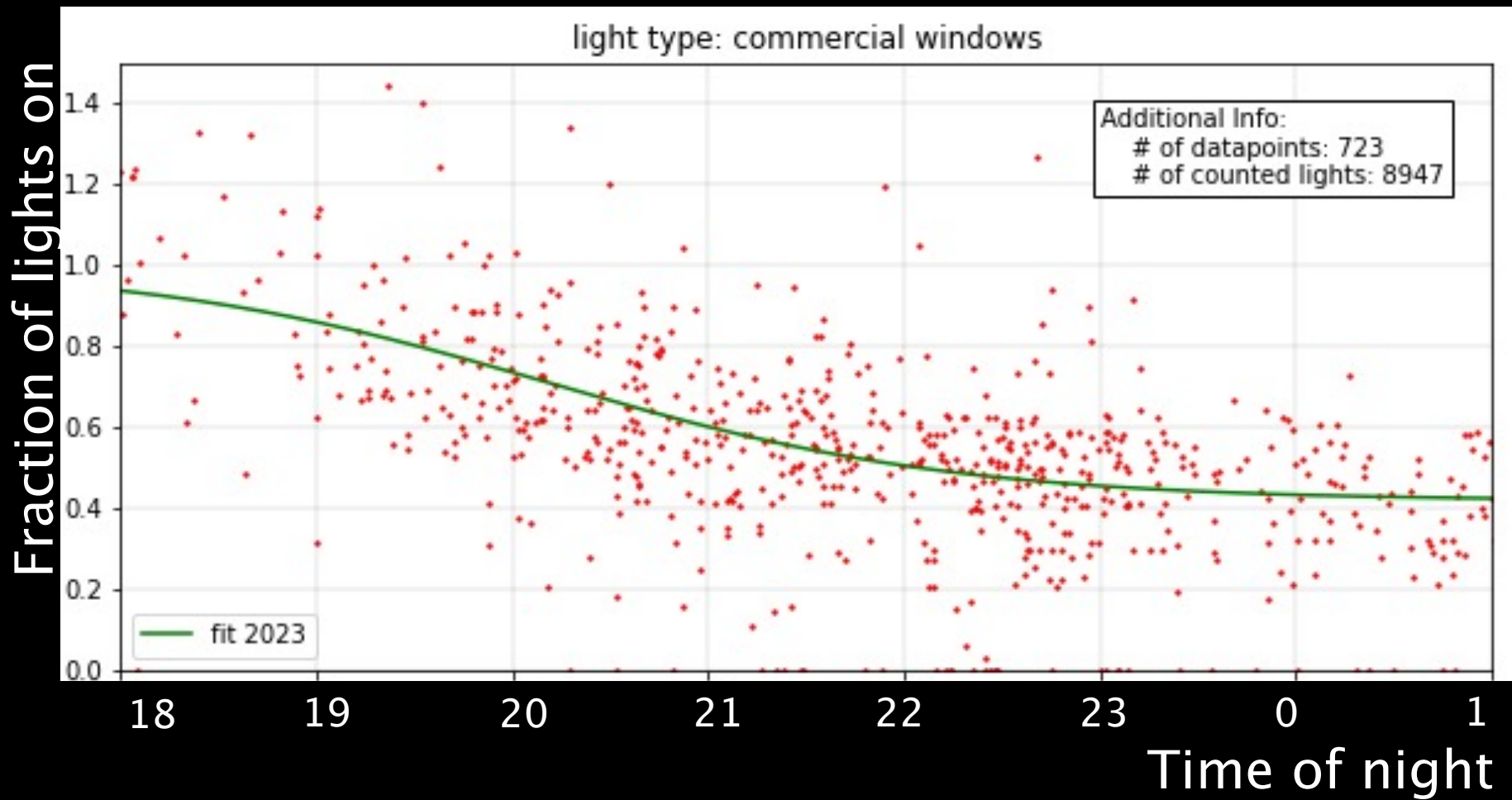
Nachtlichter preliminary

Fraction of lights on vs time of night



Nachtlichter
preliminary

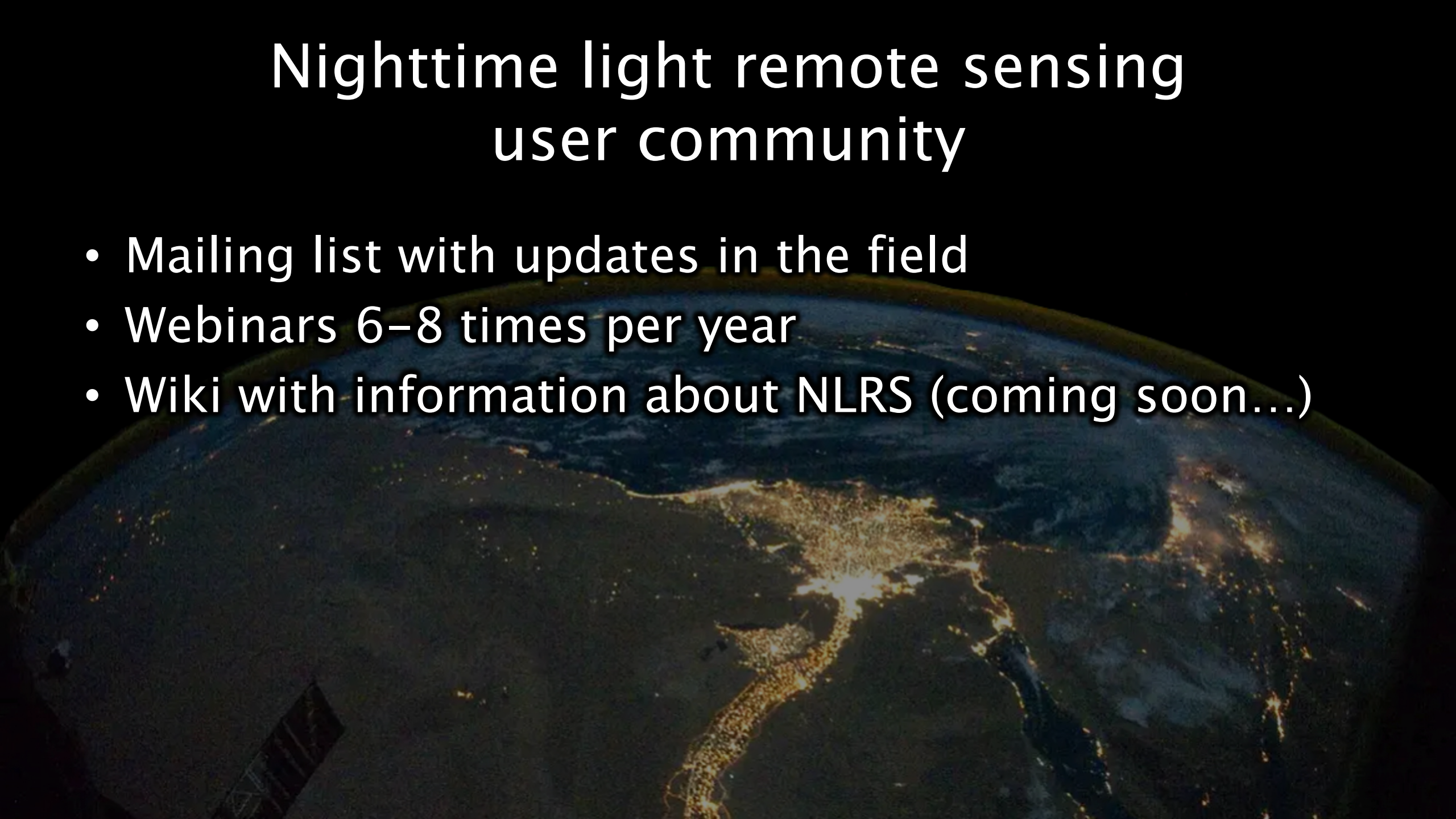
Fraction of lights on vs time of night



Nachtlichter
preliminary

Nighttime light remote sensing user community

- Mailing list with updates in the field
- Webinars 6–8 times per year
- Wiki with information about NLRS (coming soon...)



2nd European Workshop on Optical Nighttime Light Remote Sensing

- 12 October – 15 October 2026 at ESRI (Italy)
- ESA targeting >120 participants
- No fee
- Potential users without night lights experience expressly welcome!



The night research community is excited to see your results!

