

Astrophotography

Without a telescope

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Astrophotography

Without a telescope

- The Moon
- Camera settings
- (Back to) The Moon
- Milky-way
- Meteors (shooting stars)
- Movement (star-trails)

The Moon

Method – fully automatic

- Autofocus
- Autoexposure
- Auto f/number

The Moon



The Moon



The Moon



Planned using Stellarium
and an OS map

Camera settings

- Exposure time
- ISO setting
- f/number

Camera settings

- Exposure time
 - ISO setting
 - f/number
- Increase to collect more light...
- ...But objects move across the sky.

Exposure time: 10 hours!



Camera settings

- Exposure time

- ISO setting

Increase to make the camera more sensitive to light...

- f/number

But that also makes the camera more sensitive to imperfections, too.

ISO setting

ISO 100

ISO setting

ISO 200

ISO setting

ISO 400

ISO setting

ISO 800



ISO setting

ISO 1600



ISO setting

ISO 3200

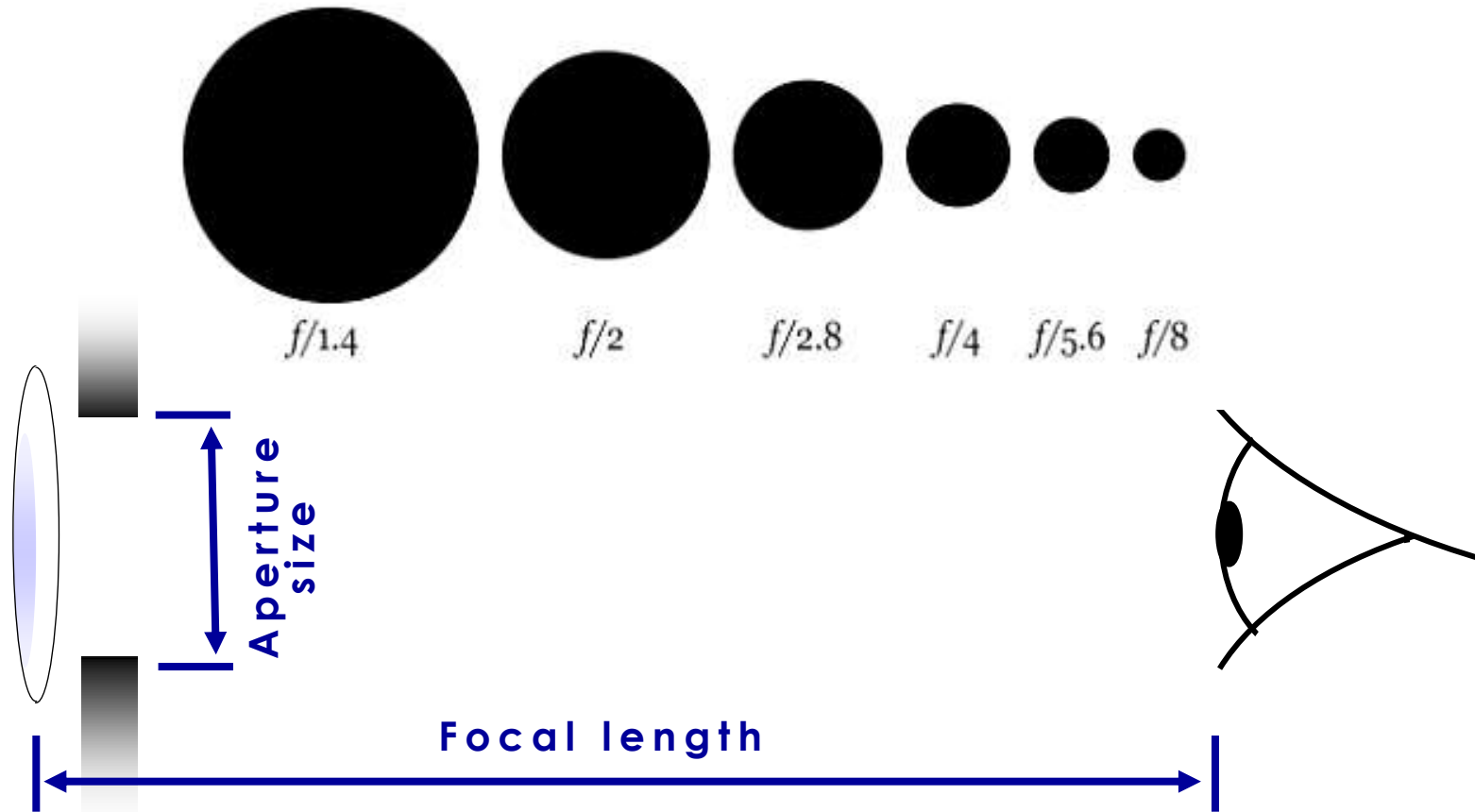
Camera settings

- Exposure time
- ISO setting
- f/number { Increase to collect more light...
... Or decrease to get a greater depth of field.

f/number is the aperture size
(opening) of a lens,
in terms of Focal length

e.g. $f/2$ means that the aperture is
one half the focal length of the lens

f-number



f/4.5



f/6.7



$f/9.5$



f/13



f/32



f/5





f/32



(back to)
The Moon

30 seconds
f/32
ISO 2000

f/5.6



f/11



(back to)
The Moon

Camera settings for shooting the Moon

- Exposure time { Short exposures for the bright Moon: 1/50s-1/200s
- ISO setting { No need to be too sensitive as the Moon is bright: ISO200-800
- f/number { f/4.0 to f/13+, depending on diffraction spikes



The Moon

f/20



The Moon

By Laurent Laveder

<http://www.pixheaven.net>



The Moon

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The Moon

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Movement

Moon trails



M o v e m e n t

M o o n t r a i l s

Stacked using startrails.de

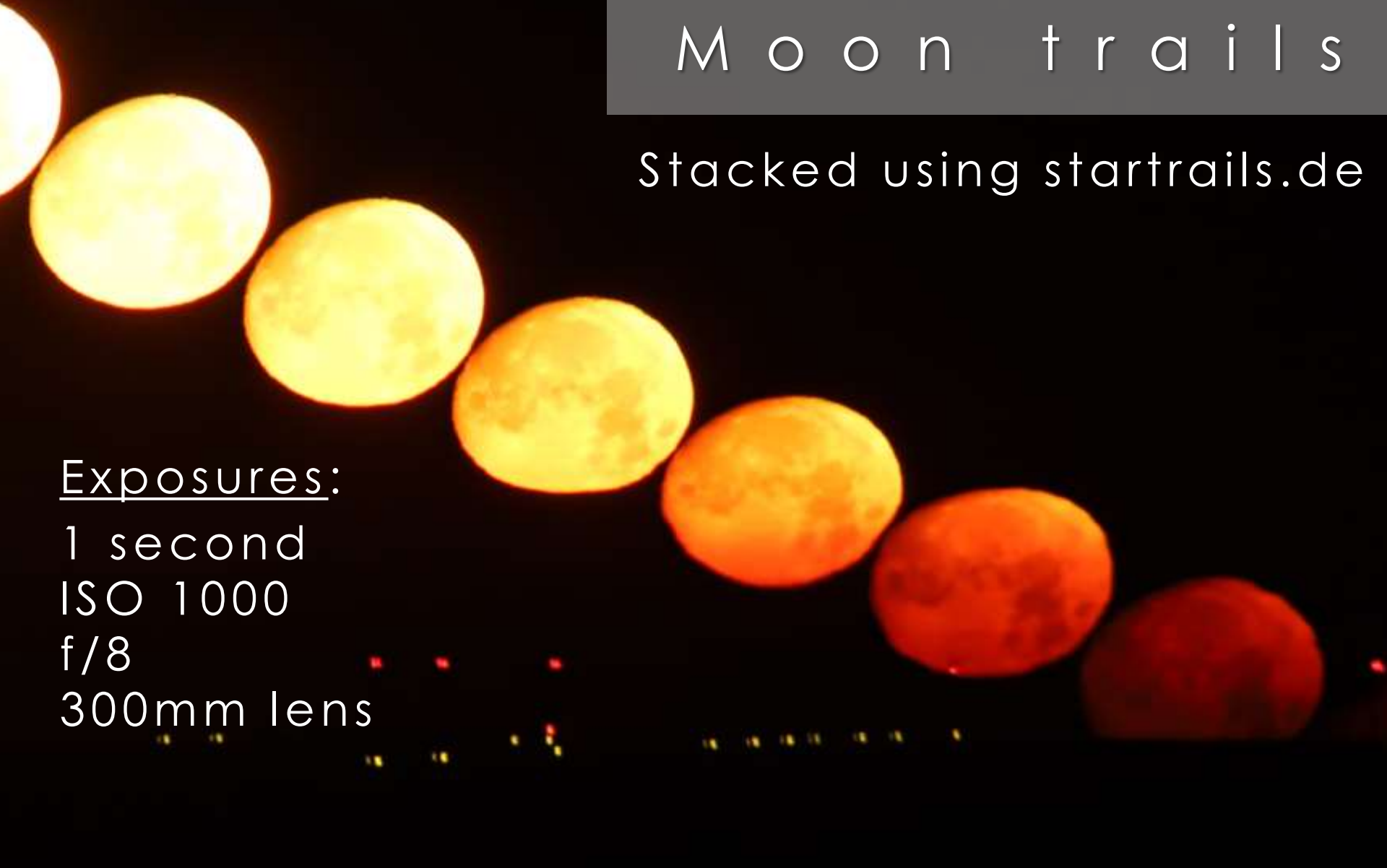
Exposures:

1 second

ISO 1000

f/8

300mm lens





Movement Through a telescope

Exposures:

0.2 second

ISO 1600

1000mm telescope

D=200mm, so f/5

Planning with Stellarium and a map

Library Square

University of Sussex
Students' Union (USSU)

The Bridge Café

N-S Rd

N-S Rd



The Moon

during a lunar eclipse



University of Sussex
Meeting House chapel



The Moon

during a lunar eclipse

University of Sussex
Meeting House chapel

The Moon

during a lunar eclipse



University of Sussex
Meeting House chapel

A long-exposure photograph of a night sky, showing numerous white star trails that curve across the frame. The trails are most prominent in the upper left and center, where they form concentric, circular patterns. The lower right portion of the image shows a dark, silhouetted tree branch with some green leaves. The overall scene is a mix of natural light trails and dark, organic shapes.

Movement

Star trails

Movement

Star trails





Exposures:

30 seconds

f/9

ISO 3200

Repeated for 8 hours

At ~f/9,
both badger
and stars
are in focus



Exposures:

30 seconds

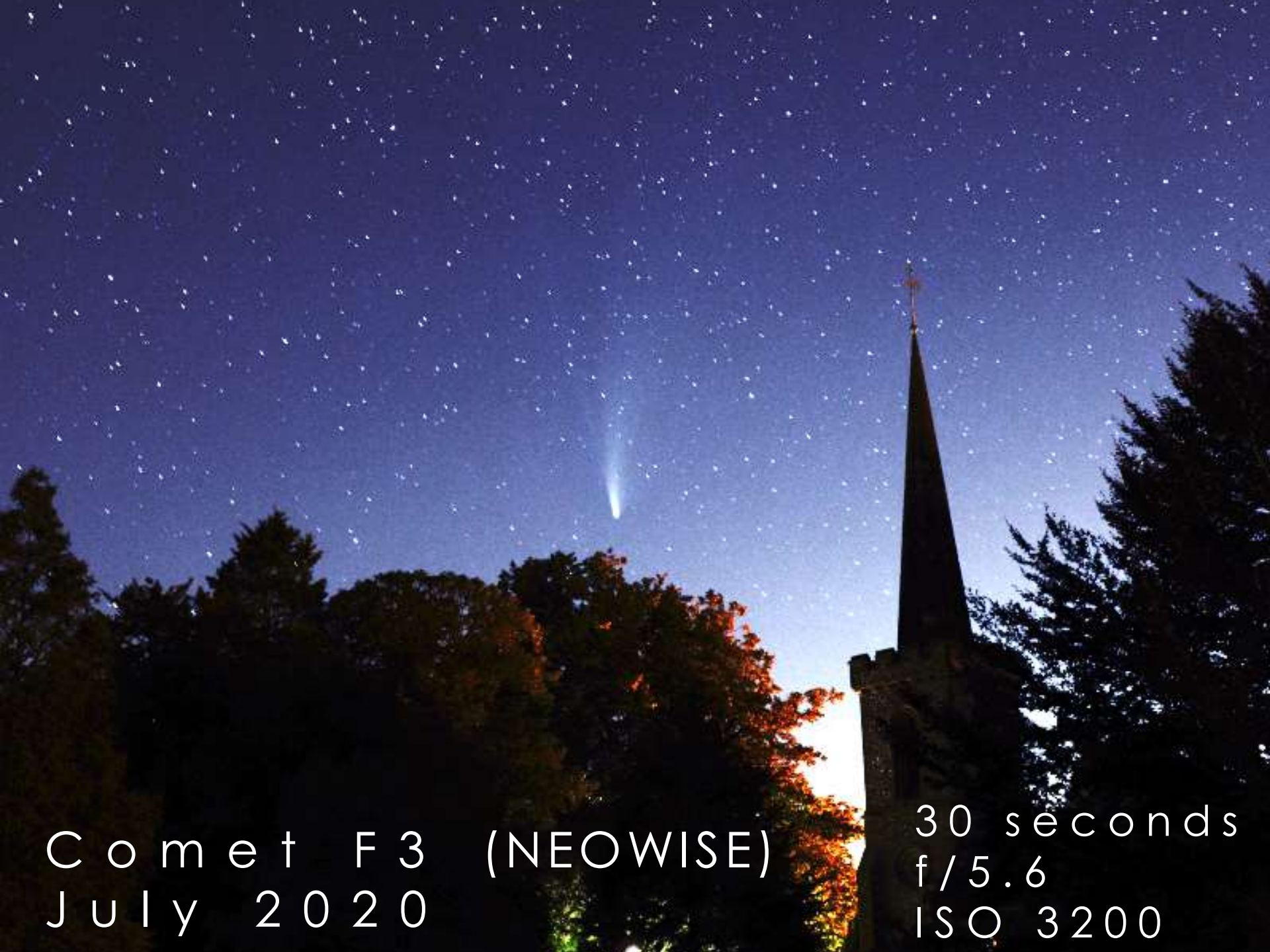
f/9

ISO 3200

Repeated for 8 hours



At ~f/9,
both badger
and stars
are in focus



Comet F3 (NEOWISE)
July 2020

30 seconds
f/5.6
ISO 3200



Meteors

Shooting stars are very difficult to photograph!

- They're very quick
- Often faint
- And can appear anywhere in the sky

Camera settings for meteors/shooting stars

- Exposure time { ~10 seconds or until light pollution dominates...
- ISO setting { Camera needs maximum sensitivity: ISO 3200+
- f/number { Wide open aperture e.g. f/2.8 or f/4 to allow as much light in as possible.

Meteors



Spot the difference!



Aircraft/drones

- Flash!
- Take minutes to pass overhead.
- May change direction.



Satellites

- Usually constant brightness, but...
- May glint sunlight
- Or vary if tumbling space debris
- Take minutes to pass



Meteors

- Burn up in a second!
- Have uneven tracks as they explode.
- Shooting stars are often colourful.

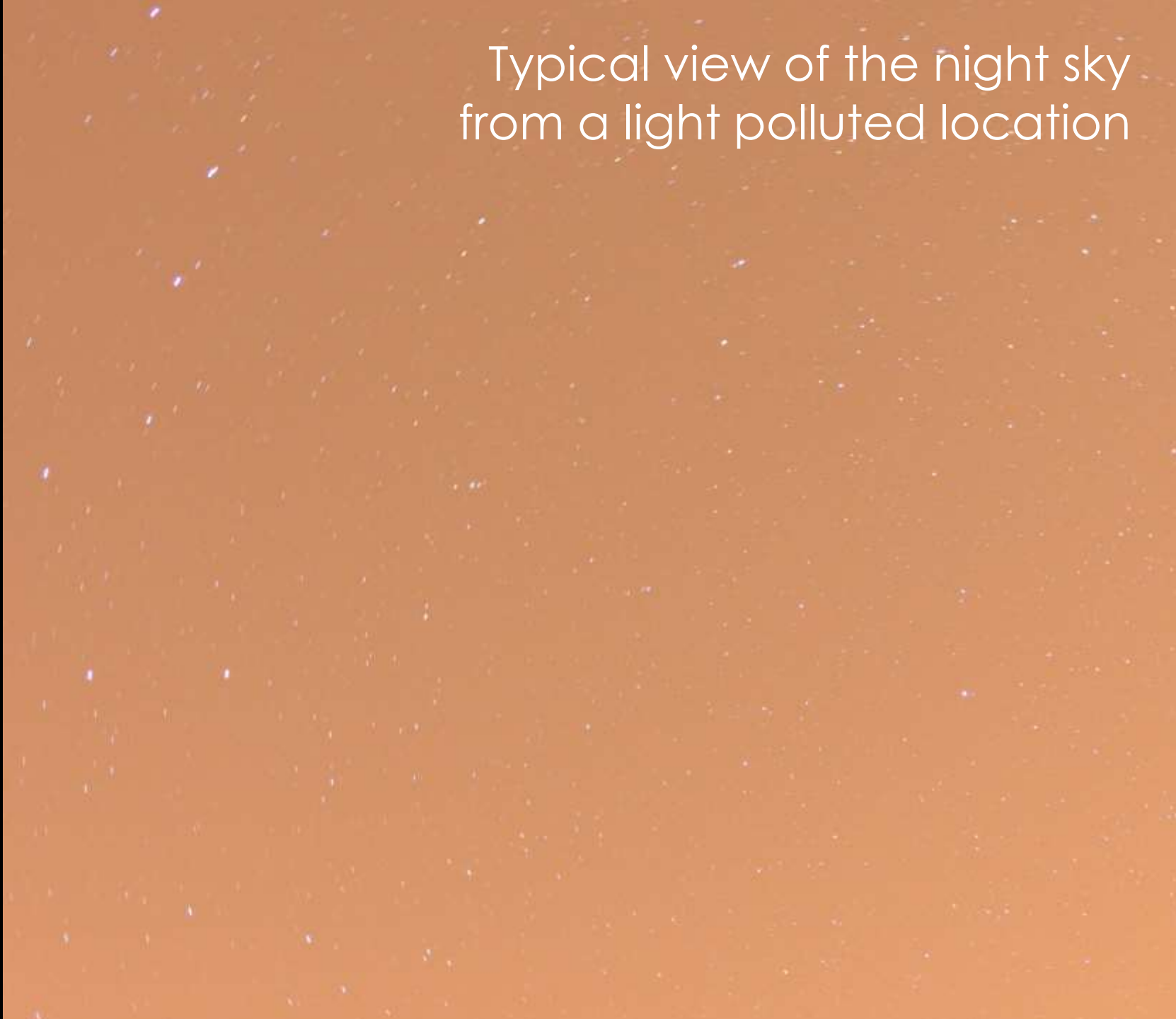


The Milky-way



Light pollution

Typical view of the night sky
from a light polluted location



Light pollution

Typical view of the night sky
from a dark location



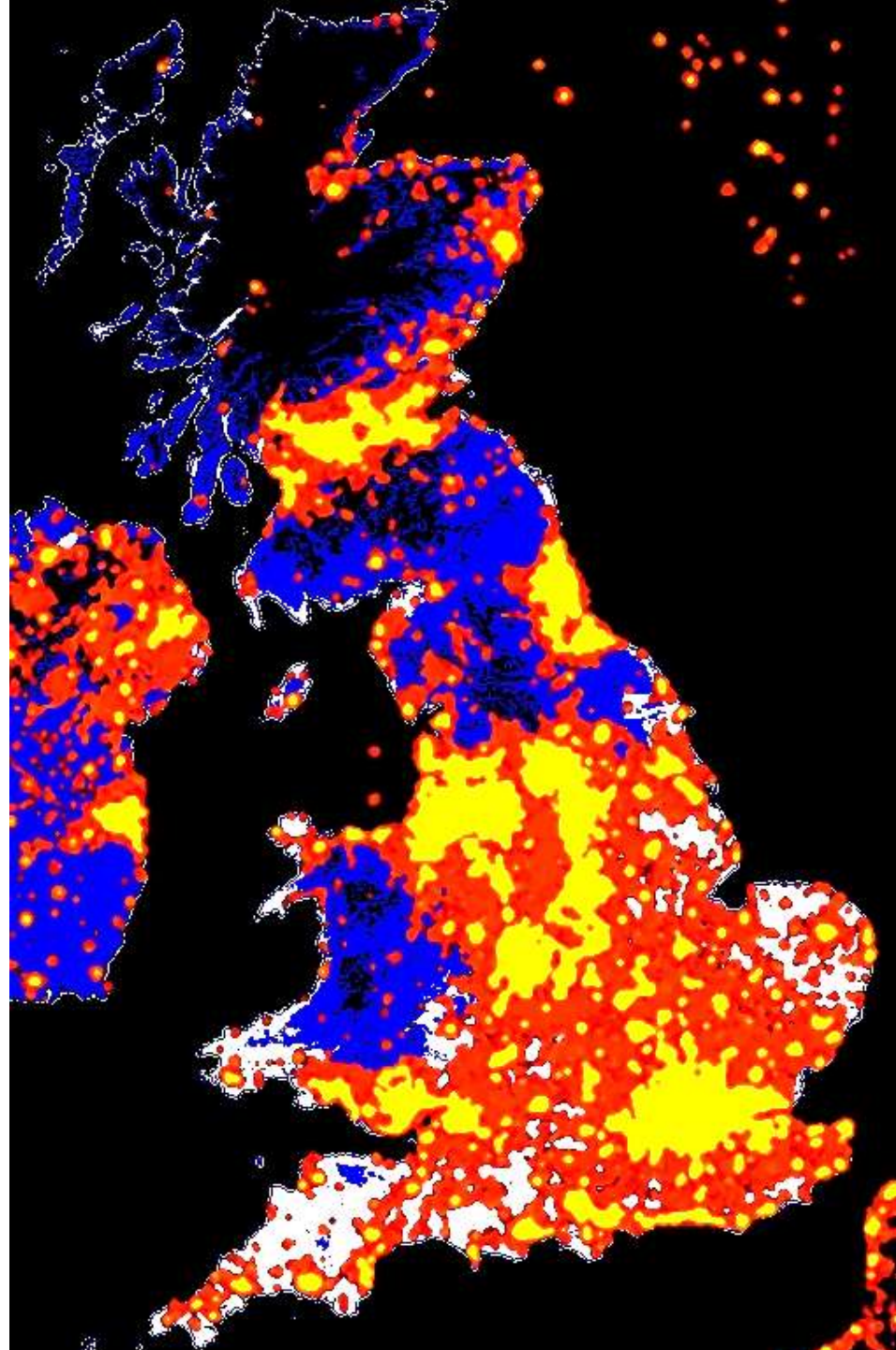
Light pollution from the inefficient
lights of Brighton



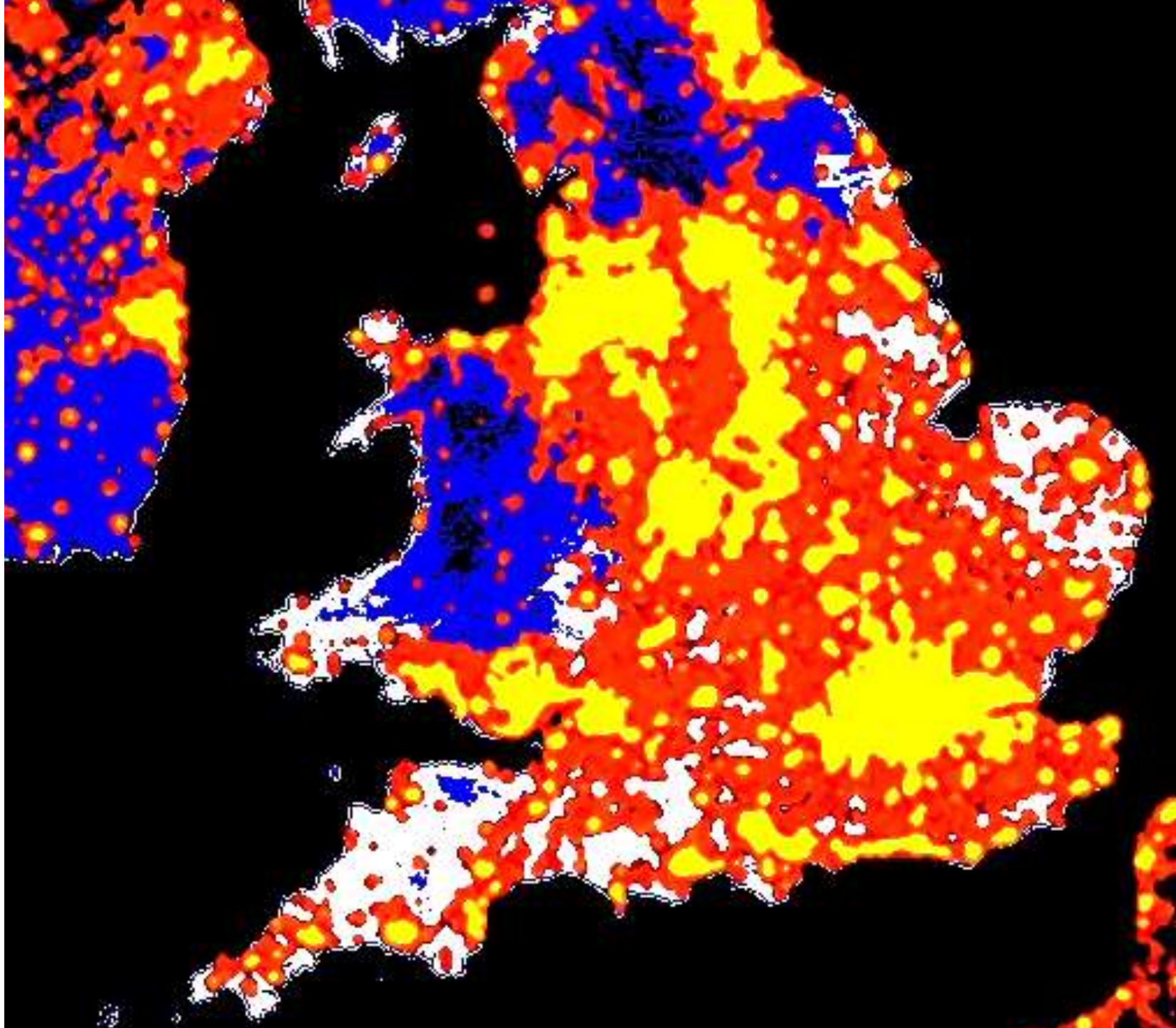
Light pollution



Light pollution



Light pollution



Mauna Kea
Hawai'i



Mauna Kea Hawai'i



Mauna Kea Hawai'i





Milky way

< Andromeda galaxy

Astrophotography

Without a telescope

Post processing:

- Brightness & contrast
- Light pollution reduction

Sequator is free software to:

- Calibrate images
(dark frame & flat fields)
- Align & rotate images
 - Stack images

A night sky photograph showing the Milky Way galaxy and numerous stars. The Milky Way is visible as a bright, diagonal band of light, with a prominent dark dust lane. The background is filled with many individual stars of varying colors and brightness. The text is overlaid on the right side of the image.

Sequator is free software to:

- Calibrate images
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www.DarrenBaskill.co.uk

