# Evaluating the systematic uncertainty of the Loss of the Night app

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GFZ Helmholtz Centre Potsdam

IGB

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# Skyglow

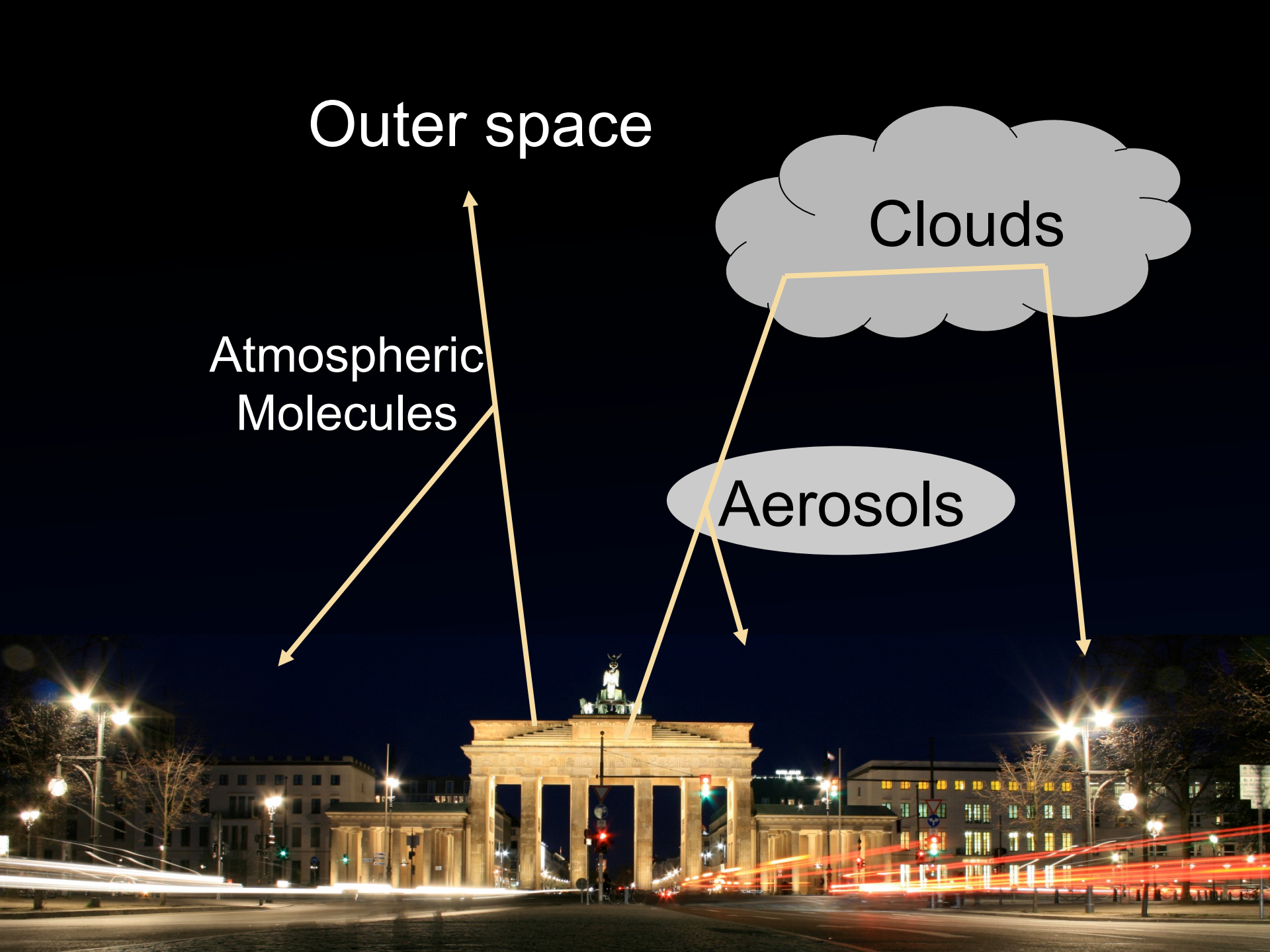
1830

Paul Clifford

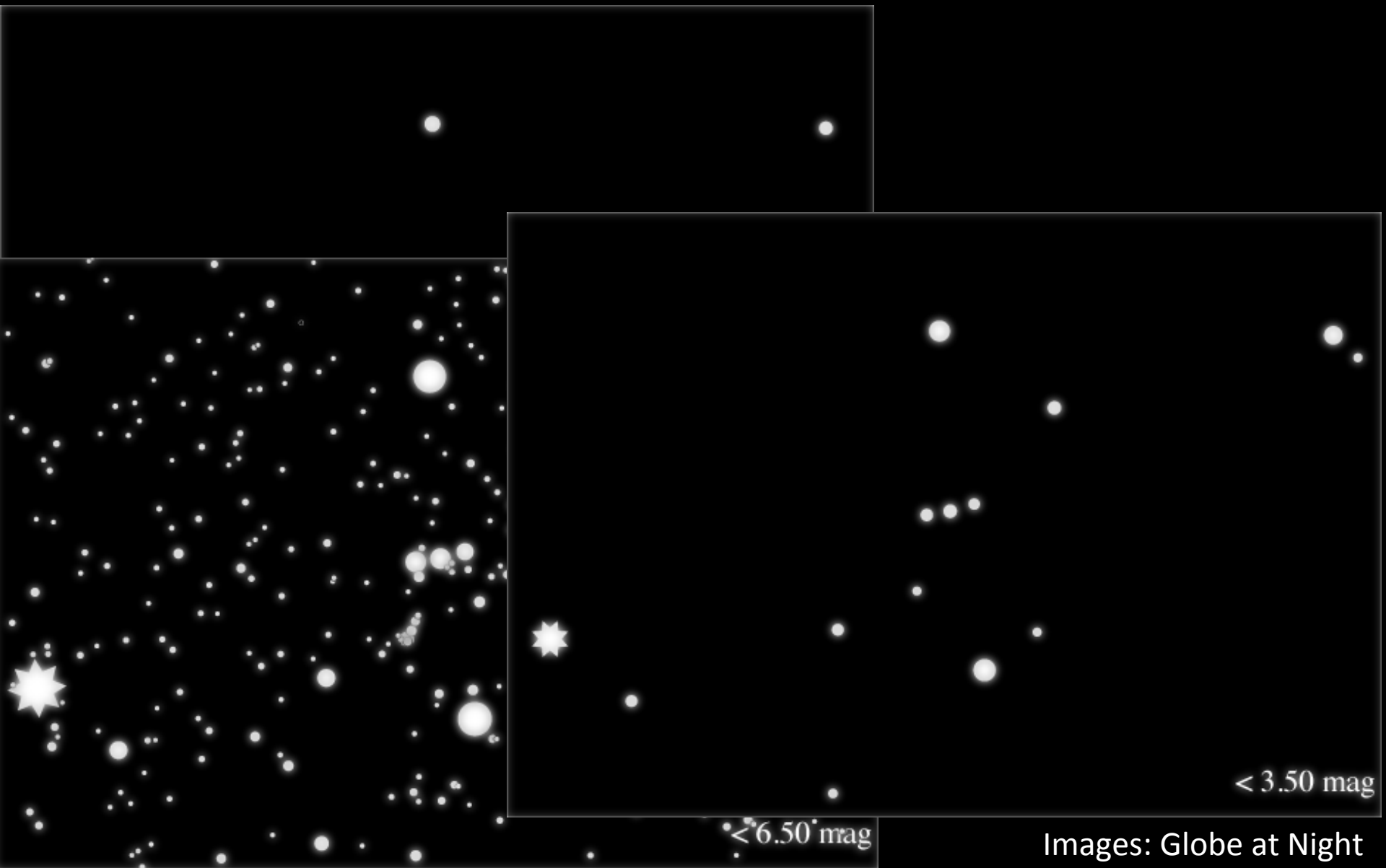
#ALAN2015

Clifford Paul

Photo by Jeremy Stanley, available on Wikimedia common

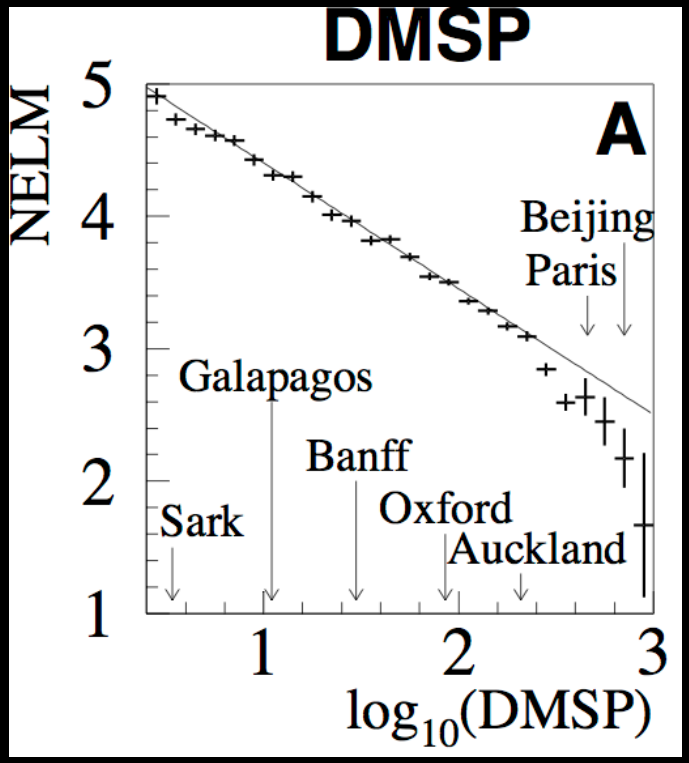

Outer space
Clouds
Atmospheric
Molecules
Aerosols

# Background: Globe at Night




Images: Globe at Night

# NELM




Kyba et al.
Sci Rep (2013)

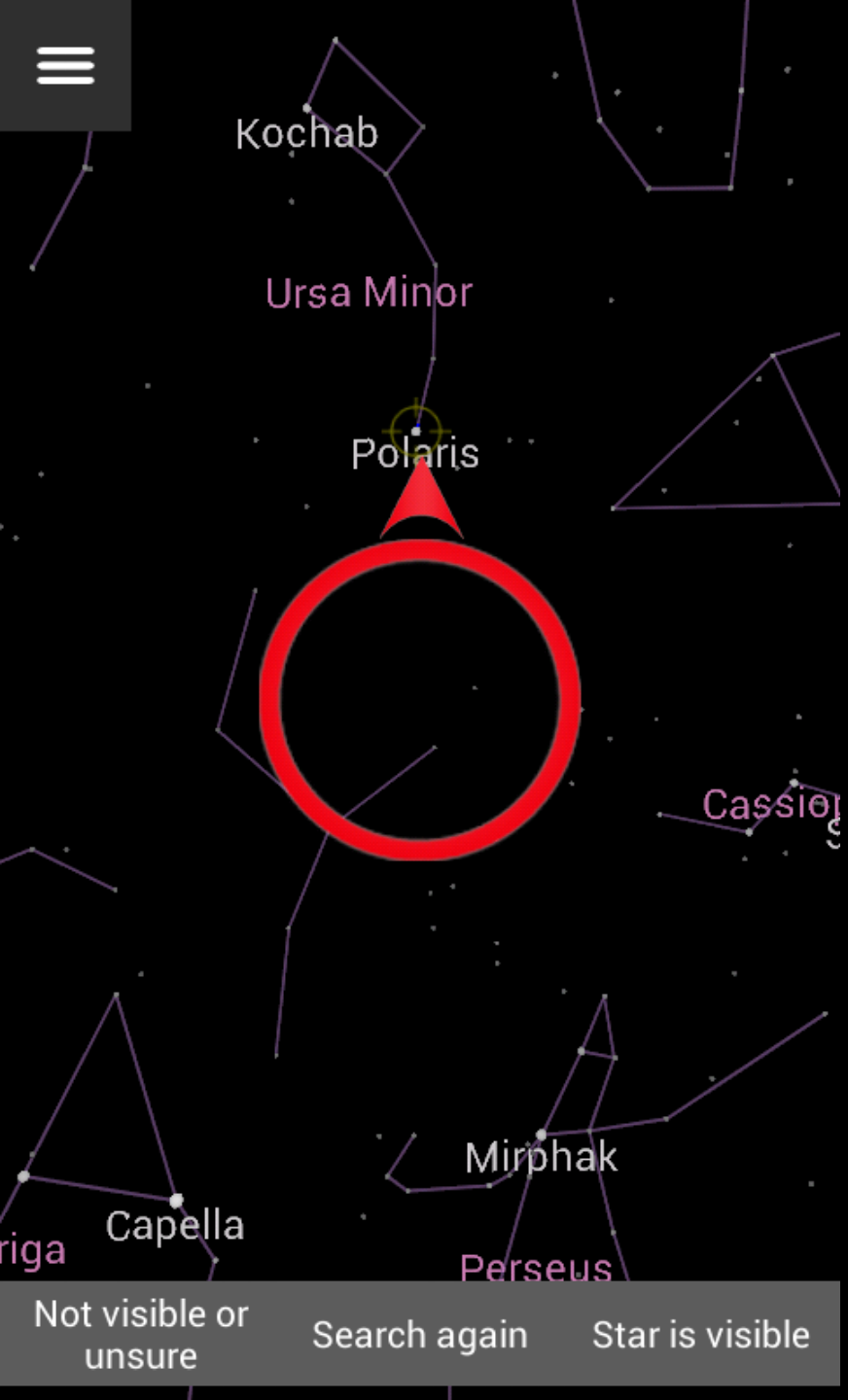
# Problems with GaN

- Can't identify constellations in the city
- $\Delta_m$ is fairly large for individual observations (~1.2 mag)
- Airmass depends on location

LOSS of the NIGHT

# Solution: Loss of the night app!

- Based upon Google Sky program
- Users make decisions on individual stars




## STAR NOT VISIBLE

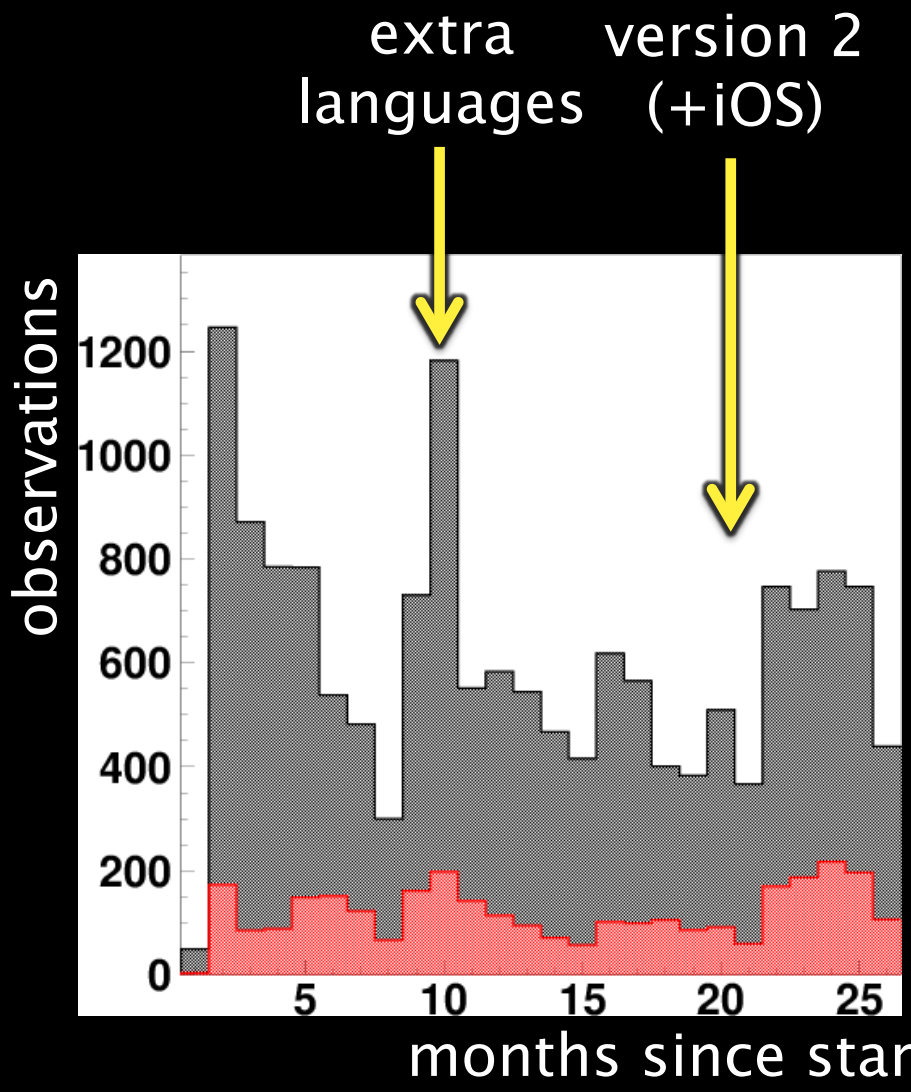
You selected the option Not visible or unsure. Please tell us more about the reasons.

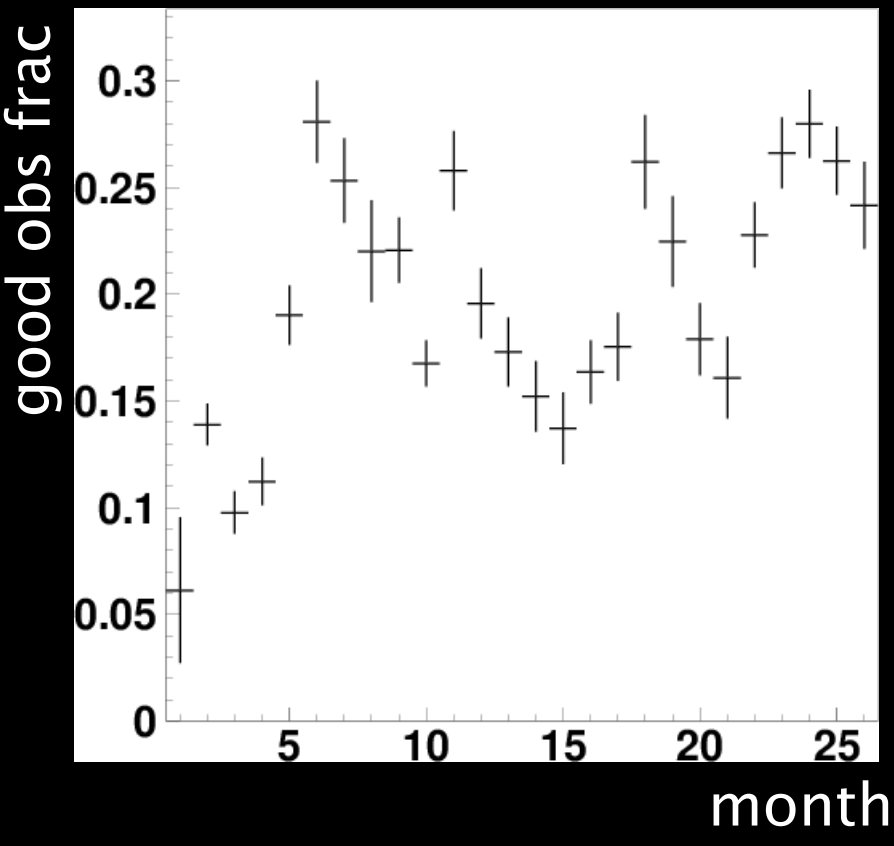
- An object is in the way
- Clouds or mist block the view
- I'm not sure if it's there or not
- Visible only with averted vision
- The star is not visible

Back | Submit

Not visible or unsure
Search again
Star is visible

# Usage by month

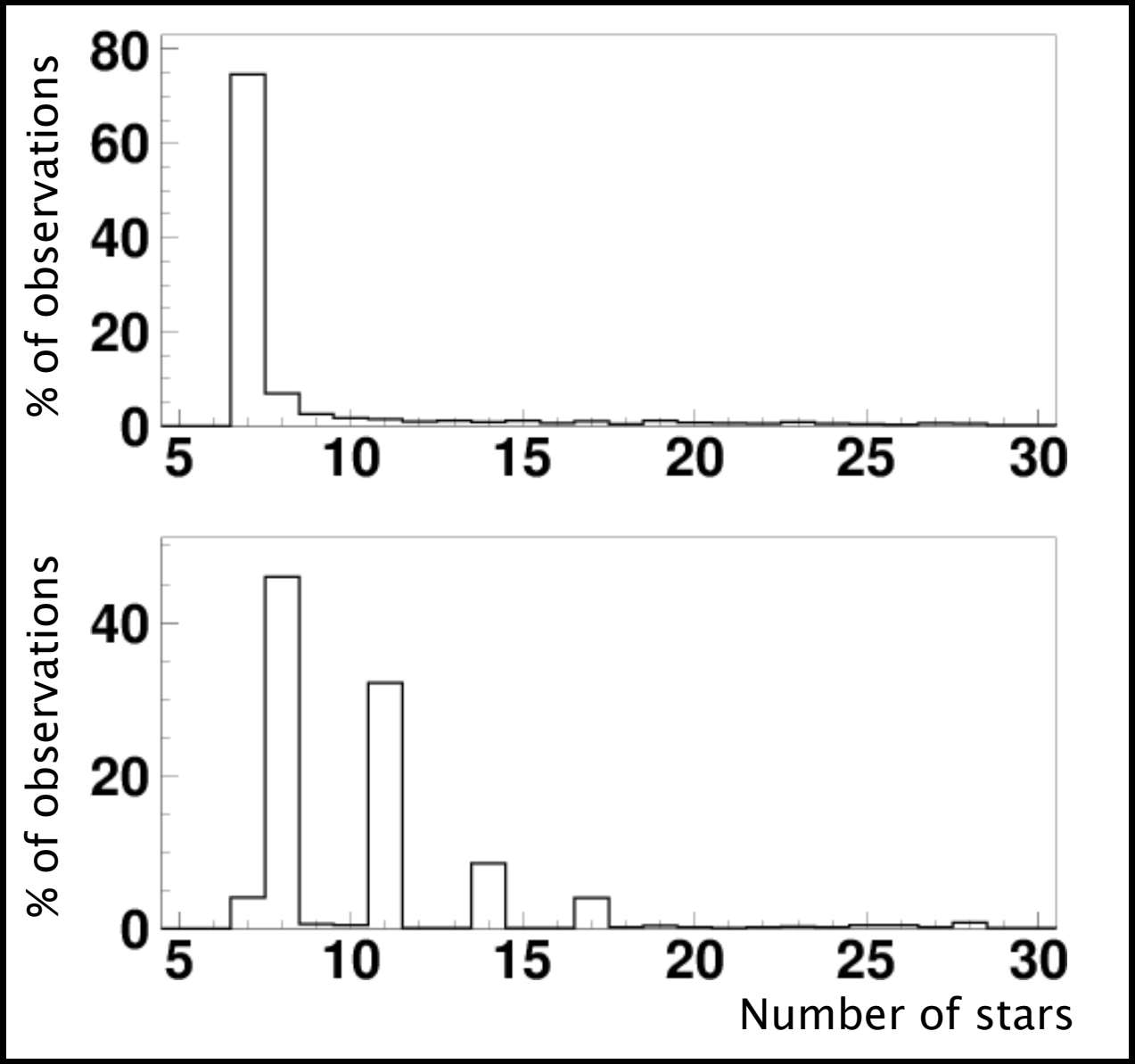


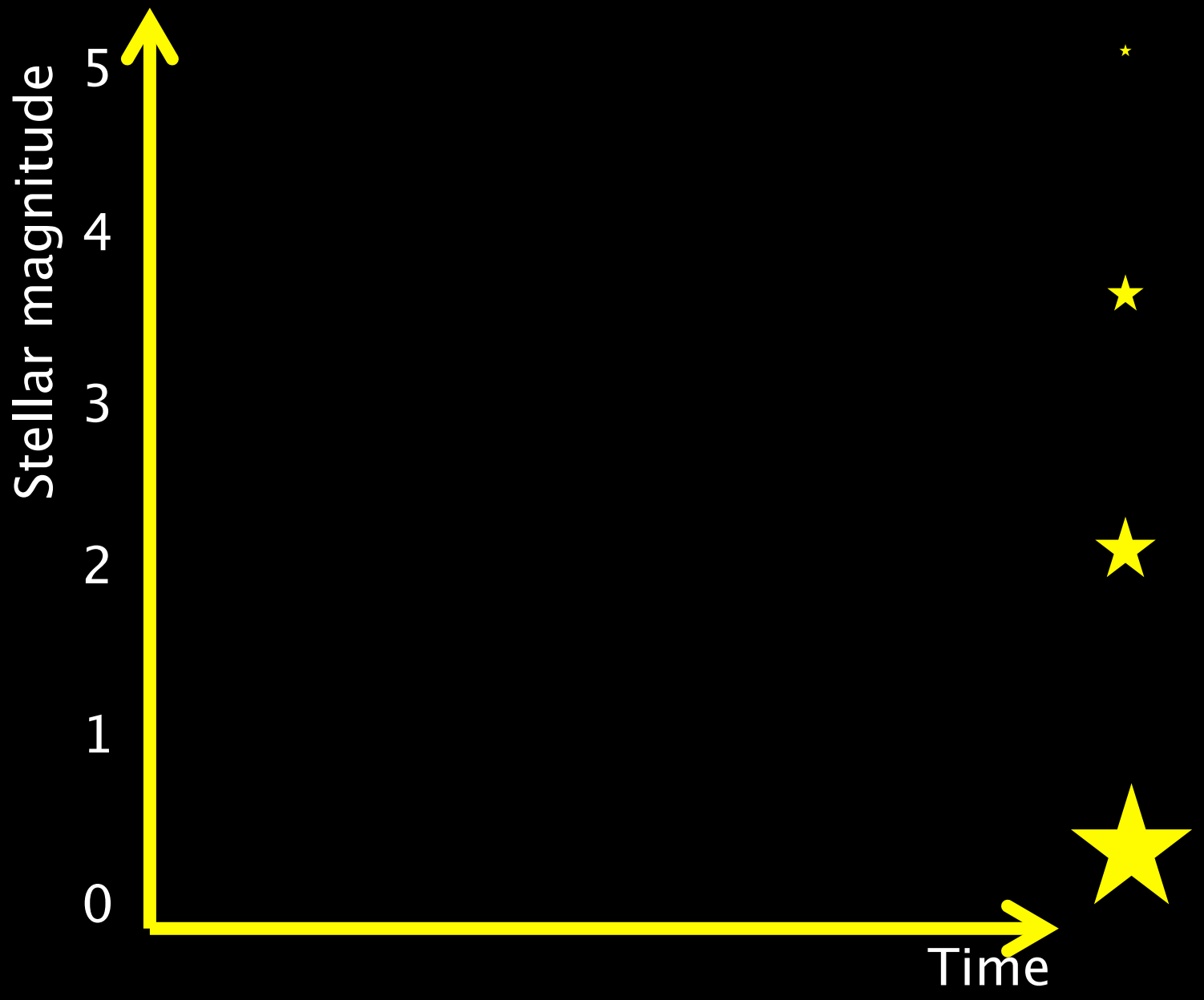
# Number of stars observed

Version 1

Version 2



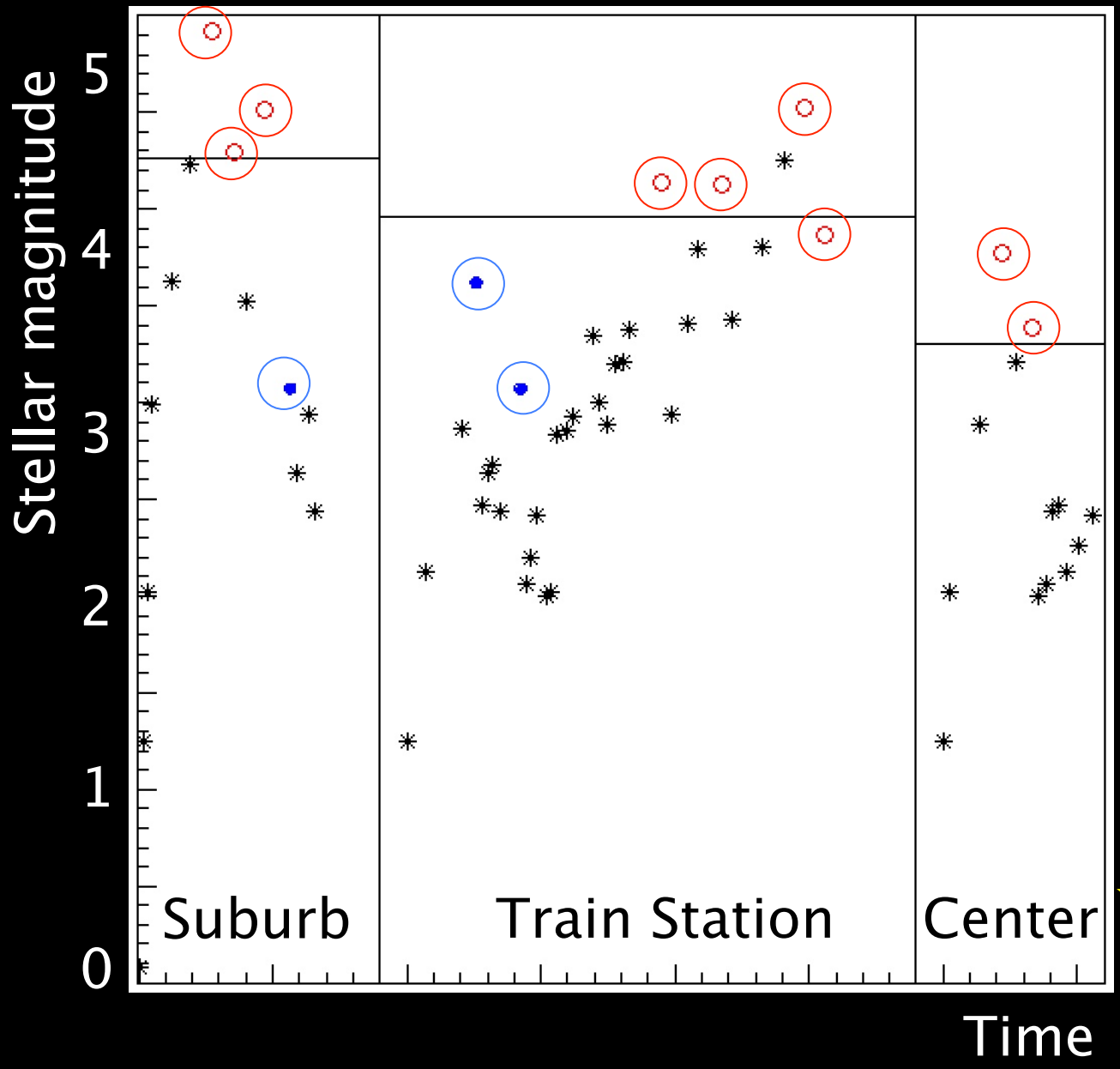
# Observations



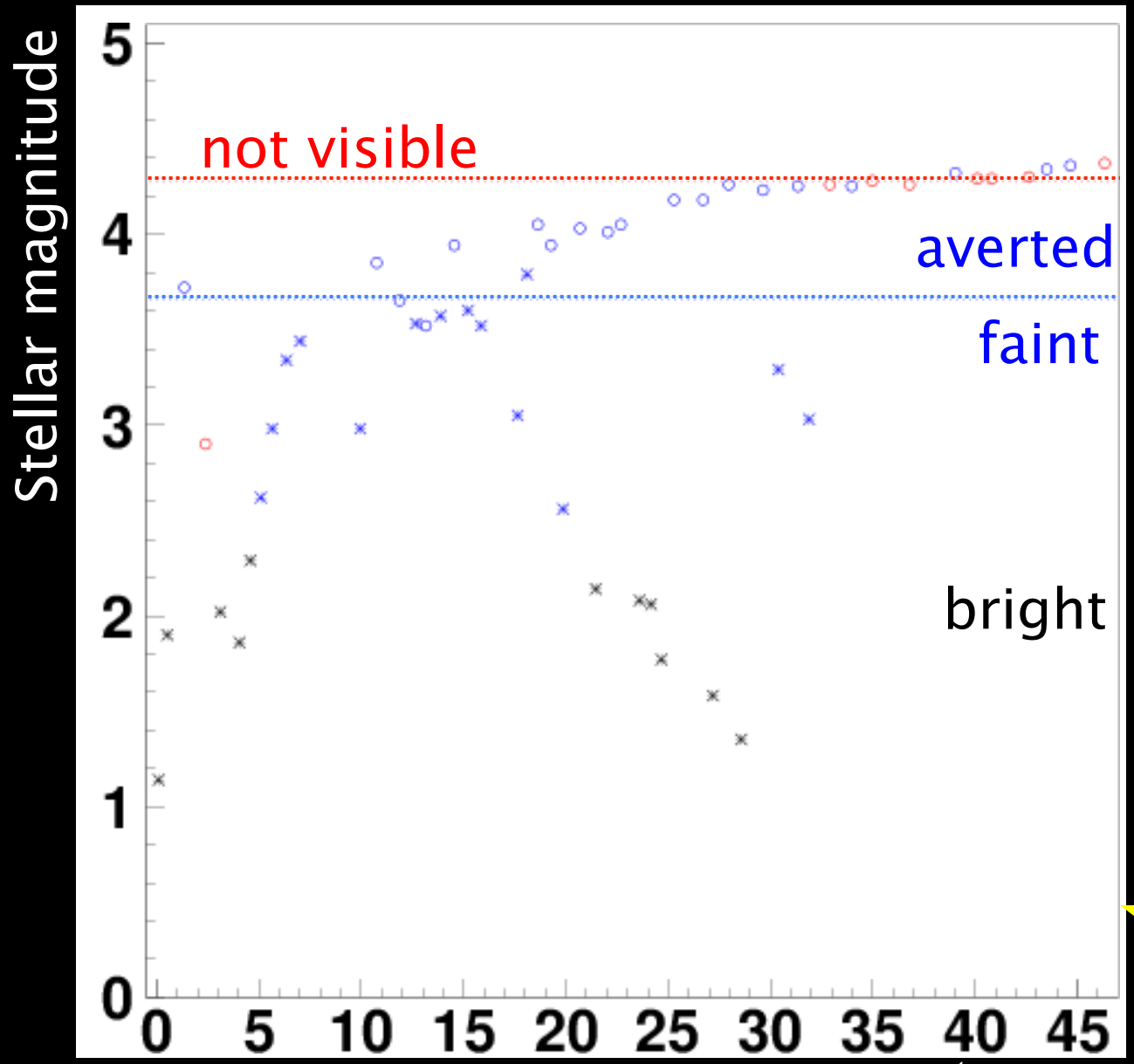
# Berlin observations

not visible

unsure



# Observation in Poland



# How accurate is the app?

- What is the systematic uncertainty
  - due to environmental variation
  - due to shot-to-shot variation
  - due to person-to-person variation

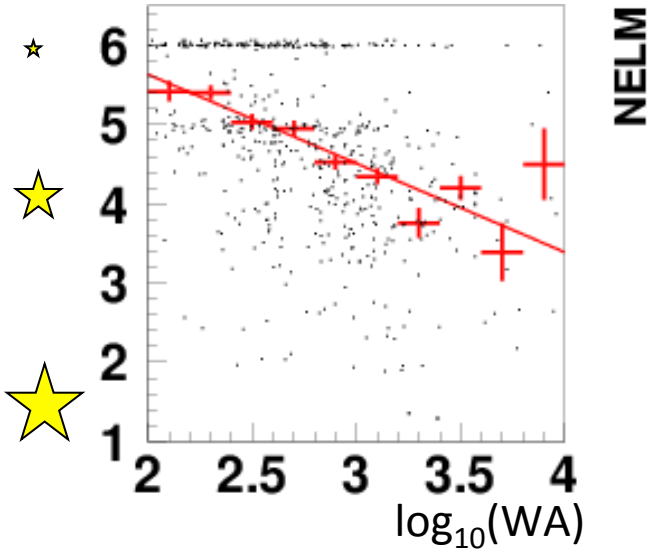
# Environmental variation for a single observer

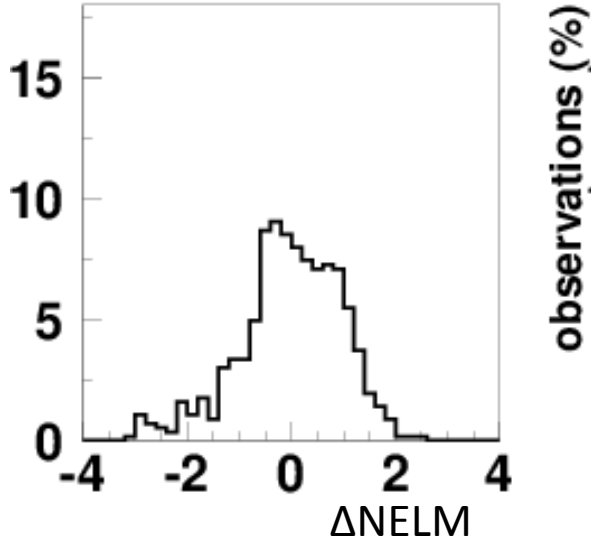
| | | |
|---|---|---|
| Berlin 1: | 12 observations | $\sigma$=0.32 |
| Berlin 2: | 7 observations | $\sigma$=0.50 |
| Potsdam: | 7 observations | $\sigma$=0.34 |

# Flashmobs for Science

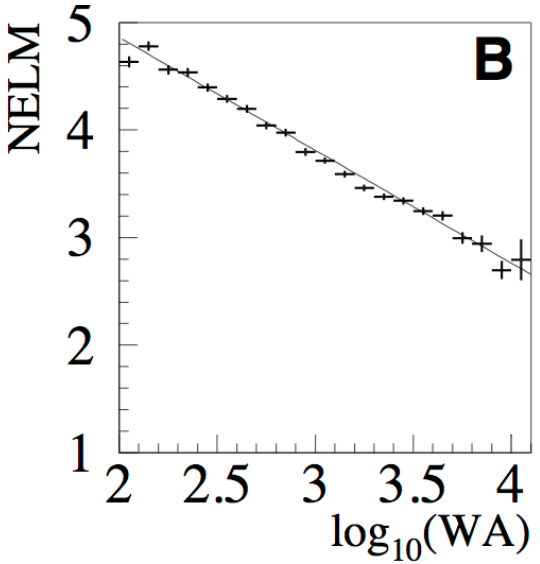
- Berlin (1st version of app)
  - 3.08, 3.23, 3.29, 3.39, 3.81, 4.08, 4.67, all seen (x2)
  - Sample standard deviation: **±0.6**
- Heidelberg (2nd version of app)
  - 3.99, 4.11, 4.29, 4.50
  - Sample standard deviation: **±0.2**
- Need a bigger event!

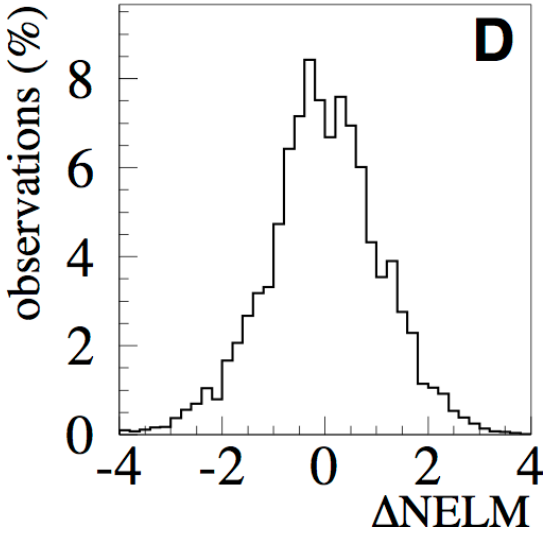
# Person-to-person variation




Globe at Night



# Acknowledgements

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App testers
App users