



Take a talk into the art of dark sky photography

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Fez wearer | Somewhere in Middle Earth



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Photography

- ▶ Willis Street, Wellington



Photography

- SplunkTrust Summit April 2018



Photography

► July 2018



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My first dark sky photography experience

After 45 minutes of driving into the desert near Phoenix, AZ....



What you will learn in this talk

or what questions did I ask myself to get this app done

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What you will learn in this talk

or what questions did I ask myself to get this app done

- ▶ What is photography in the first place?
- ▶ Some basics for DarkSky photography
- ▶ How and where to `I get me` data?
- ▶ How to use Splunk as a web/map tile server
- ▶ How to create map tiles
- ▶ How to use image data in Splunk - WTF aRe you talking about?
- ▶ How not to use KVstore
- ▶ tstats to the rescue
- ▶ Putting it all together ...
- ▶ And last but not least: Size does matter!

What is photography in the first place?

“Physics”

- *Moving camera parts, weather, light*

“Math”

- *Simple math not eval()*

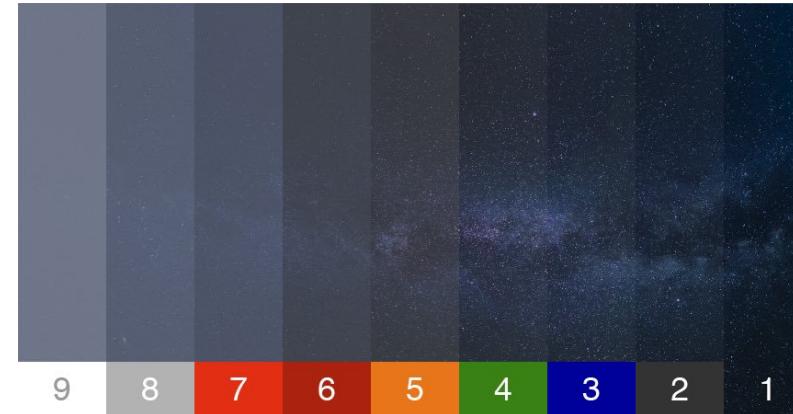
“Chemistry”

- *Old School 35mm film or endorphins*

The image is a composite of two photographs. The upper half shows a deep night sky with numerous stars of varying brightness against a dark purple background. The lower half shows a close-up view of dark, jagged, and textured rock formations, possibly volcanic in origin, with some light-colored patches where snow or ash might be present. The two images are joined at the horizon line.

Some basics for DarkSky photography

- ▶ 500 rule
 - $500 \text{ seconds} / \text{focal length} = \text{safe shutter speed in seconds}$
- ▶ The Bortle scale
 - It quantifies the astronomical **observability** of celestial objects and the interference caused by light pollution



- ▶ Fun fact: Which place has the worst natural light pollution?
 - Antarctica! Caused by the Aurora Australis and the reflections from the snow

Some basics for DarkSky photography

- ▶ Know the current Lunar phase
 - Avoid full moon, plan for new moon
- ▶ Find the Galactic Center
 - Know the best time of the **observability** of the Galactic Center
 - In the Southern Hemisphere from February to October
 - In the Northern Hemisphere from March to October
 - There are plenty of iDevice apps that help with that

How and where to `I get me` data?

- ▶ NASA dark marble satellite image
 - The only available source for light pollution
- ▶ NASA lunar phase API
 - Simple API that returns the lunar phases in CSV
- ▶ Weather API
 - Get the current weather and a forecast for your destination
- ▶ MapBox directions API
 - How do I get there?
- ▶ Custom Splunk command
 - | get me=EasterEgg

How to use Splunk as a web/map tile server?

- ▶ Splunk supports map tile URLs
 - custom map tiles (e.g. <https://custom.com.au/{z}/{x}/{y}.png>)
- ▶ OR
 - Put your map tiles into \$SPLUNK_HOME/etc/apps/foobar/appserver/static/maptiles
 - Configure map to use
`https://SplunkInstanceHostName:8000/static/app/foobar/maptiles/{z}/{x}/{y}.png`

How to create map tiles

- ▶ Ingest GPS data into dark marble TIFF
 - Geospatial Tools like gdal_translate and gdal_wrap can ingest GPS data
- ▶ TileMill
 - Used to create 9GB map tiles from dark marble TIFF

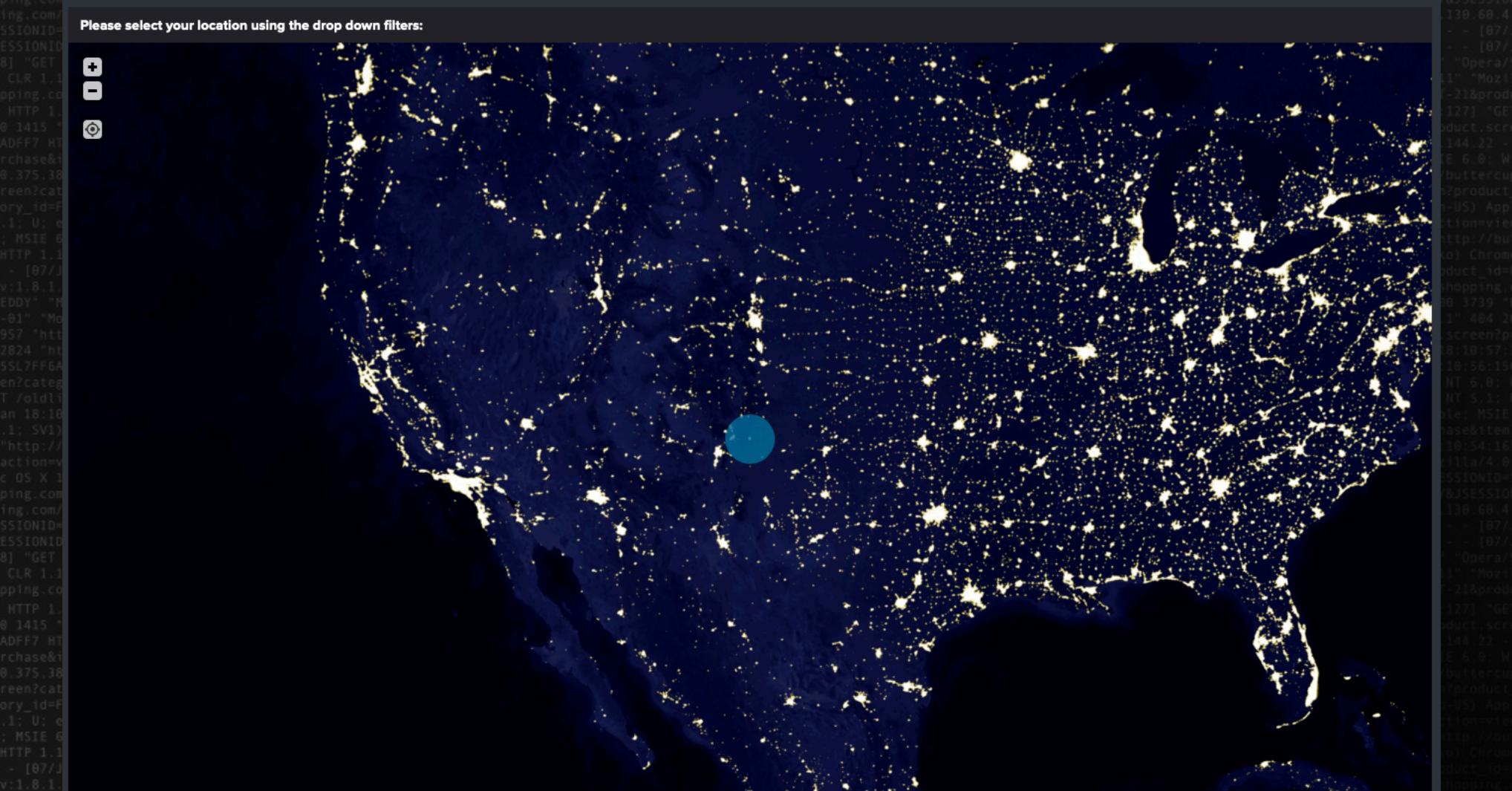
Dark Sky 2017 - Location

Show Filters

Edit Export ...

Please verify the location we found for you or use the dropdown filters to select a location you are right now or you want to go, these are passed down to the next dash board as tokens

Please select your location using the drop down filters:



How to use image data in Splunk

WTF aRe you talking about?

- ▶ Dark marble TIFF = structured data!
 - Each pixel represents a coordinate
- ▶ R
 - Install r and r packages raster and rgdal
- ▶ Using R
 - ```
library(raster)
r <- raster("/Users/michaeluschmann/Downloads/lights.tif", package="raster")
data_matrix <- rasterToPoints(r)
head(data_matrix)
write.table(data_matrix, 'data_matrix.csv', sep=',')
```

# How not to use KVstore

- ▶ Ingesting 90 million entries at once into KVstore is like ...



# tstats to the rescue

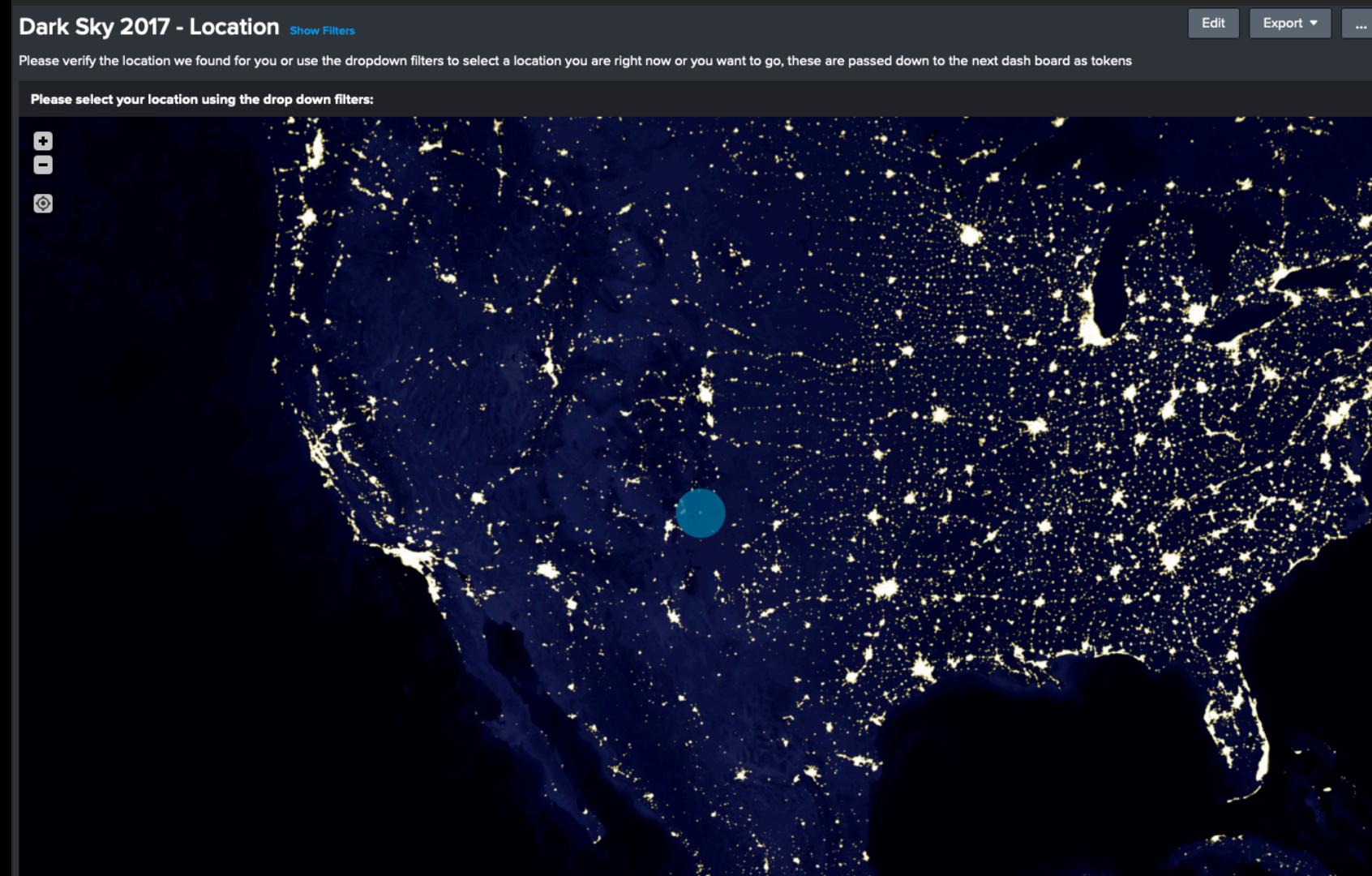
## mstats maybe in a later version of the app ↴\_(ツ)\_↗

- ▶ Accelerated data model
- ▶ tstats SPL like this:

- | tstats values(darksky\_RootEvent.lights) AS lights values(darksky\_RootEvent.bortle) AS bortle from datamodel=darksky WHERE darksky\_RootEvent.country=\$country\$ AND darksky\_RootEvent.lights="" AND darksky\_RootEvent.latitude >  
[| stats count | eval num=\$lat\$ - 1 | rename num AS search] AND darksky\_RootEvent.latitude <  
[| stats count | eval num=\$lat\$ + 1 | rename num AS search] AND darksky\_RootEvent.longitude >  
[| stats count | eval num=\$lon\$ - 2 | rename num AS search] AND darksky\_RootEvent.longitude <  
[| stats count | eval num=\$lon\$ + 2 | rename num AS search] by darksky\_RootEvent.latitude  
darksky\_RootEvent.longitude darksky\_RootEvent.country  
| rename darksky\_RootEvent.country AS country darksky\_RootEvent.latitude AS lat darksky\_RootEvent.longitude AS lon  
darksky\_RootEvent.country AS country  
| eval src\_lat=\$lat\$, src\_lon=\$lon\$  
| stats values(bortle) AS bortle values(src\_lat) AS src\_lat values(src\_lon) AS src\_lon max(lights) AS max\_lights  
min(lights) AS min\_lights by lat lon  
| `distance(src\_lat,src\_lon,lat,lon)` | `bearing(lat,lon,src\_lat,src\_lon)`

# Putting it all together ...

- ▶ Dark marble TIFF as map tile source



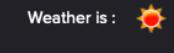
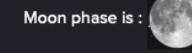
# Putting it all together ...

- ▶ Weather and Moon API's

In October it is possible to spot the center of the Milky Way during: **Difficult: Sunset (early October only)** and while the moon is in this phase: **Last Quarter to New Moon**.

The current moon phase is **Full Moon** with the next moon phase **Last Quarter** starting at **22-10-19 01:39:00**

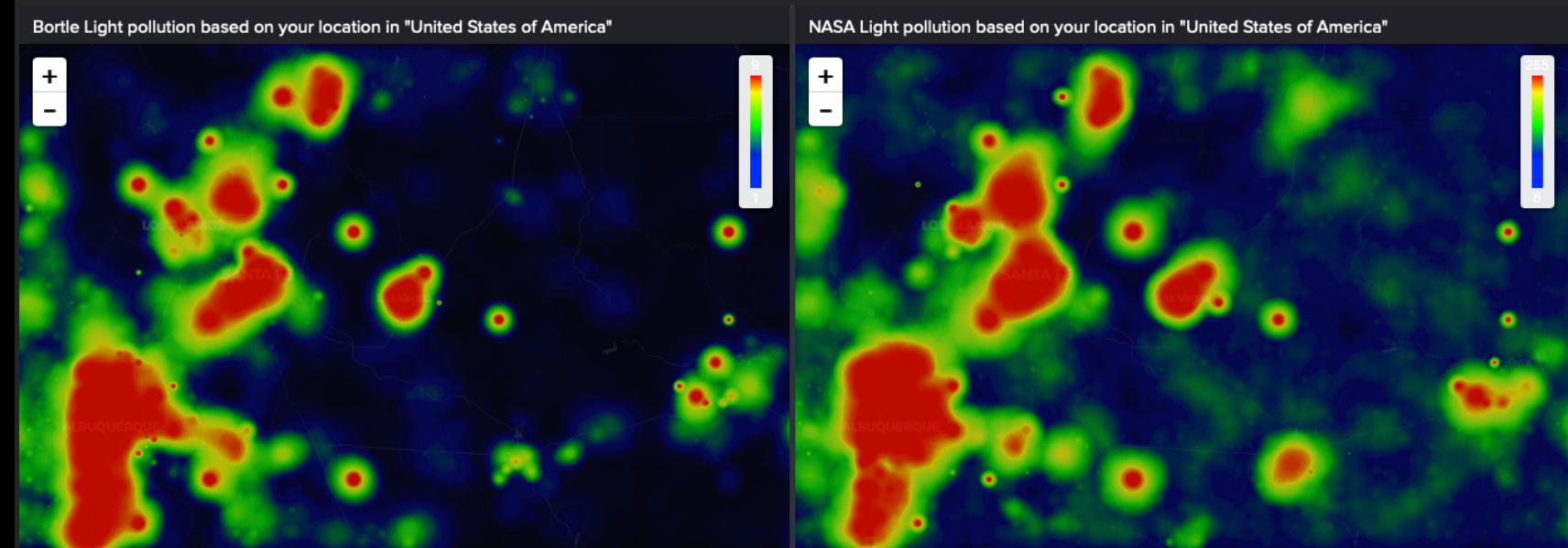
The current temperatur at your location is **20.18** degrees celsius and **clear sky** with winds of **3.315** km/h from the direction of **176.836** degrees.



| _time            | weather | weather.desc | temp  | humidity | wind.speed | wind.deg |
|------------------|---------|--------------|-------|----------|------------|----------|
| 2019-10-16 10:00 | ☀       | clear sky    | 20.18 | 14       | 3          | 177      |
| 2019-10-16 13:00 | ☀       | clear sky    | 16.68 | 22       | 4          | 132      |
| 2019-10-16 16:00 | ☀       | clear sky    | 9.78  | 47       | 3          | 130      |
| 2019-10-16 19:00 | ☀       | clear sky    | 6.88  | 58       | 1          | 119      |
| 2019-10-16 22:00 | ☀       | clear sky    | 5.18  | 64       | 1          | 182      |
| 2019-10-17 01:00 | ☀       | clear sky    | 4.72  | 65       | 2          | 206      |
| 2019-10-17 04:00 | ☀       | clear sky    | 8.75  | 52       | 4          | 214      |

# Putting it all together ...

- ▶ Dark marble TIFF as light pollution data source

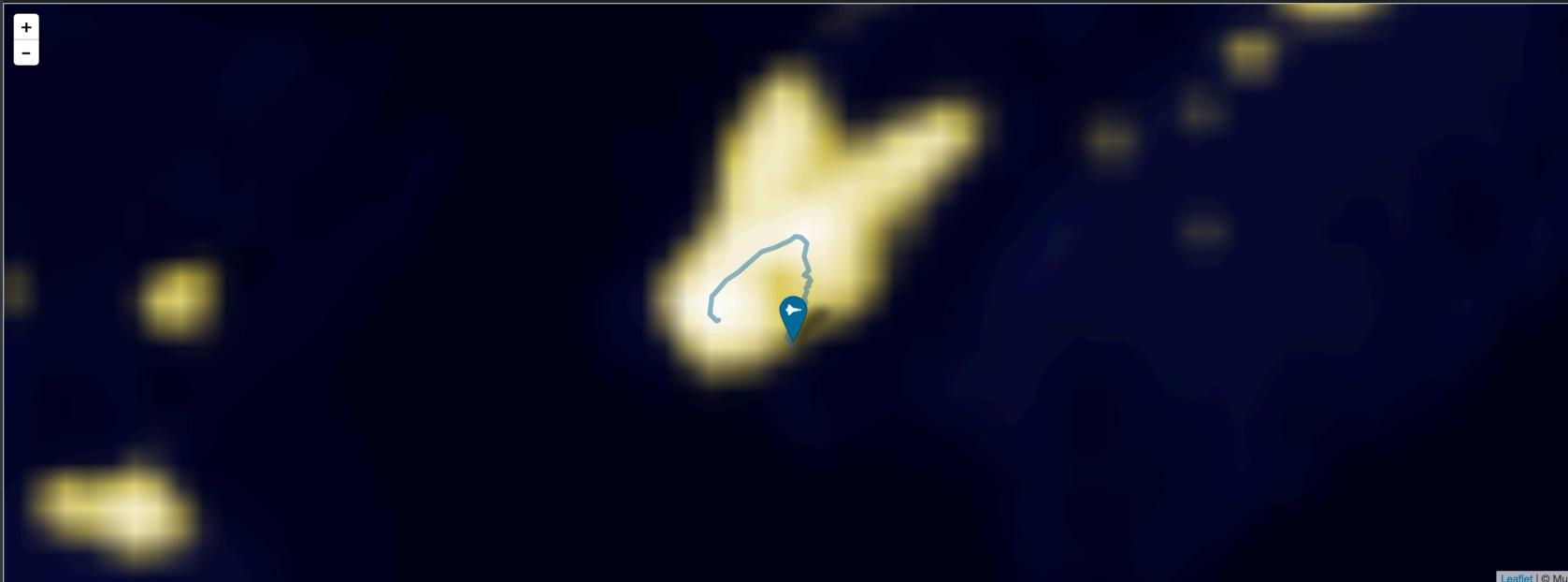


# Putting it all together ...

- ▶ MapBox API to get directions

|                                                              |                                                             |                                                     |                                                         |
|--------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|
| Closest location with lowest Bortle scale<br><b>Distance</b> | Closest location with lowest Bortle scale<br><b>Azimuth</b> | Azimuth you should take a photo!<br><b>between:</b> | Azimuth you should NOT take a photo!<br><b>between:</b> |
| <b>9km</b>                                                   | <b>104°</b>                                                 | <b>72 - 122°</b>                                    | <b>252 - 302°</b>                                       |

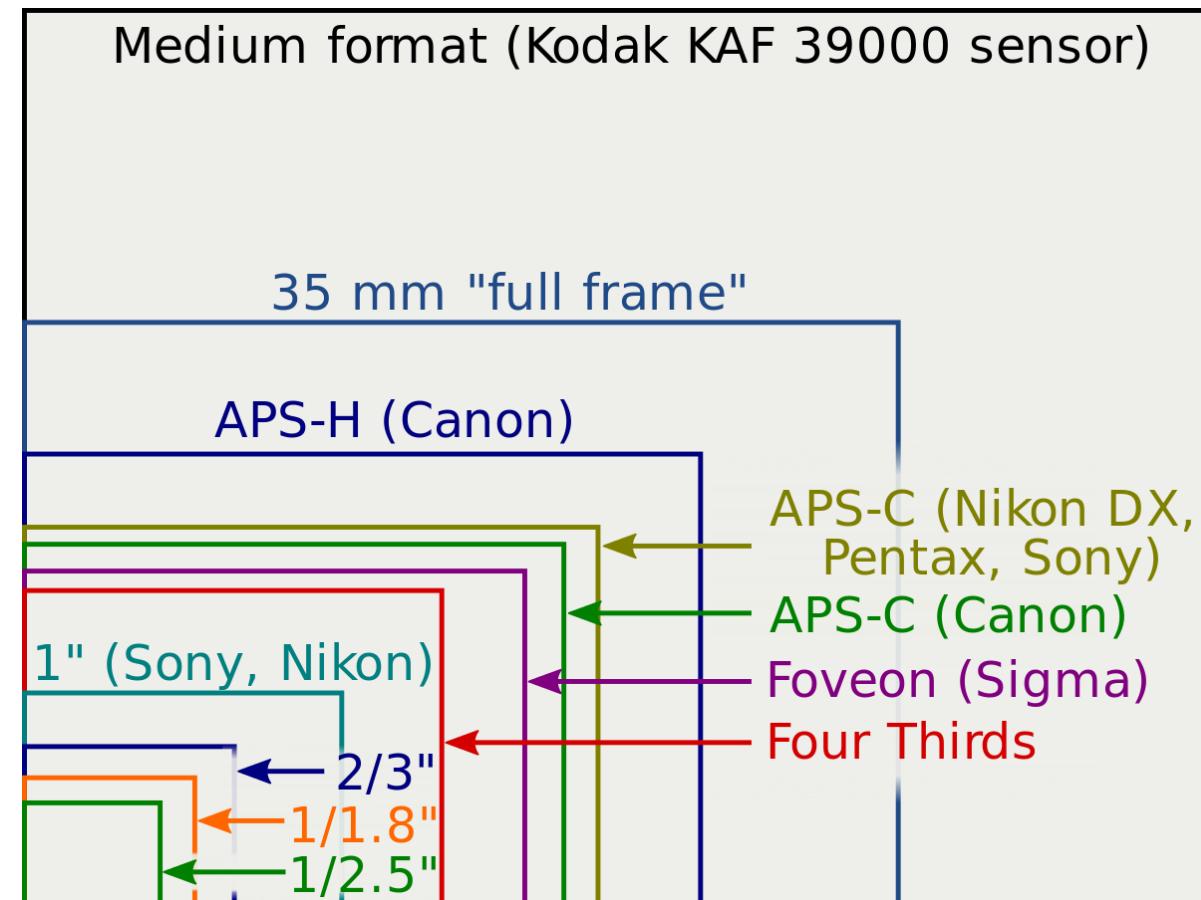
Direction form Mapbox Al



# And last but not least: Size does matter!

Because ...

- ▶ The bigger the sensor the more light you will get on it!





# Demo

# Key Takeaways

You are all awesome!

1. Sometimes it takes a whole lot of work outside of Splunk to make Splunk look good
2. You will always learn something new if you think outside of the box
3. There is no limit, go and explore what you can do with Splunk 😊

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Thank  
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