June 7th, 2025

Videos removed to post on GitHub

The Fairfield CT Reservoir Plasmoid

A Field and Video Analysis Case Study

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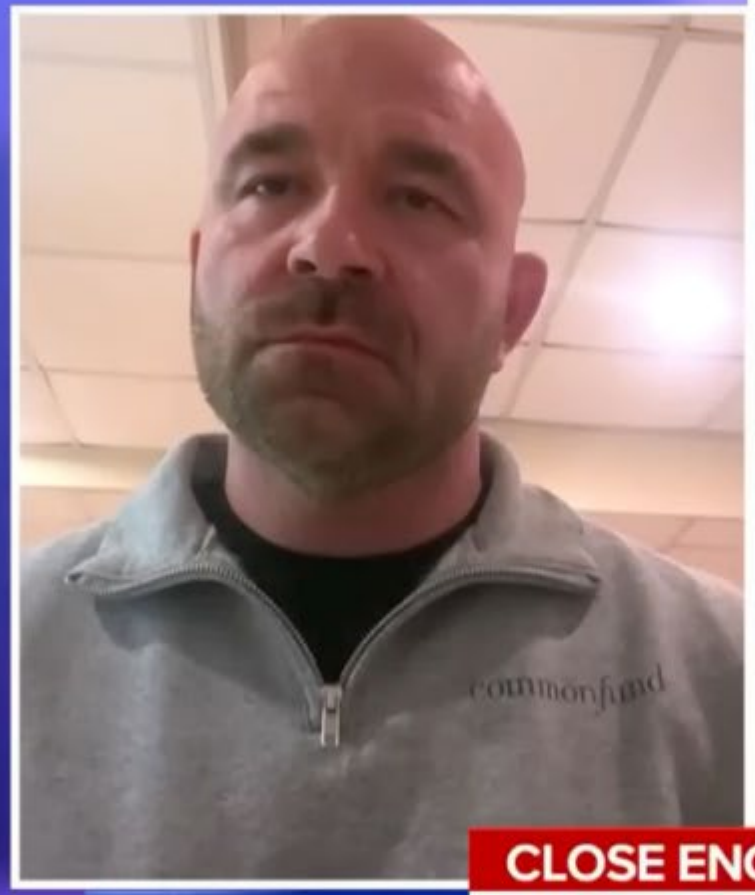
Page linked to News Nation Video



NEWSNATION EXCLUSIVE

CLOSE ENCOUNTER?

NEWS NATION

NOW: CONNECTICUT COP ON 2022 UFO SIGHTING

10:07 PM ET

NN NEWS FOR ALL AMERICANS NN

Banfield

Initial Expedition: December 2024

- Invited NewsNation
- Interviewed 4 new witnesses
- Established Officer Klein's observation point
- Conducted field audio and light intensity tests
- Conducted sky lantern color and light dispersion comparison tests
- 1st field surveillance

Page linked to News Nation Video

Chris Burns Documented UAP History

Second Expedition: May 2025

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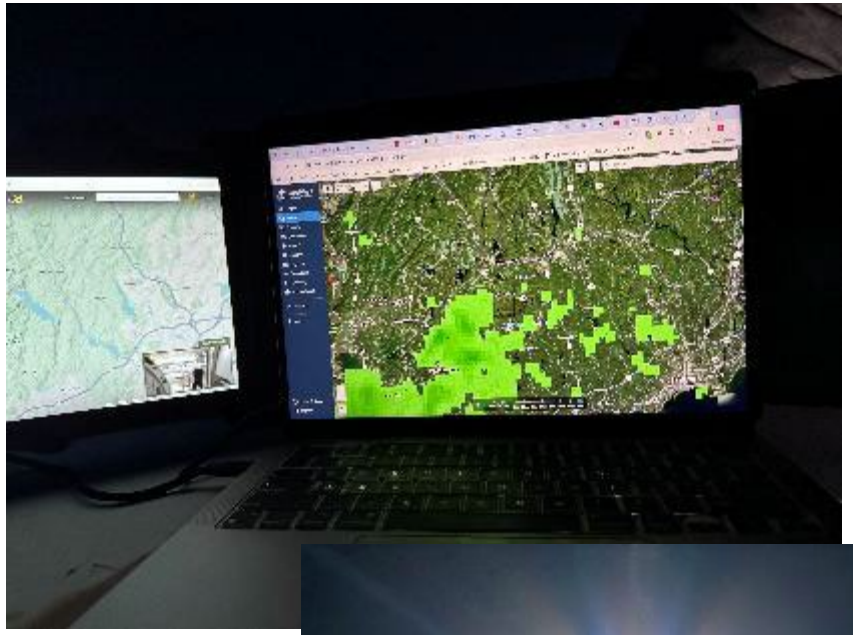
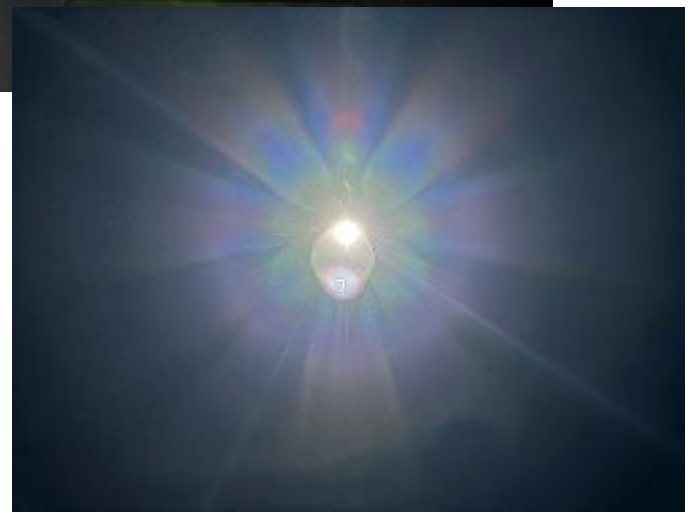




- Community outreach and establishment of vantage points for triangulation
- Interviewed a witness to new phenomena possibly related
- Conducted an aerial survey via fixed-wing aircraft
- Completed Brewster’s angle test via drone on the opposite shoreline
- 3 nights of field observation (despite inclement weather)

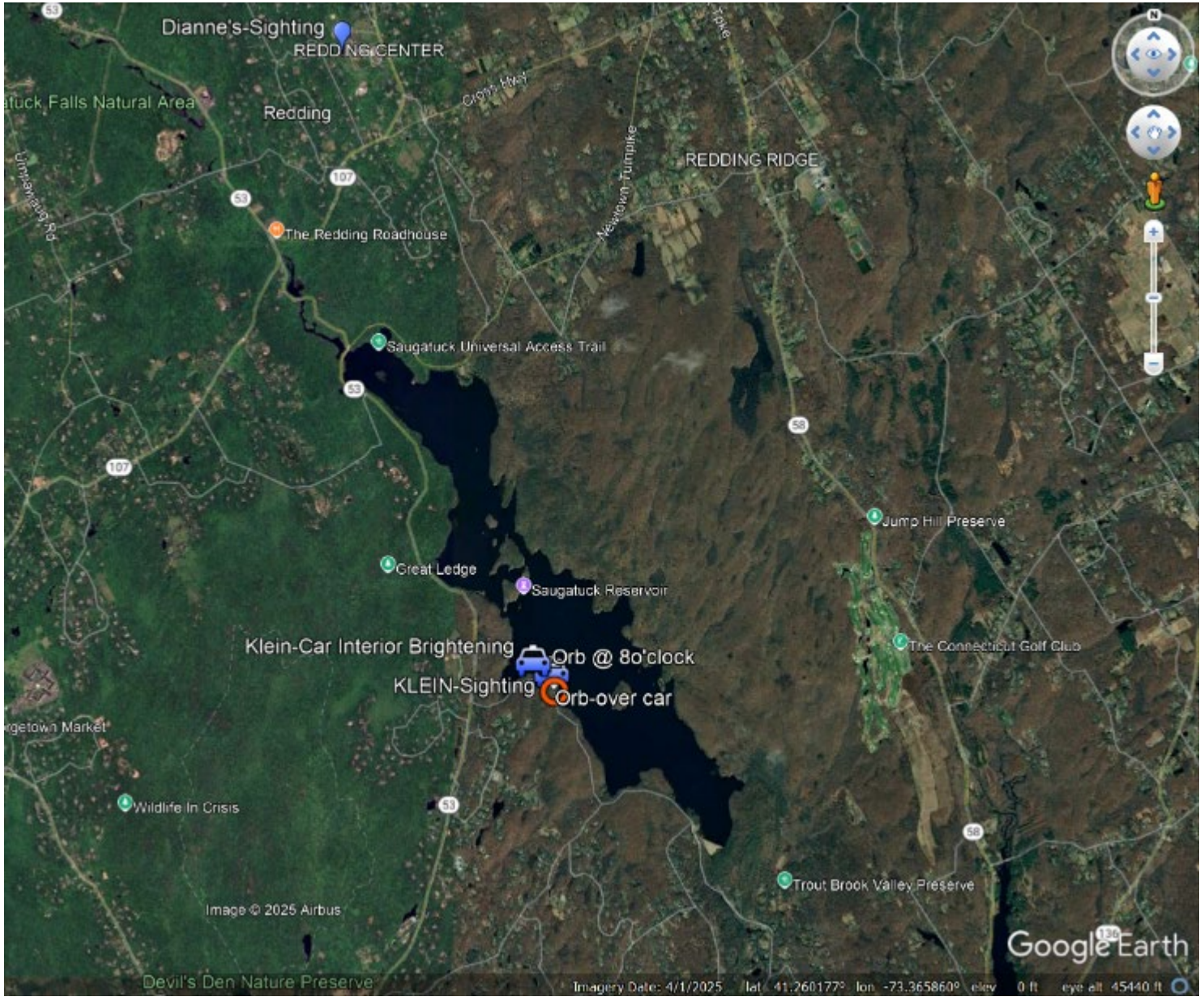
Drone with 10K lumen light used to calculate the Brewster's angle from the east shore and the height above the treeline. Video taken from the reservoir shore.

Aerial Reconnaissance and Radiation Detection

Klein’s Video Metadata

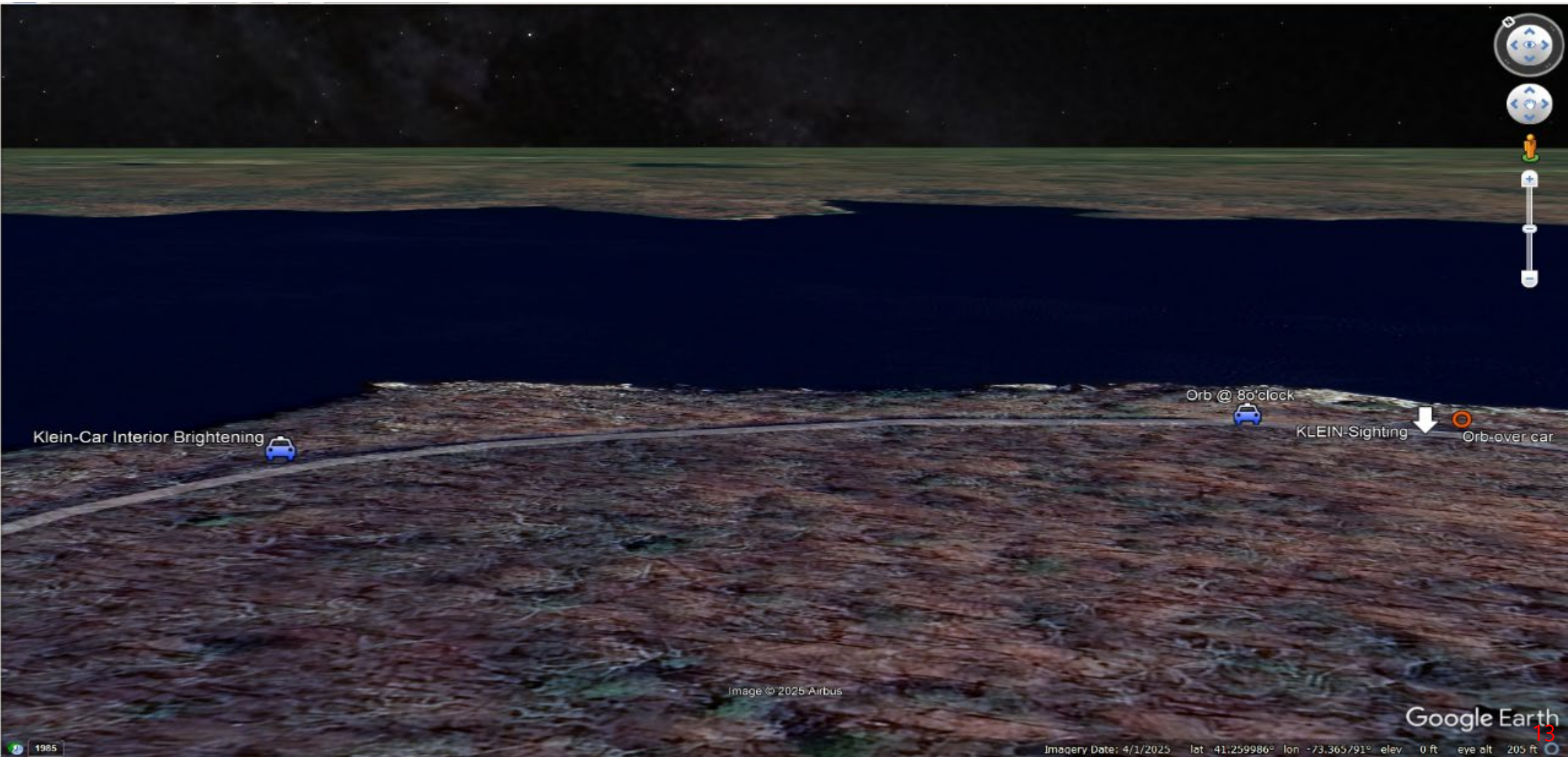
- Make: Apple
- Model: iPhone 13
- Software: 15.4.1
- Creation Date: 2022:04:27 23:22:48-04:00
- Duration : 0:01:40
- Audio Format: mp4a
- Image Width: 1920
- Image Height: 1080
- Compressor Name: H.264
- Bit Depth: 24
- Video Frame Rate: 23.999

Location: Saugatuck Reservoir CT

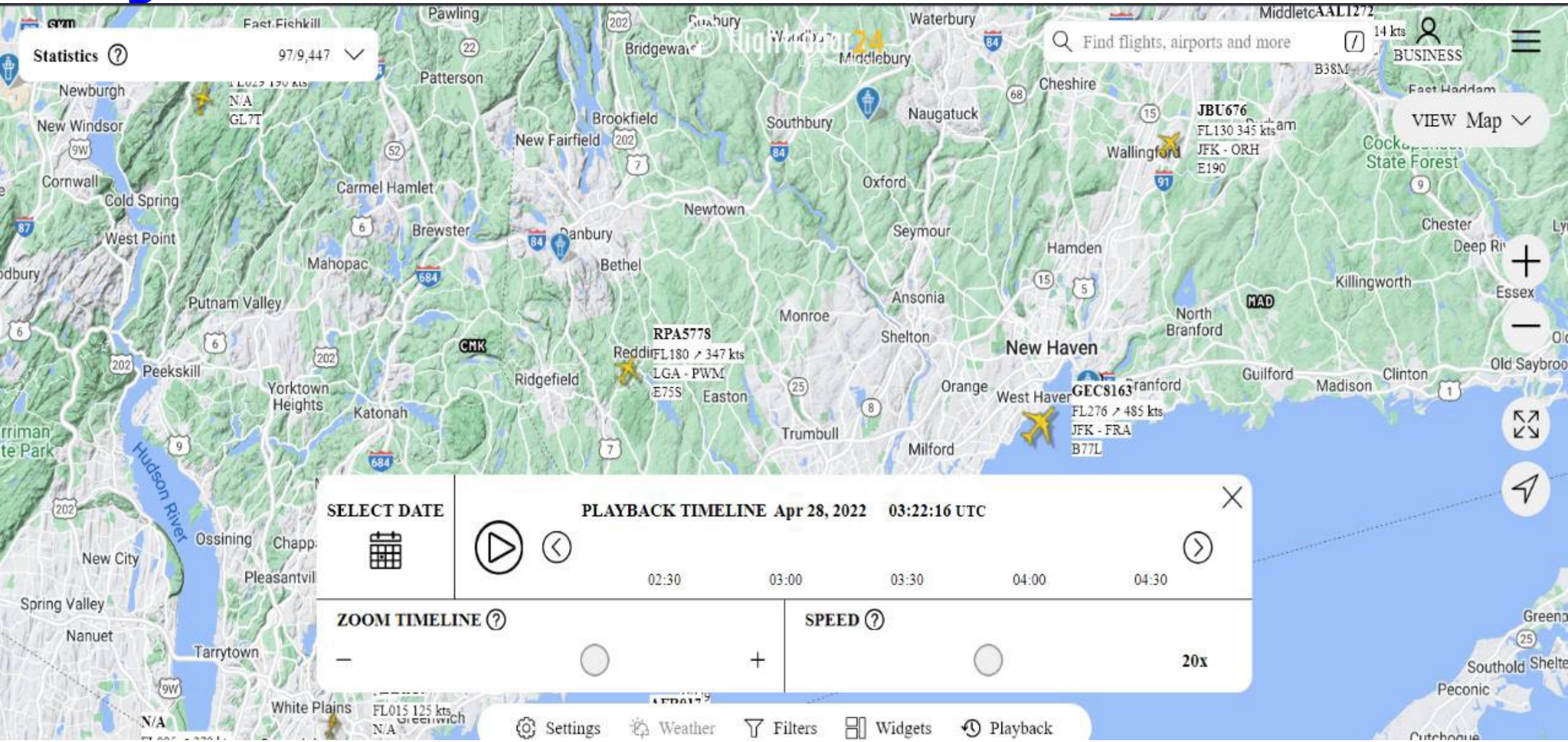


Dianne Maksel's Sighting Looks Due South

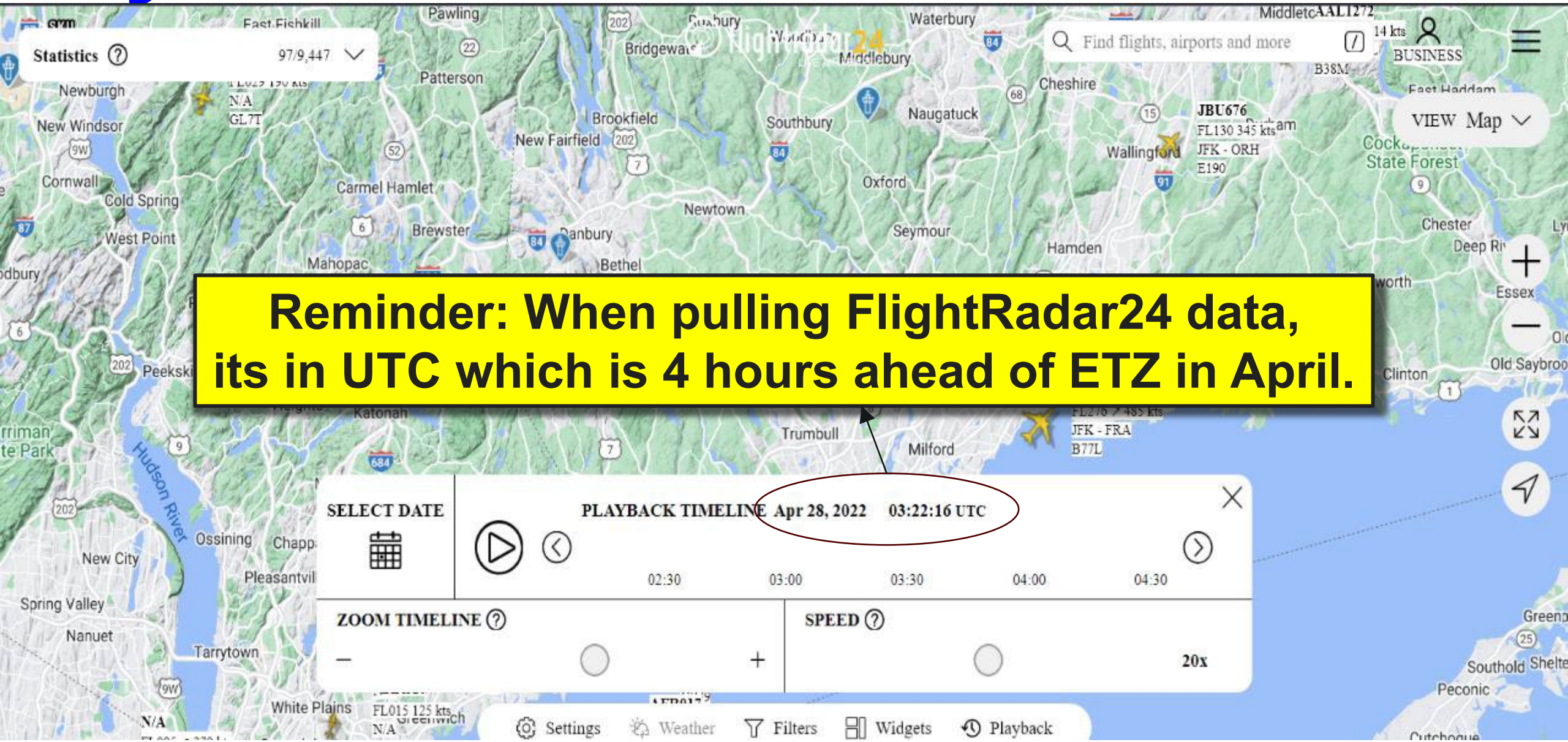
Klein’s Sighting Saugatuck Reservoir CT



FlightRadar24



FlightRadar24



Reminder: When pulling FlightRadar24 data, its in UTC which is 4 hours ahead of ETZ in April.

Converting Lat/Lon/Altitude to Az/El

Prime vertical radius of curvature:

$$N(\phi) = \frac{a}{\sqrt{1 - e^2 \sin^2(\phi)}}.$$

ECEF coordinates (X,Y,Z):

$$X = \left(N(\phi) + h\right) \cos(\phi) \cos(\lambda),$$

$$Y = \left(N(\phi) + h\right) \cos(\phi) \sin(\lambda),$$

$$Z = \left(\frac{b^2}{a^2} N(\phi) + h\right) \sin(\phi) \quad \text{or} \quad Z = \left(N(\phi)\left(1 - e^2\right) + h\right) \sin(\phi).$$

a = Semi-major axis (m) = 6378137

b = Semi-minor axis (m) = 6356752.314

e = Unitless eccentricity = 0.0818192

h = altitude (m)

ϕ = latitude (in radians)

λ = longitude (in radians)

Converting Lat/Lon/Altitude to Az/El

East ($\hat{e}$) points toward the local east direction.
North ($\hat{n}$) points toward local geodetic north.
Up ($\hat{u}$) points upward (normal to the reference ellipsoid at the observer's latitude/longitude).

$$\begin{pmatrix} e \\ n \\ u \end{pmatrix} = \begin{pmatrix} \hat{e}_x & \hat{e}_y & \hat{e}_z \\ \hat{n}_x & \hat{n}_y & \hat{n}_z \\ \hat{u}_x & \hat{u}_y & \hat{u}_z \end{pmatrix} \begin{pmatrix} v_x \\ v_y \\ v_z \end{pmatrix}.$$

$$\mathbf{v} = \begin{pmatrix} v_x \\ v_y \\ v_z \end{pmatrix} = \mathbf{X}_1 - \mathbf{X}_0 = \begin{pmatrix} X_1 - X_0 \\ Y_1 - Y_0 \\ Z_1 - Z_0 \end{pmatrix}.$$

$\hat{e}$ (unit east)

$$\hat{e} = \begin{pmatrix} -\sin(\lambda_0) \\ \cos(\lambda_0) \\ 0 \end{pmatrix},$$

$\hat{n}$ (unit north)

$$\hat{n} = \begin{pmatrix} -\sin(\phi_0)\cos(\lambda_0) \\ -\sin(\phi_0)\sin(\lambda_0) \\ \cos(\phi_0) \end{pmatrix},$$

$\hat{u}$ (unit up)

$$\hat{u} = \begin{pmatrix} \cos(\phi_0)\cos(\lambda_0) \\ \cos(\phi_0)\sin(\lambda_0) \\ \sin(\phi_0) \end{pmatrix}.$$

Converting Lat/Lon/Altitude to Az/El

Range (straight-line distance from observer to aircraft):

$$\text{range} = \|\mathbf{v}\| = \sqrt{v_x^2 + v_y^2 + v_z^2} = \sqrt{e^2 + n^2 + u^2}.$$

Azimuth (Az): direction angle in the local horizontal plane, measured from **north** toward **east**

$$\text{Az} = \text{atan2}(e,\, n).$$

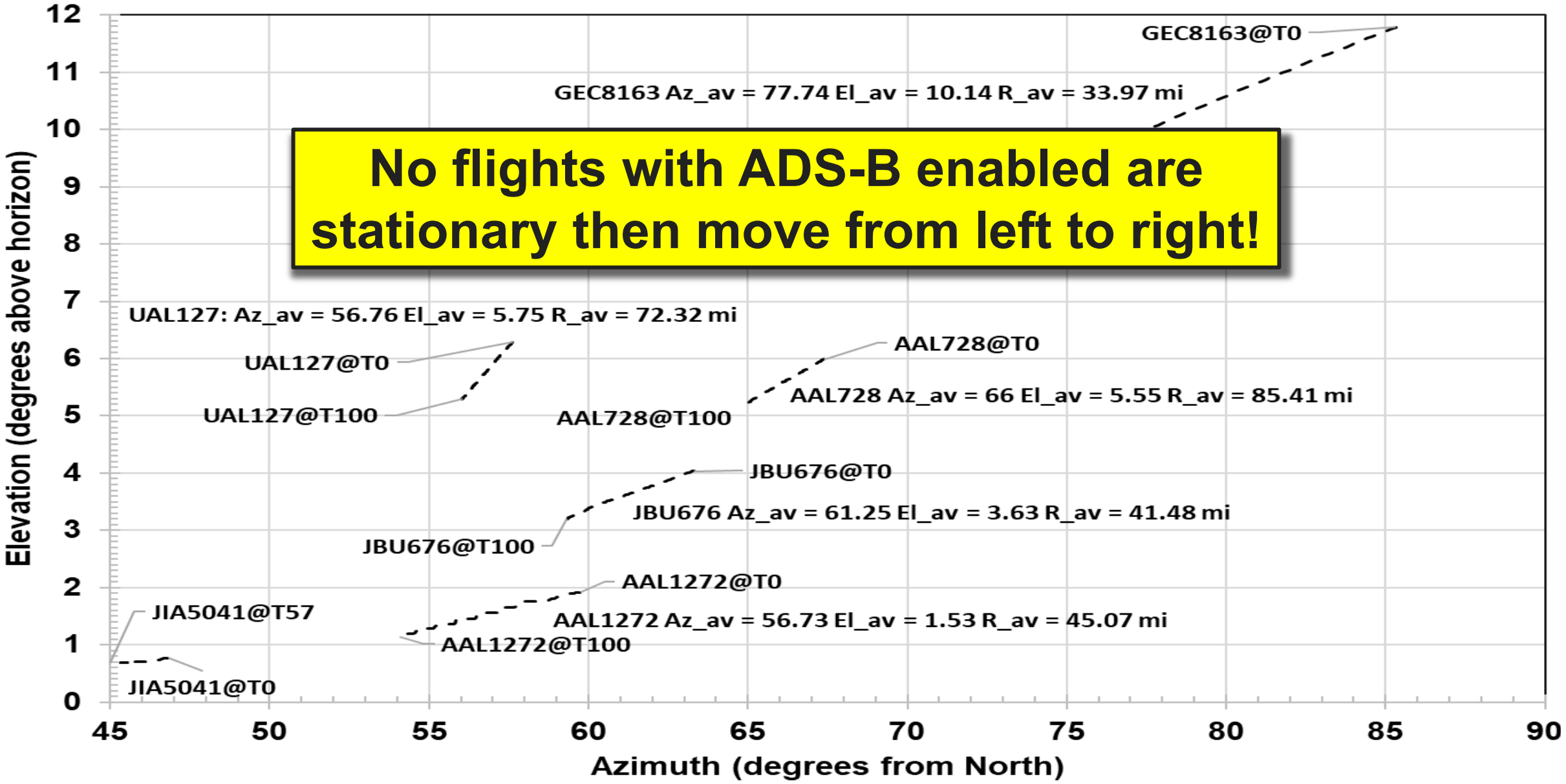
- atan2(e,n) returns the angle whose tangent is e/n, but also takes into account the signs of e, n to give a full 0–2π or −π-+π range.
- If you want Azimuth in degrees, do Az°=Az×180/π .
- By convention, Az=0° is North, Az=90° is East, and so on.

Elevation (El): angle above the local horizontal plane

$$\text{El} = \arctan 2\left(u,\ \sqrt{e^2 + n^2}\right).$$

- El=0° is the horizon, +90° is straight up.
- If you want degrees, El∘=El×180/π .

Possible Flights in Officer Klein's Video



Reference Location Algorithm

brighten.py

1. Load an image file
2. Brighten image: increase_brightness(img_bgr, val=0.3, adj=20)

   Python code mimic's Mathematica®'s frameLighten algorithm:

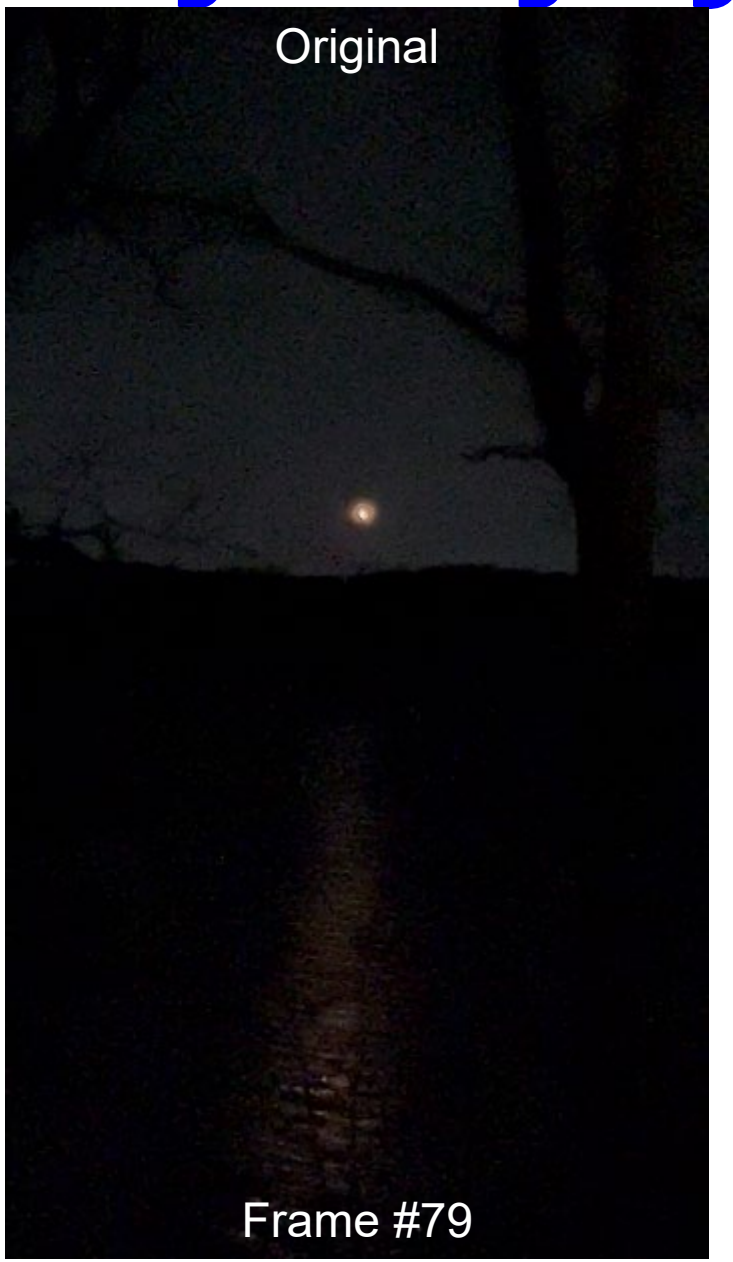
   1) *Binarize[img, val]*
   2) *ColorNegate*
   3) *ImageAdjust[img, {0, adj}] => multiply by adj, clip to [0..1]*
   4) *Compose brightened image from original using a mask value == 1*
3. Save brightened image

Manually identify image locations for template matching…

findReferenceLocations.py

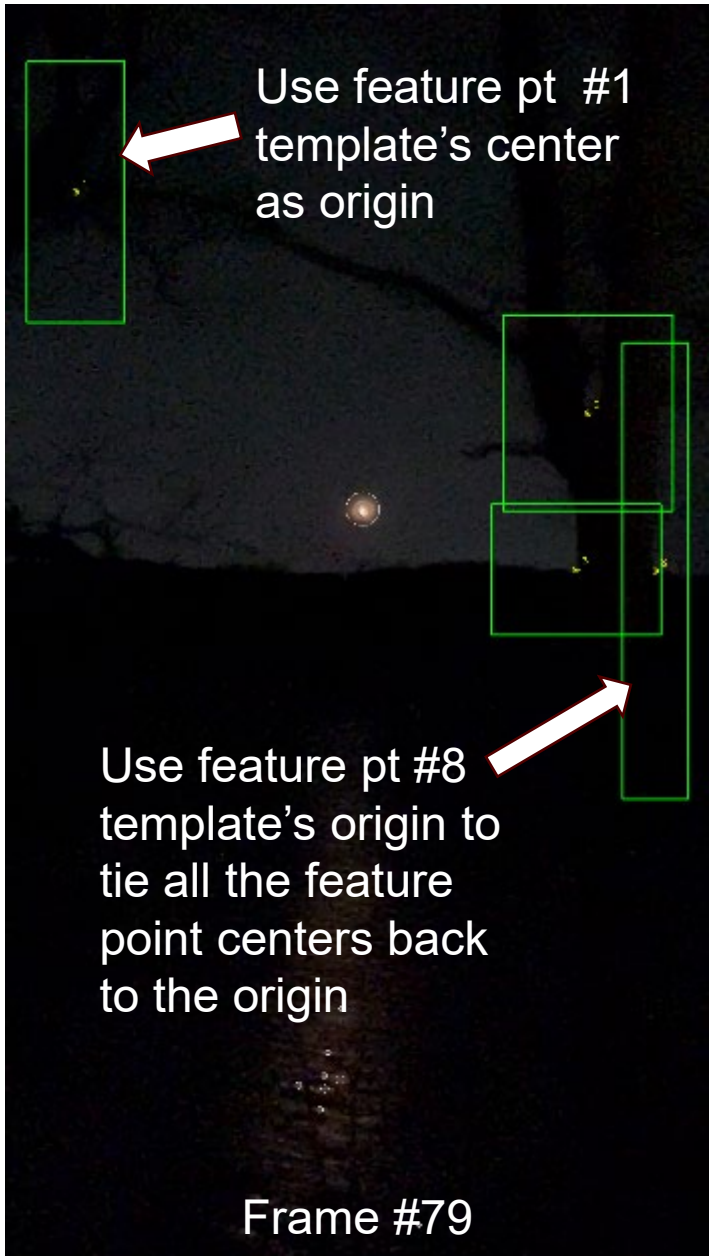
1. Load image template CSV file: readTemplateCSVFile ()
2. Load brightened images from the output from brighten.py
3. Extract feature templates from identified files (79, 1301, 1900, 2028 and 2350)
4. Convert template images to a gray scale image 0 to 255
5. Loop over all frames and templates
   1) Convert frame image to gray scale
   2) Use OpenCV's matchTemplate algorithm with a match threshold of 0.7
   3) Save the matched locations if the algorithm identifies an x coordinate

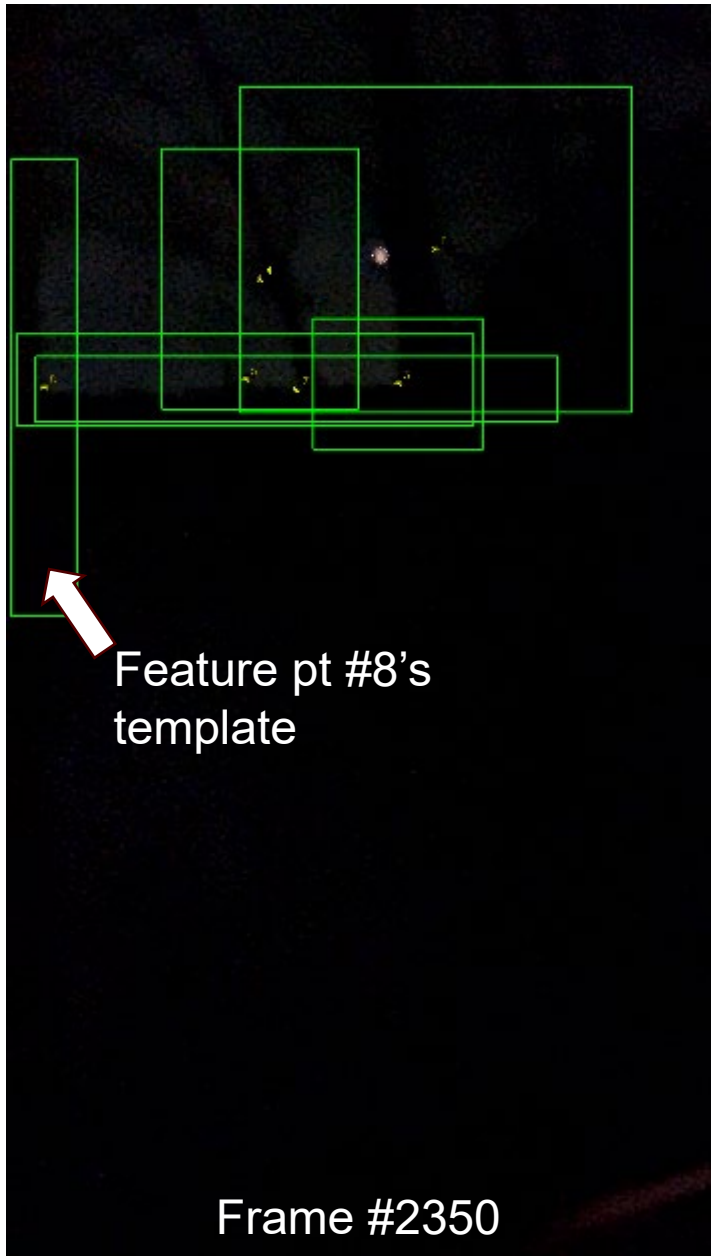
Brightening Algorithm: Frame 79



Significantly improves the identification of low visibility image features!

Feature Pt Reference Location Results



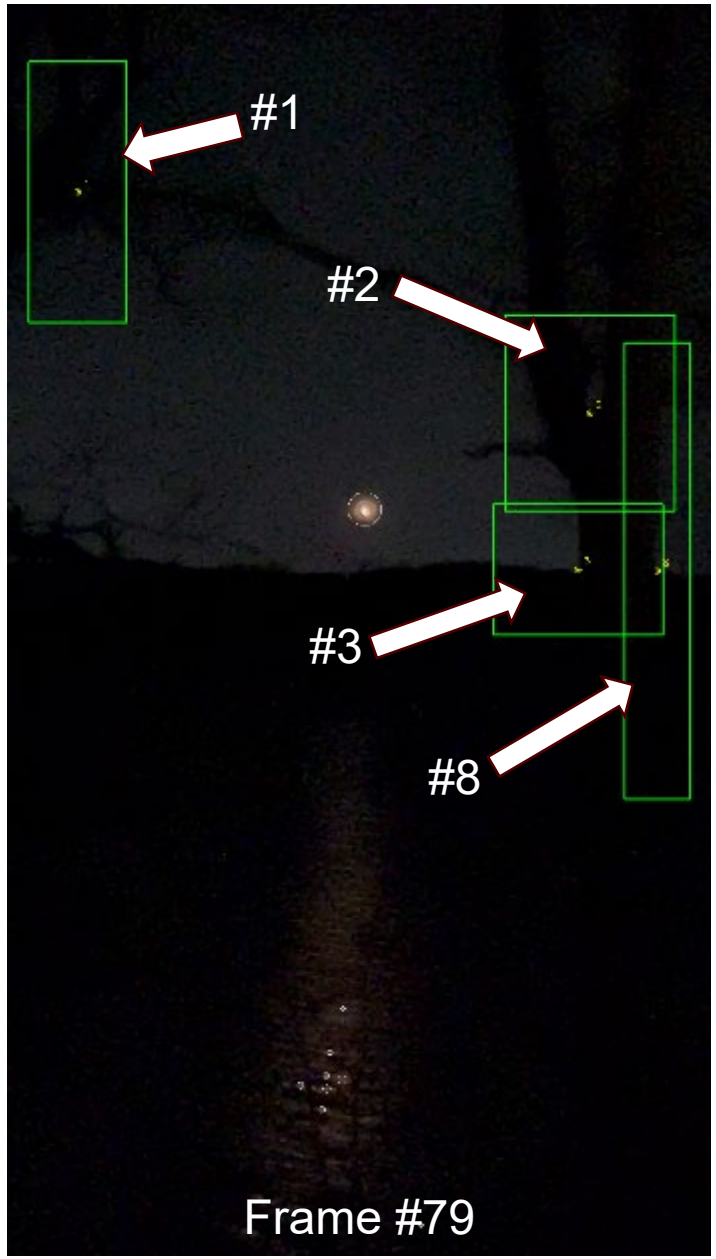


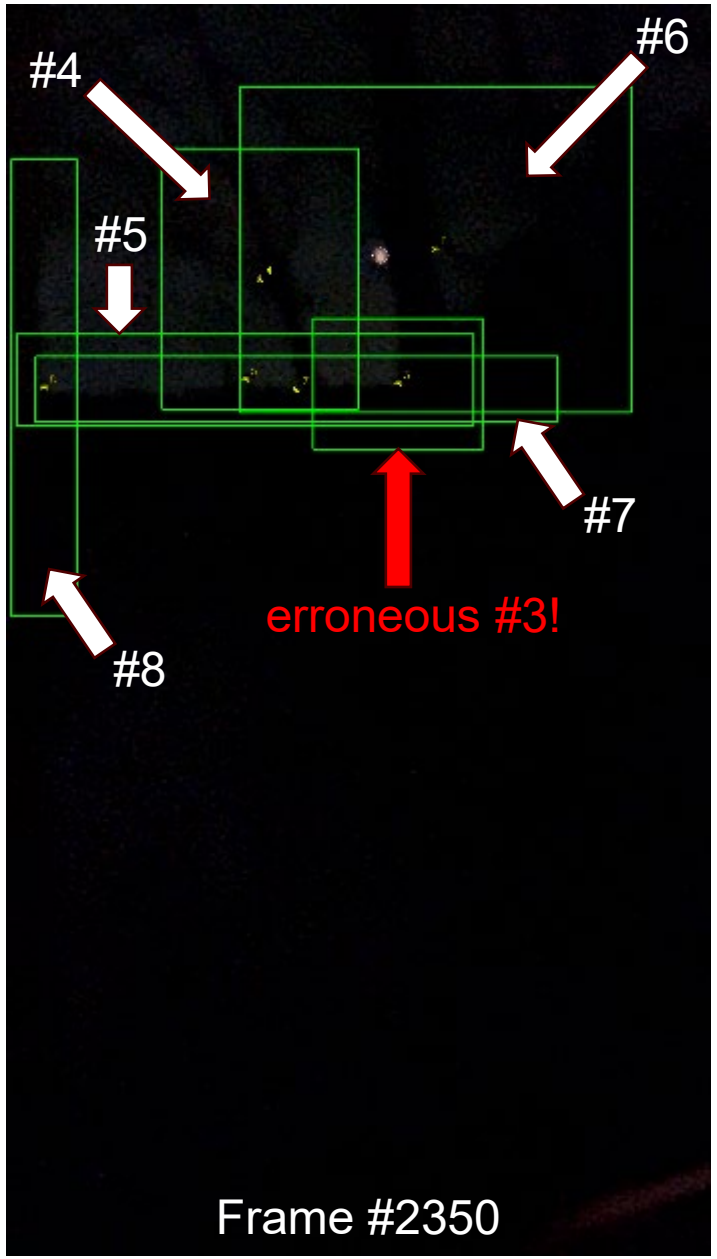
Identify Image Feature Points

- Identify brightened images with the best features for matching
  - 8 feature points used
  - Frames 79, 1301, 1900, 2028 and 2350 used to extract feature templates as ftr pt #8 is visible in all these frames
- After using OpenCV's matchTemplate pattern matching
- Use feature center points to translate back to the origin (feature point #1)
- Python used annotate these frames
- Use aircraft locations to provide image feature point relative Az & El

Orb Az/El from Feature Pts

Feature Pt Reference Location Results

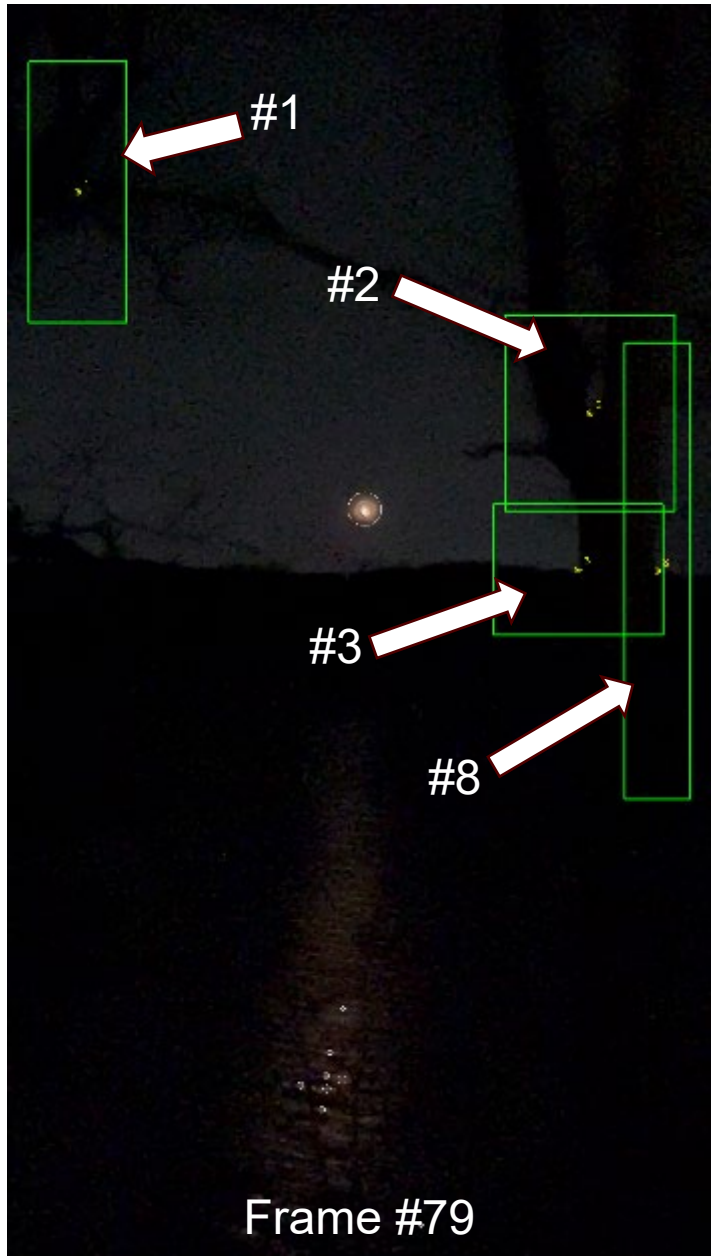


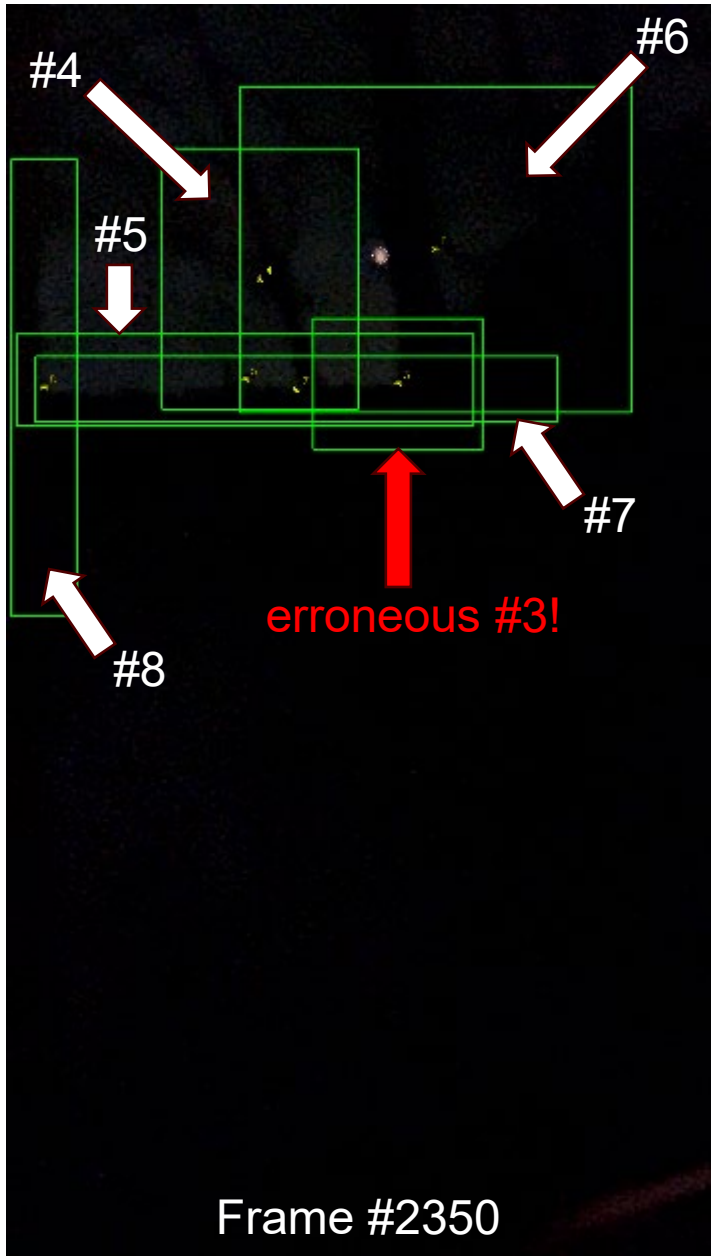


Algorithm isn't perfect!

Erroneous match score is 0.710 for feature point #3

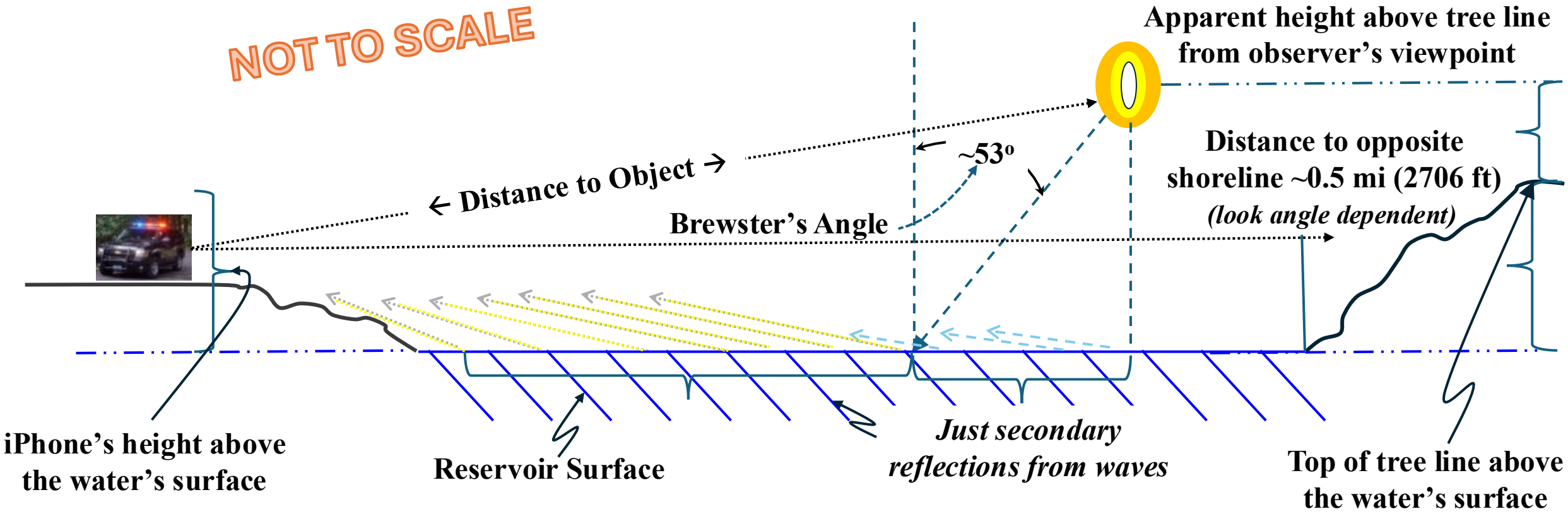
Orb Locations in Az/El





Orb Az/El from Feature Pts should be able to simply use interpolation

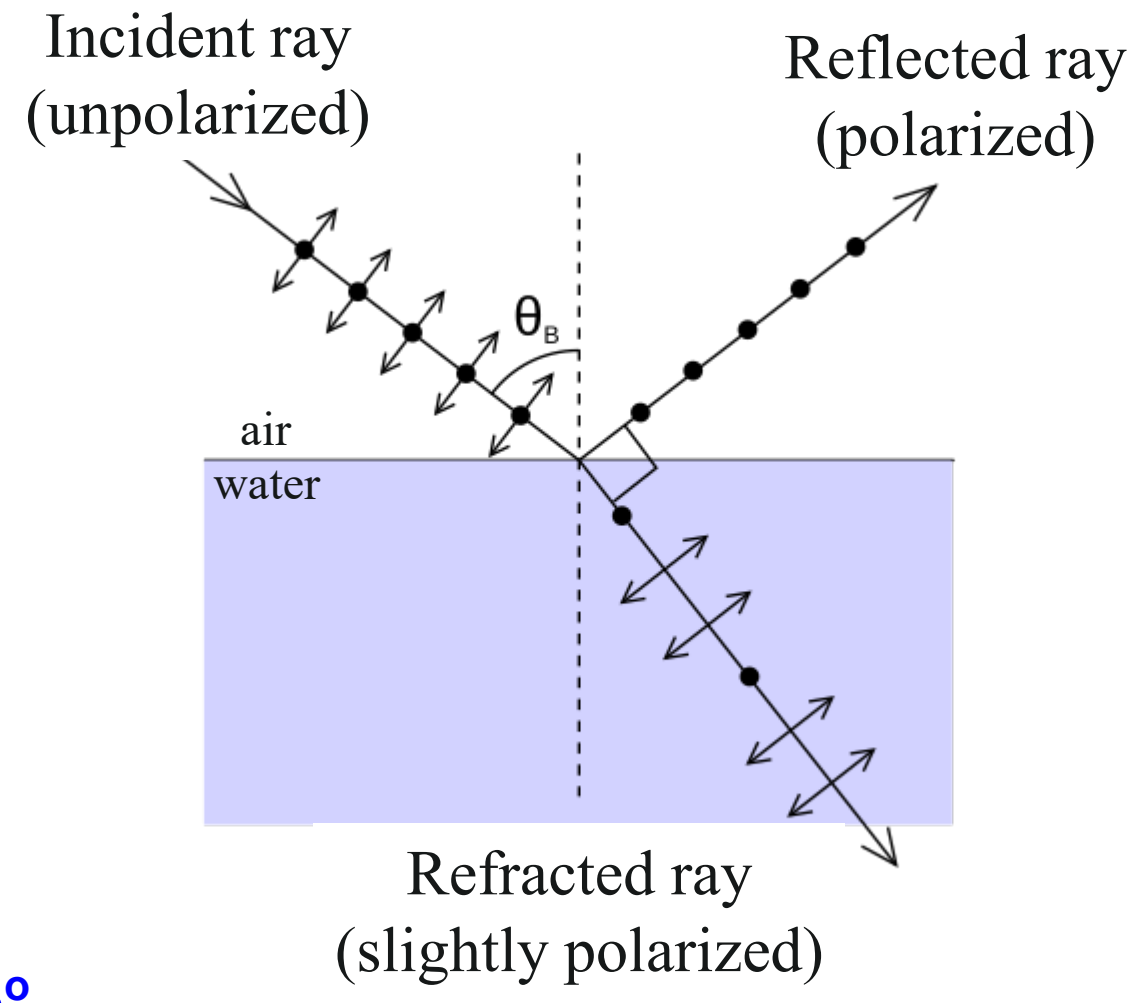
Viewing Geometry



Brewster's Angle

Brewster's angle (also known as the **polarization angle**) is an angle of incidence at which light with a particular polarization is perfectly transmitted through a transparent dielectric surface, with *no reflection*. When *unpolarized* light is incident at this angle, the light that is reflected from the surface is therefore perfectly polarized. The angle is named after the Scottish physicist Sir David Brewster (1781–1868).

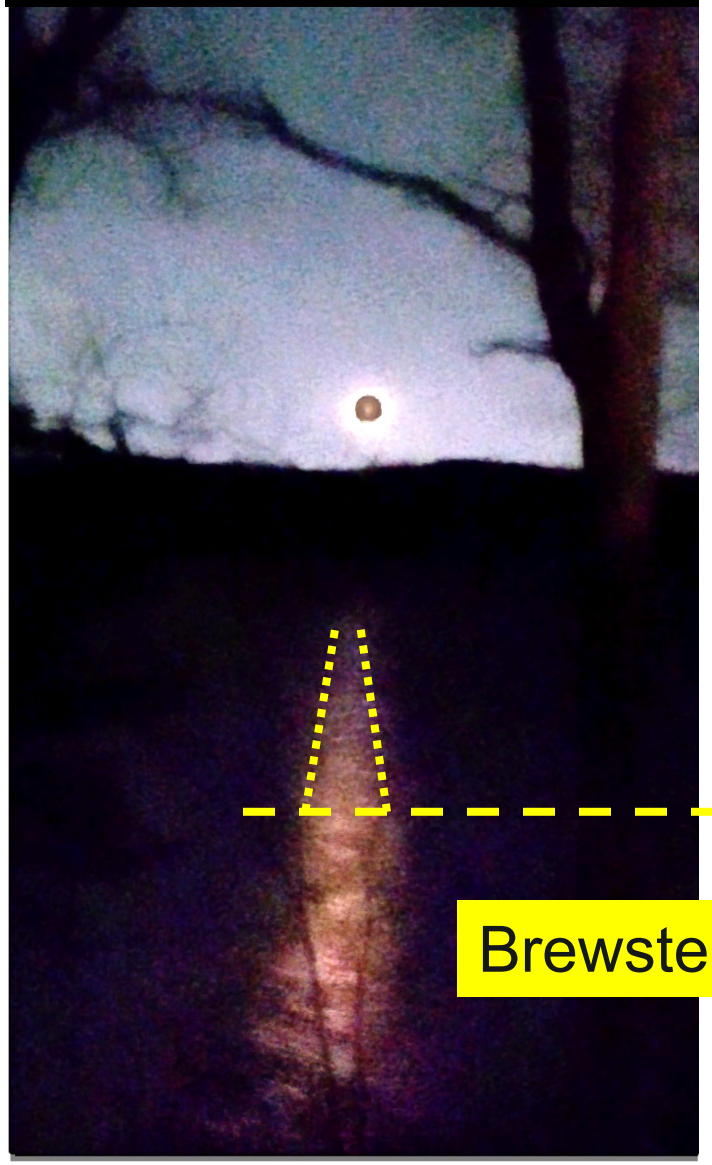
For the air water interface this angle is ~53°.



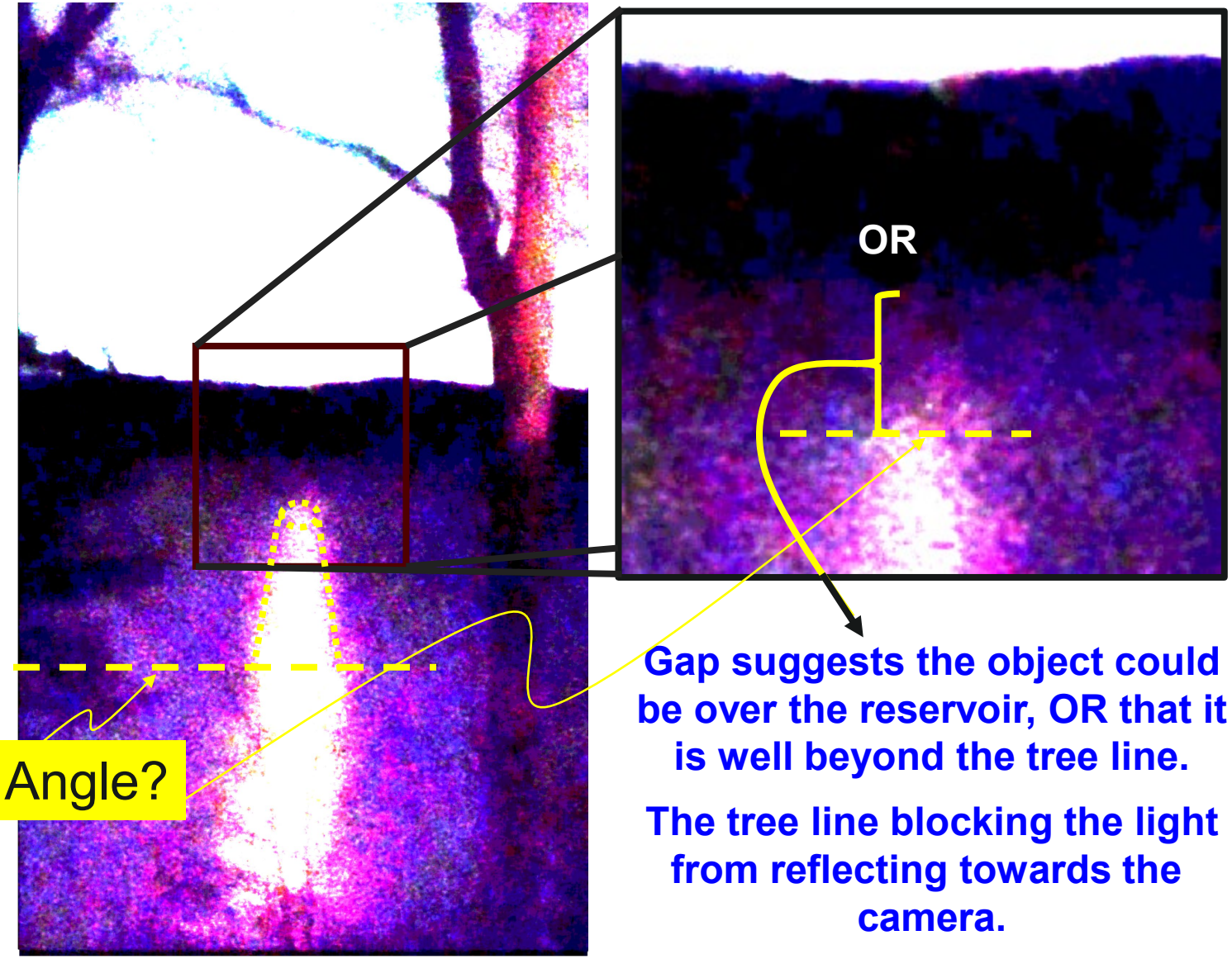
Modified version of, Public Domain,
https://commons.wikimedia.org/w/index.php?curid=2519325

Brewster's Angle

Median Pix of Frms 40-69



7x Median Pix of Frms 40-69



Brewster's Angle?

Gap suggests the object could be over the reservoir, OR that it is well beyond the tree line.

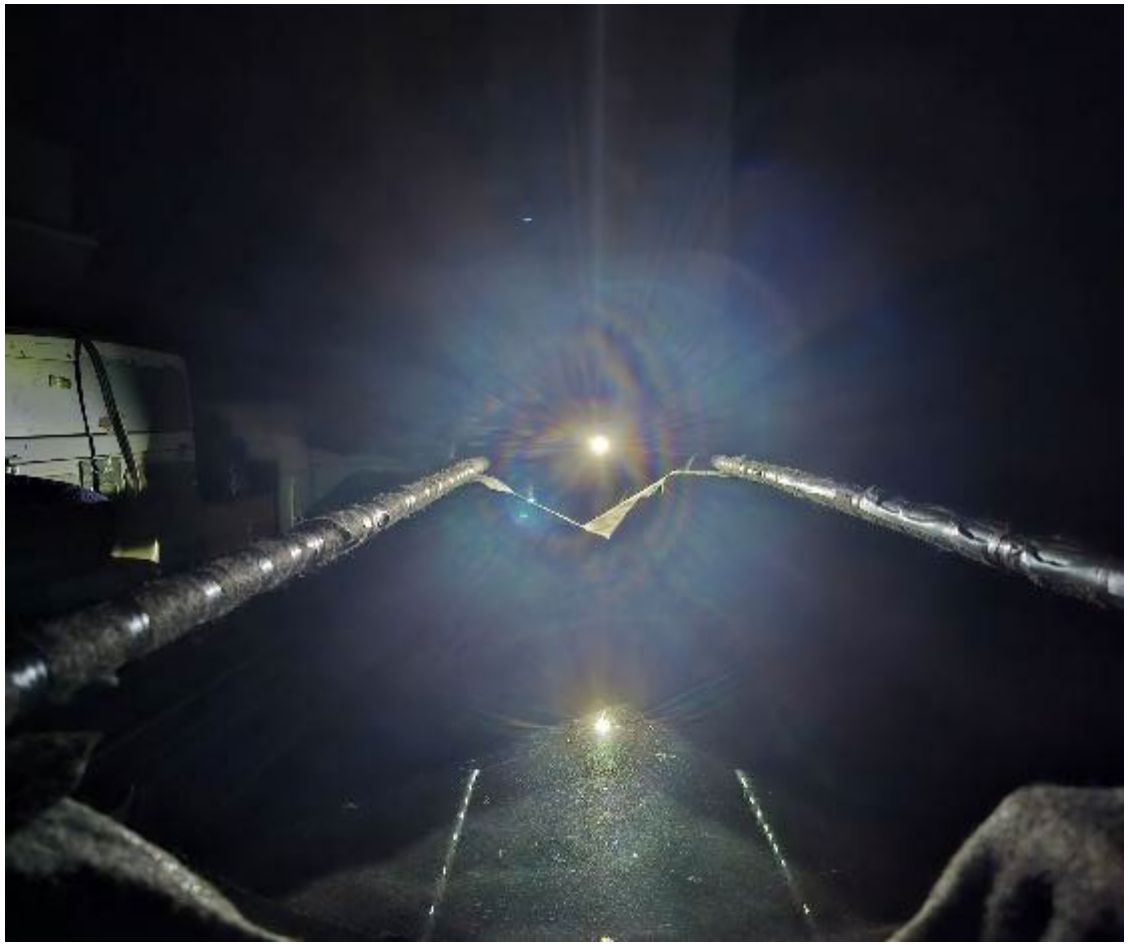
The tree line blocking the light from reflecting towards the camera.

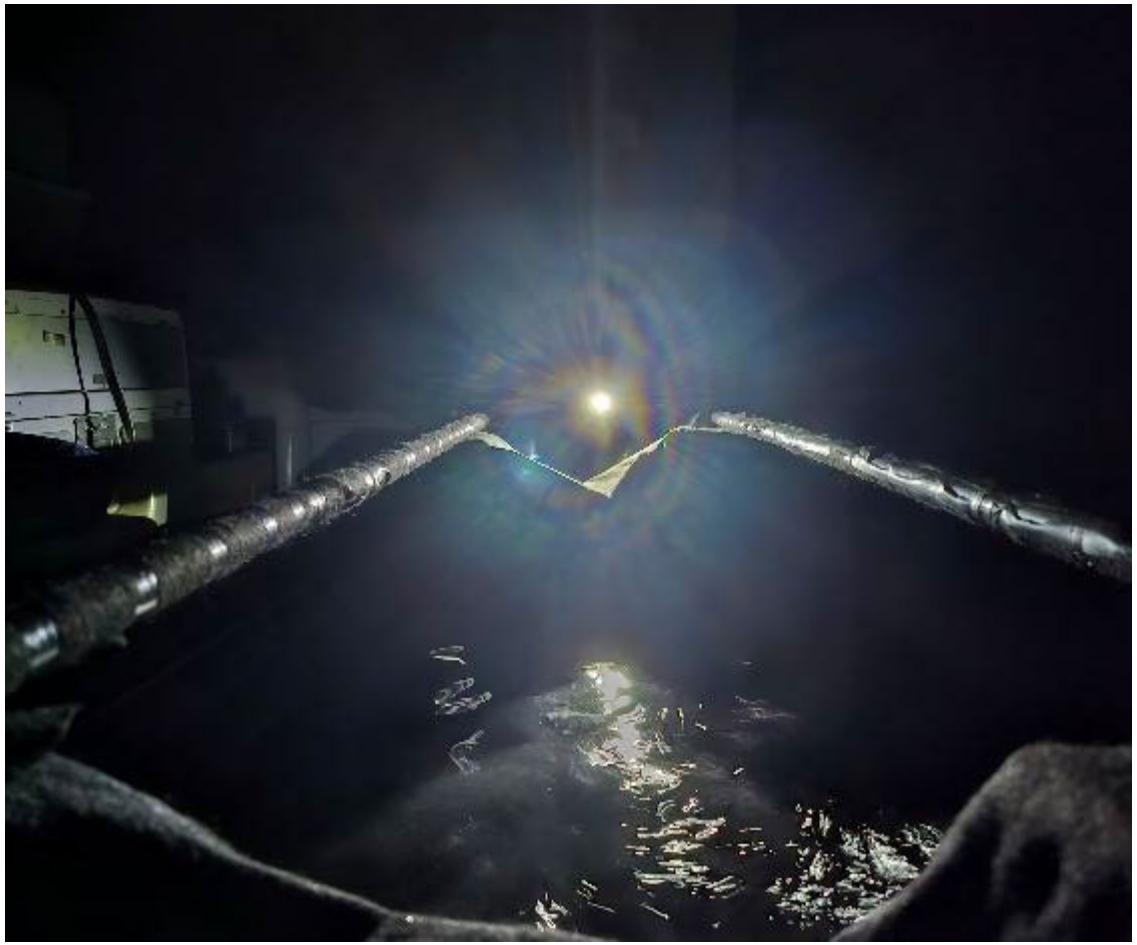
Garage Experiment

Simple attempt to replicate the geometry and reflection…

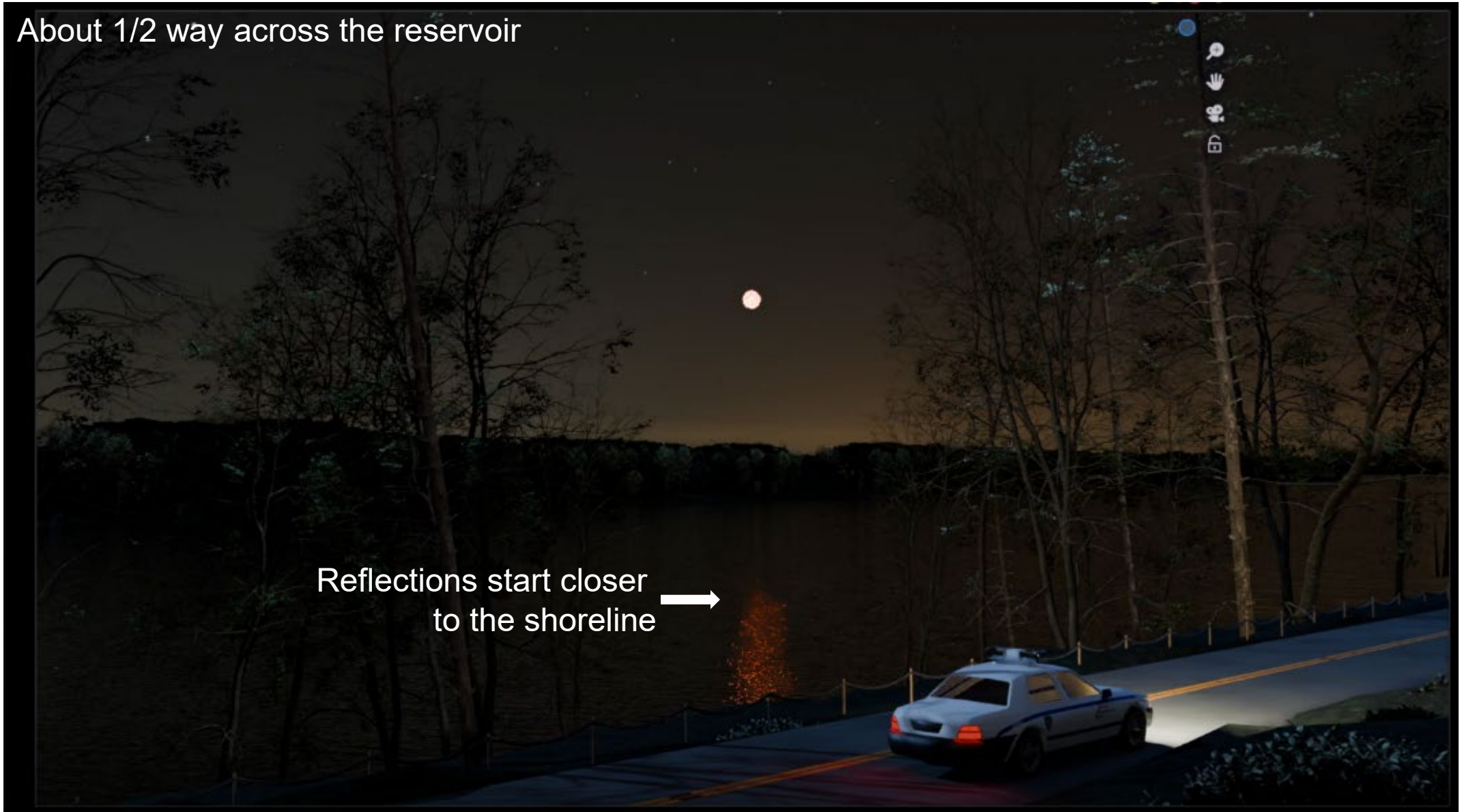
In My Garage

Garage Experiment



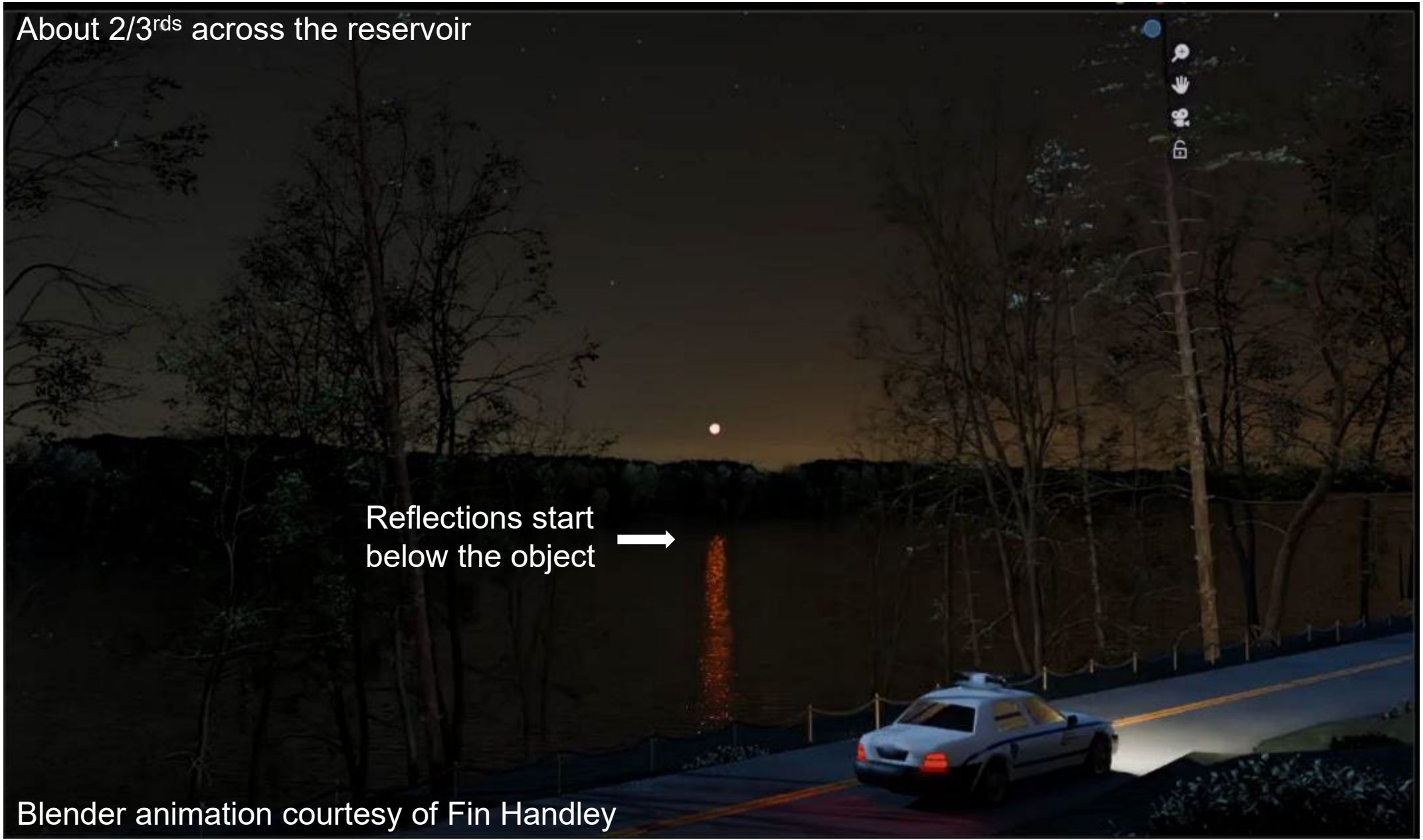


Blender Rendering Experiment: 984 feet

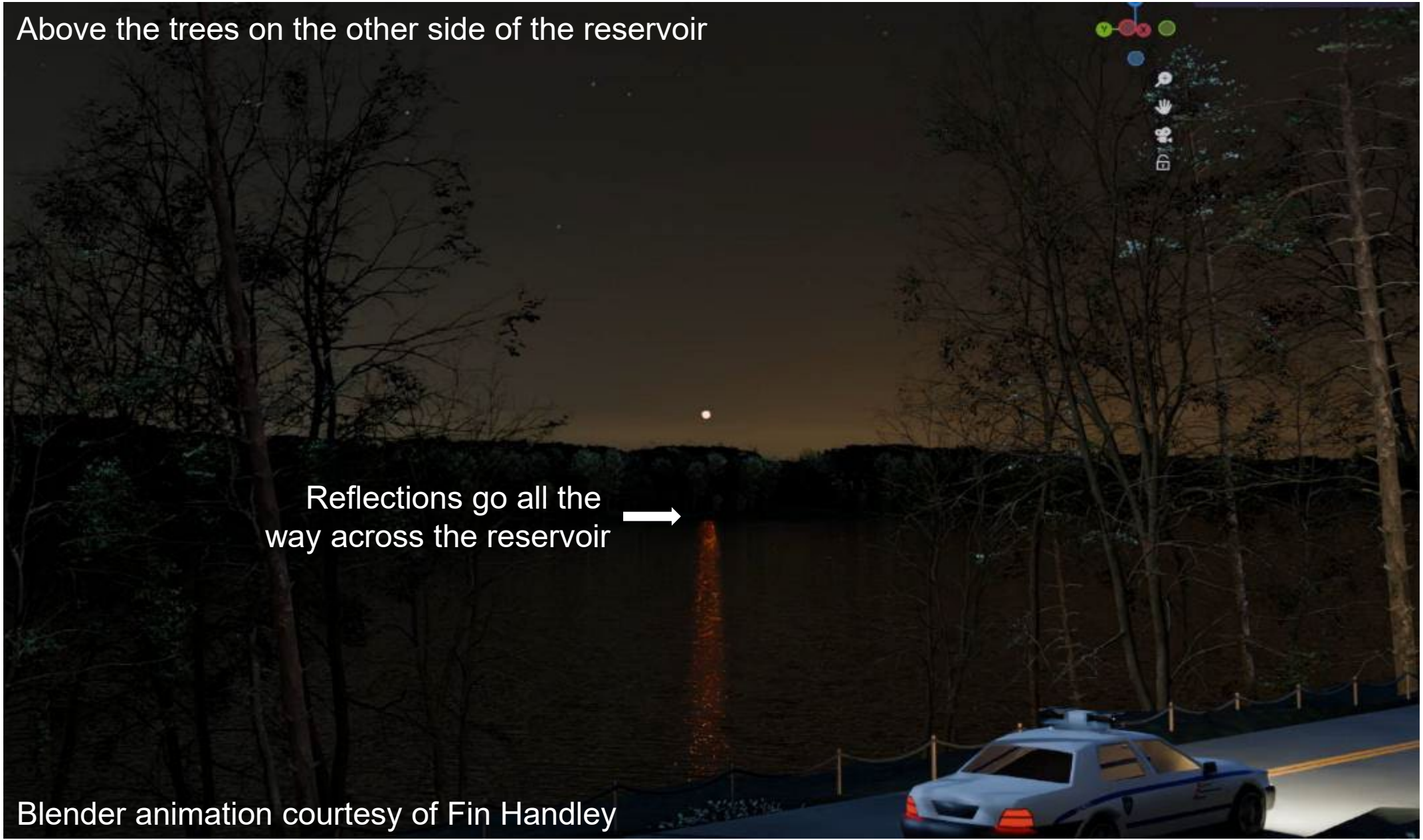


Blender animation courtesy of Fin Handley

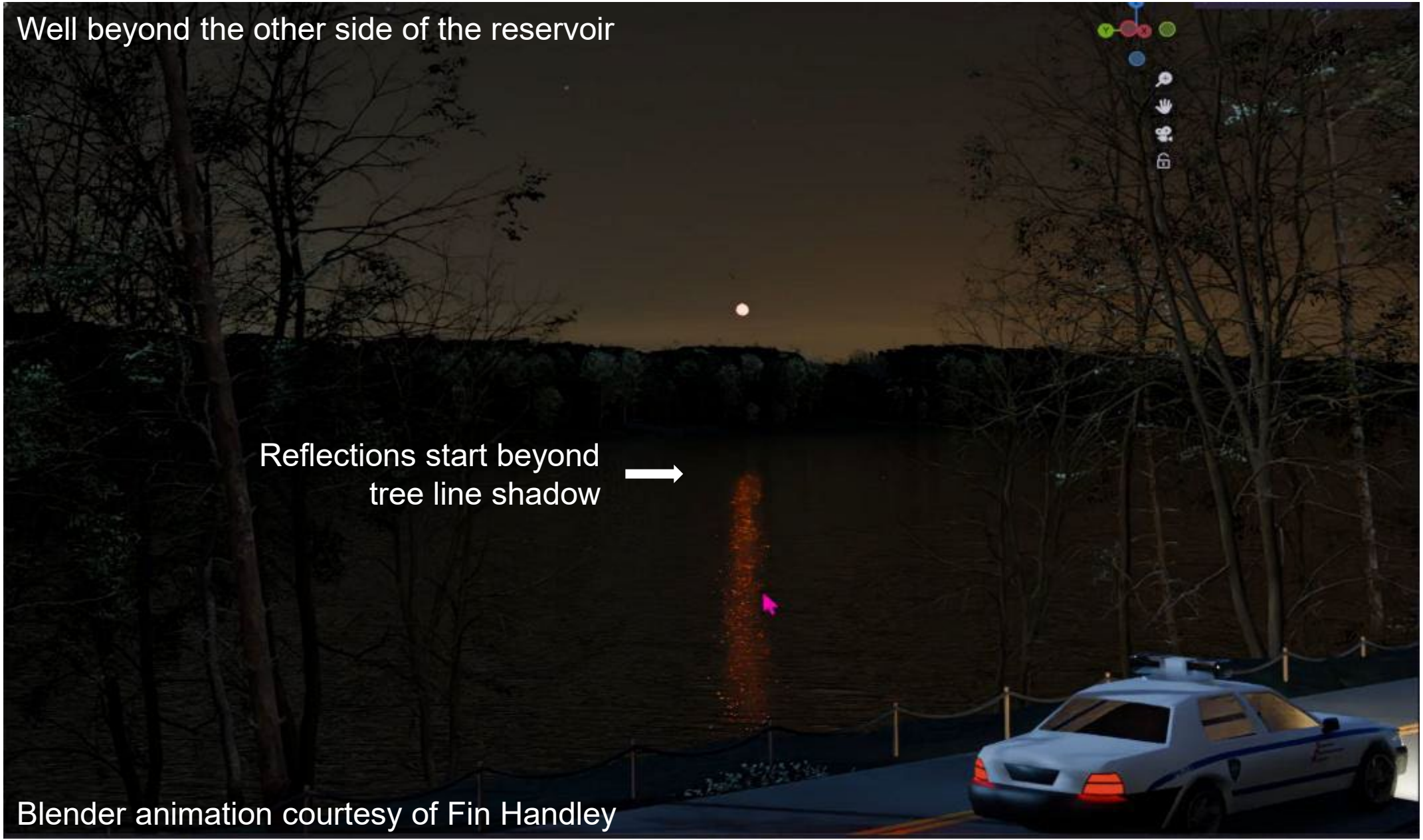
Blender Rendering Experiment: 2057 feet



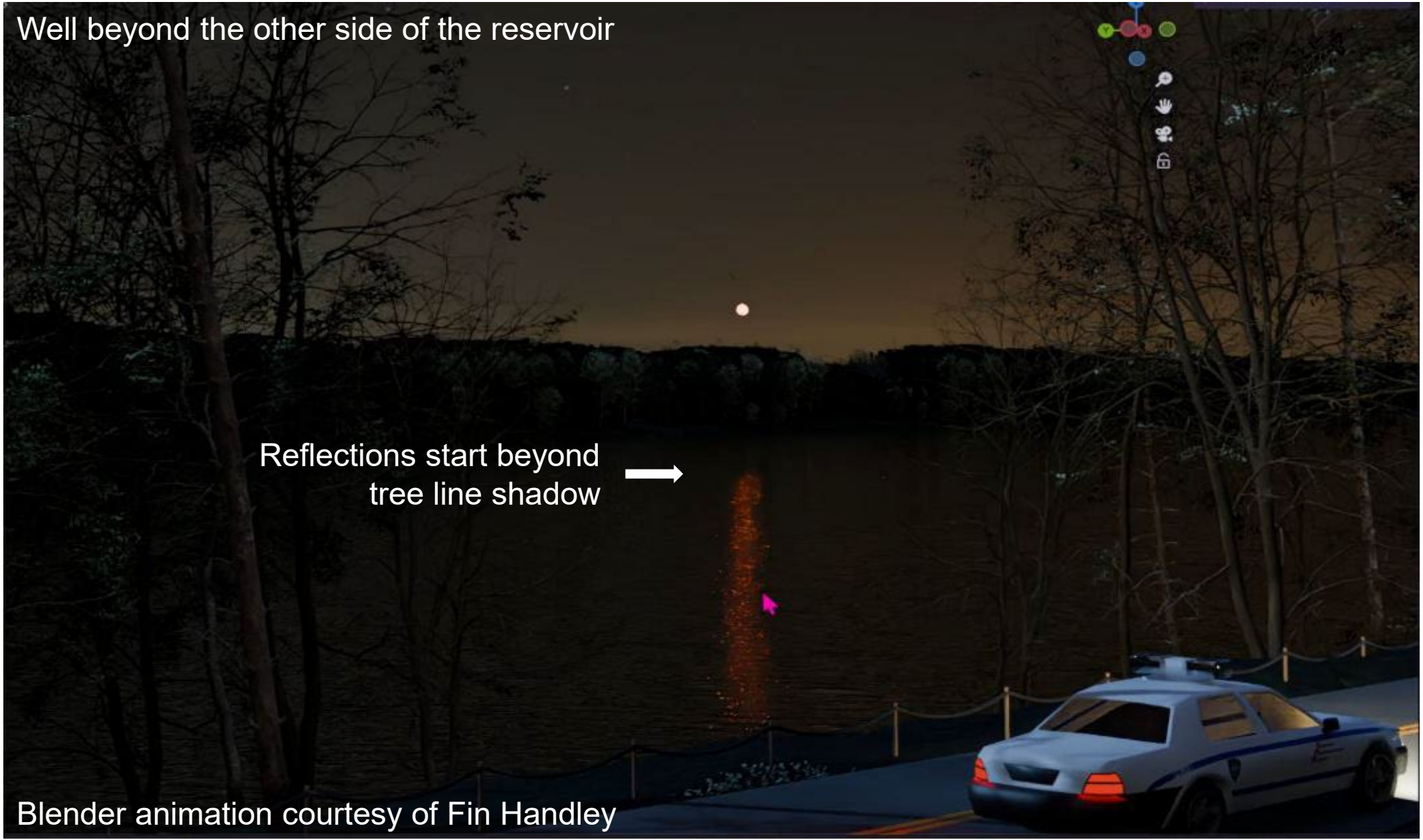
Blender Rendering Experiment: 3317 feet



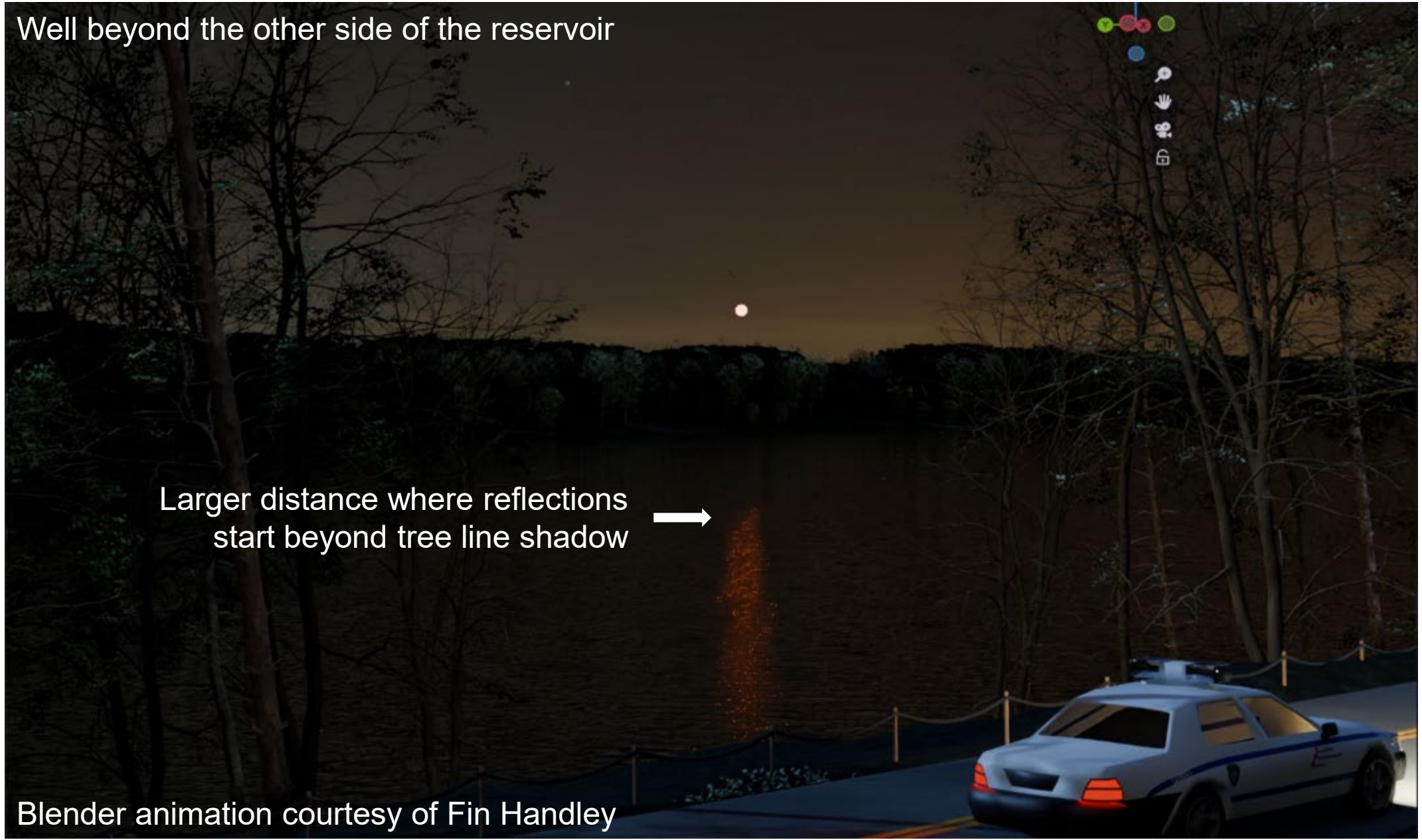
Blender Rendering Experiment: 6562 feet



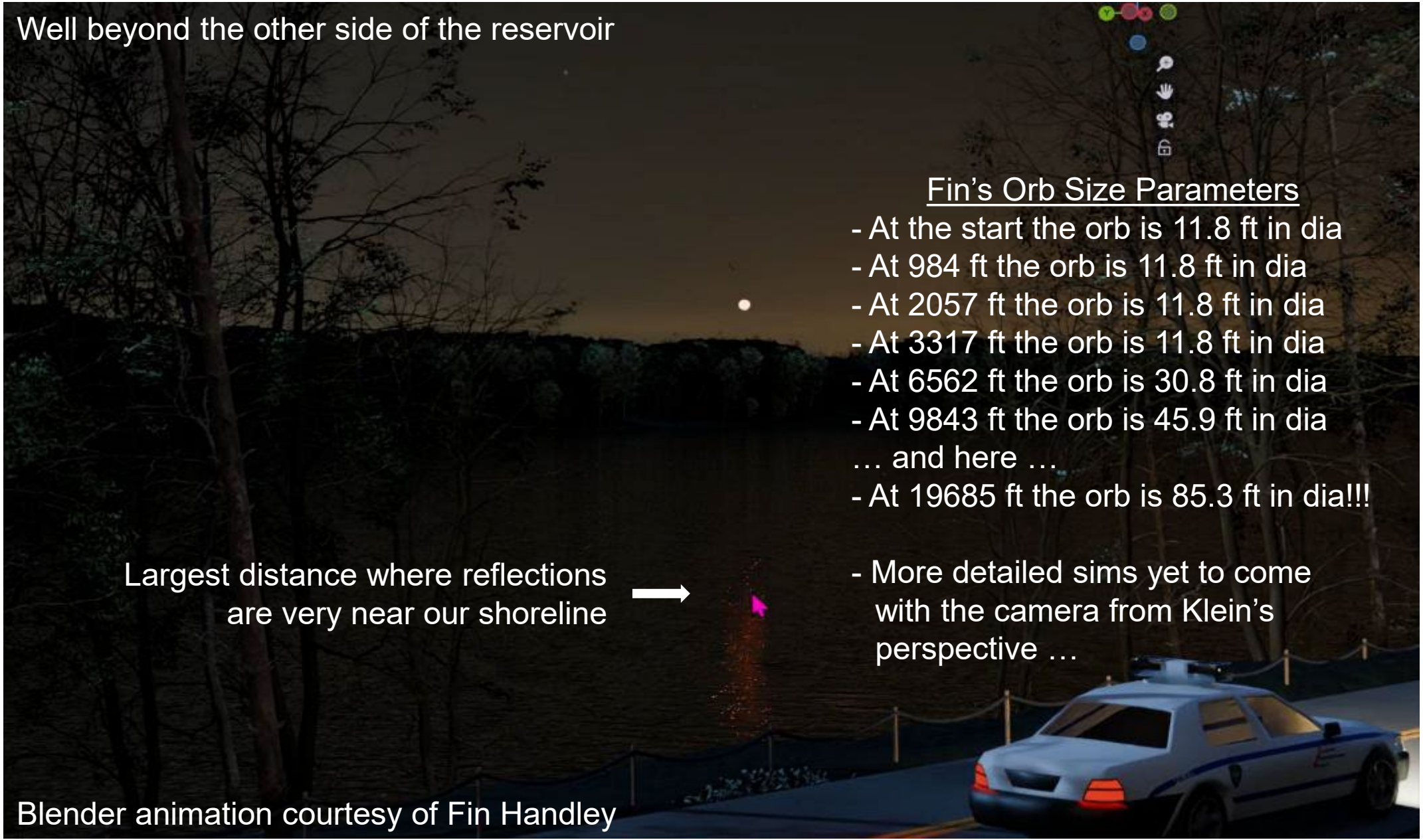
Blender Rendering Experiment: 6562 feet



Blender Rendering Experiment: 9843 feet



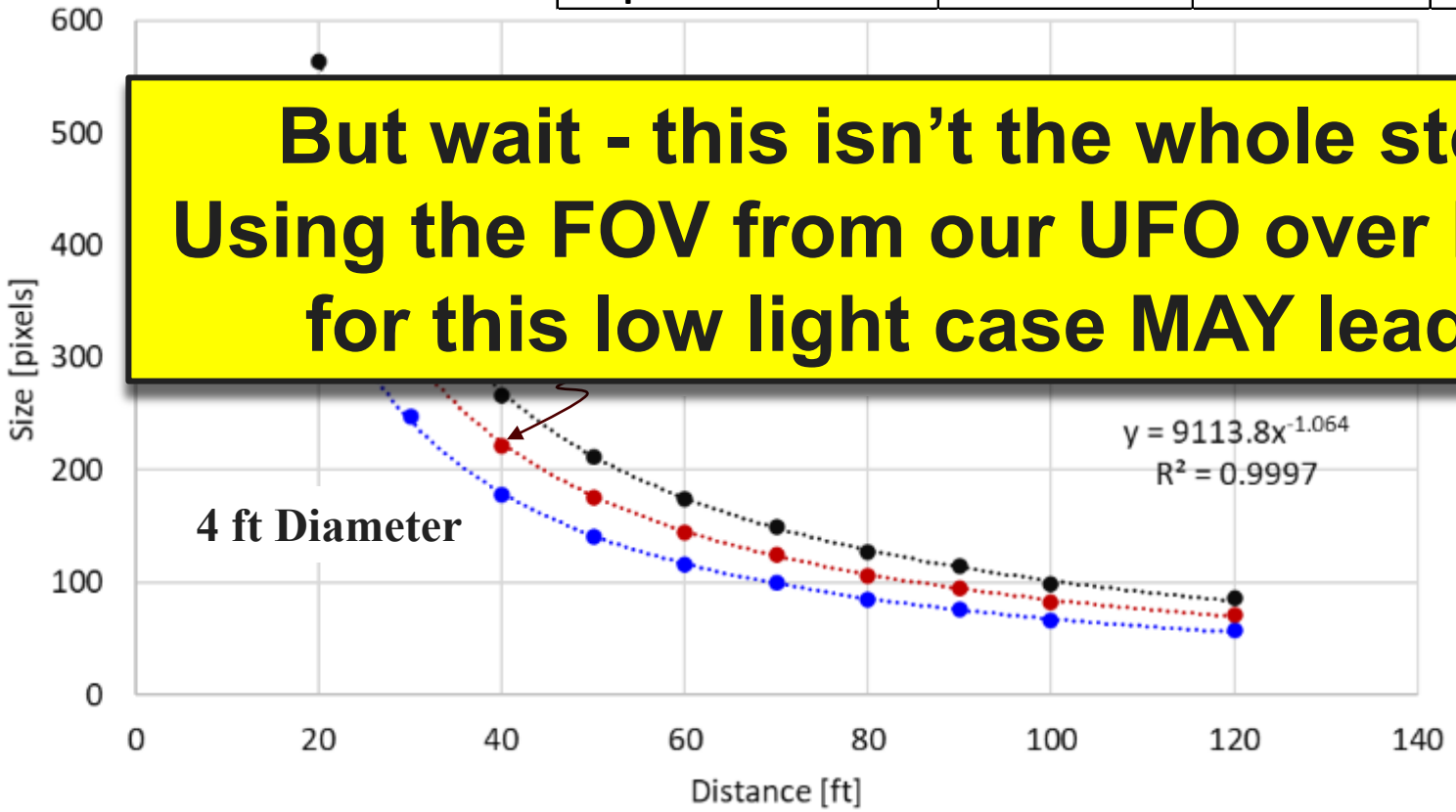
Blender Rendering Experiment: 19685 feet



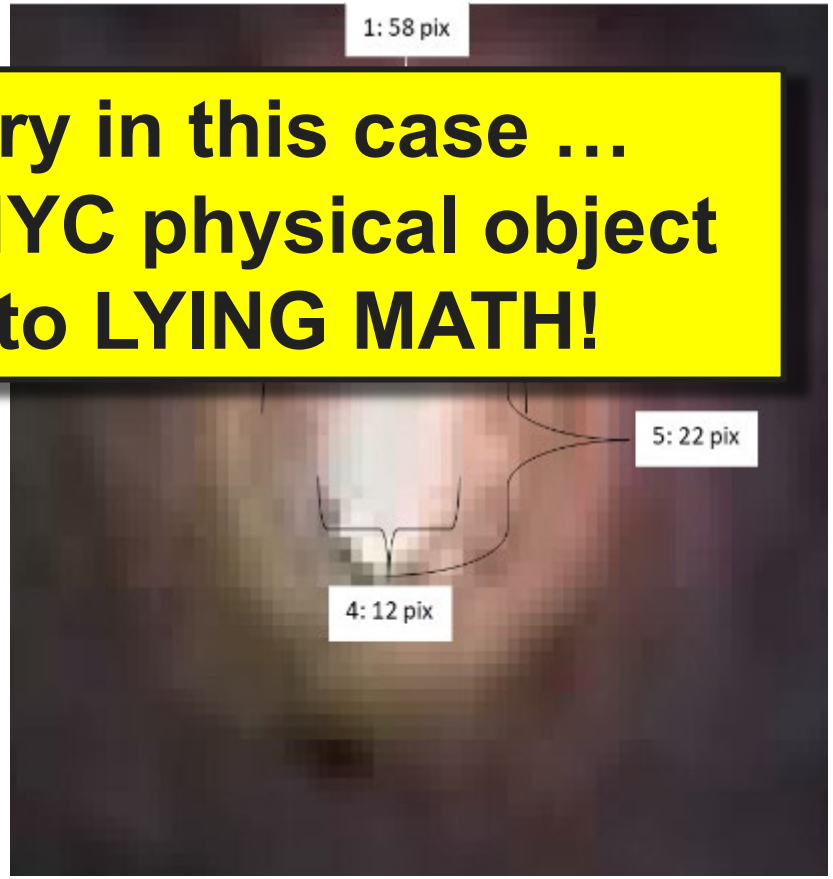
Size vs Distance FOV Calibration

Distance to Object Estimates Based on Size

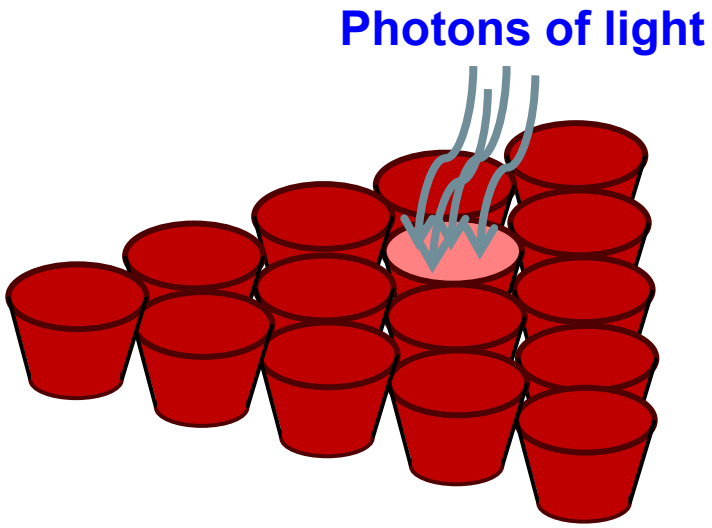
	1x (in ft)	2x (in ft)	3x (in ft)
38 pixels in diameter	432 ± 92	864 ± 183	1296 ± 275
25 pixels in diameter	674 ± 143	1348 ± 286	2023 ± 430
12 pixels in diameter	1472 ± 143	2944 ± 627	4417 ± 940

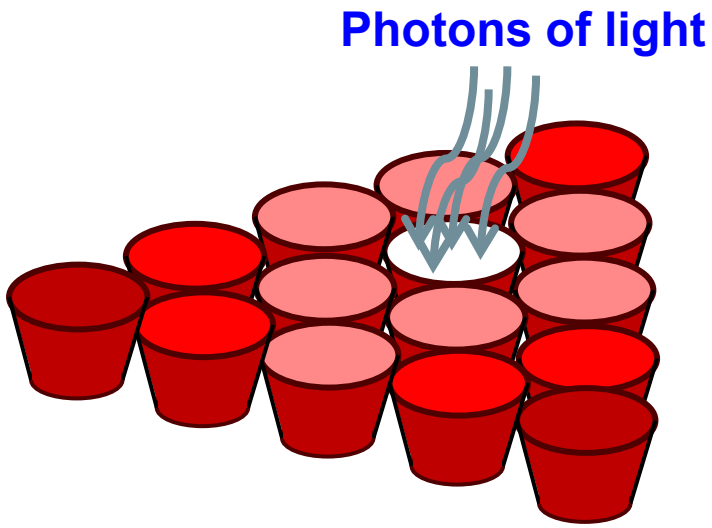


But wait - this isn't the whole story in this case …
Using the FOV from our UFO over NYC physical object for this low light case MAY lead to LYING MATH!



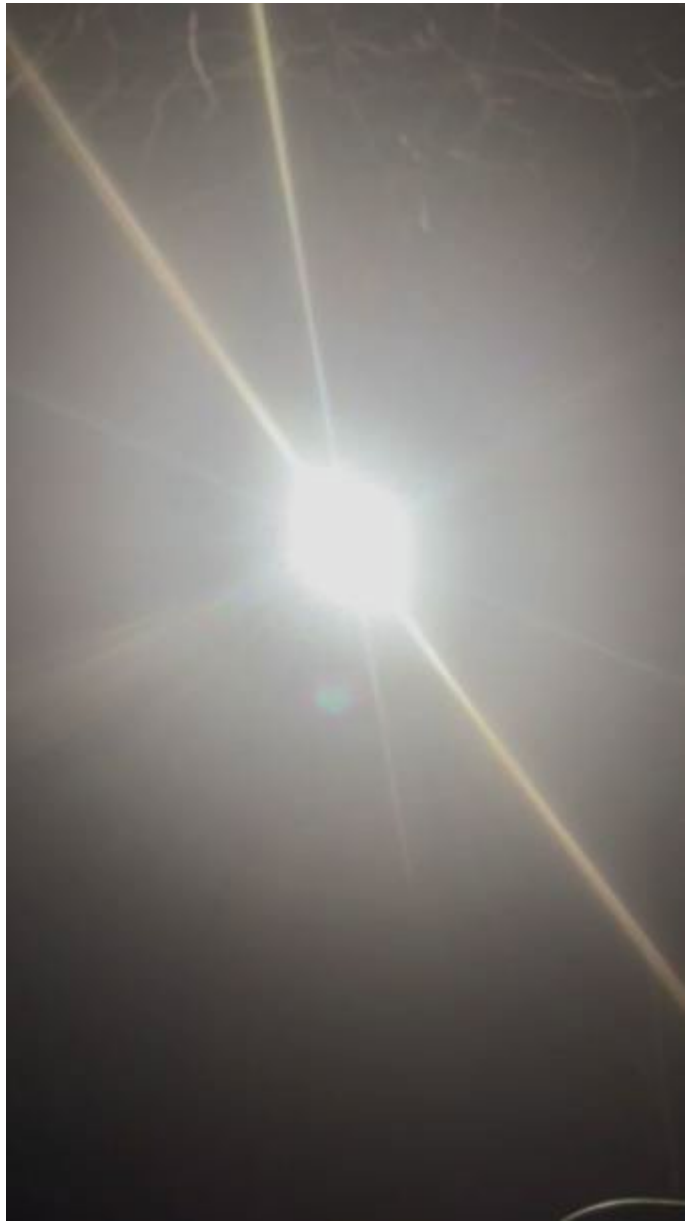
What is the “blooming effect?”



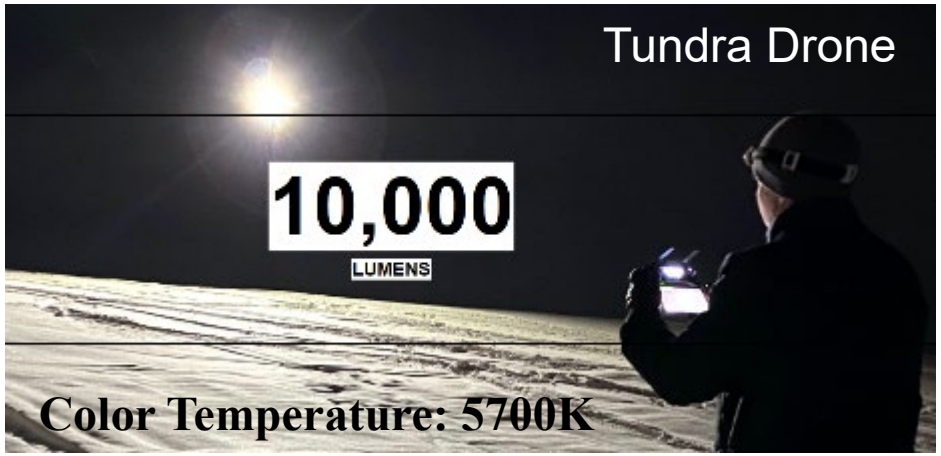


As photons of light continue to strike the same CMOS element, electrons begin to flow into nearby elements which causes those elements to appear as if photons were also striking them. When in fact, they were not.

Drone Tests: View from Squad Car



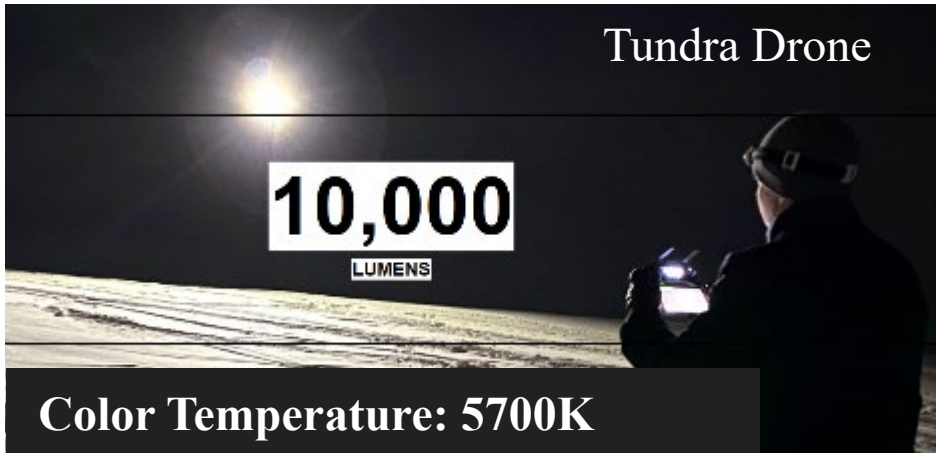
10K Lumen DJI Drone Light



https://tundradrone.com/wp-content/uploads/2020/04/drone-light-for-mavic.jpg

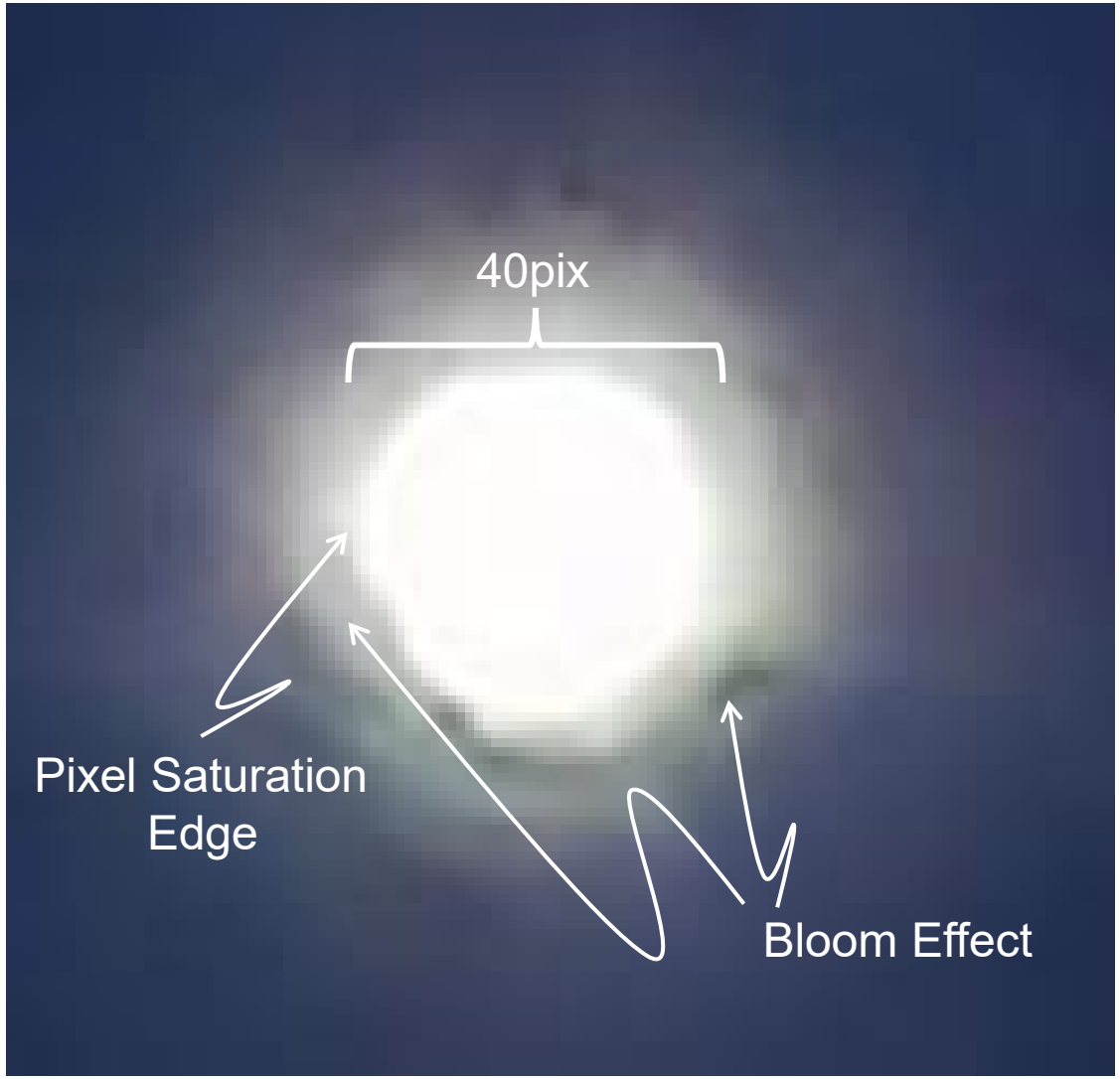
Drone Tests: Reservoir Far Shore

10K Lumen DJI Drone Light

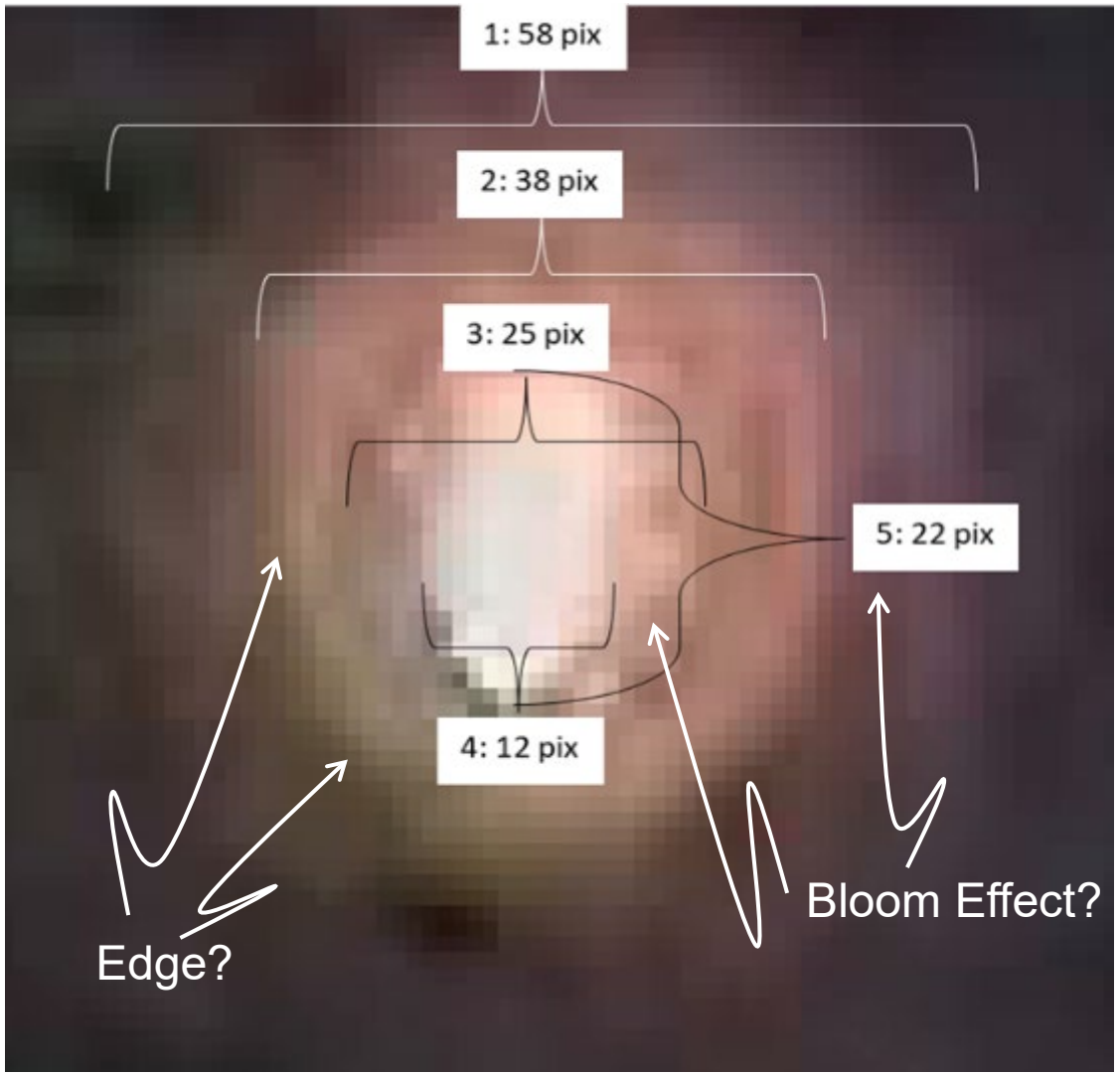


Drone and Object Comparison

Samsung Galaxy S23 Ultra at 3x: 30 fps



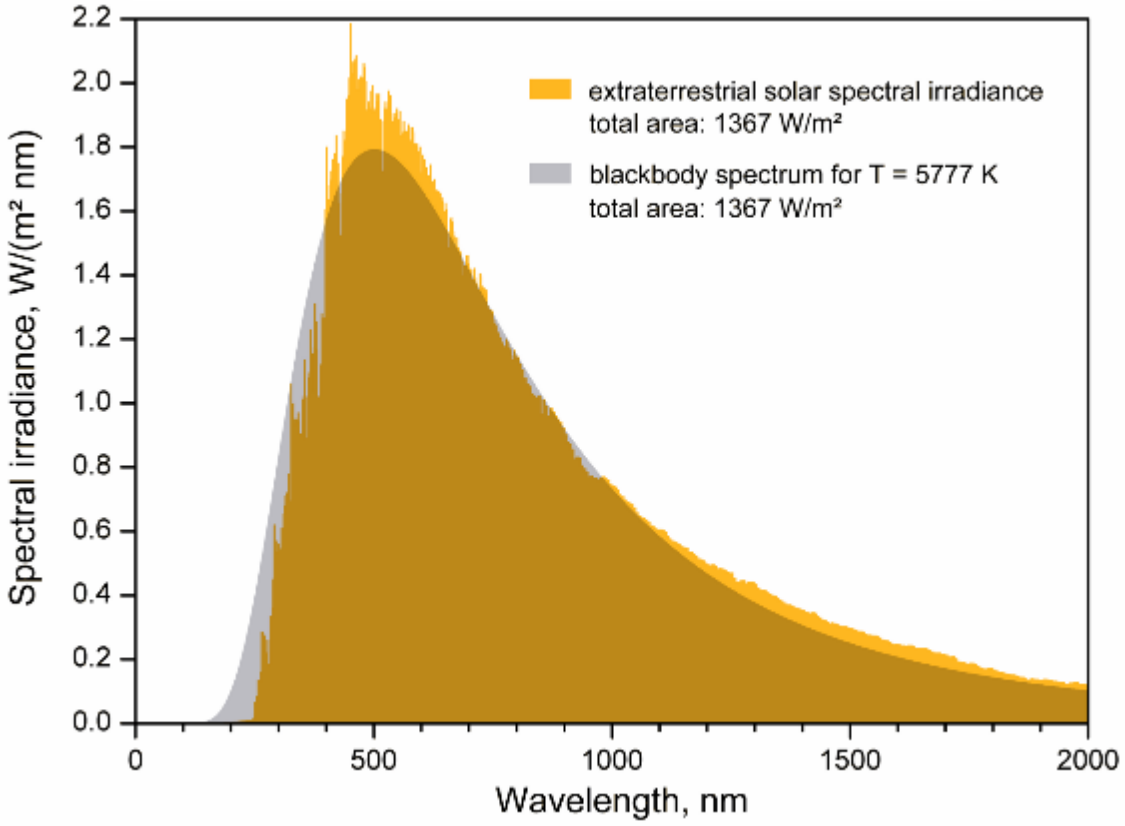
iPhone 13, we believe at 3x: 24 fps



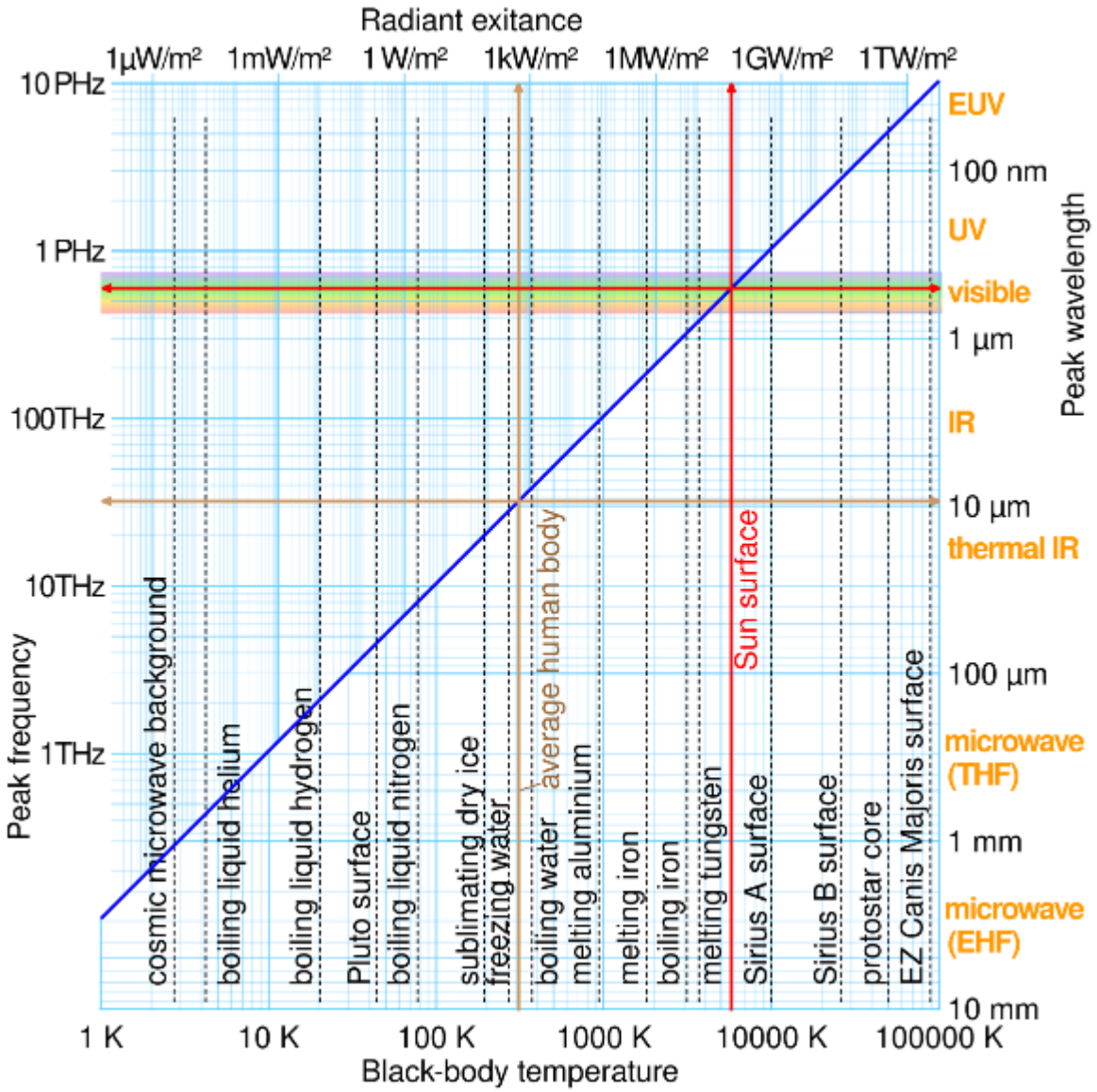
Plank's Law

Plank's Law: Energy Density

$$u_\lambda(\lambda, T) = \frac{8\pi hc}{\lambda^5} \frac{1}{e^{hc/(\lambda k_B T)} - 1}$$



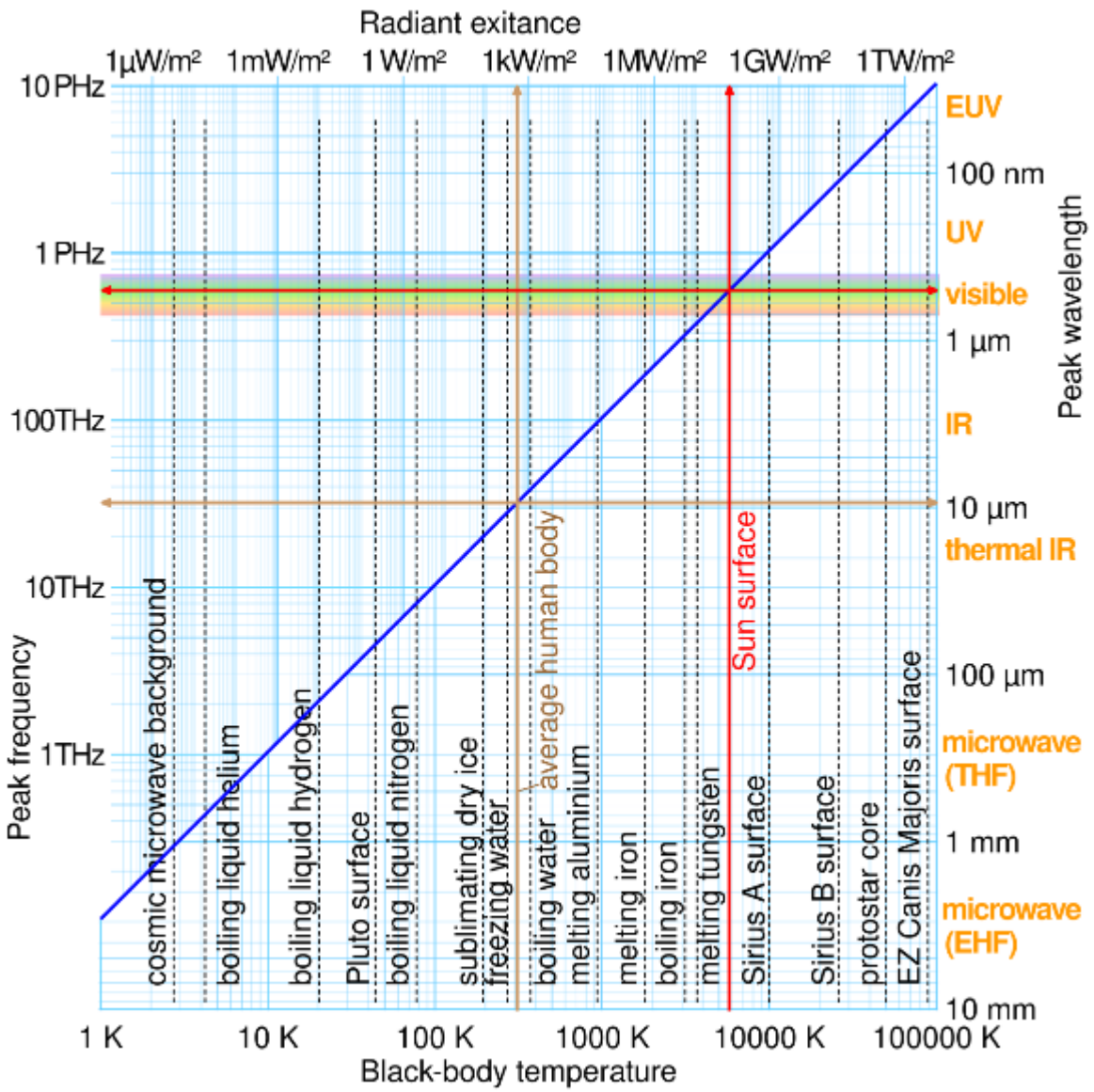
https://en.wikipedia.org/wiki/Planck%27s_law



https://en.wikipedia.org/wiki/Correlated_color_temperature

Correlated Color Temperature (CCT)

A black body is characterized by its temperature and emits light of a specific hue, which is referred to as it's color temperature. In practice, light sources that approximate Planckian radiators, such as certain fluorescent or high-intensity discharge lamps, are assessed based on their CCT, which is the temperature of a Planckian radiator whose color most closely resembles that of the light source. For light sources that do not follow the Planckian distribution, aligning them with a black body is not straightforward; thus, the concept of CCT is extended to represent these sources as accurately as possible on a one-dimensional color temperature scale, where "as accurately as possible" is determined within the framework of an objective color space.



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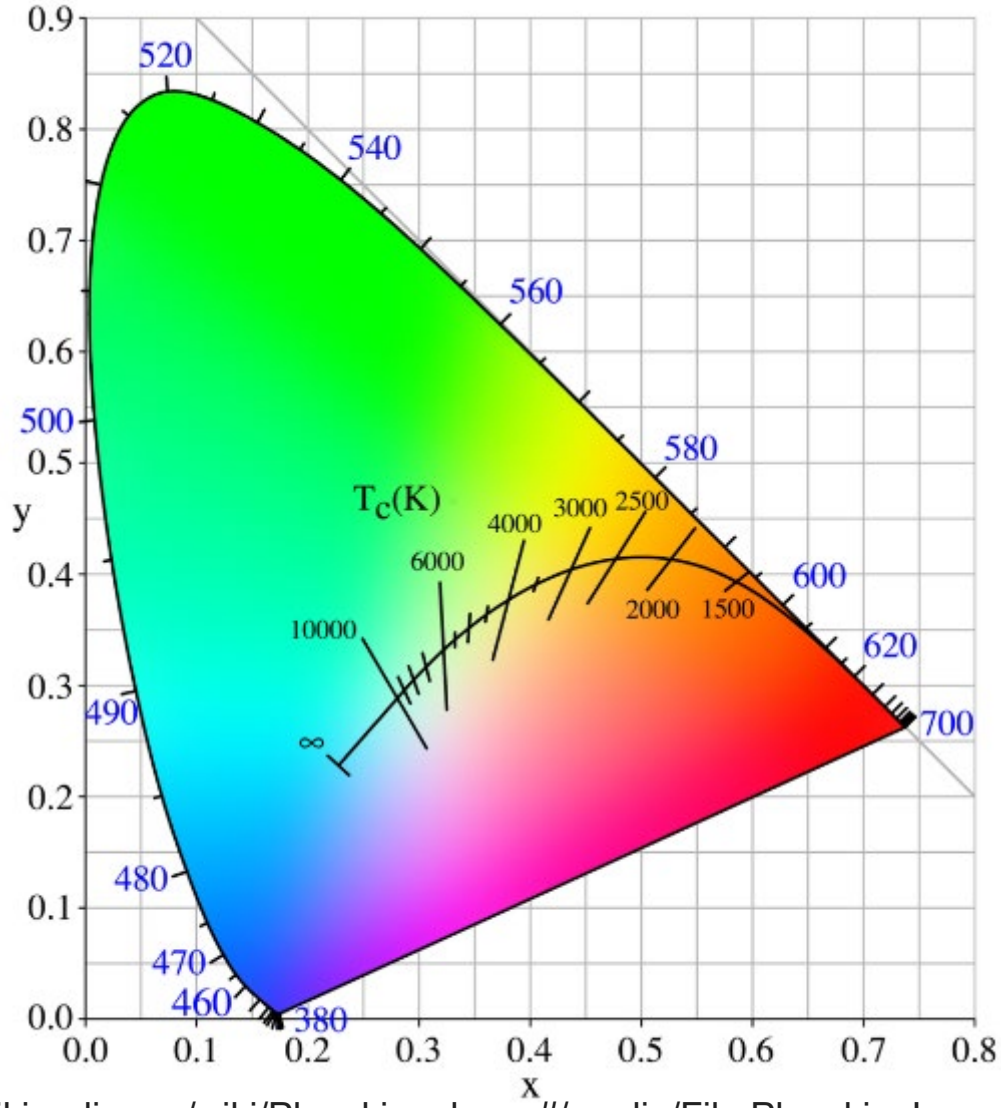
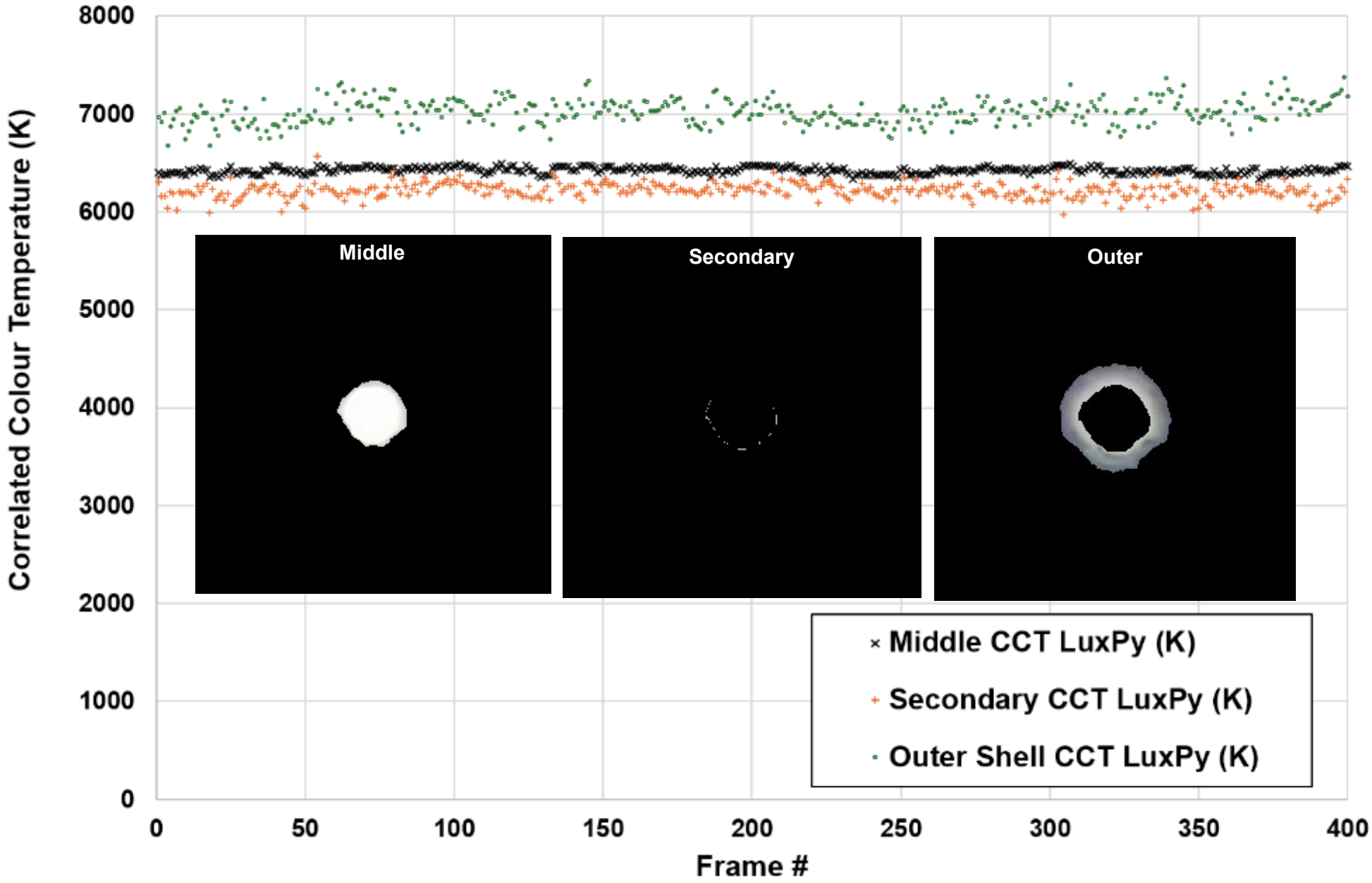
Planckian locus in the CIE 1931 chromaticity diagram



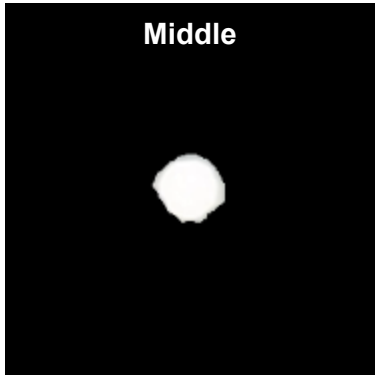
https://en.wikipedia.org/wiki/Correlated_color_temperature

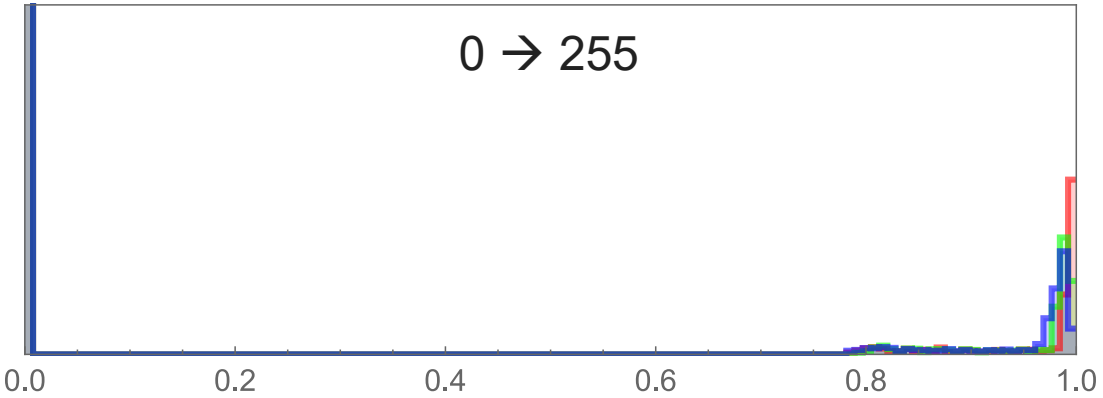
https://en.wikipedia.org/wiki/Planckian_locus#/media/File:PlanckianLocus.png

Drone's Tundra 10K Lumen LED @ 0.47mi

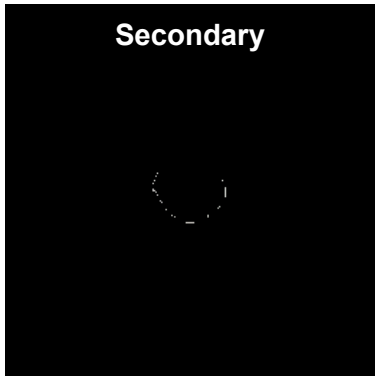


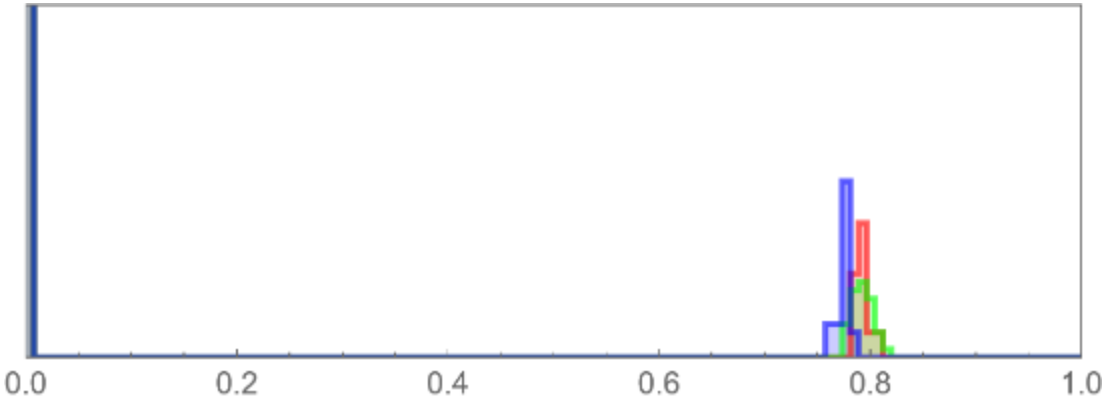
Drone's Tundra 10K Lumen LED: Histograms



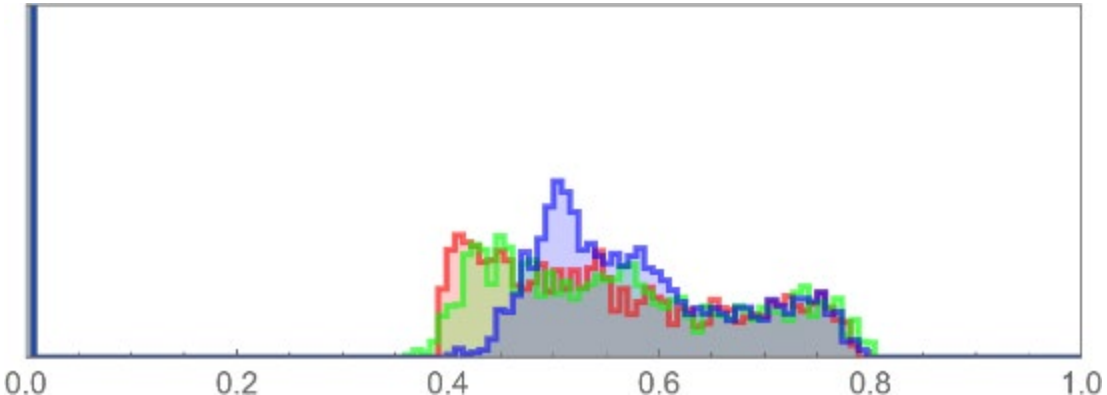


$0 \rightarrow \frac{\text{\# in bin}}{\text{\# of pixels}}$

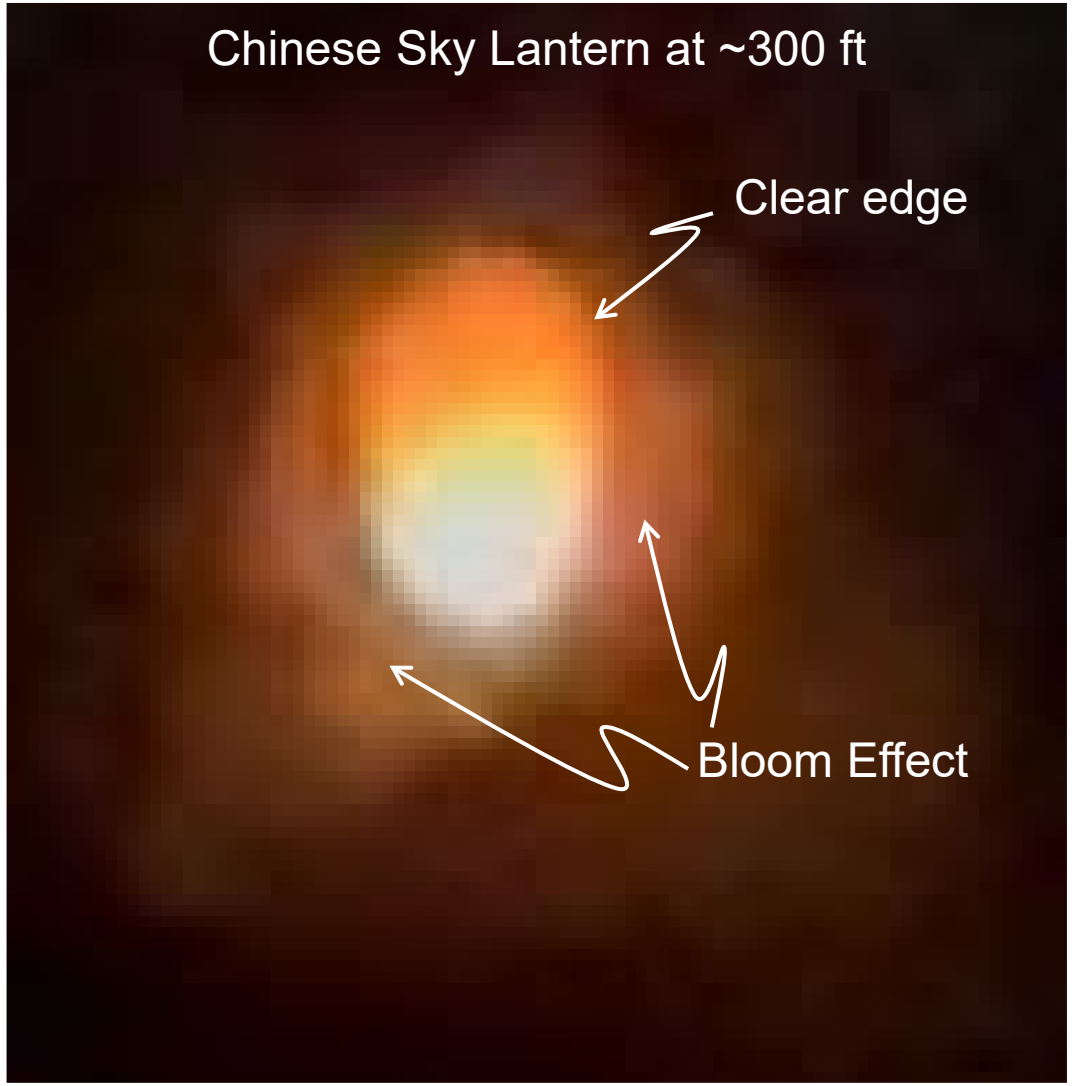


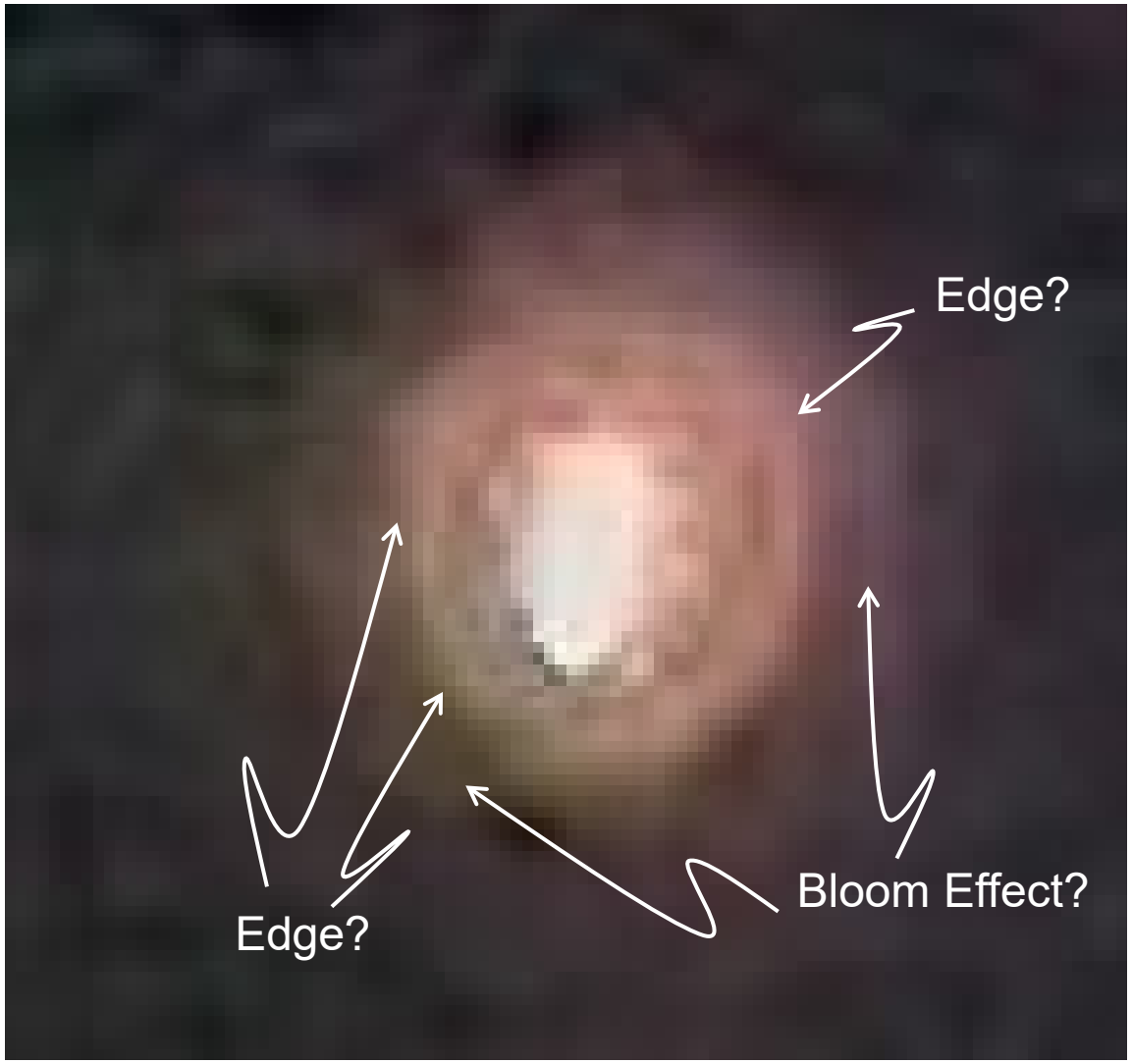


<u>Reminder</u>
Did Not Use An iPhone

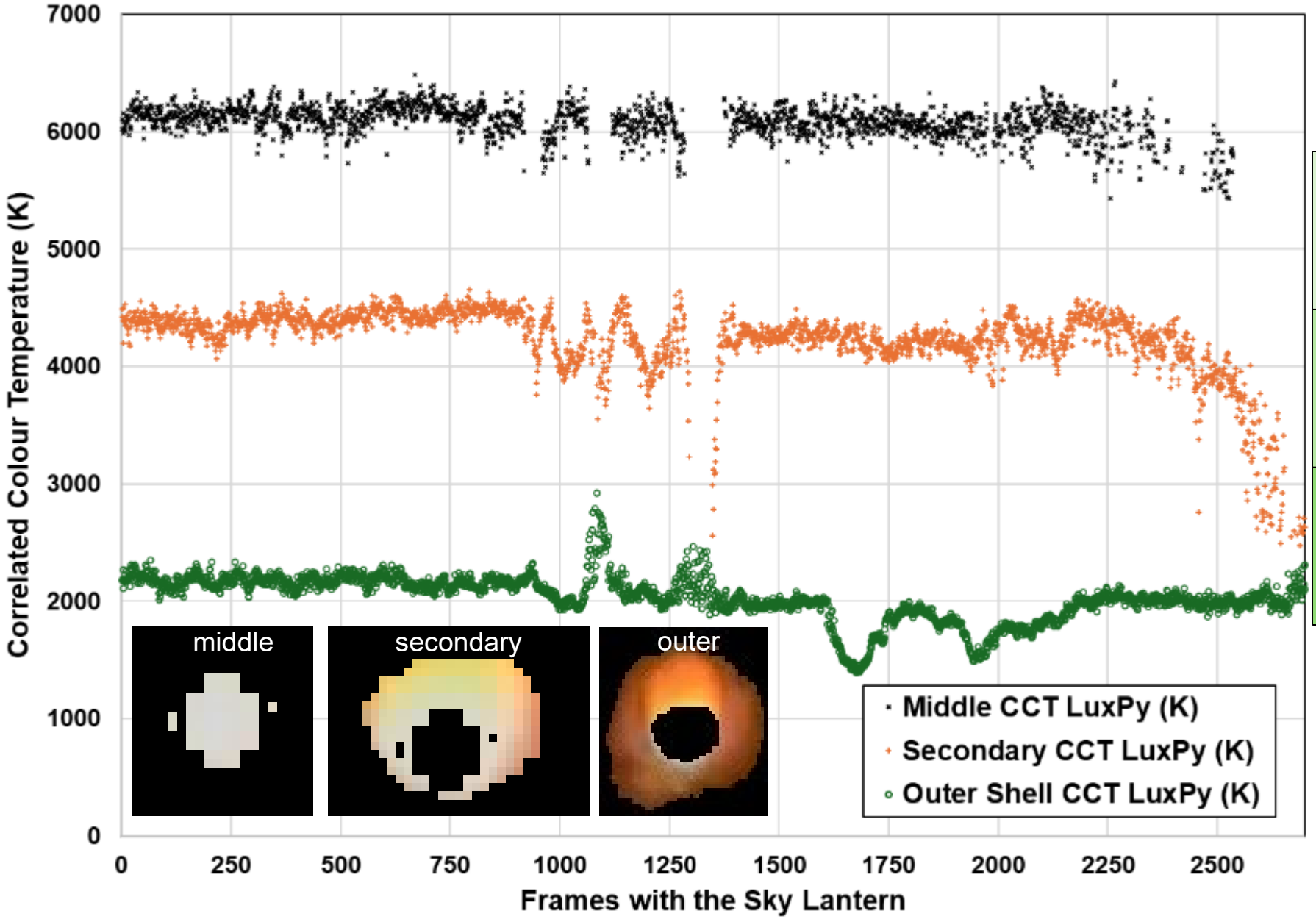


Sky Lantern and Object Comparison



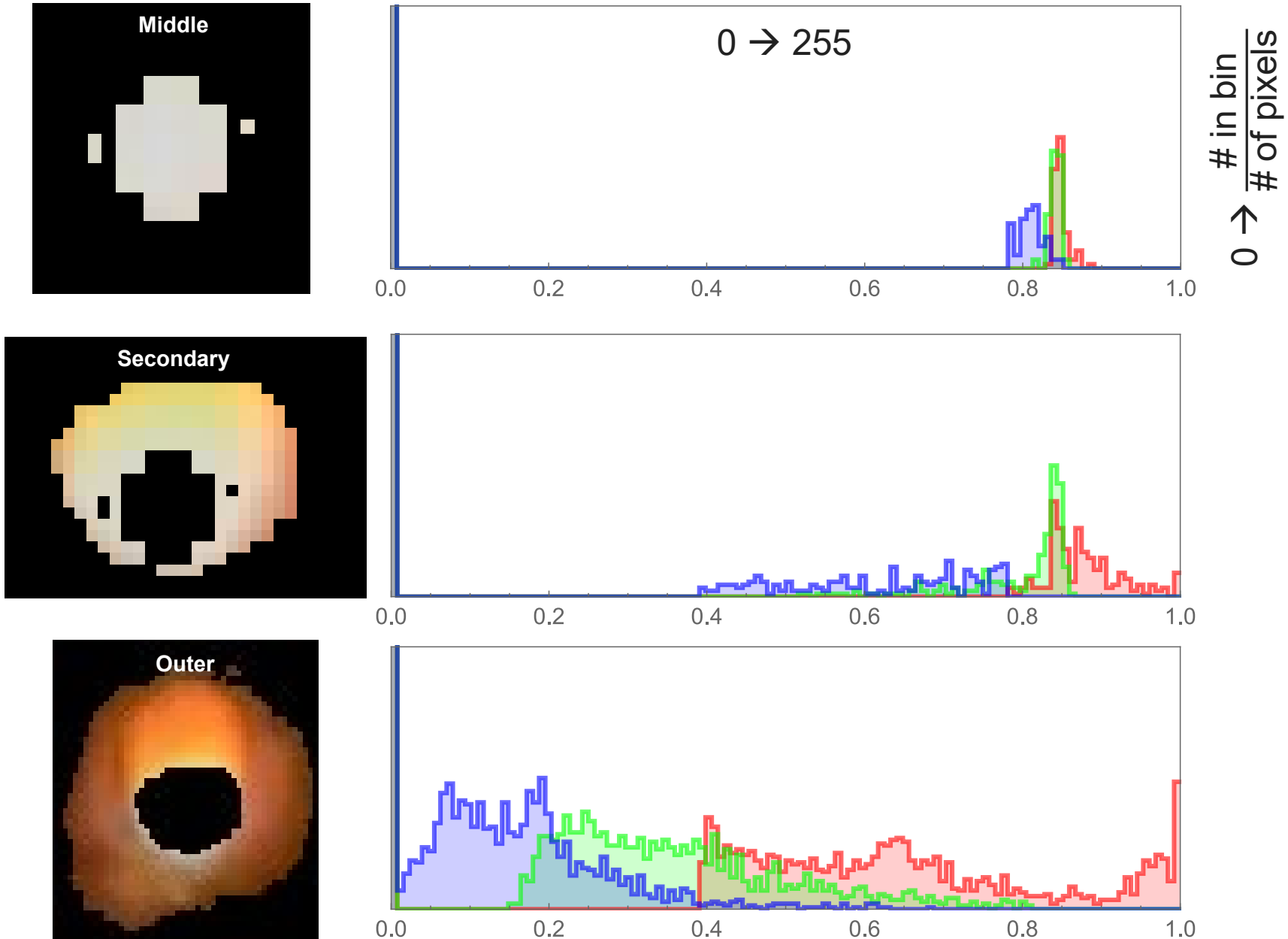


Sky Lantern: Correlated Color Temperature (CCT)

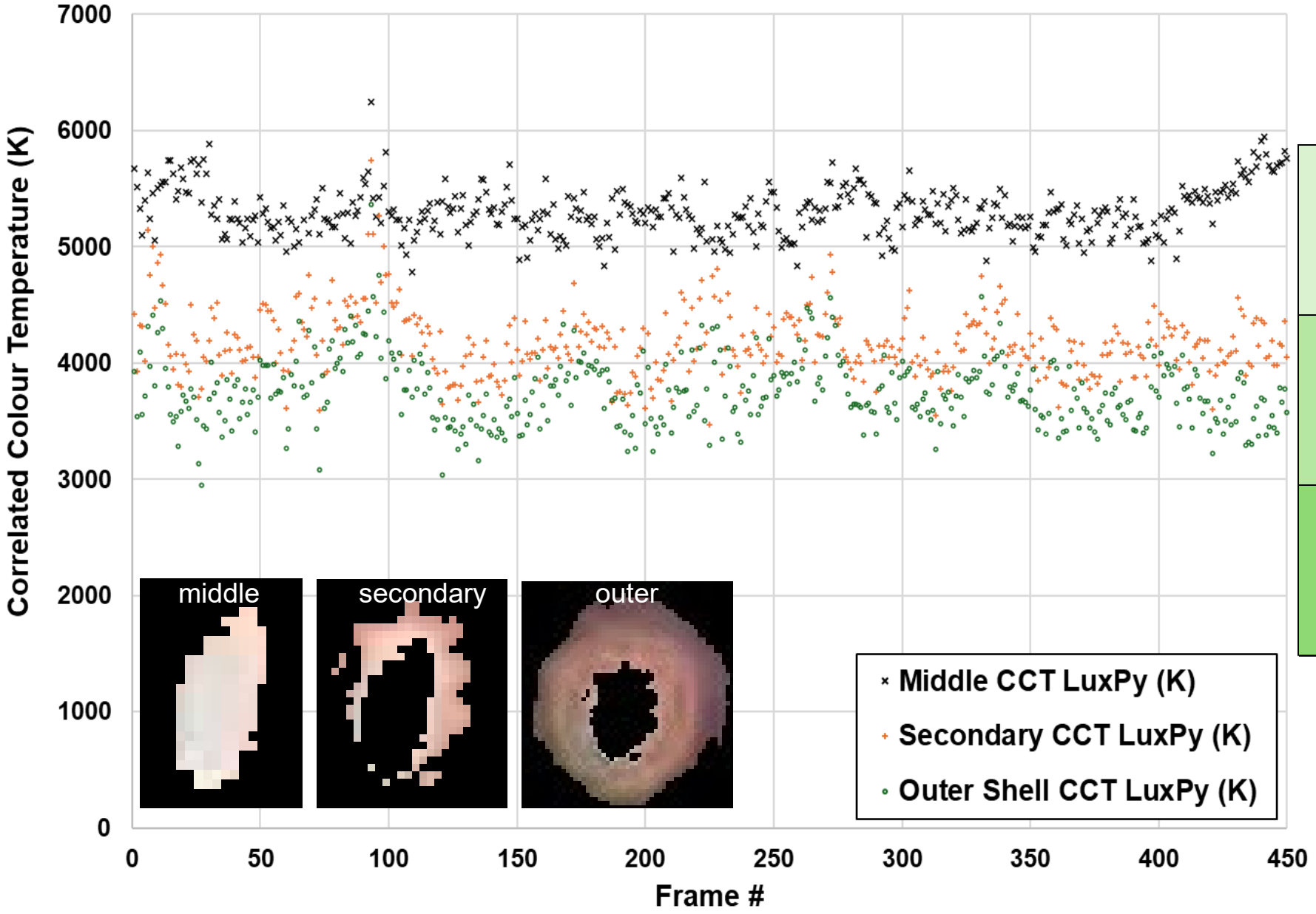


Middle CCT LuxPy (K)	Ave	6134
	SDOM	89.7
	Max	6385
	Min	5792
Secondary CCT LuxPy (K)	Ave	4369
	SDOM	81.3
	Max	4616
	Min	4062
Outer Shell CCT LuxPy (K)	Ave	2174
	SDOM	56.2
	Max	2347
	Min	2011

Sky Lantern: Histograms

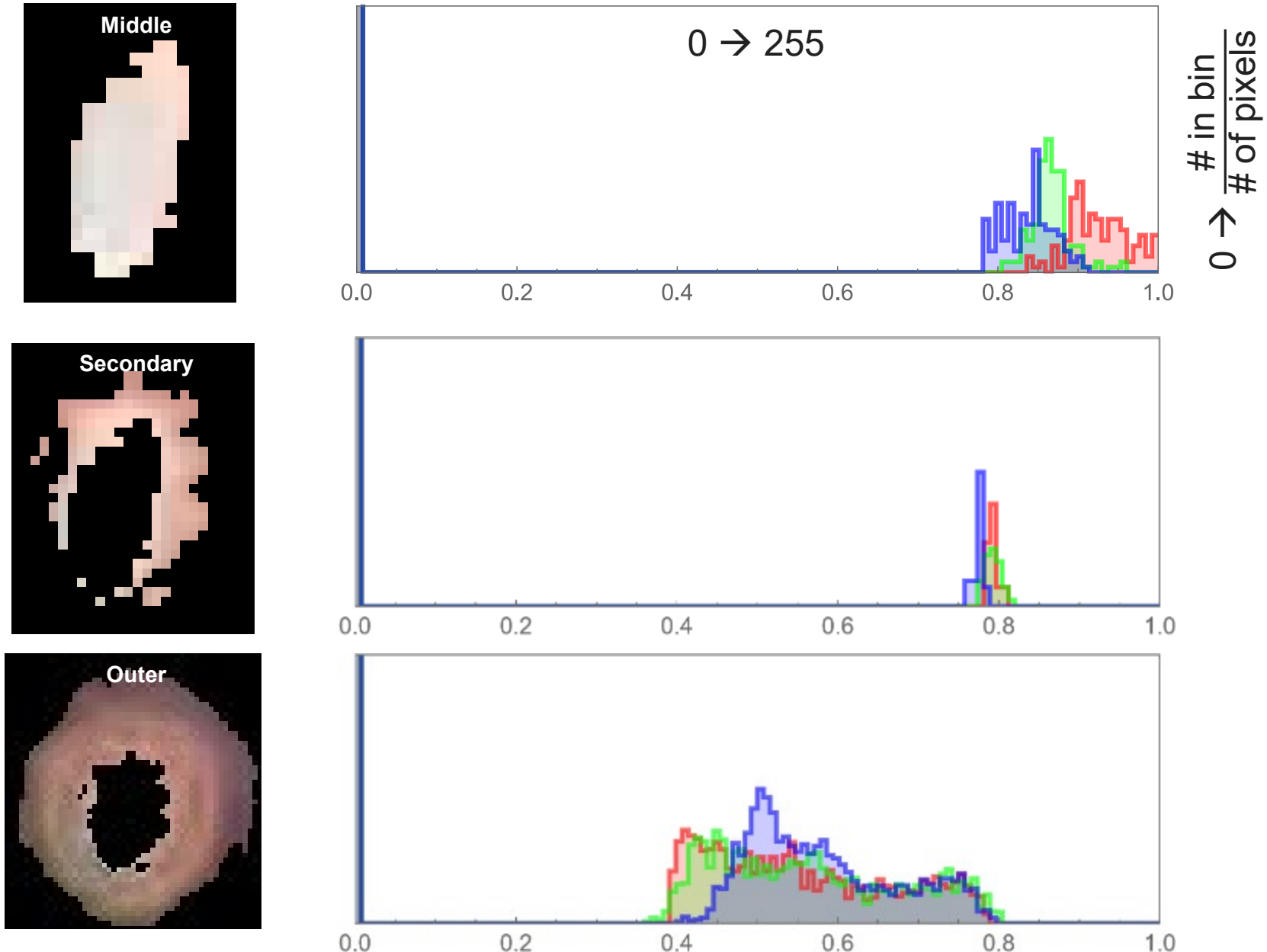


Klein Plasmoid: Correlated Color Temperature (CCT)

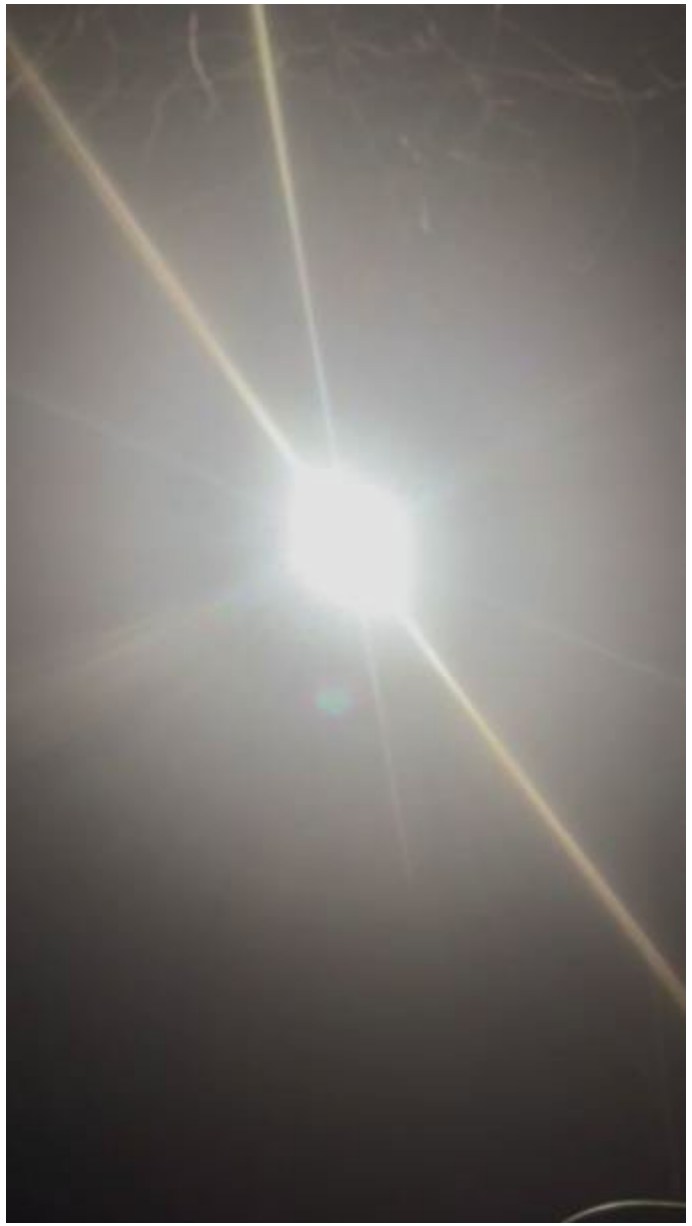


Middle CCT LuxPy (K)	Ave	5330
	SDOM	230
	Max	6244
	Min	4780
Secondary CCT LuxPy (K)	Ave	4167
	SDOM	286
	Max	5742
	Min	3473
Outer Shell CCT LuxPy (K)	Ave	3728
	SDOM	311
	Max	5365
	Min	2785

Klein Plasmoid: Histograms



Drone Tests: View from Squad Car

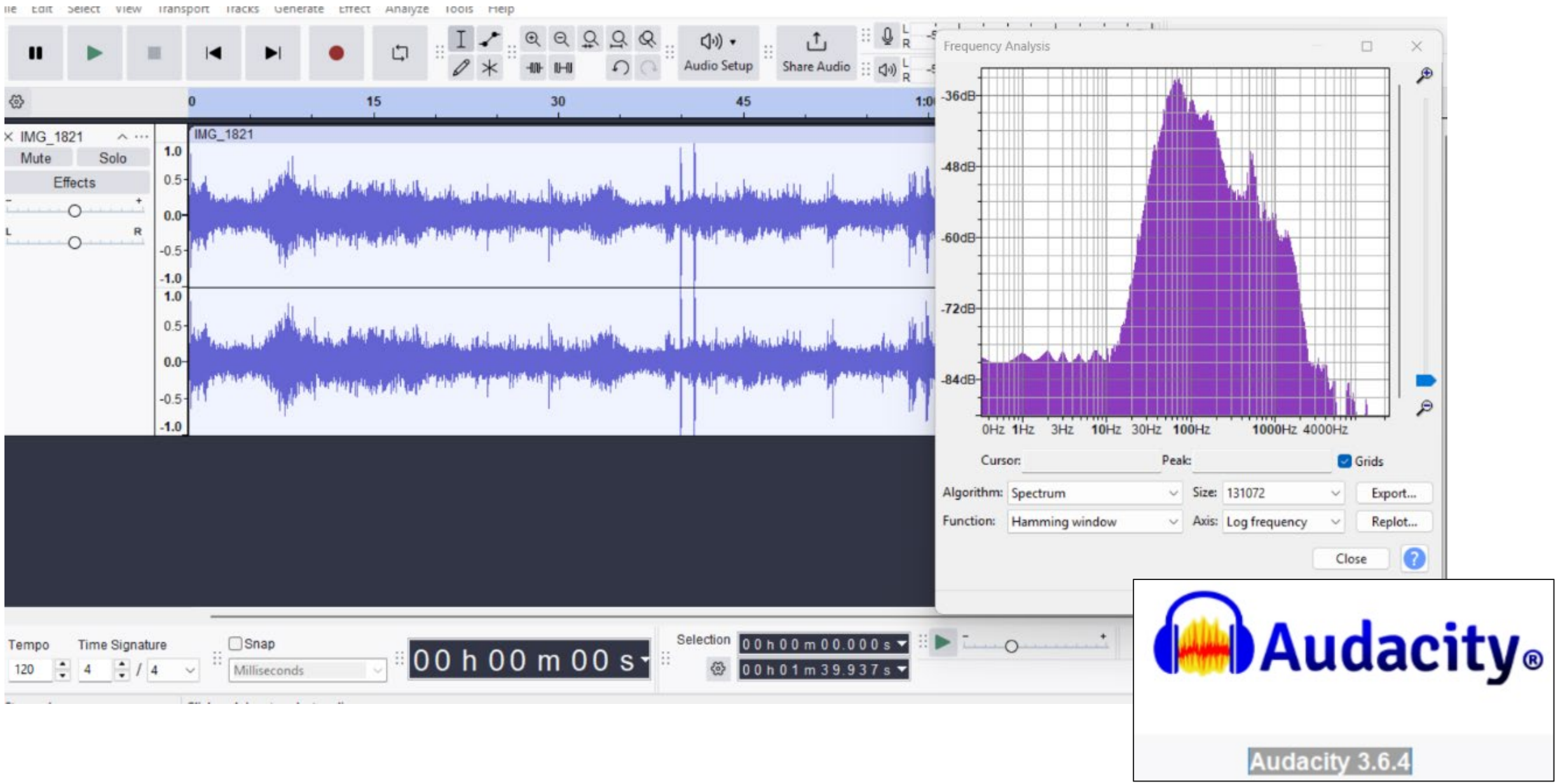


10K Lumen DJI Drone Light

Only one video at close range survived, will need to re-execute these tests!

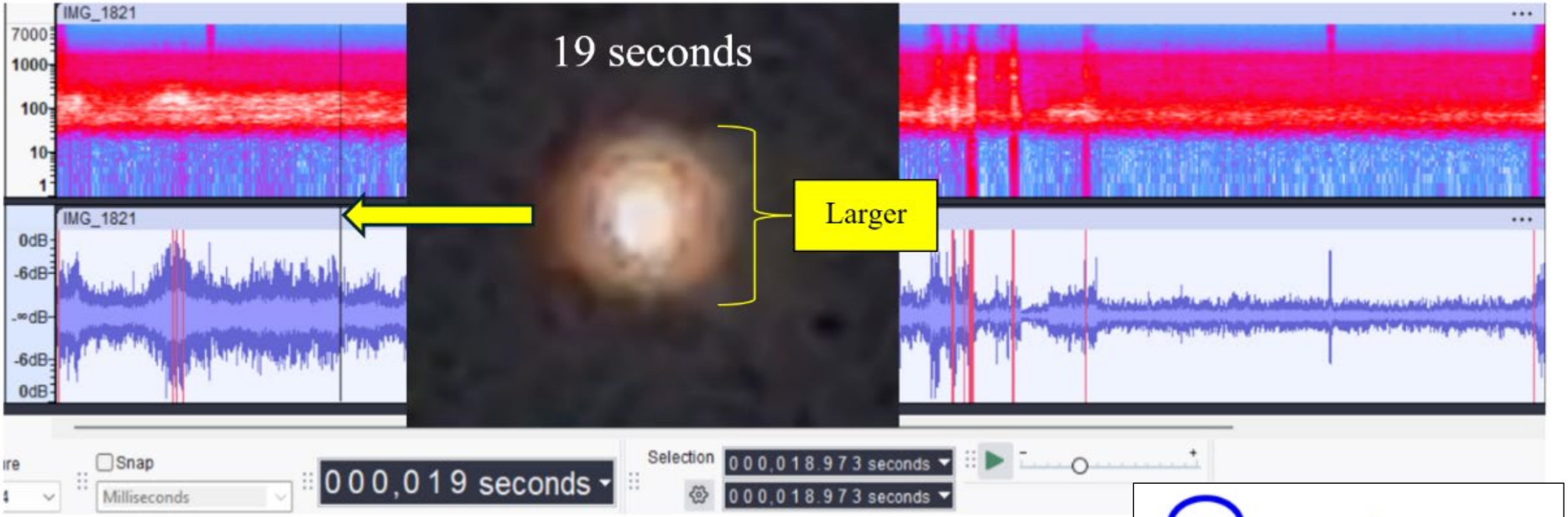
https://tundradrone.com/wp-content/uploads/2020/04/drone-light-for-mavic.jpg

Audio Analysis



Audio Analysis

Now We Will See the Importance of Working With…

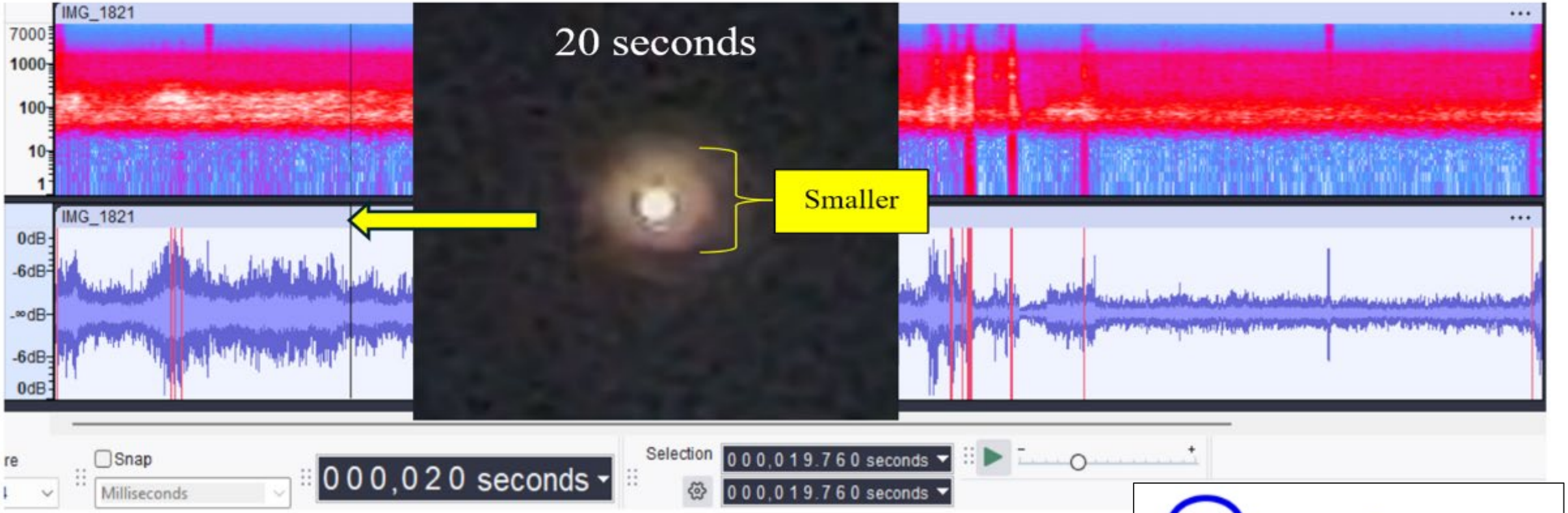


Audacity®

Audacity 3.6.4

Audio Analysis

… Cross Disciplinary Subject Matter Experts …

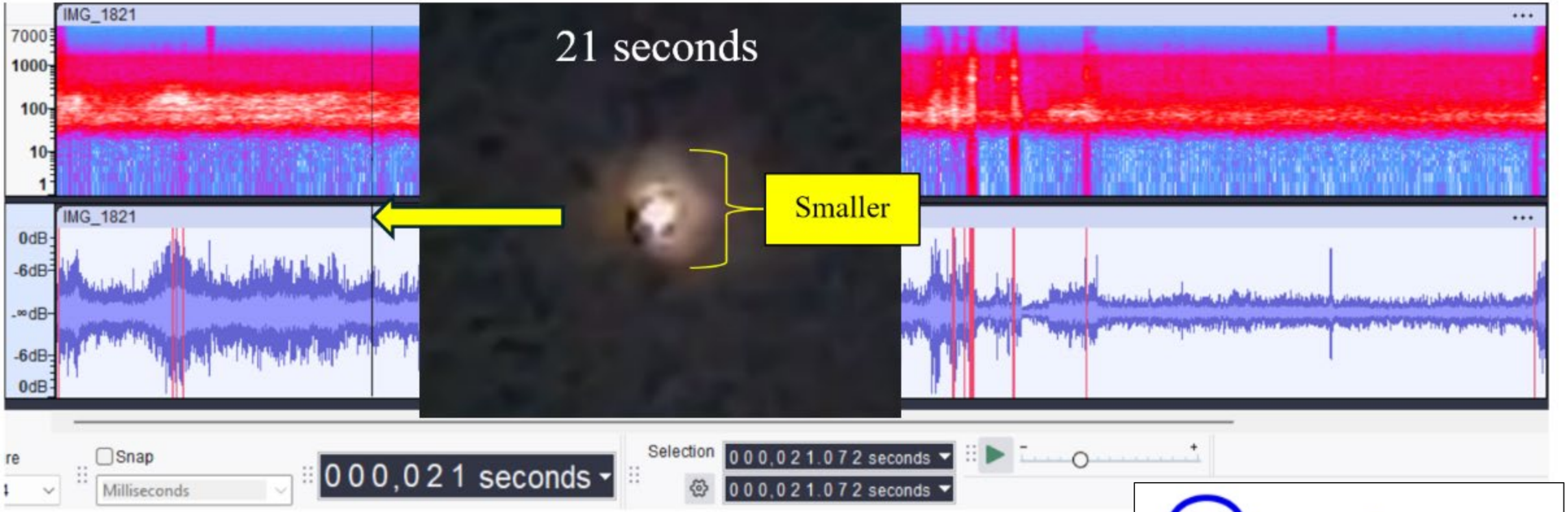


Audacity®

Audacity 3.6.4

Audio Analysis

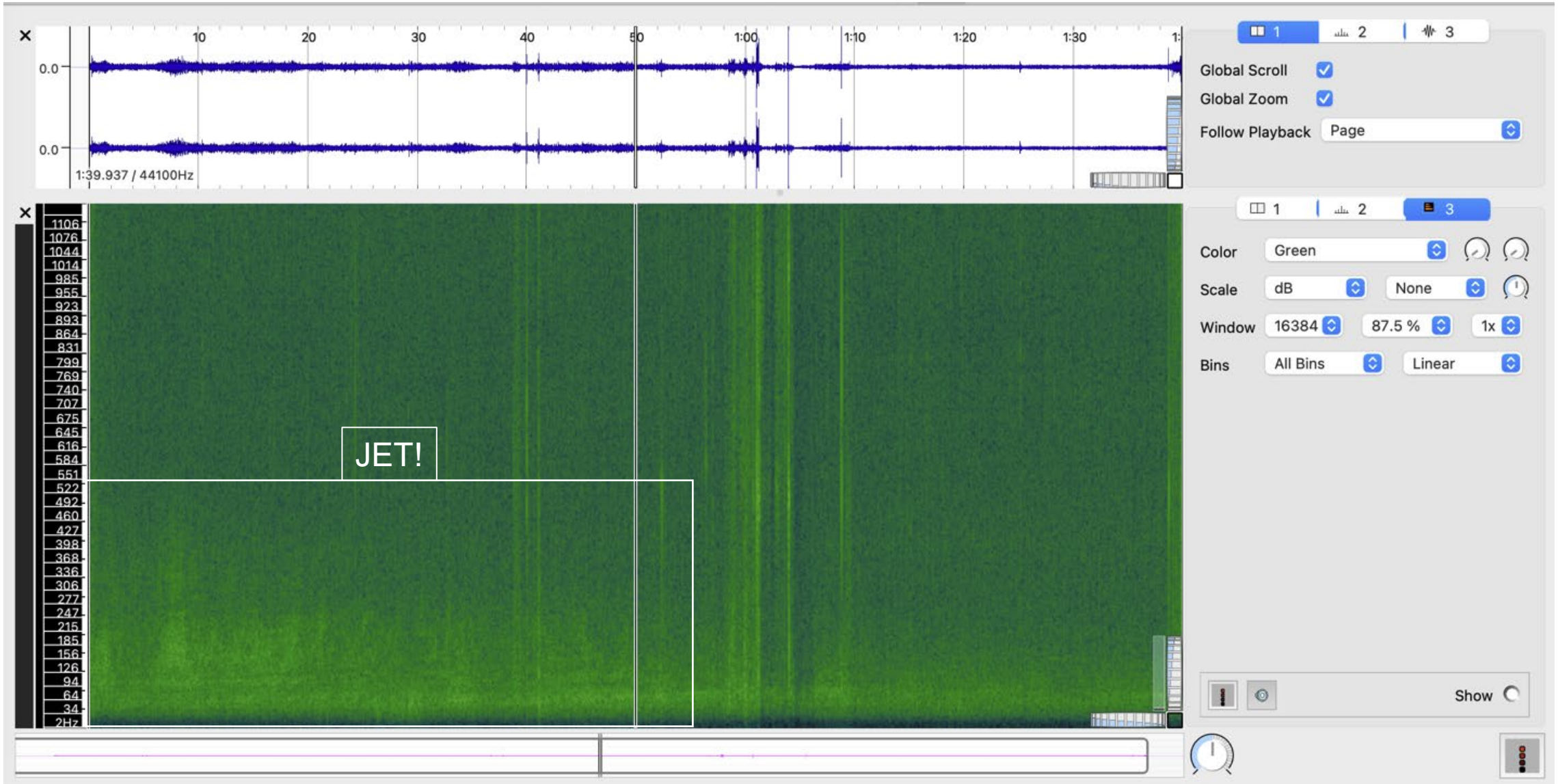
… Outside of Your Areas of Expertise!!!



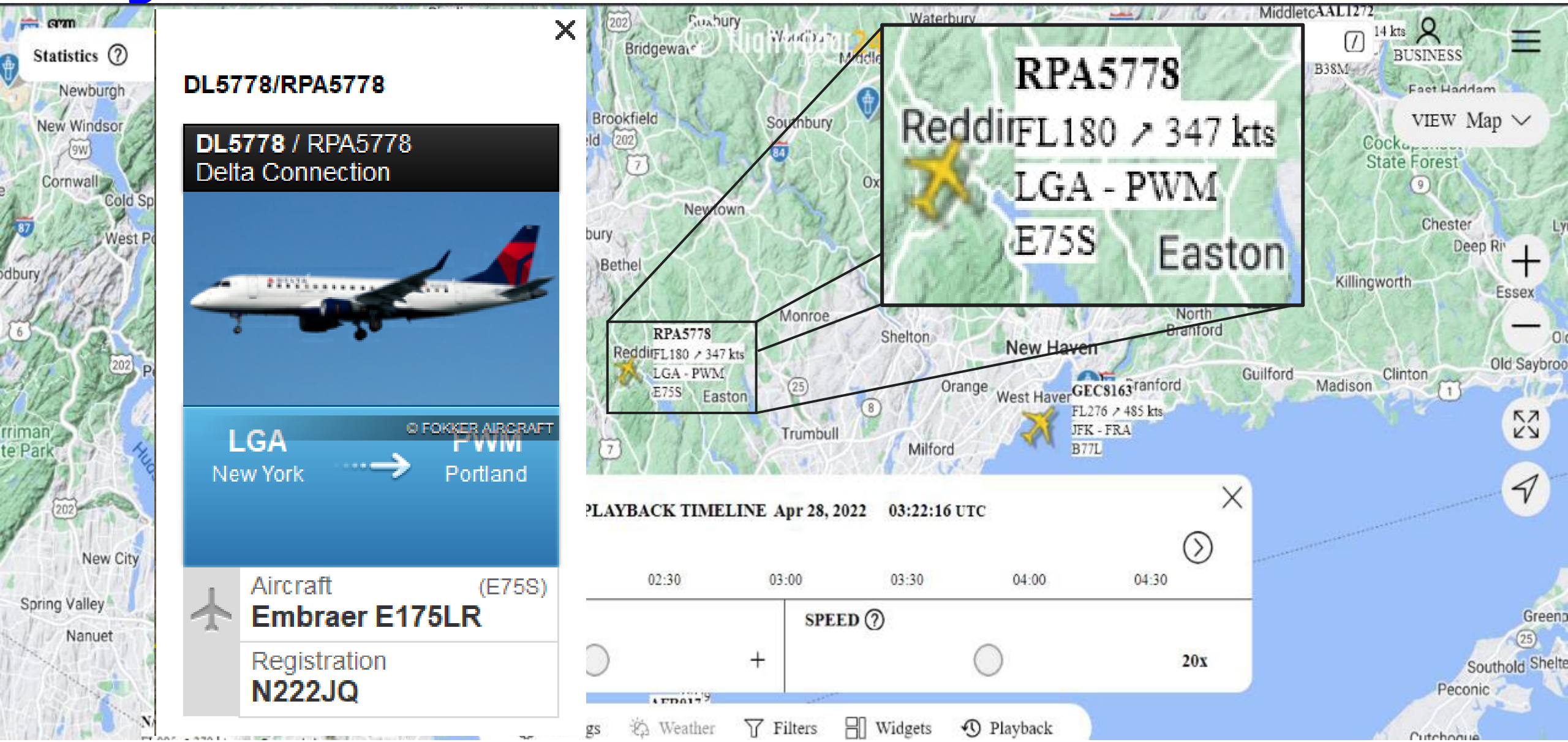
Audacity®

Audacity 3.6.4

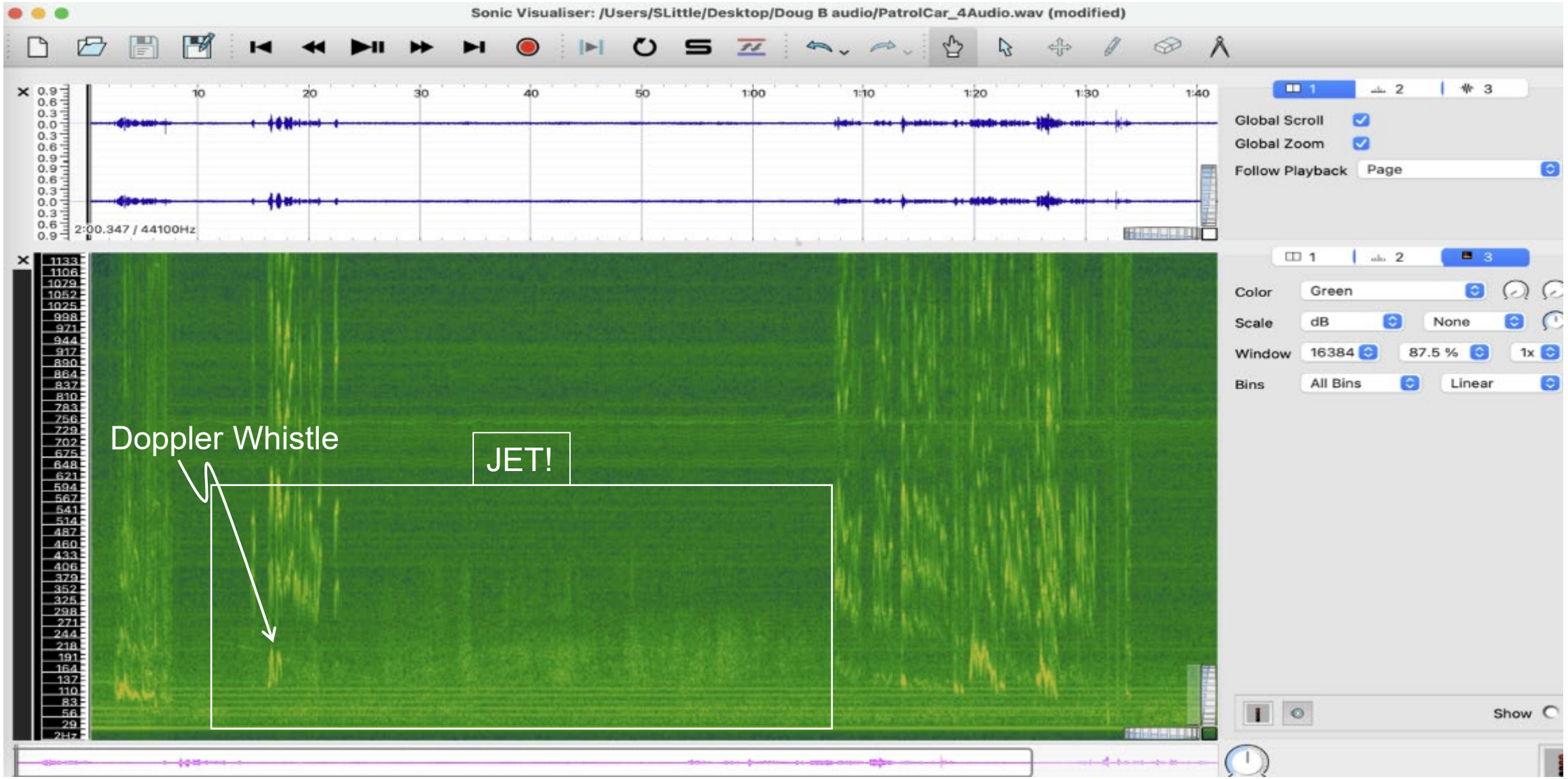
Independent Audio Analysis



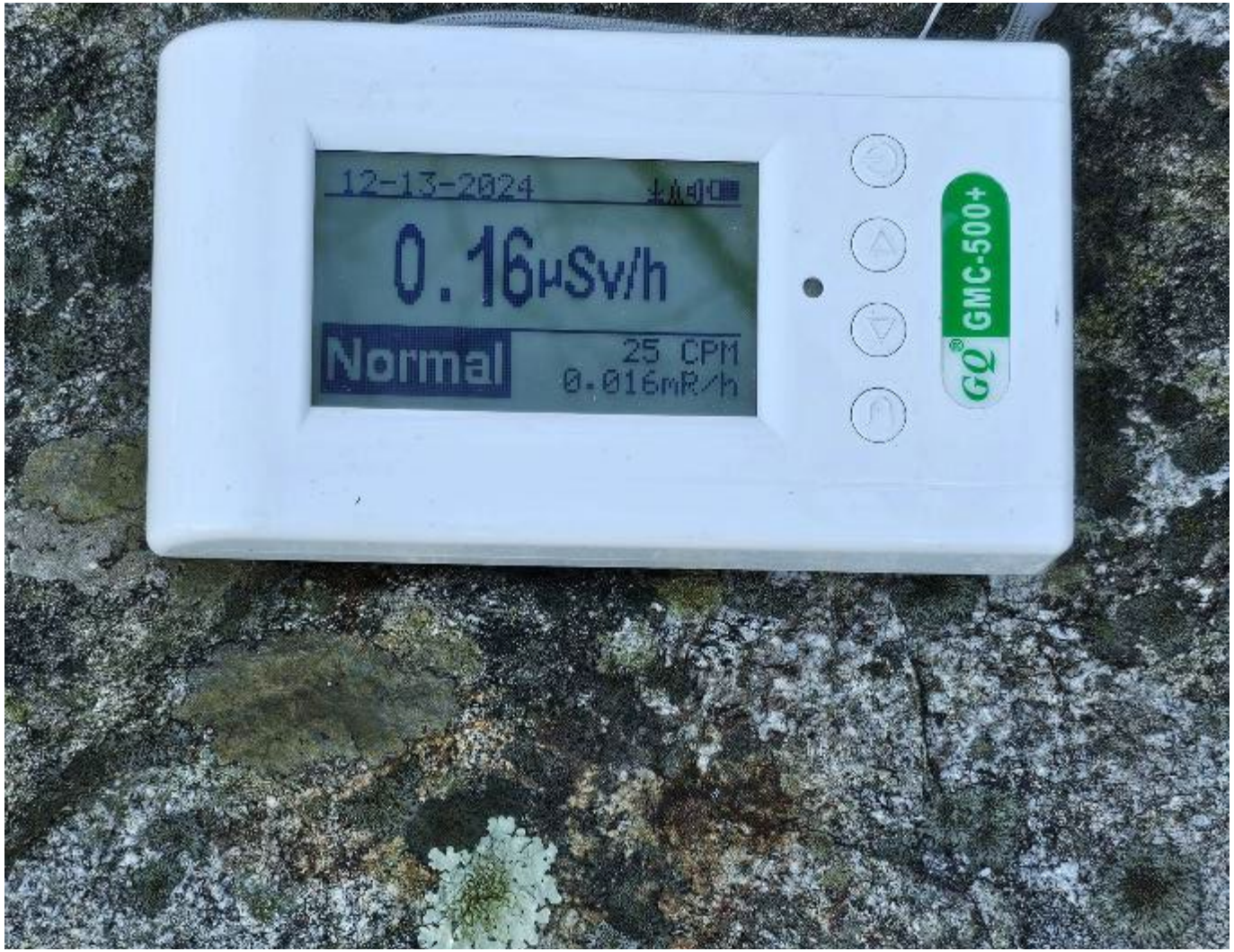
FlightRadar24



Independent Audio Analysis: Reproduction in CT



Radiation: Normal not Elevated



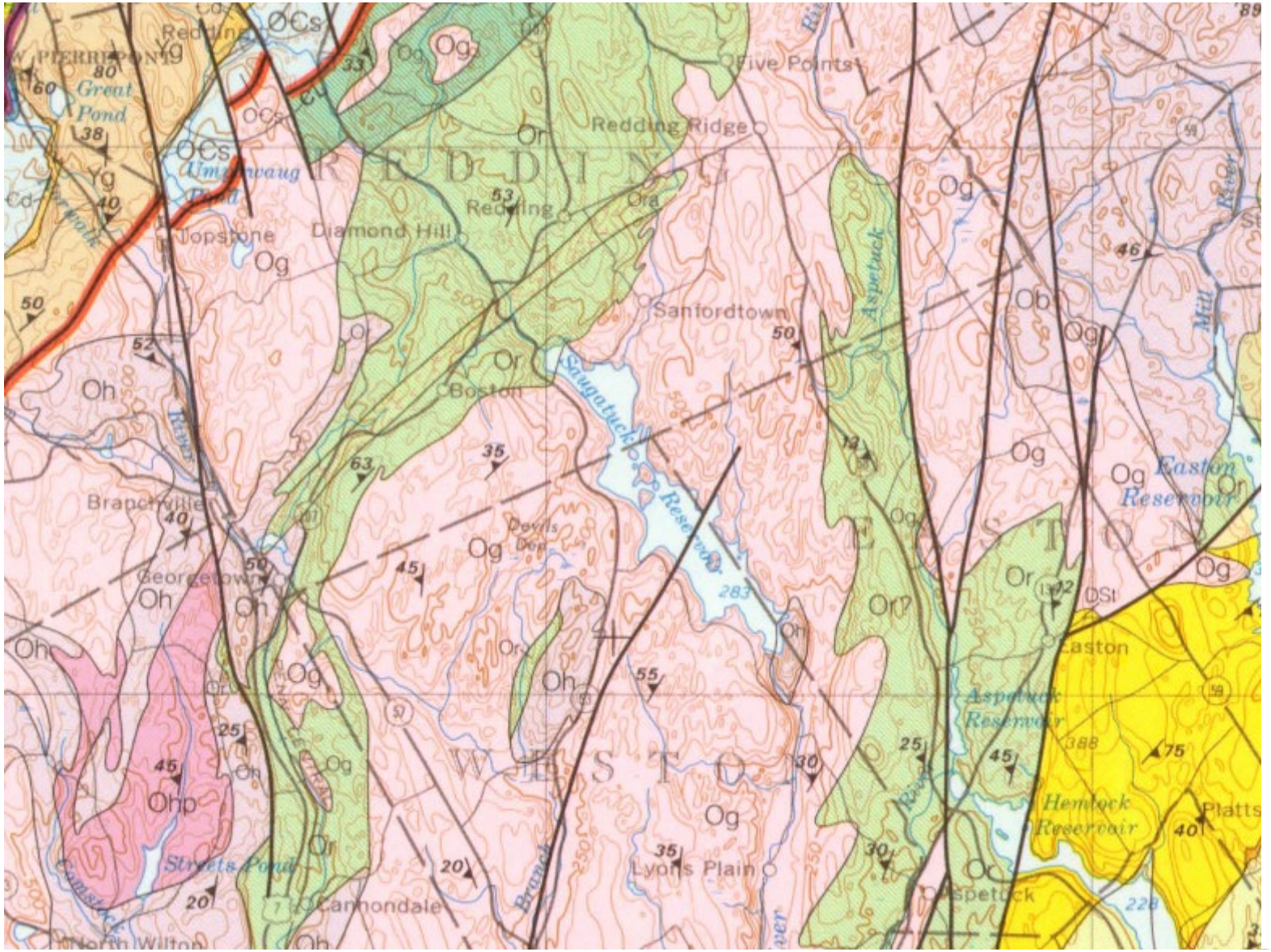
https://www.gqelectronicsllc.com/support/GMC_Selection_Guide.htm

GQ GMC-500+ Geiger Counter

Detected normal background levels of radiation, even when placed directly on top of a boulder near the sighting.

Model	**GMC-500+**
Ready-To-Use	**Yes**
On Board CPU	**Yes**
Geiger Tube Installed	**Two**
Radiation detected	**Beta, Gamma, X-ray**

Connecticut Bedrock Geology Map



https://cteco.uconn.edu/maps/state/Bedrock_Geologic_Map_of_Connecticut.pdf

Ob Brookfield Gneiss: dark and light, medium- to course-graned **dioritic gneiss**

Oc Collinsville Formation: gray and silvery, medium- to course-grained schist and dark, fine- to medium-grained **amphibolite** and hornblende **gneiss**

Ocs Sweetheart Mountain Member of Collinsville Formation: gray and silvery, medium- to course-grained schist

Og Ordovician? granitic gneiss: light-colored foliated granitic gneiss

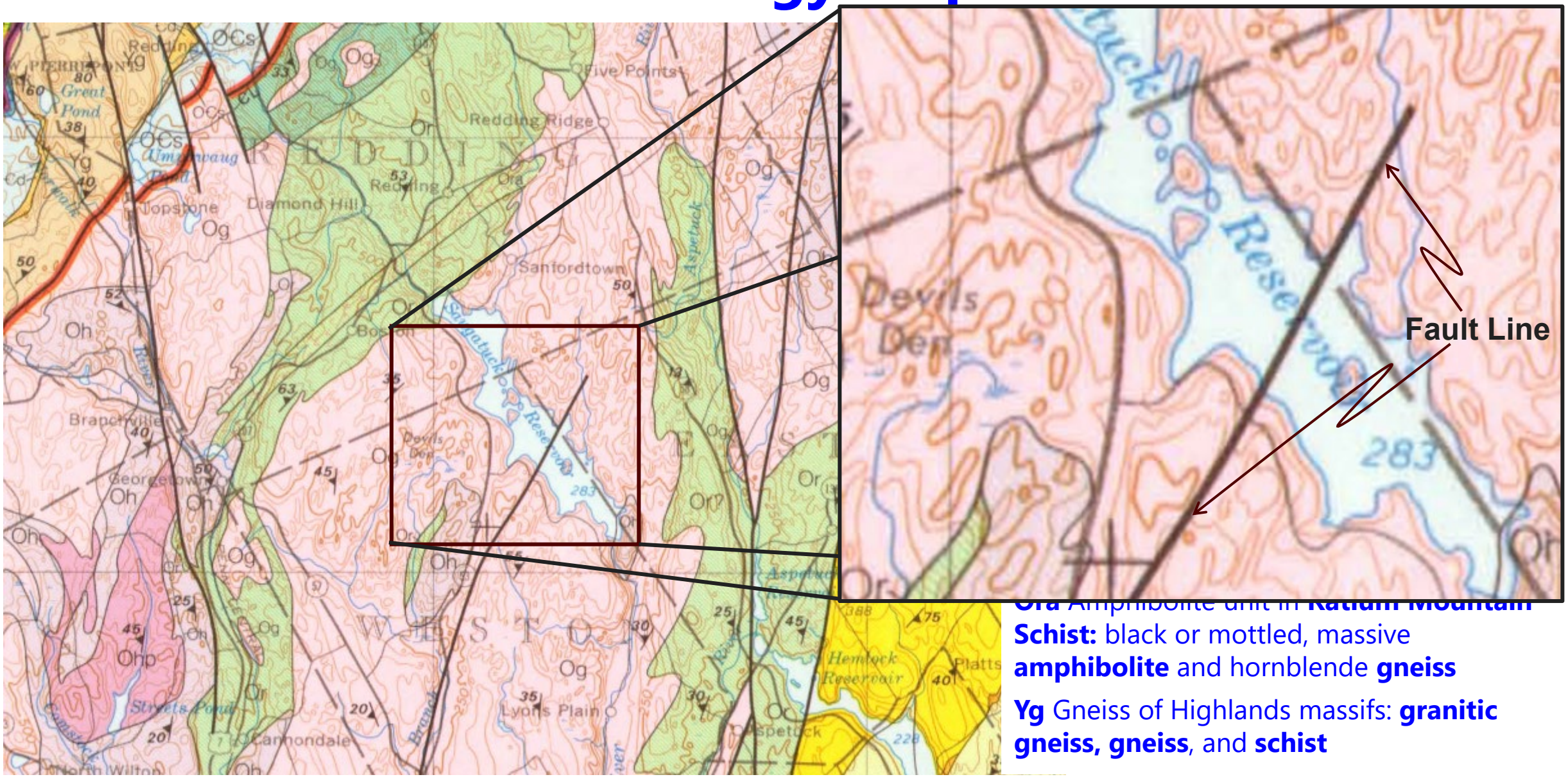
Oh Harrison Gneiss: interlayed dark- and light-gray, medium-grained, foliated gneiss

Or Ratlum Mountain Schist: gray, medium-grained **schist** and **granofels**

Ora Amphibolite unit in **Ratlum Mountain Schist:** black or mottled, massive **amphibolite** and hornblende **gneiss**

Yg Gneiss of Highlands massifs: **granitic gneiss, gneiss**, and **schist**

Connecticut Bedrock Geology Map



https://cteco.uconn.edu/maps/state/Bedrock_Geologic_Map_of_Connecticut.pdf

Geology terms

Term	Definition
gneiss	Light and dark, medium- to course-grained, metamorphic rock characterized by compositional banding of light and dark minerals, typically composed of quartz, feldspar, and various amounts of dark minerals; occurs with a variety of compositions and is a characteristic rock of the uplands.
schist	A medium grade metamorphic rock, formed by the metamorphosis of mudstone / shale, or some types of igneous rock, to a higher degree than slate, i.e. it has been subjected to higher temperatures and pressures.
dioritic gneiss	Light and dark, medium- to coarse-grained, compositionally banded metamorphic rock fo dioritic composition. Diorite is a rock typically containing plagioclase feldspar, hornblende, and sometimes biotite.
amphibolite	Dark-colored, fine- to course-grained, massive to poorly layered metamorphic rock containing amphibole and plagioclase with little or no quartz.
hornblende gneiss	A gneiss that includes this dark-colored amphibole mineral, often black or dark green, found in many igneous and metamorphic rocks
granitic gneiss	Light-colored, medium- to course-granined, compositionally banded metamorphics rock of granitic composition. Quarried for use ad simension stone (see granite).
foliated gneiss	Refers to repetitive layering in metamorphic rocks.
granofels	Light to dark, medium- to course-grained, massive to poorly layered metamorphic rock composed primarily of quartz and feldspar; lacking the compositional banding of a gneiss.

Composition

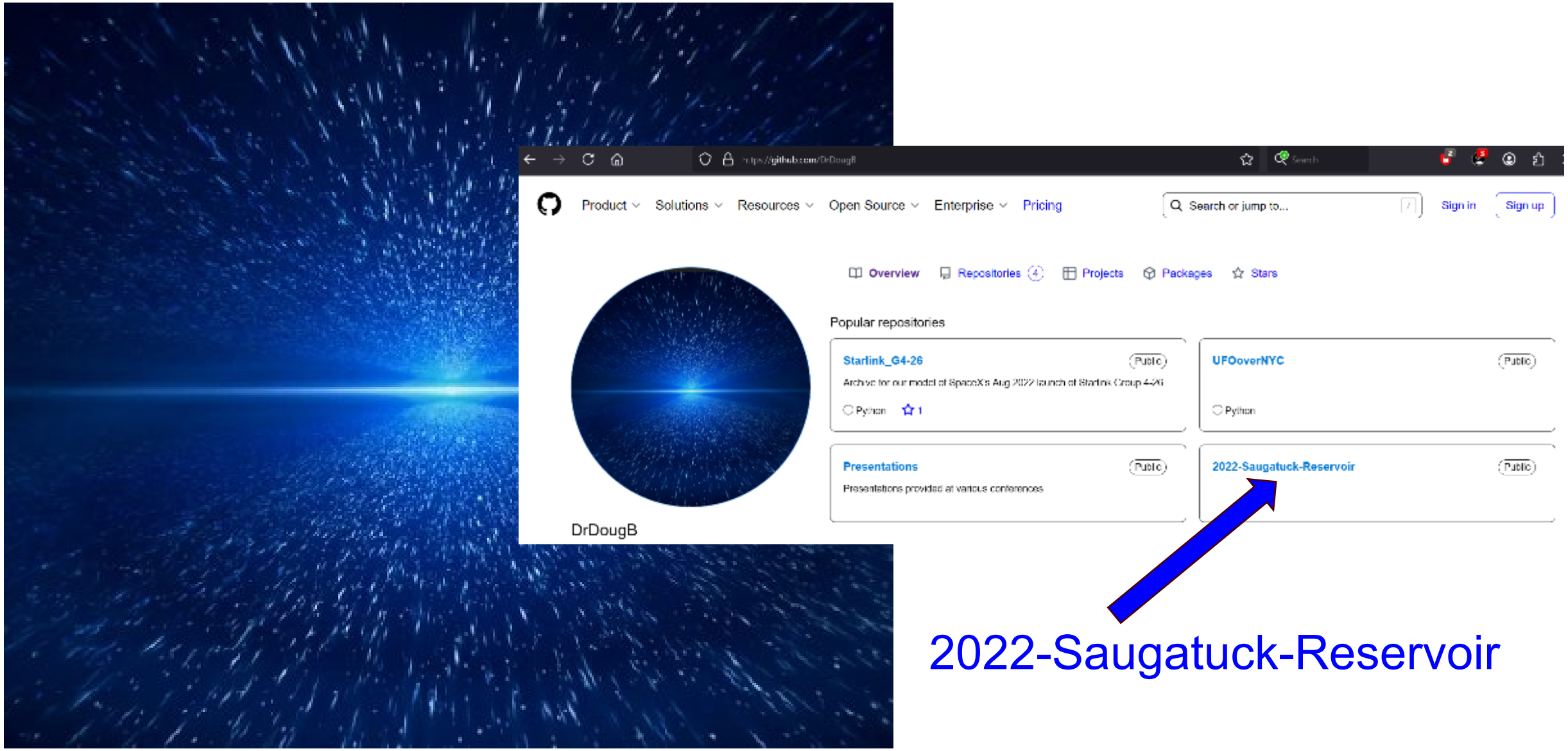
In addition to feldspar and quartz, the Connecticut granite and granite gneiss contain muscovite, biotite, hornblende, pyroxene, titanite, allanite, pyrite, apatite, zircon, and magnetite. Most of these minerals are of rare occurrence and few of them are of economic importance. In fact, all the igneous rocks, including the granites and granite gneisses, consist chiefly of but five minerals; feldspar forms 59 per cent, quartz 12 per cent, biotite 4 per cent, hornblende and pyroxene taken together 17 per cent.

T. N. DALE, And H. E. Gregory, The granites of Connecticut, United States Geological Survey, Bulletin 484, 1911. https://doi.org/10.3133/b484, pgs. 14 - 15

Possible Theories: Accept Testimony

1. **Earth light or optical phenomena**
   - **Interesting geology in the area**
   - **Like the Hessdalen Lights?**
   - **Other optical phenomena?**
2. **Ball lightning**
   - Would need a new generation mechanism as weather conditions were not conducive to their creation
3. **Exotic hoax?**
   - Not ruled out but unlikely due to the history of sightings going back decades in this area
4. **Exotic plasma technology?**
   - Not ruled out but again unlikely due to the long history of sightings
5. **Weston Meteorite?**
   - Brought a “plasmoid life form” to Earth? i.e., yah the stuff of science fiction…!
6. **Plasmoid life form?**

https://github.com/DrDougB



2022-Saugatuck-Reservoir

Acknowledgements:

- Sincere thanks to Officer Robert Klein for submitting the original video for analysis, putting up with our witness interview process and meeting us onsite to describe this UAP.
- News Nation's Ashley Banfield for breaking the story, and Brian Entin, and his camera crew for the additional onsite to recordings.
- Fin Handley for his amazing Blender animations.
- Marc D'Antonio for on site MUFON support…
- Other witnesses Dianne Maksel, and Chris Burns who reported on the story in the 80s.
- Dr. Sarah Little and the two independent sound engineers for their expertise in the analysis of audio sources.
- SCU member's Don Tadaya and Jarod Yates for using their use of the chromaticity diagram

References

Smet, K. A. G., Tutorial: The LuxPy Python Toolbox for Lighting and Color Science. *LEUKOS*, *16*(3), (2019). pgs 179–201. DOI: 10.1080/15502724.2018.1518717

Kevin Smet, Michael Royer, Doug Baxter, Eric Bretschneider, Tony Esposito, Kevin Houser, Wendy Luedtke, Kwong Man & Yoshi Ohno, “Recommended Method for Determining the Correlated Color Temperature and Distance from the Planckian Locus of a Light Source,” LEUKOS, 20:2, (2024). pgs. 223-237, DOI: 10.1080/15502724.2023.2248397

Wikipedia, Correlated color temperature, https://en.wikipedia.org/wiki/Correlated_color_temperature

Wikipedia, Planck’s law, https://en.wikipedia.org/wiki/Planck%27s_law

T. N. DALE, And H. E. Gregory, The granites of Connecticut, United States Geological Survey, Bulletin 484, (1911). https://doi.org/10.3133/b484, pgs. 14 - 15

Rodgers, John, “Bedrock geological map of Connecticut,” Connecticut Geological and Natural History Survey, (1985). https://cteco.uconn.edu/maps/state/Bedrock_Geologic_Map_of_Connecticut.pdf

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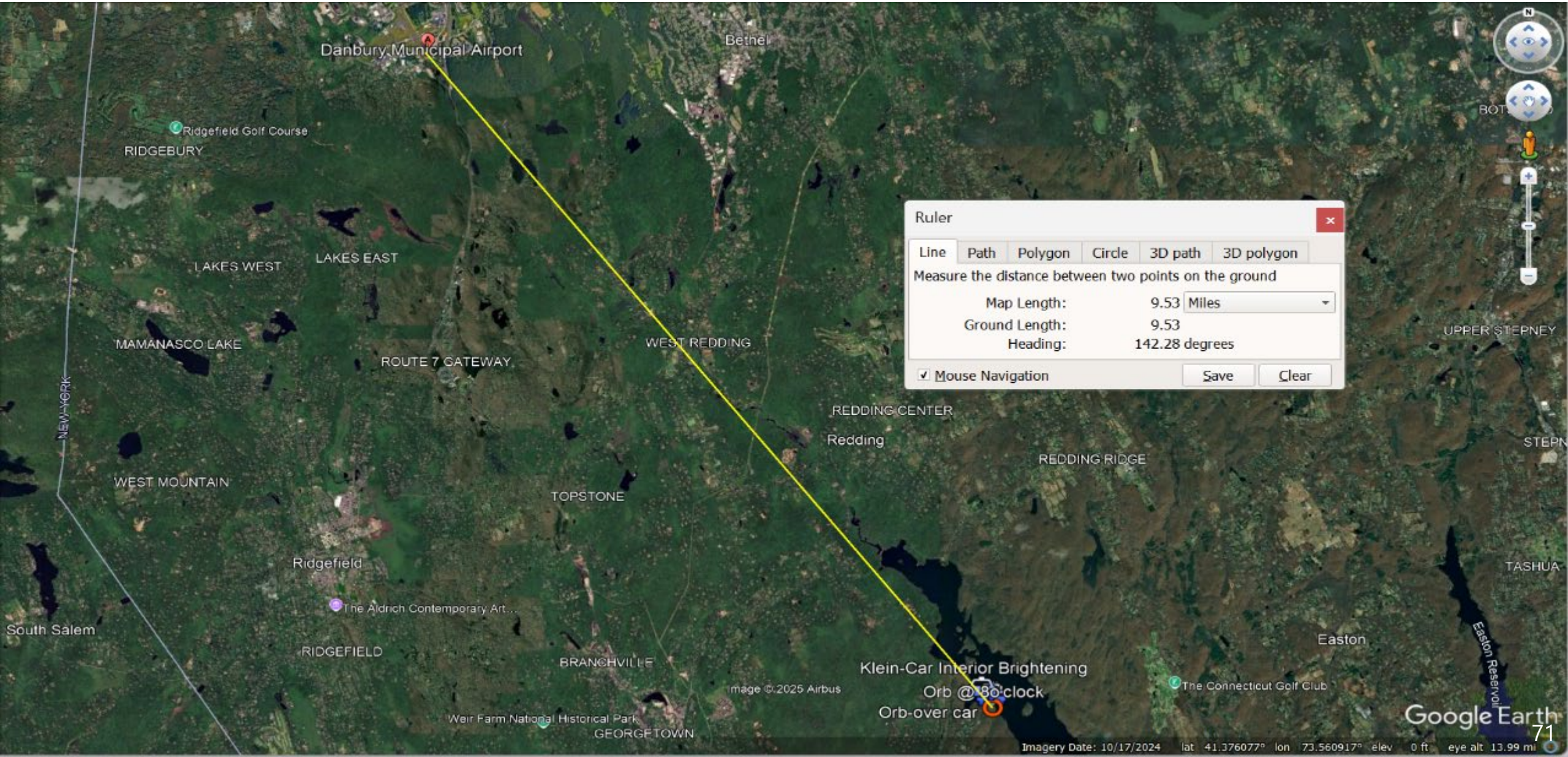
All analysis and opinions are that of the authors.

Backup

Weather: Danbury CT Airport



Weather: Klein Sighting 4/27/2022

41.39 °N, 73.45 °W

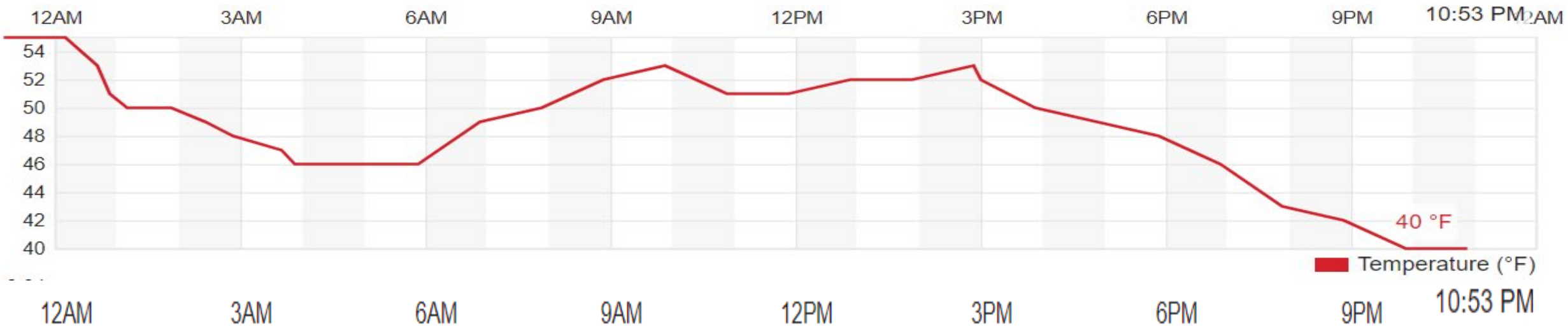
Danbury, CT Weather History

20° DANBURY MUNICIPAL AIRPORT STATION | CHANGE

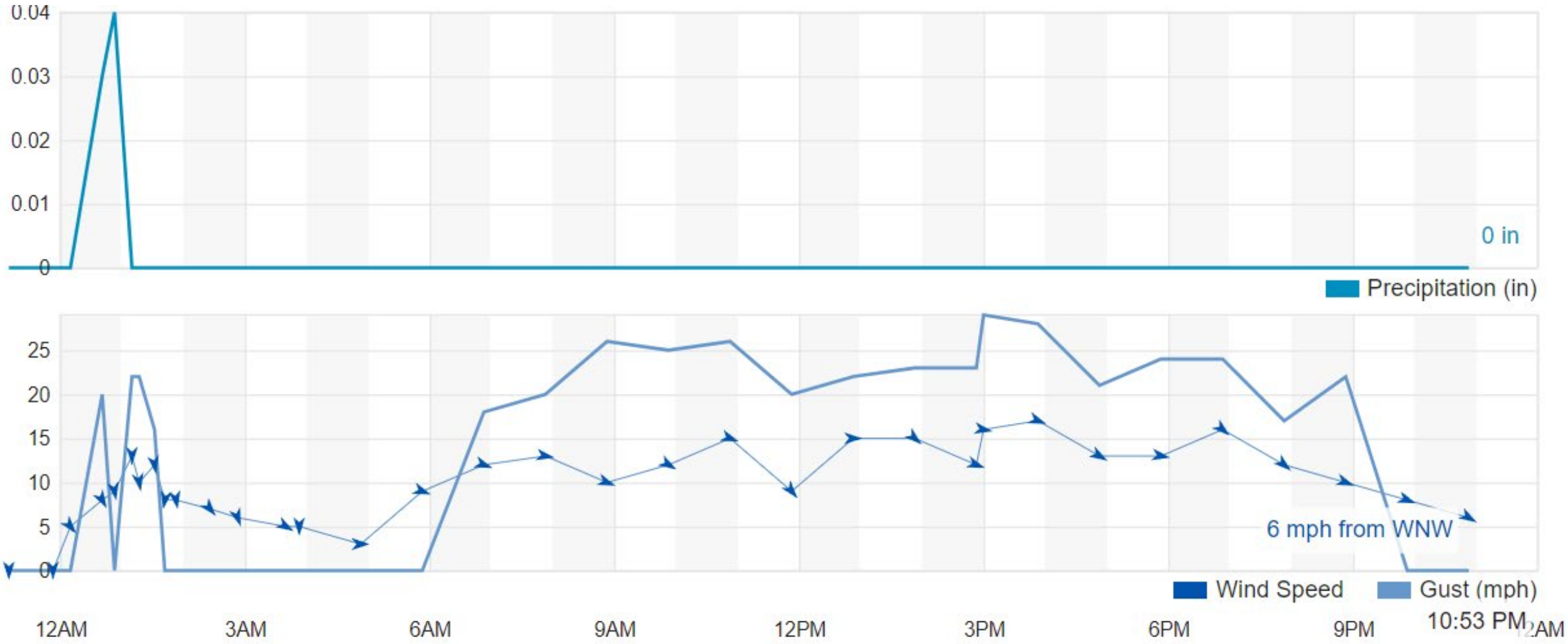
TODAY | HOURLY | 10-DAY | CALENDAR | HISTORY | WUNDERMAP

Daily | Weekly | Monthly

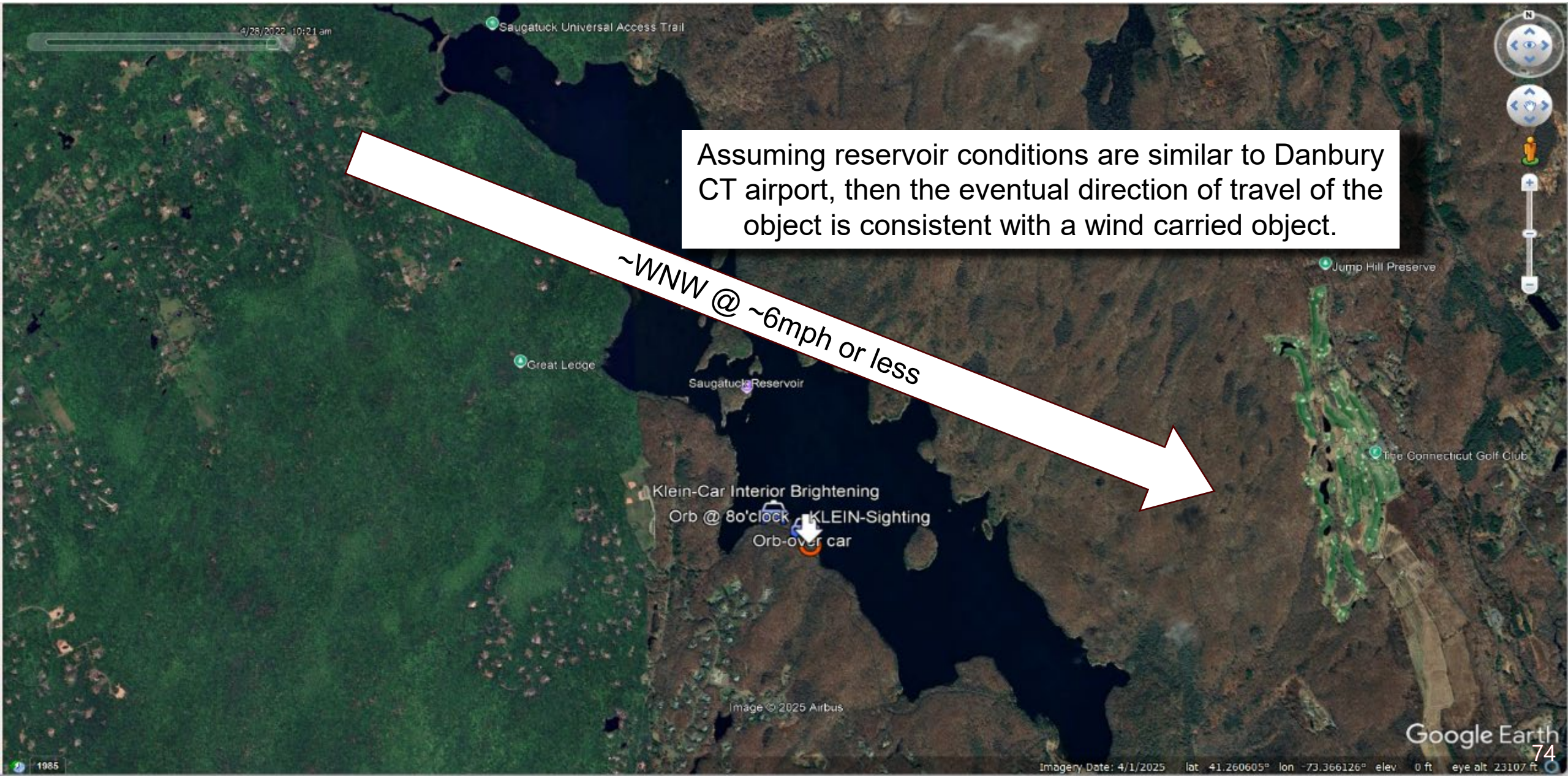
April | 27 | 2022 | View



Weather: Klein Sighting 4/27/2022



Weather: Klein Sighting 4/27/2022



Weather: Dianne's Sighting 2/9/2022

41.39 °N, 73.45 °W

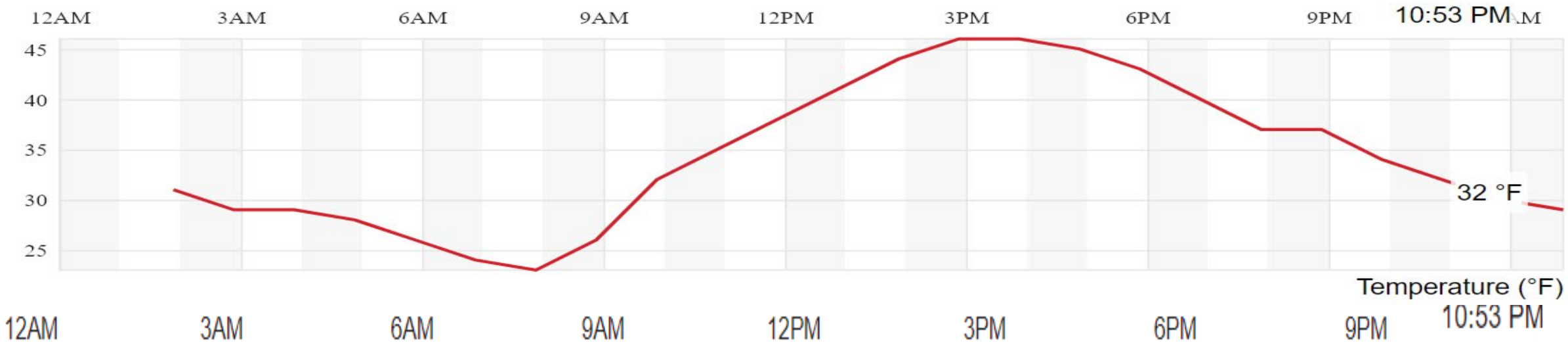
Danbury, CT Weather History ★

51° DANBURY MUNICIPAL AIRPORT STATION | CHANGE

TODAY | HOURLY | 10-DAY | CALENDAR | **HISTORY** | WUNDERMAP

Daily | Weekly | Monthly

February | 9 | 2022 | View



Weather: Dianne's Sighting 2/9/2022

41.39 °N, 73.45 °W

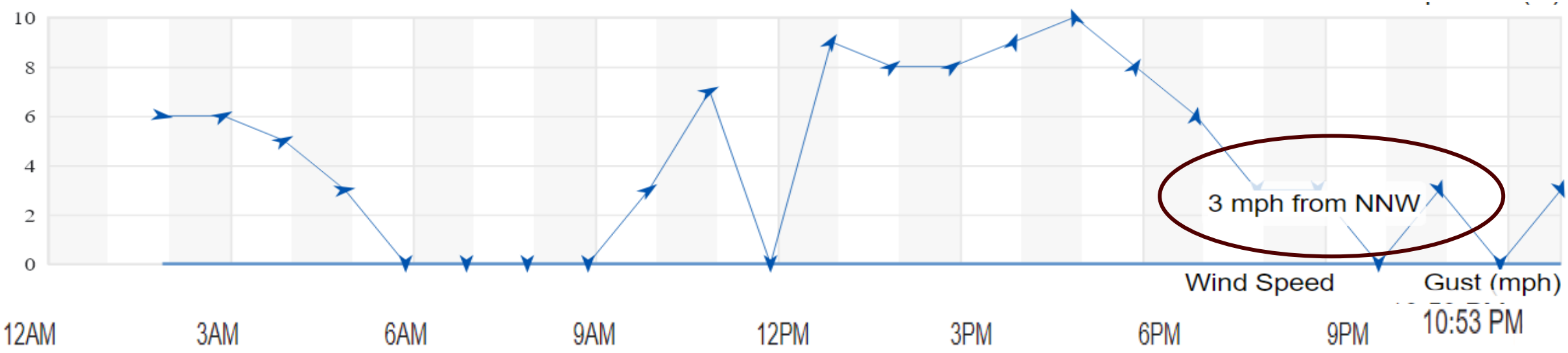
Danbury, CT Weather History ★

51° DANBURY MUNICIPAL AIRPORT STATION | CHANGE

TODAY | HOURLY | 10-DAY | CALENDAR | HISTORY | WUNDERMAP

Daily | Weekly | Monthly

February | 9 | 2022 | View



Weather: Dianne's Sighting 2/9/2022

41.39 °N, 73.45 °W

Danbury, CT Weather History ★

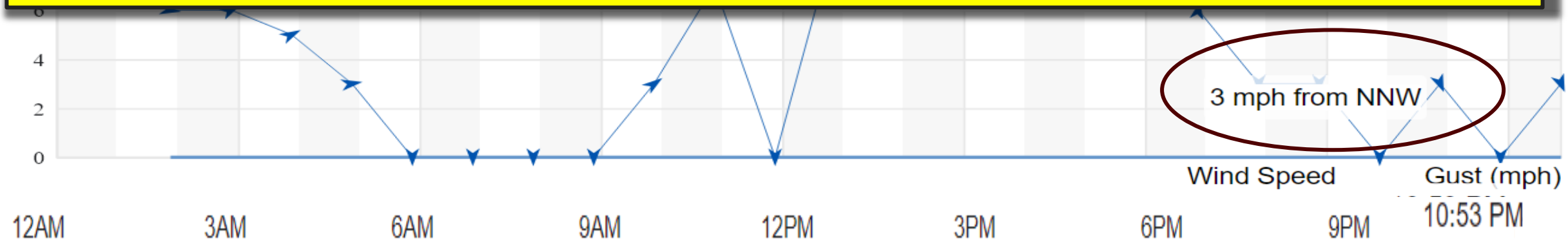
51° DANBURY MUNICIPAL AIRPORT STATION | CHANGE

TODAY | HOURLY | 10-DAY | CALENDAR | HISTORY | WUNDERMAP

Daily | Weekly | Monthly

February | 9 | 2022 | View

The wind was ever so slightly coming from the NNW, in the opposite direction of travel of 1st two objects she witnessed.



Weather: Dianne's Sighting 2/9/2022