SPECTROMETRY PERFORMANCE FOR EVALUATING REFLECTANCE AND ANALYSIS

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CONTENTS

OBJECTIVES

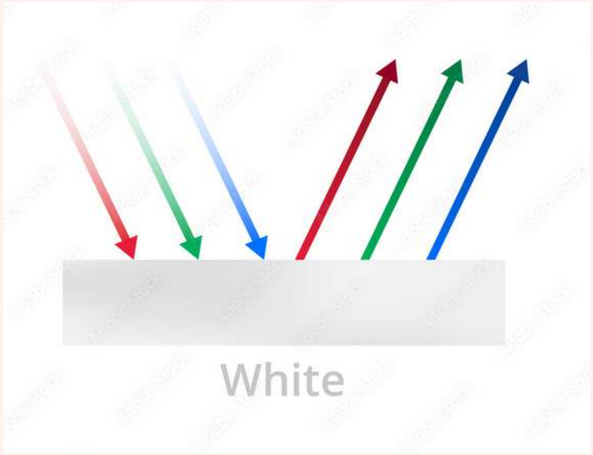
Understand the concept of spectral reflectance.

Know how to measure spectral reflectance using a spectrometer.

Know how to analyze and interpret the data collected from the measurements.

INSTRUMENTS

ASD FieldSpec 4



White Body

Black Cloth

Halogen Lamp

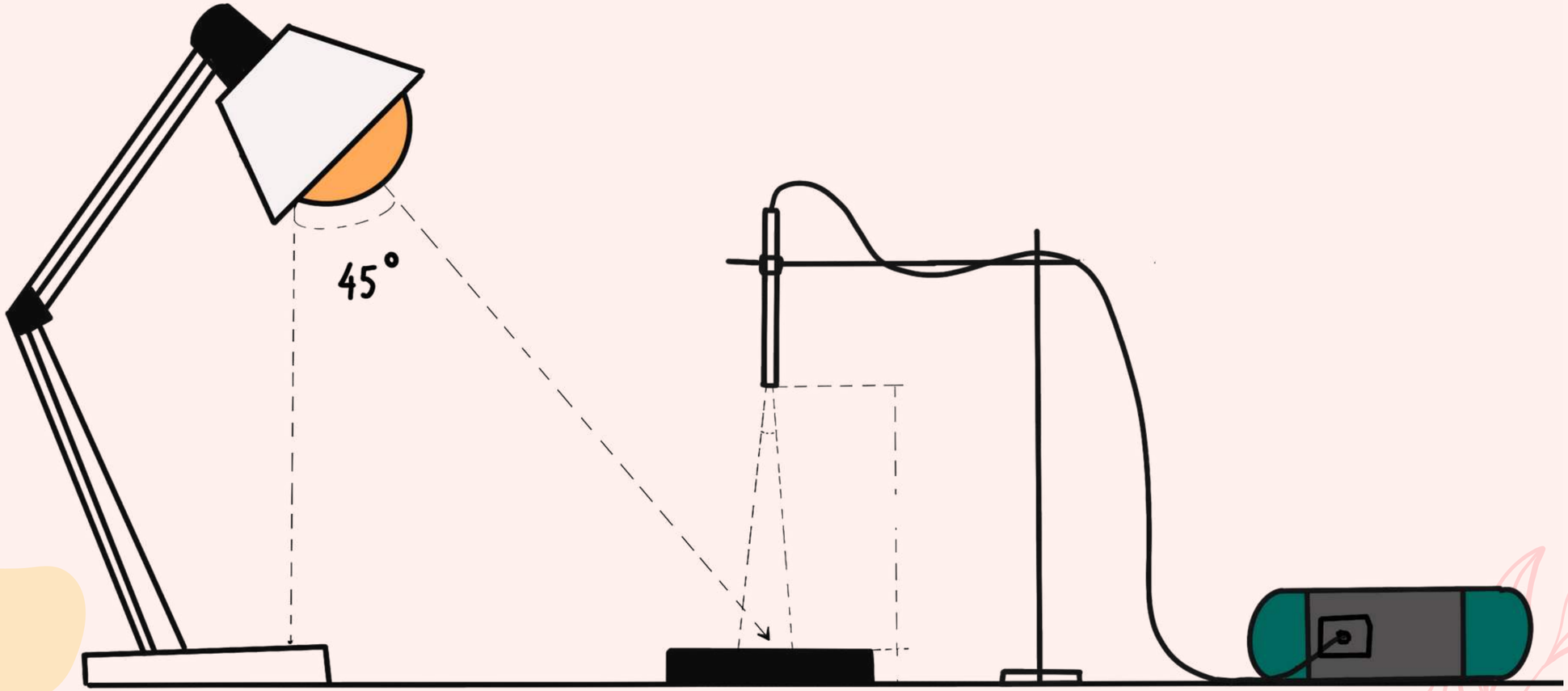
MATERIALS



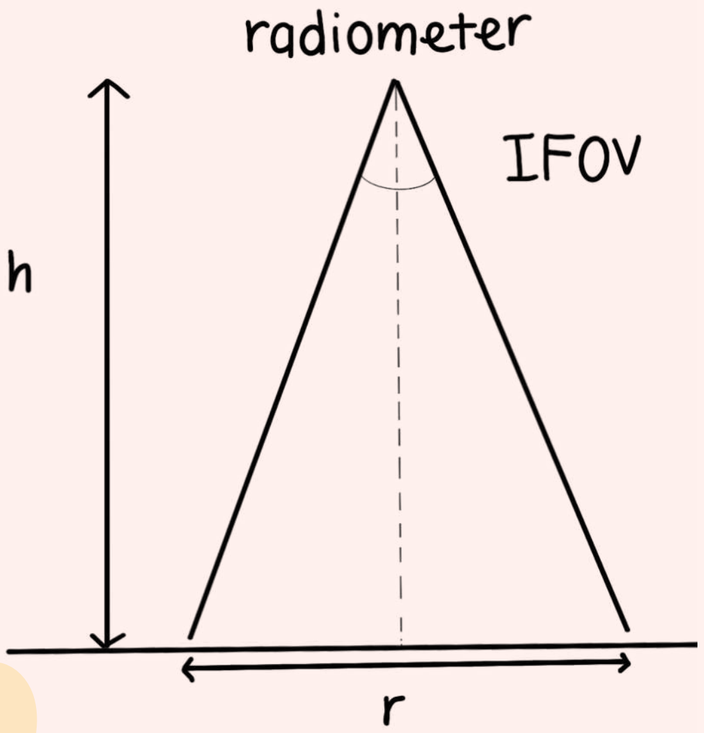


MATERIALS

PREPARATION



IMPLIMENTATION

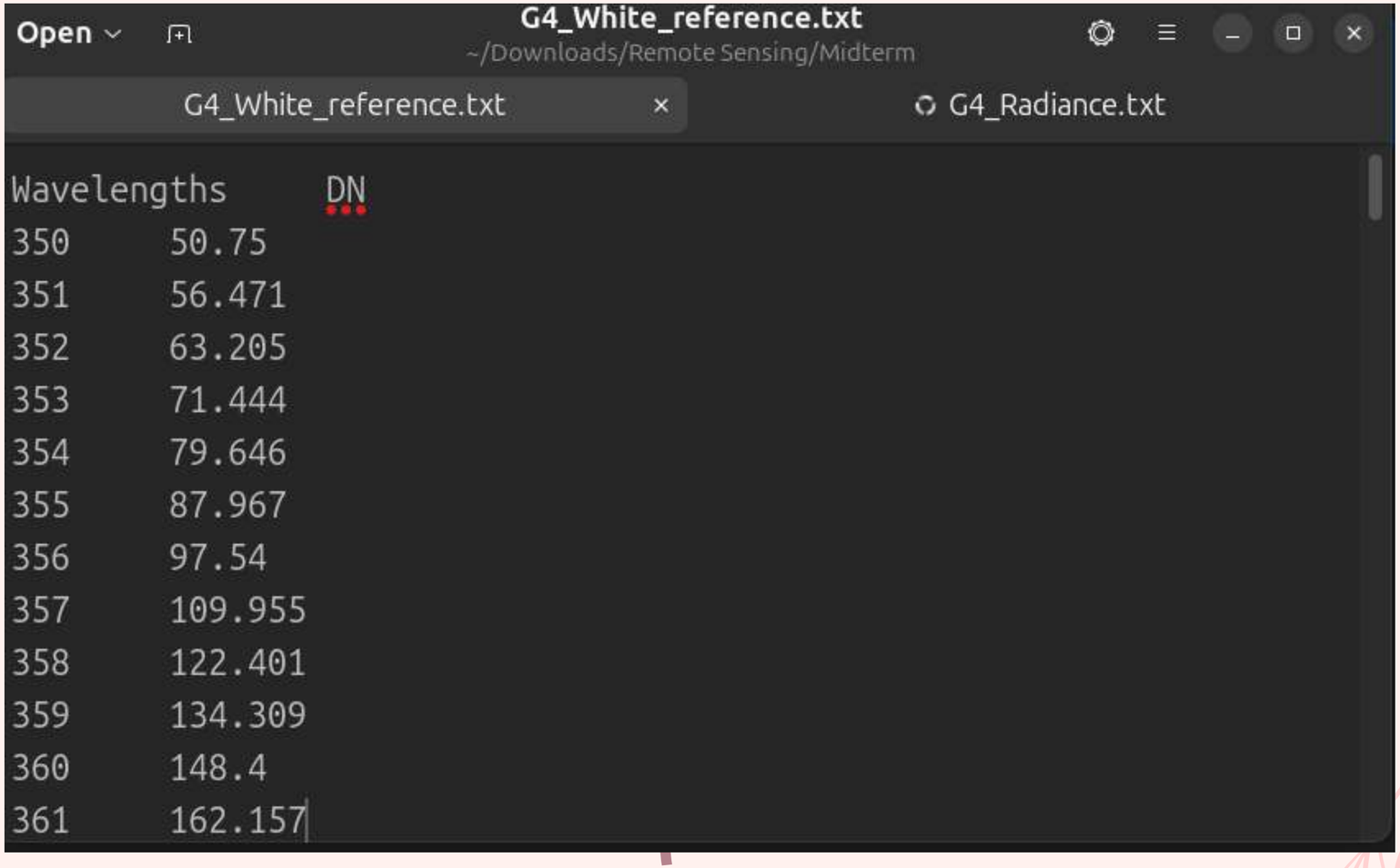


$$\tan\frac{\theta}{2} = \frac{r}{2h}$$

$$\Rightarrow r = \tan 4^\circ \times 2 \times 20\,\text{cm}$$

$$\approx 2.797\,\text{cm}$$

DATA EXPORTED



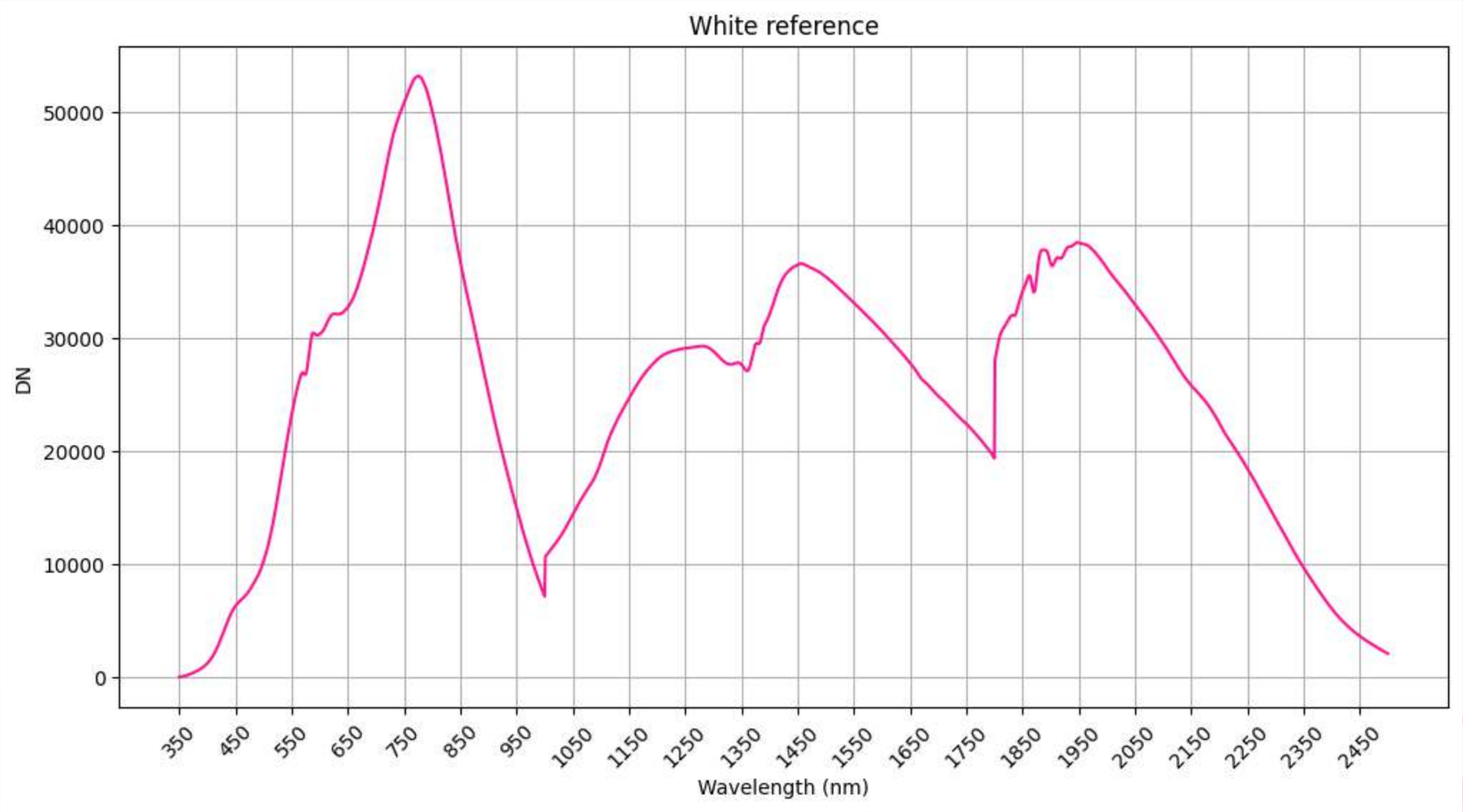
DATA EXPORTED

Open

G4_Radiance.txt
~/Downloads/Remote Sensing/Midterm

```
Wavelengths,G4_cam00000.asd,G4_dat100000.asd,G4_dat200000.asd,G4_dat3
00000.asd,G4_nau00000.asd,G4_nuoc100000.asd,G4_nuoc200000.asd,G4_nuo-
c300000.asd,G4_tim00000.asd,G4_vang00000.asd,G4_xanh00000.asd
350,2.104,0.536,0.673,0.711,3.406,2.775,1.886,1.389,2.123,1.711,2.927
351,2.654,0.674,0.788,1.441,2.738,2.335,1.373,0.526,2.13,1.405,2.709
352,3.574,0.126,1.058,1.928,4.609,3.654,0.739,0.688,2.909,2.423,2.198
353,2.723,1.1,1.629,1.663,5.371,4.13,1.713,0.994,3.042,3.118,2.702
354,2.747,0.846,1.563,1.546,5.877,4.389,1.783,1.479,3.679,3.772,1.884
355,3.622,0.021,1.323,1.709,6.503,4.42,0.966,1.742,4.657,3.892,0.759
356,4.076,0.047,1.834,1.926,7.309,4.2,0.453,1.098,5.14,2.917,1.488
357,3.743,0.105,2.2,2.378,6.973,5.326,0.275,1.757,4.08,1.733,2.124
358,3.857,0.388,2.166,2.092,7.771,5.745,1.025,1.934,4.273,2.348,3.158
359,4.87,0.787,1.647,1.426,9.877,5.241,2.199,1.206,5.709,4.769,4.405
360,6.053,0.732,0.703,2.47,10.479,6.269,1.929,1.285,4.5,6.443,4.607
```

RESULTS & DISCUSSION



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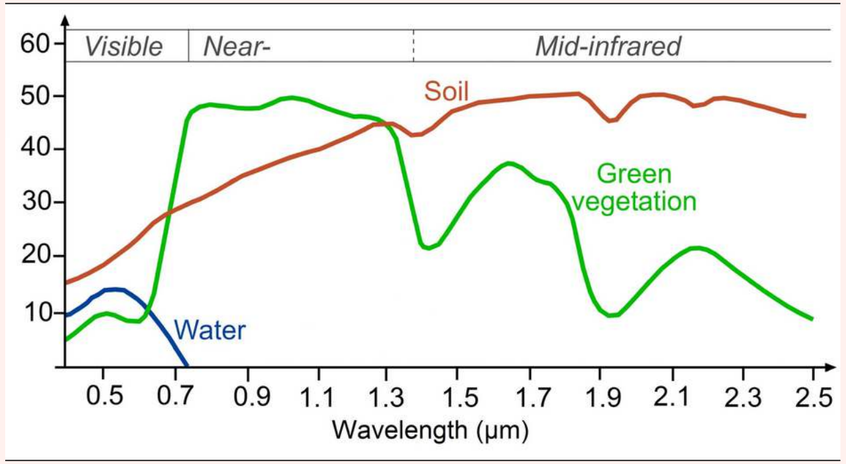
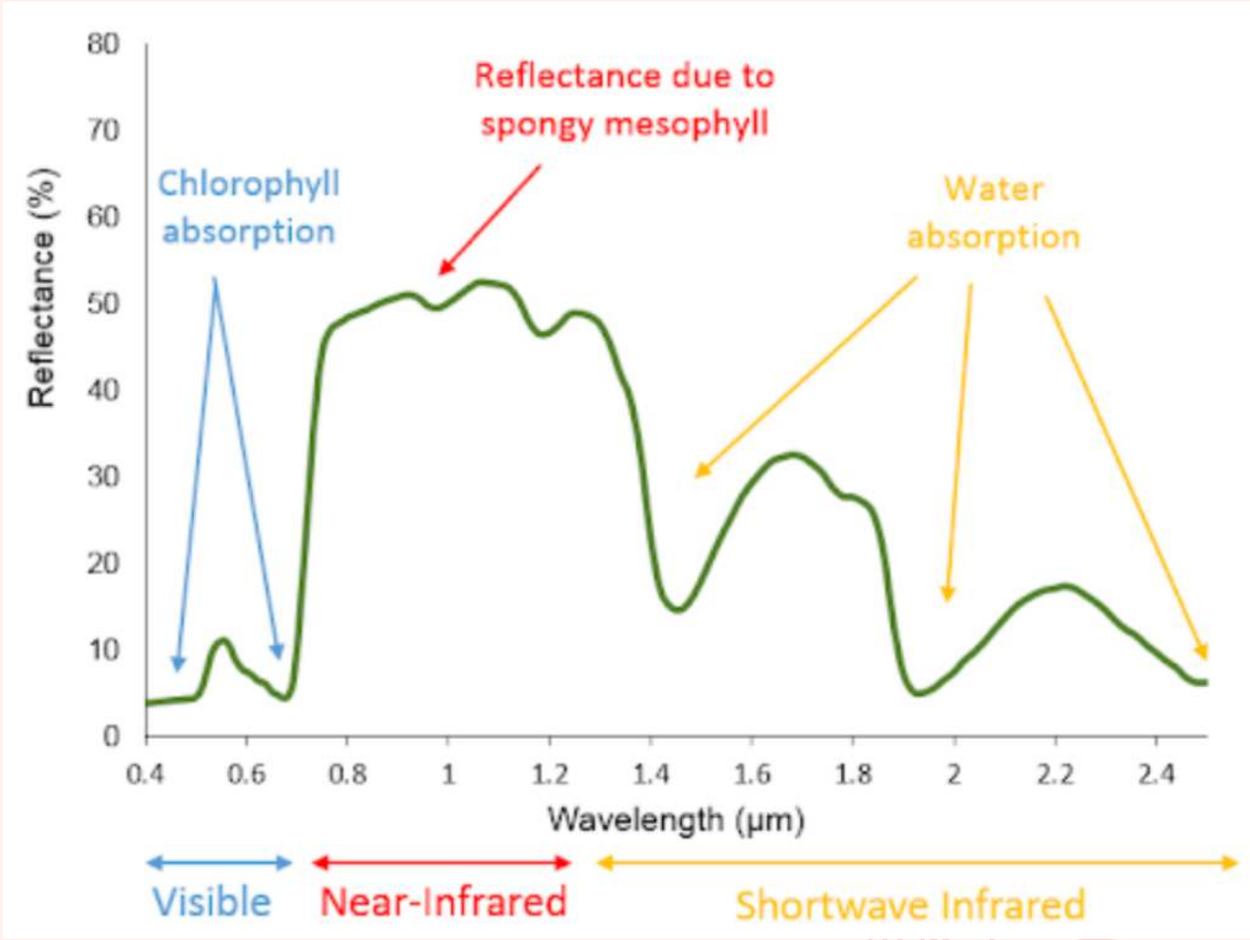
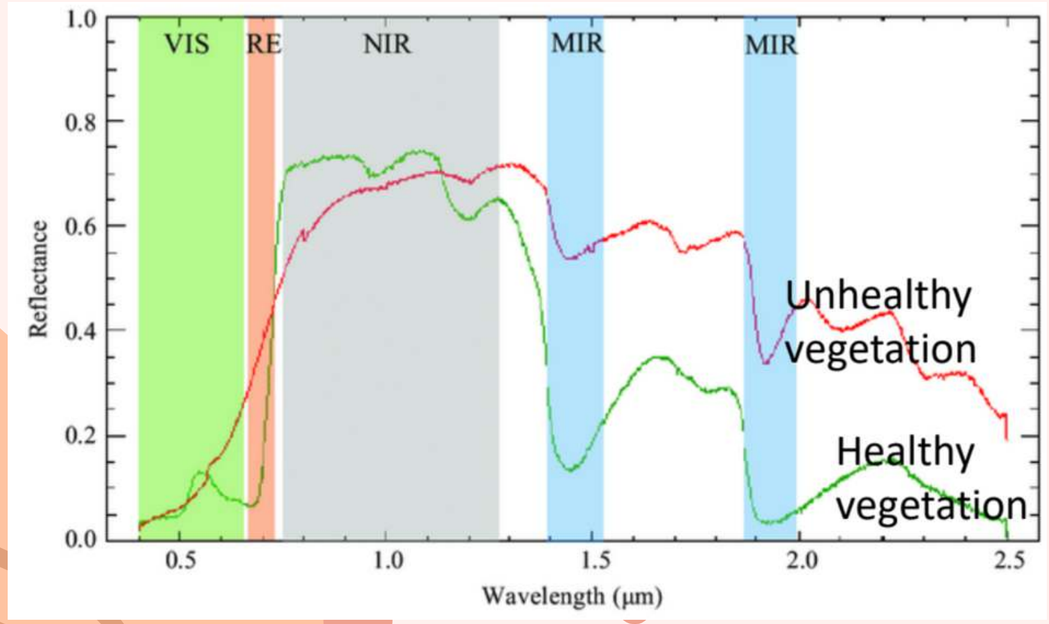
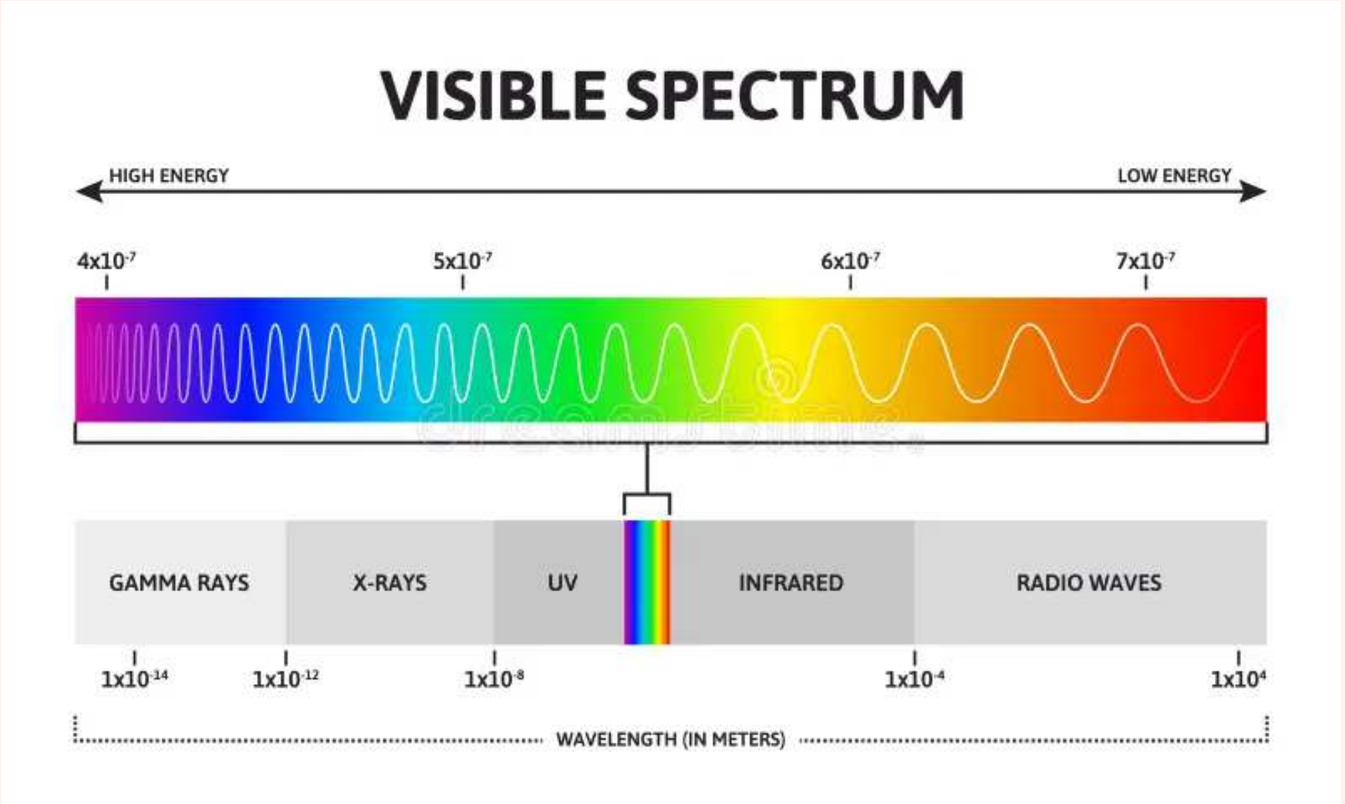






RESULTS & DISCUSSION

COLORS	WAVELENGTH (nm)
RED	~ 652 - 740
ORANGE	~ 590 - 625
YELLOW	~ 565 - 590
GREEN	~ 520 - 565
BLUE	~ 445 - 520
INDIGO	~ 425 - 445
VIOLET	~ 380 - 425



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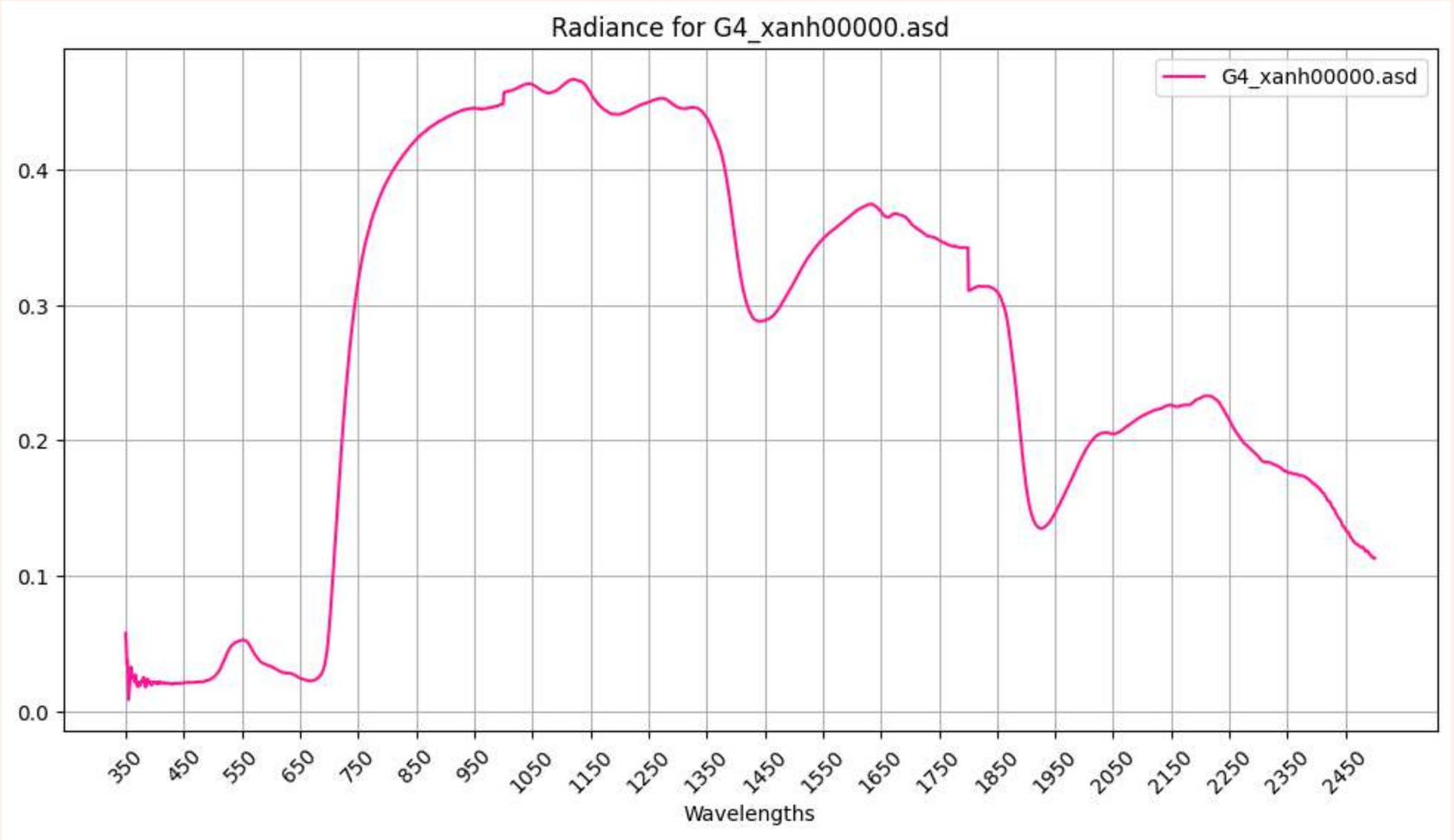

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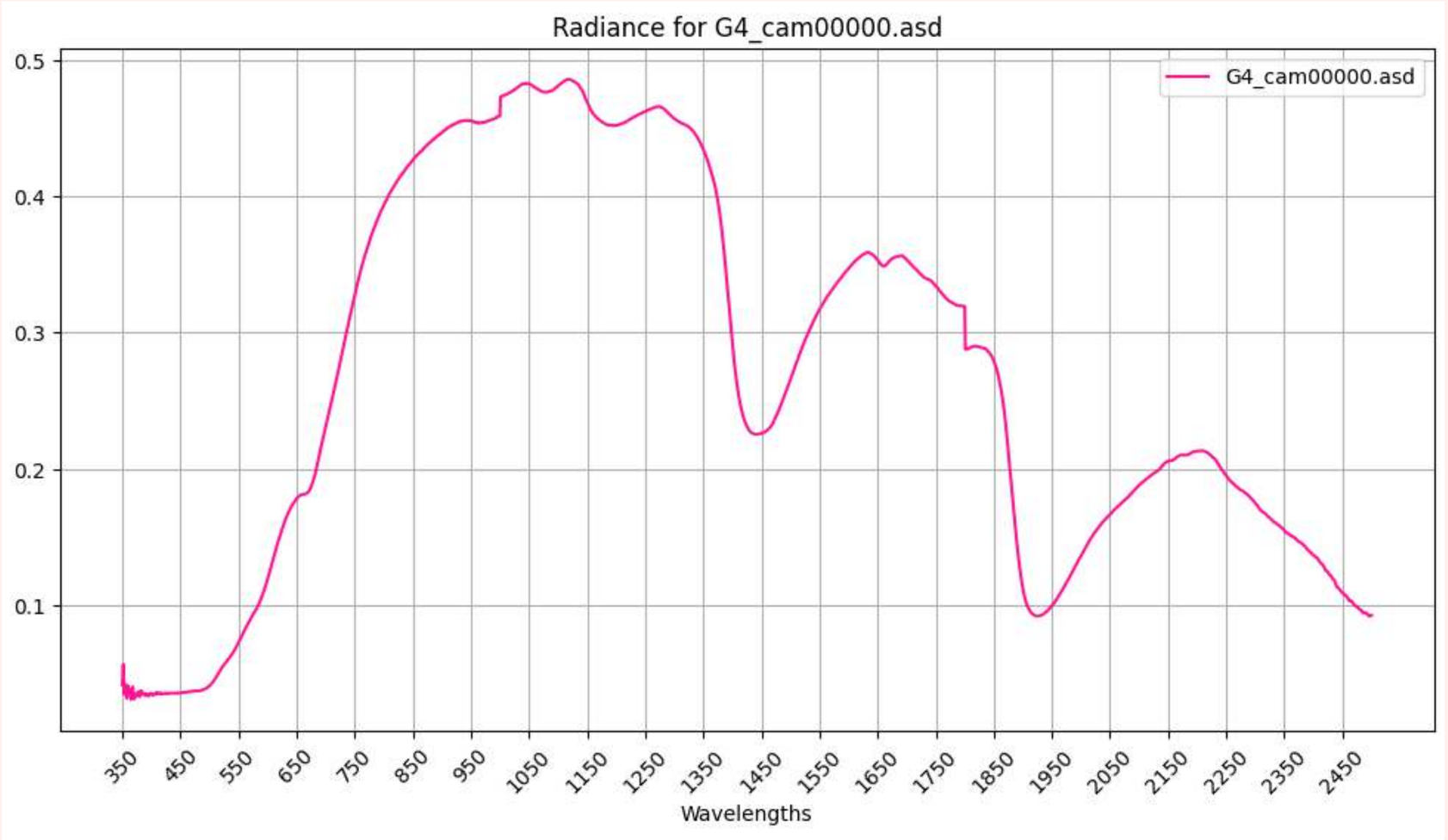

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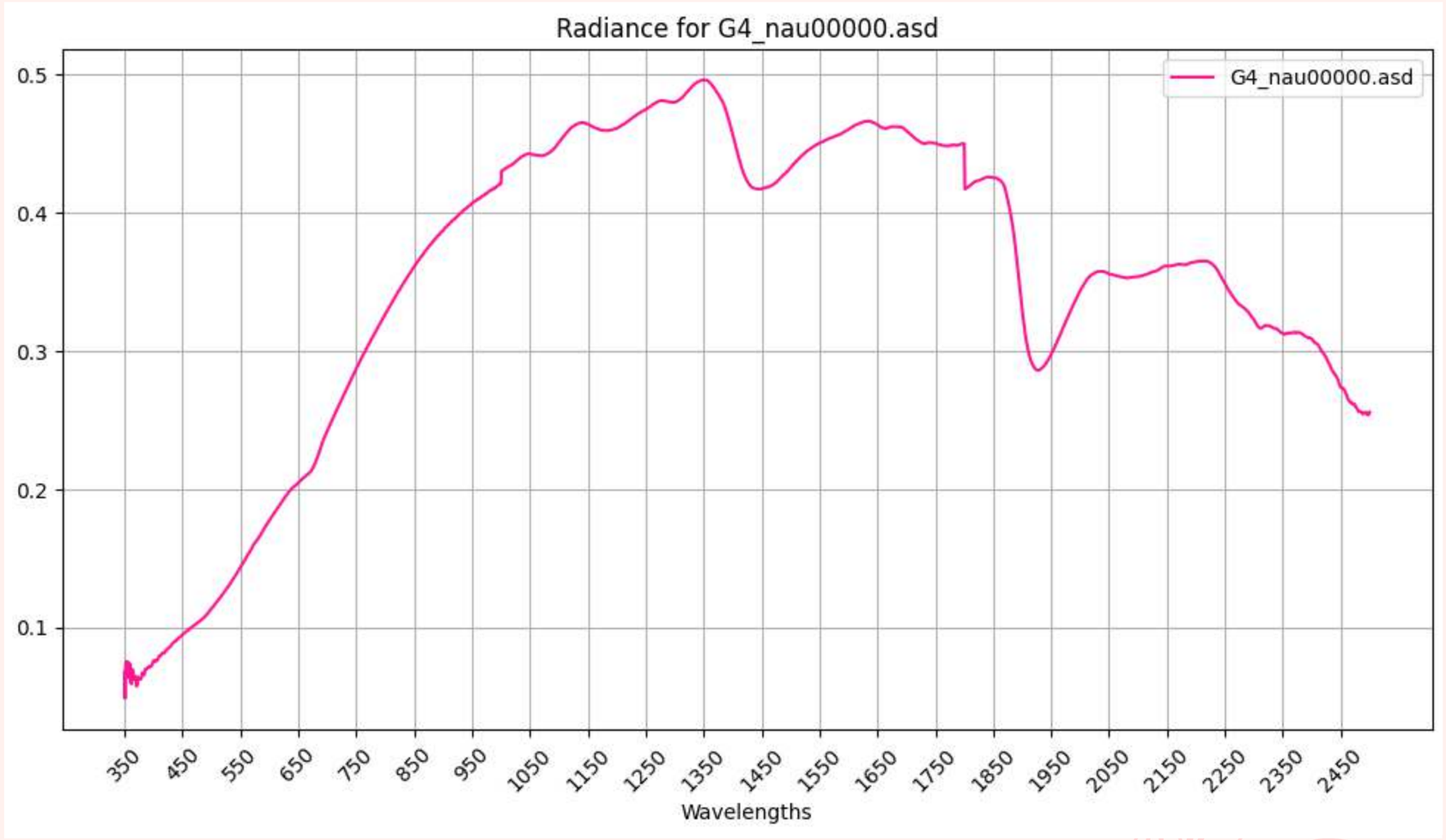

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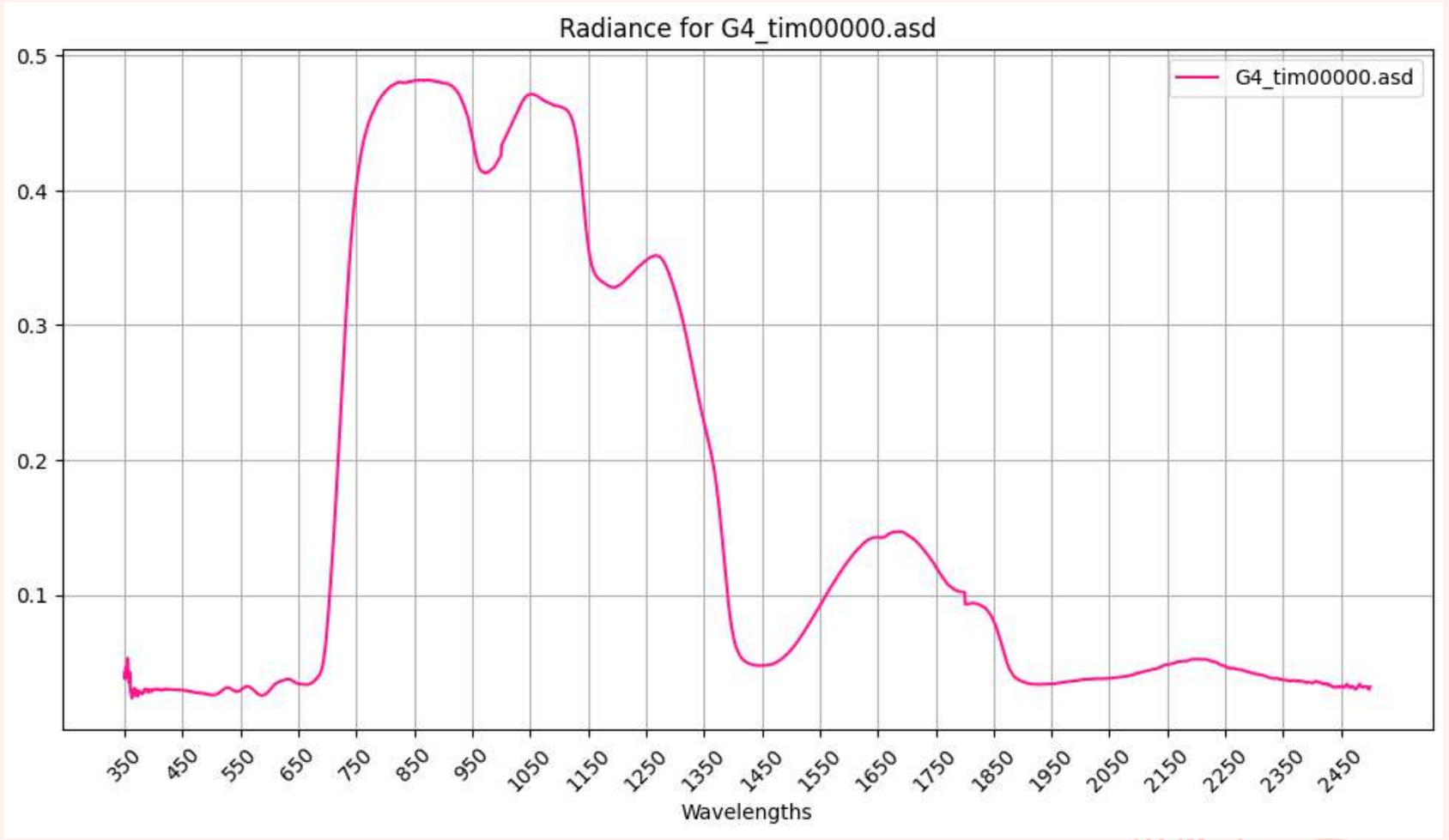

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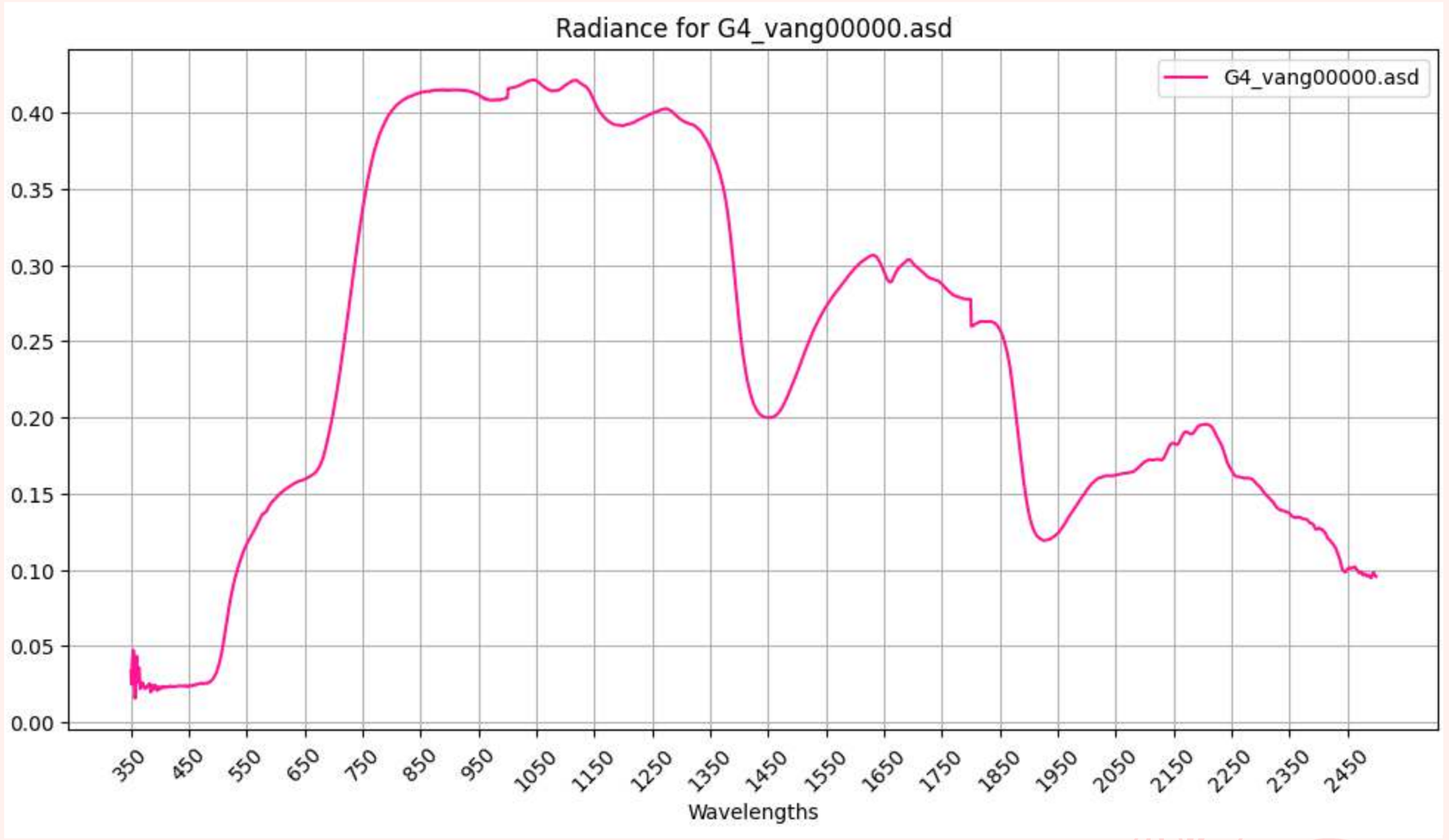

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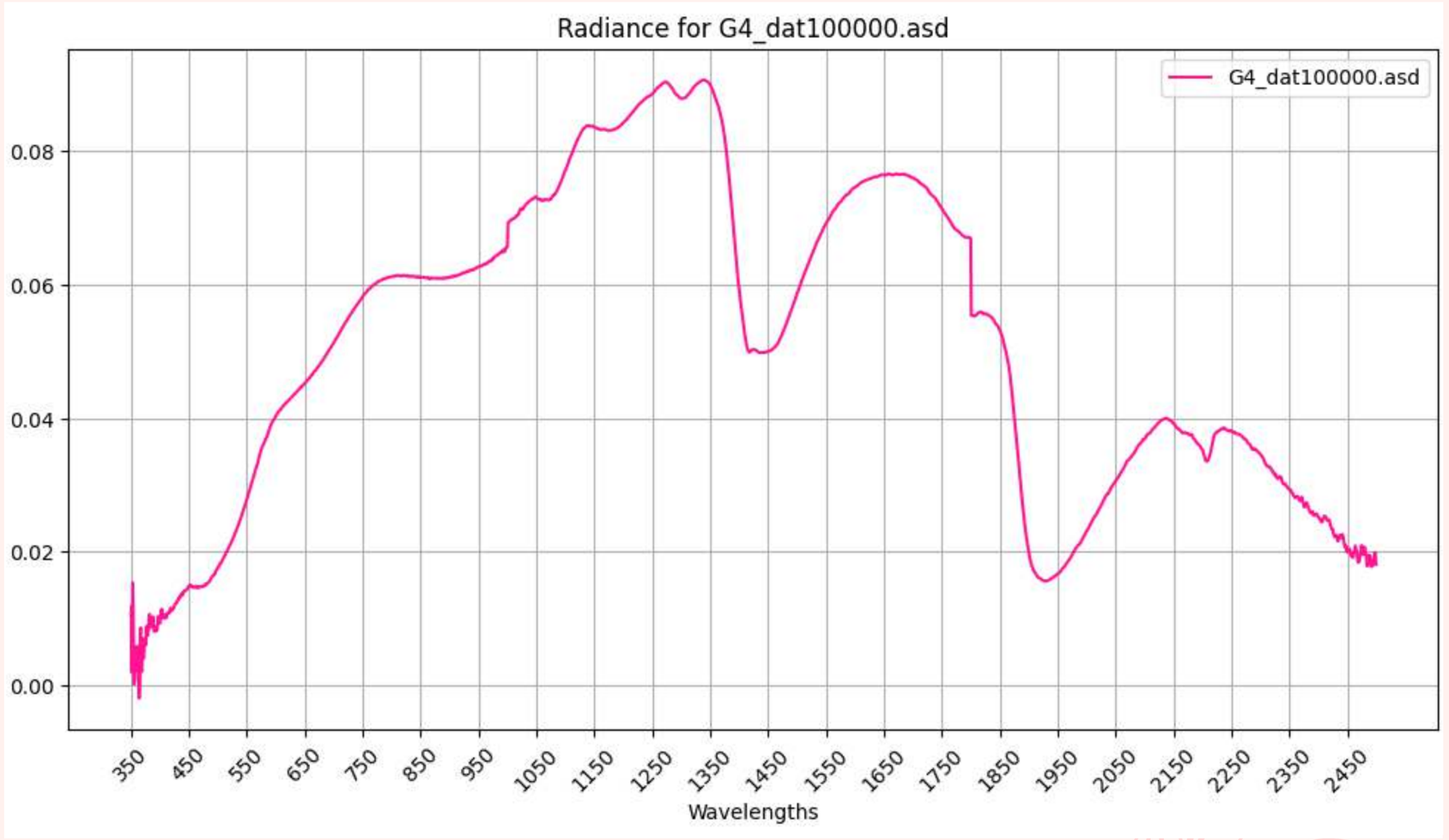

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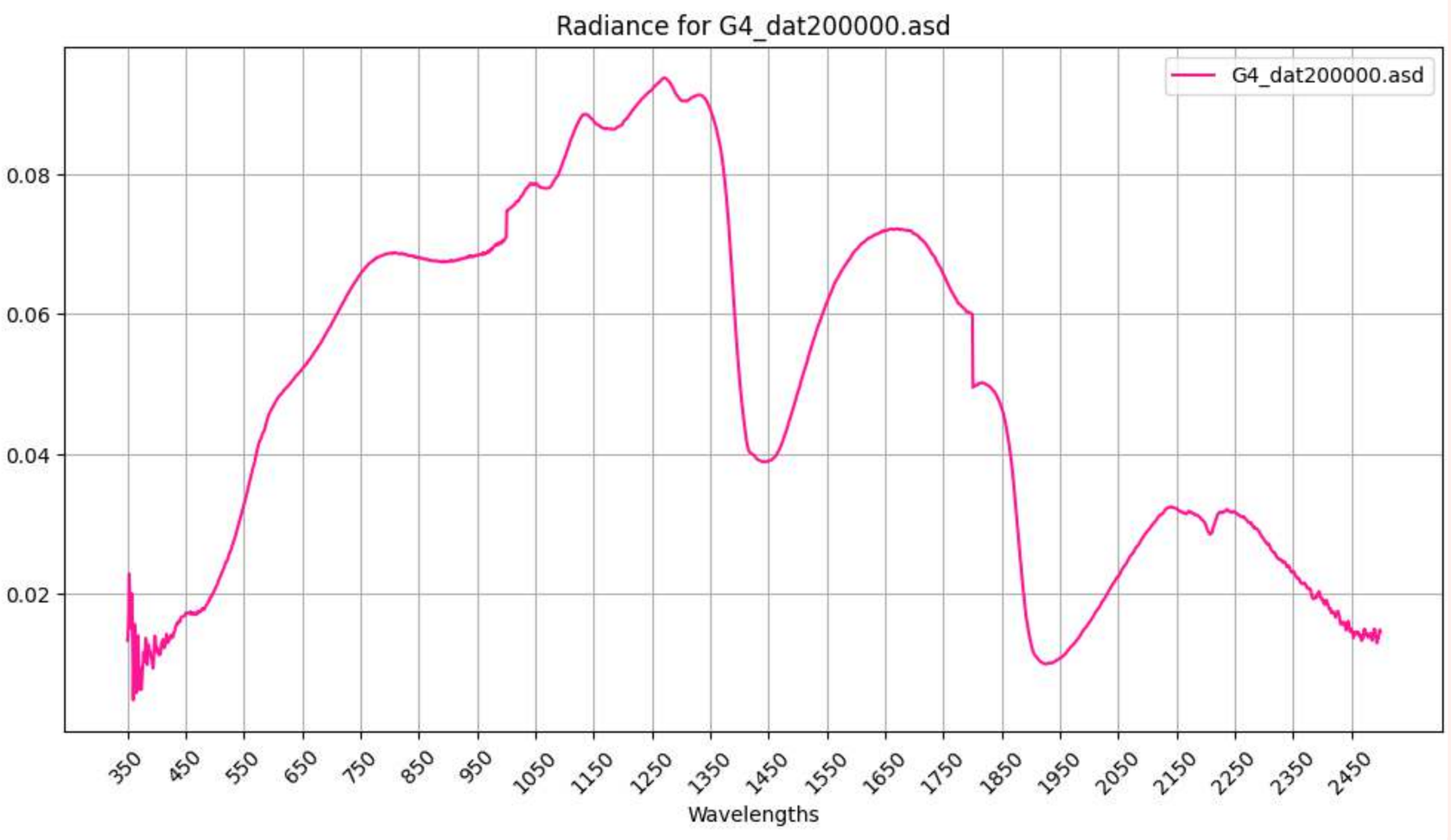

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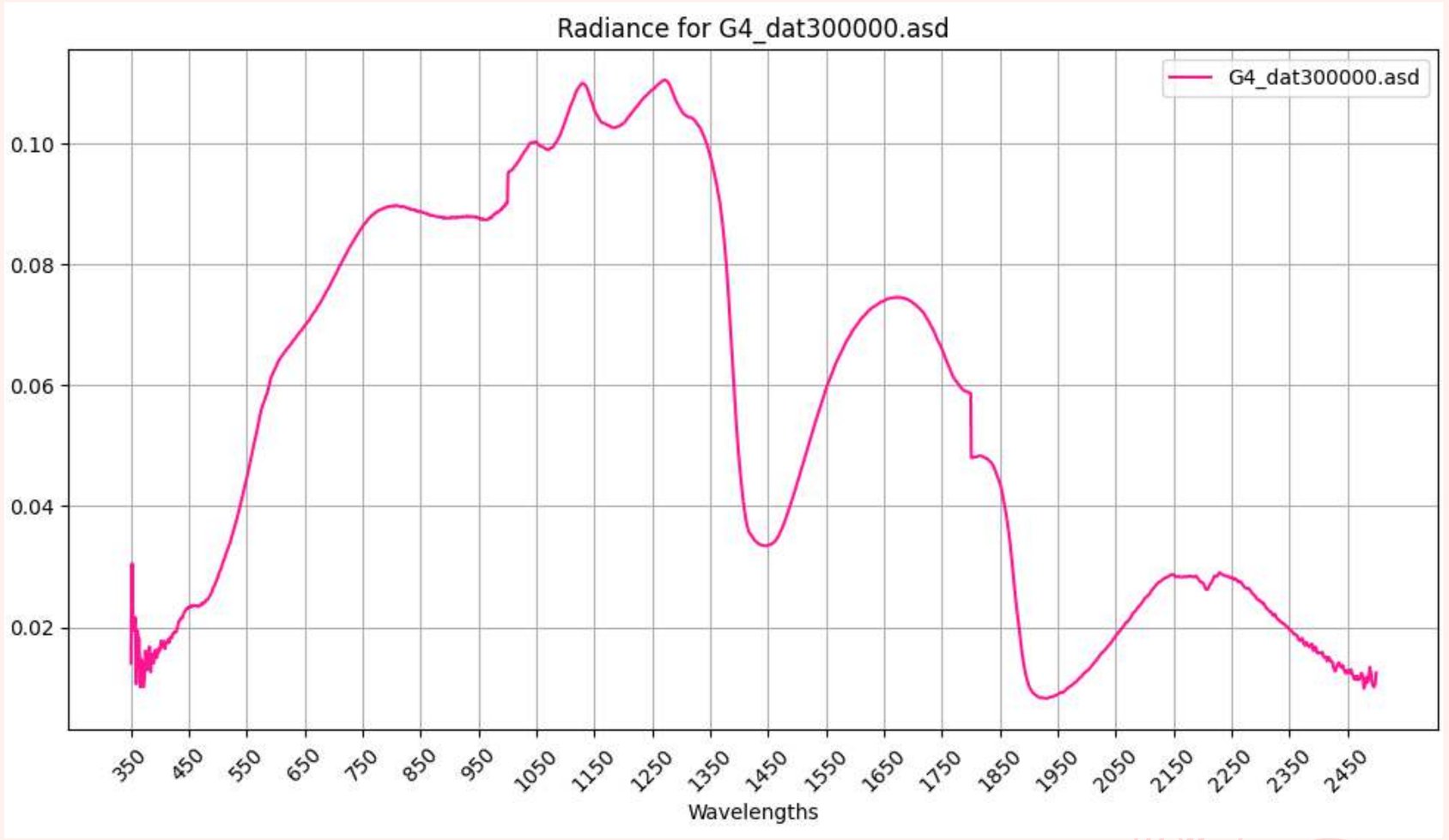

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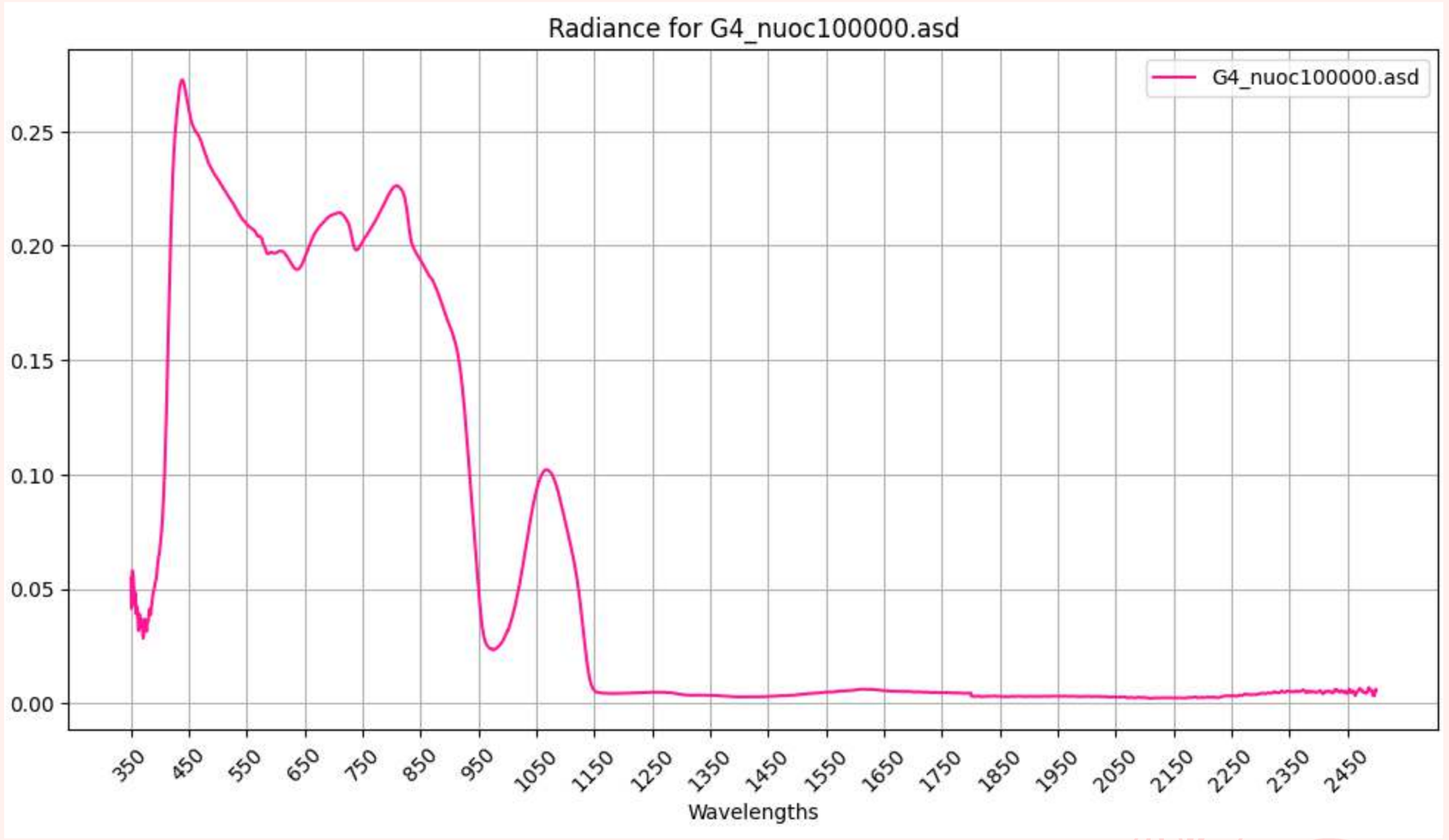

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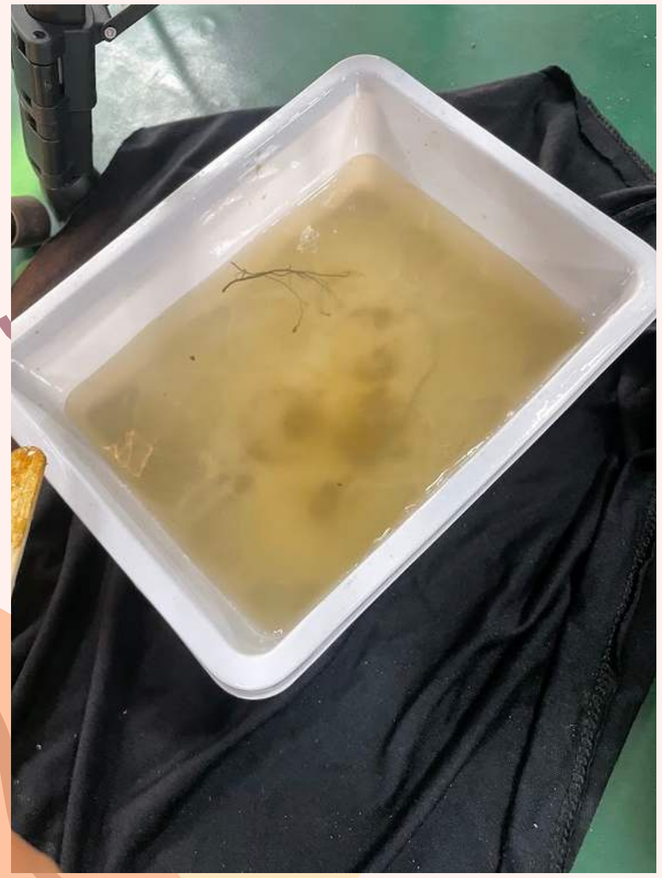
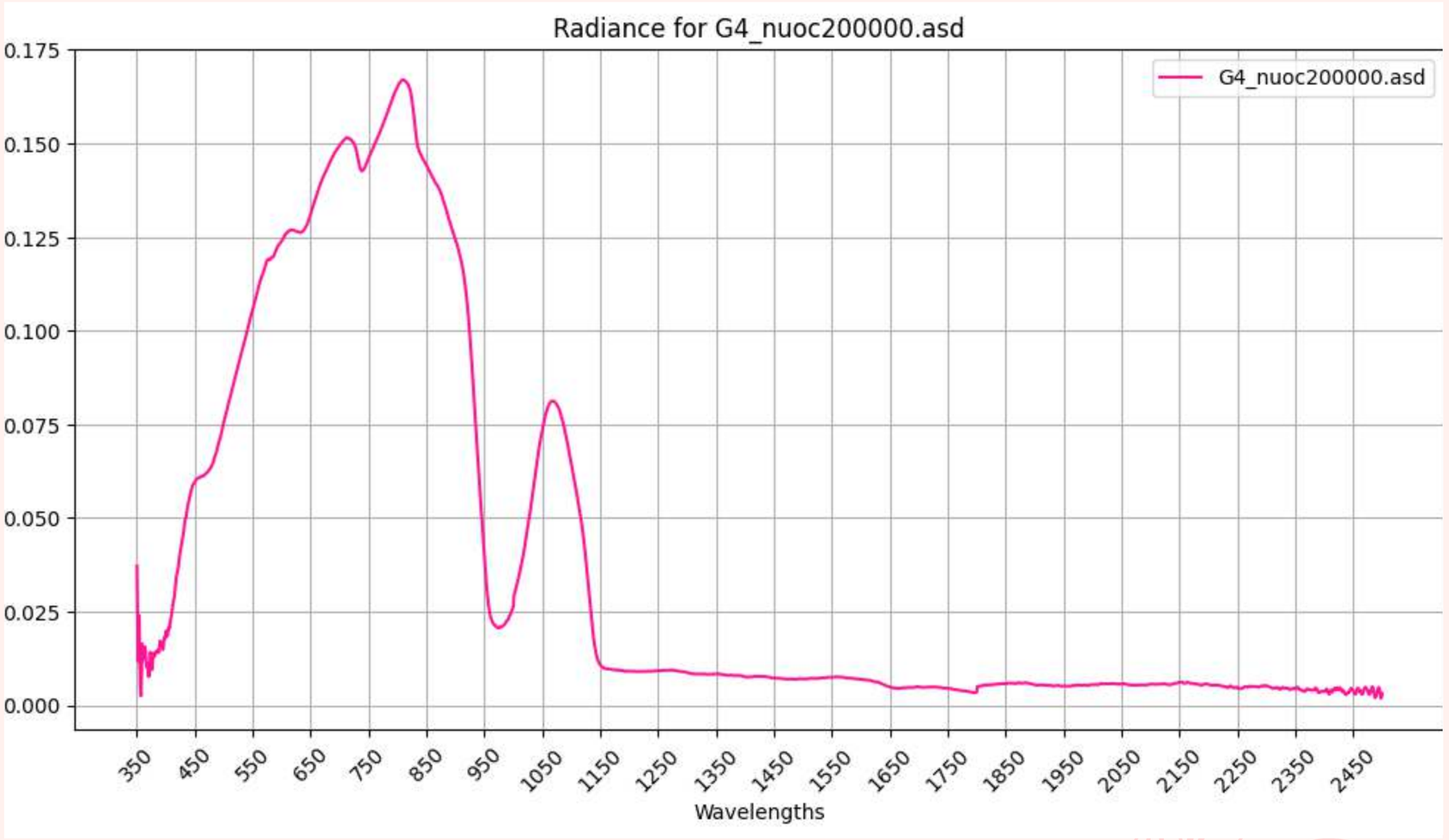
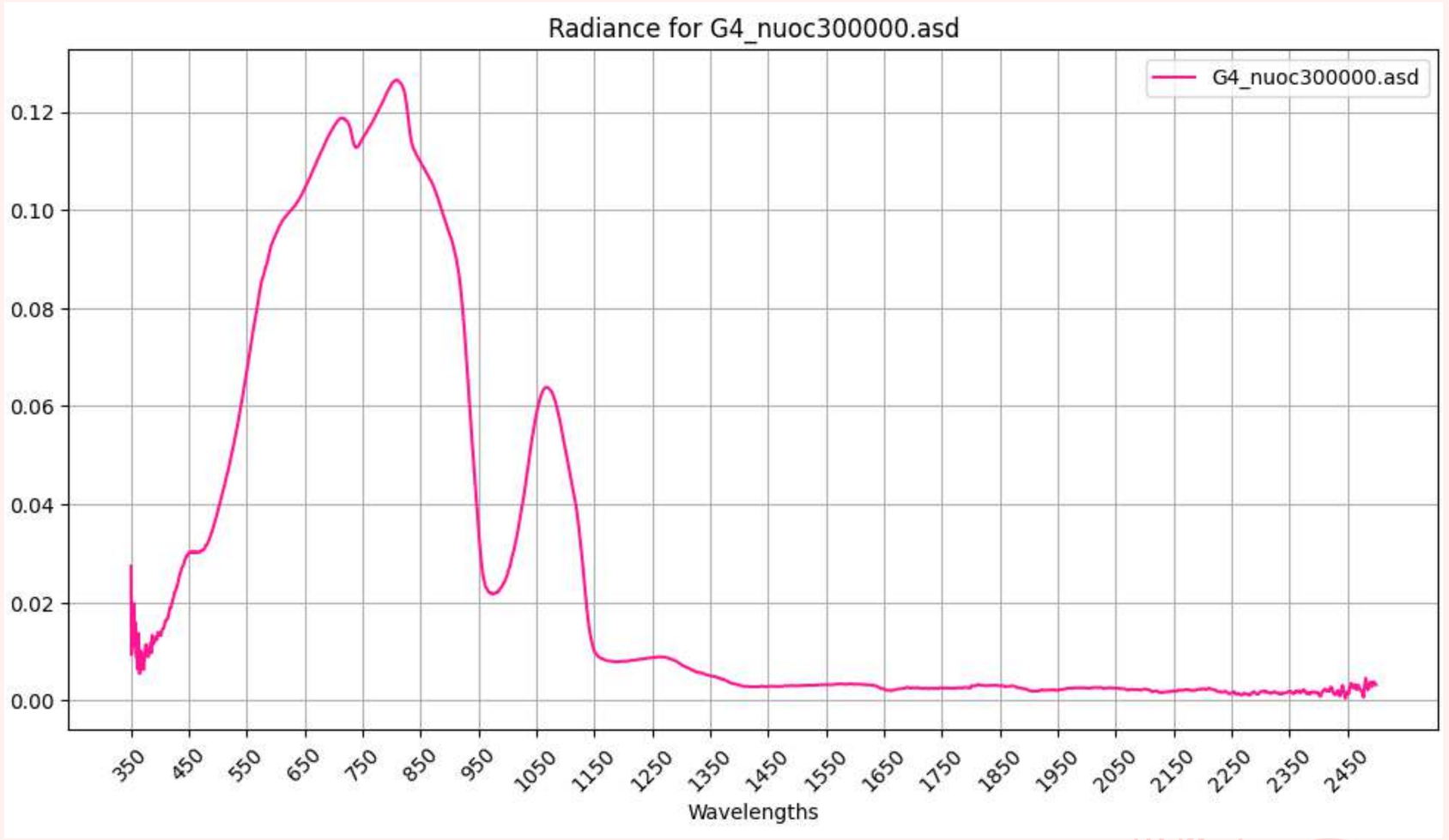
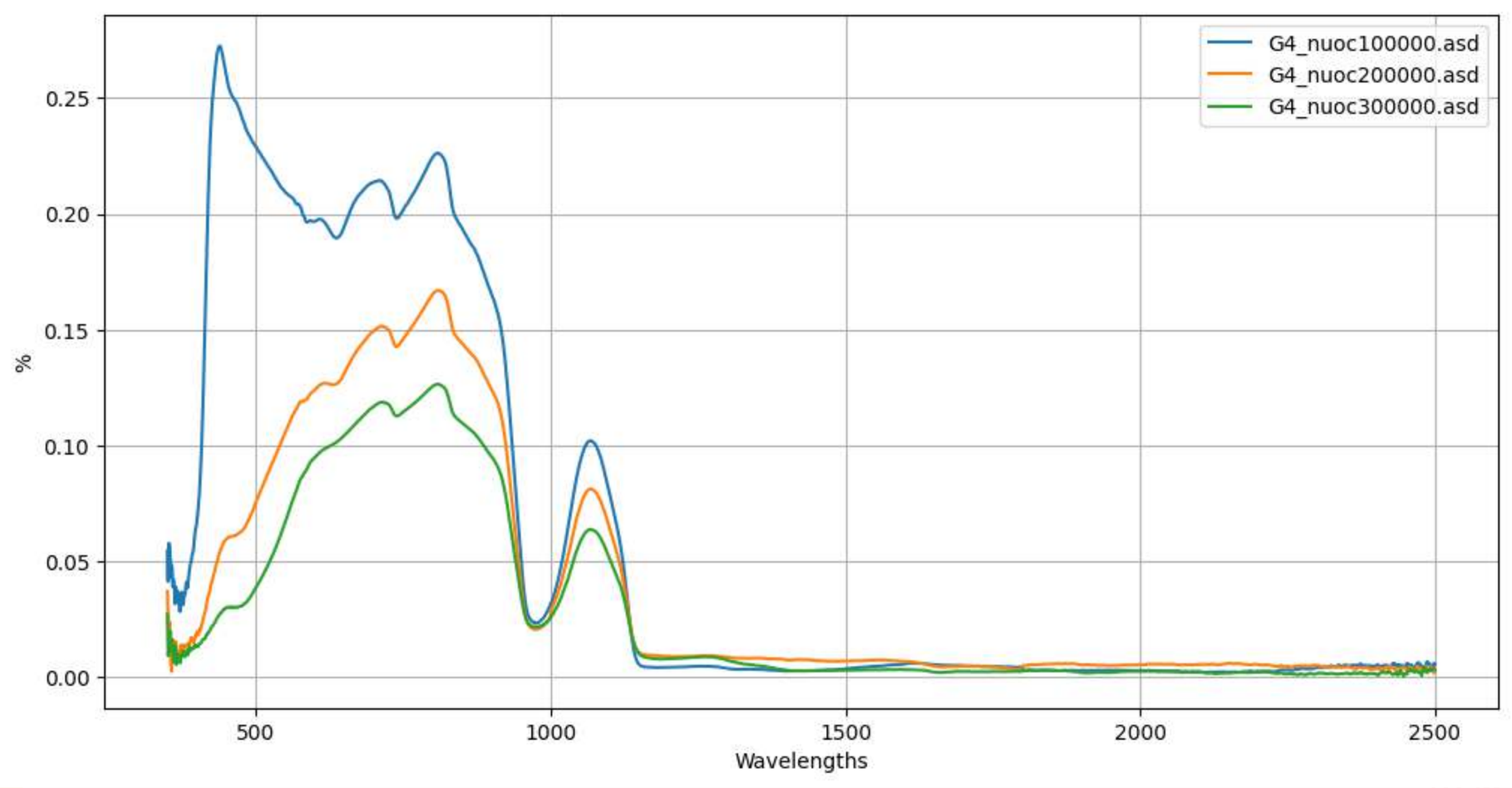




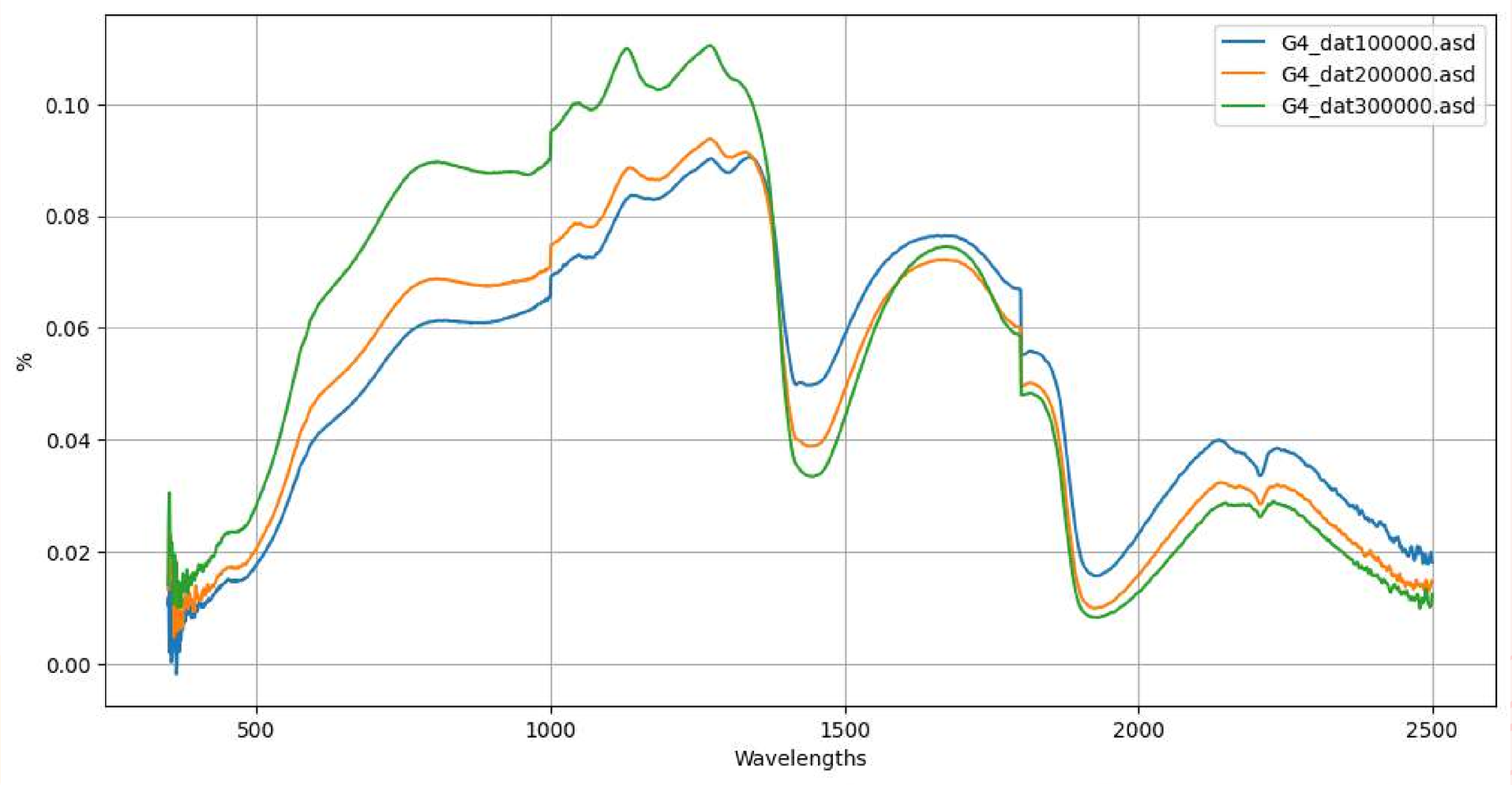
RESULTS & DISCUSSION



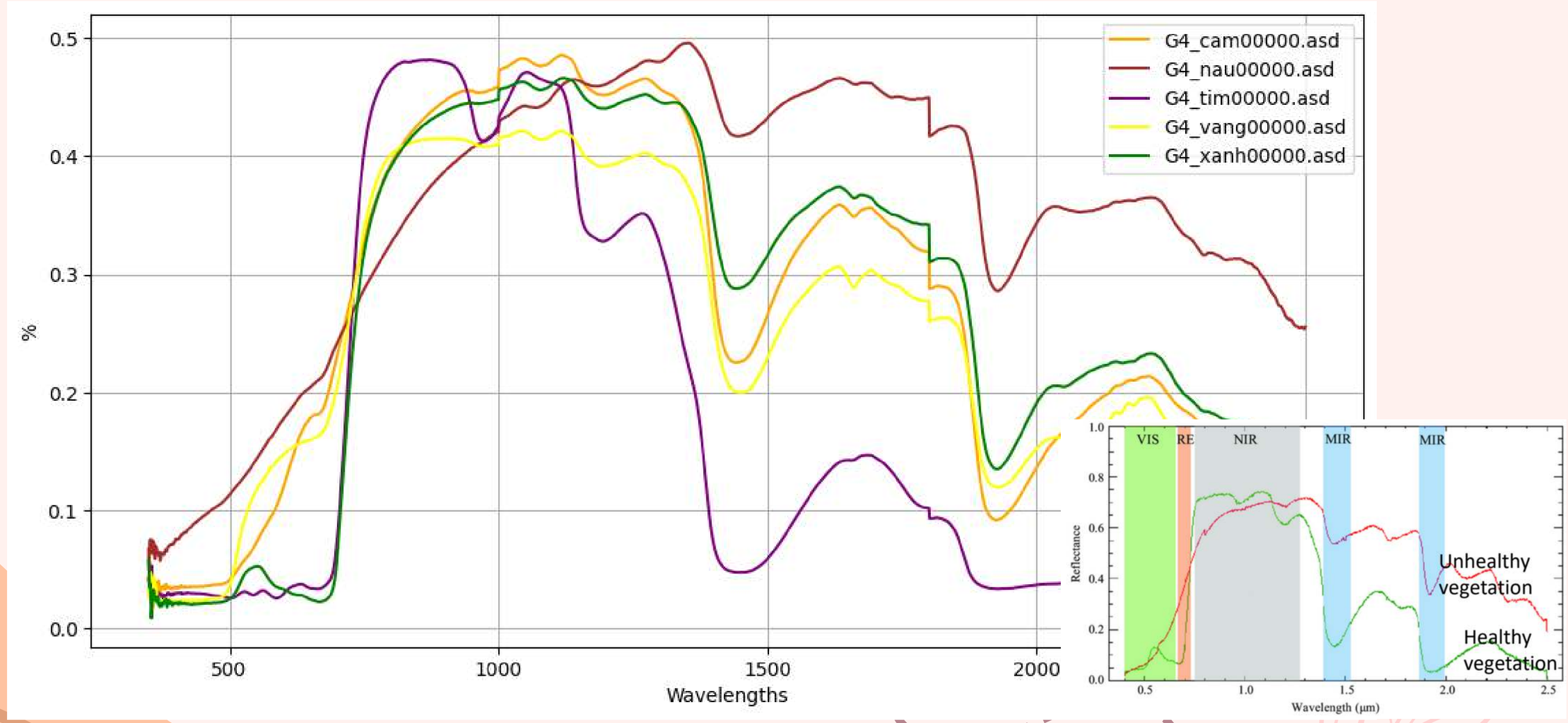
RESULTS & DISCUSSION



RESULTS & DISCUSSION



RESULTS & DISCUSSION

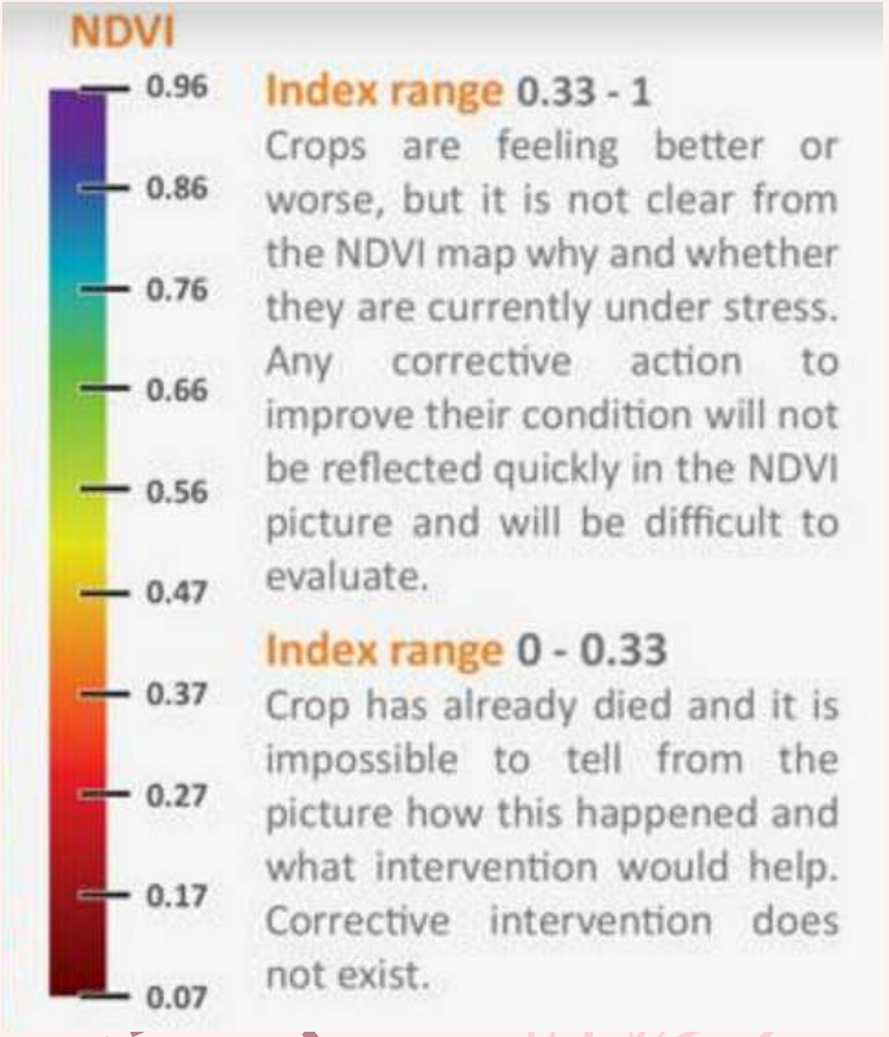


RESULTS & DISCUSSION

Normalized Difference Vegetation Index

$$NDVI = \frac{(NIR - RED)}{(NIR + RED)}$$

NDVI Range	Feature
-1 – 0	Water, snow, cloud
0 – 0.2	Barren land / built up /rock
0.2 – 1	Vegetation



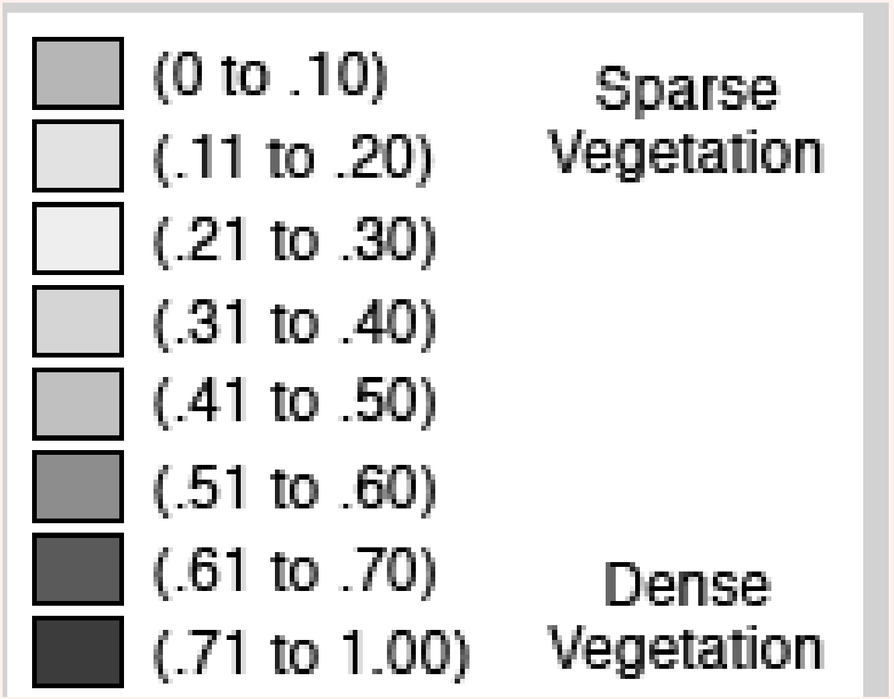
RESULTS & DISCUSSION

Enhanced Vegetation Index

A parameter to simultaneously correct soil and atmospheric effects

$$EVI = 2.5 * \frac{(NIR - RED)}{(NIR + C_1 * RED - C_2 * BLUE + L)}$$

L corrects for soil background, C1 and C2 correct for aerosol scattering
The standard EVI (NASA) in MODIS sensor: L=1, C1=6 and C2=7.5



RESULTS & DISCUSSION

https://colab.research.google.com/drive/12viJ4ywZom6WnA52bH0QjkIjwRVLUzN6?usp=sharing

RESULTS & DISCUSSION

$$NDVI = \frac{(NIR - RED)}{(NIR + RED)}$$

- more widely used
- more sensitive to the canopy background
- better for overall health of vegetation at a larger scale, such as agricultural fields or forested areas, rather than individual leaves

$$EVI = 2.5 * \frac{(NIR - RED)}{(NIR + C_1 * RED - C_2 * BLUE + L)}$$

- less sensitive to the canopy background
- better for vegetation monitoring
- similarly to NDVI but uses additional wavelengths of light to correct for the inaccuracies of NDVI

THANK YOU