

The background features a light pink base with various decorative elements. In the top left, there is a blue line-art branch with leaves. In the top right, a large blue abstract shape contains a yellow rounded rectangle and two orange dots. A dashed brown line curves across the top. On the left, another dashed brown line curves downwards. In the bottom left, an orange abstract shape contains a yellow rounded rectangle and two orange dots. In the bottom right, there is a pink line-art branch with leaves.

# **SPECTROMETRY PERFORMANCE FOR EVALUATING REFLECTANCE AND ANALYSIS**

Group 4: Duong Thu Phuong  
Pham Tuan San  
Bui Khai Son  
Le Quang Tri

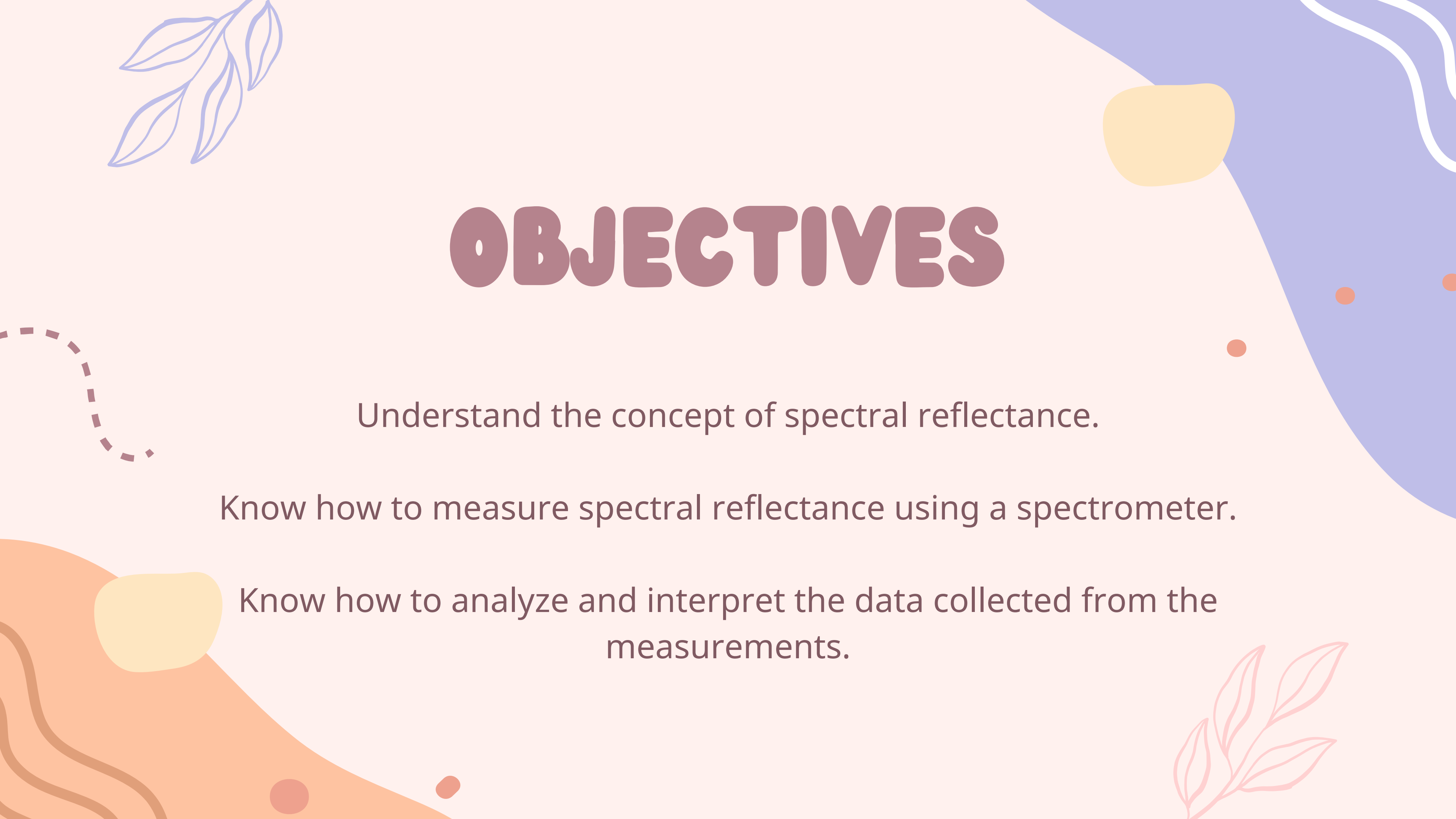
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# OBJECTIVES

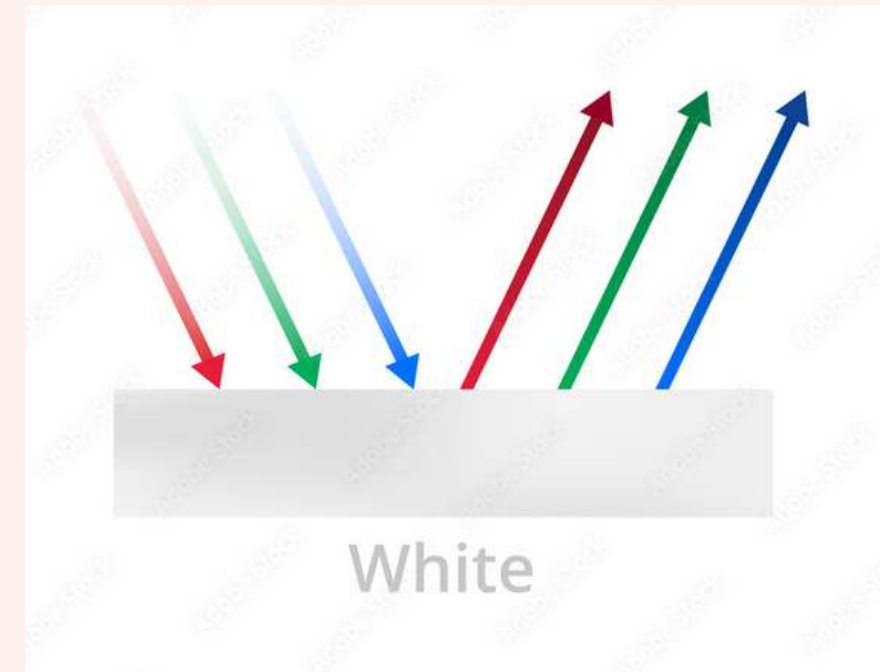
Understand the concept of spectral reflectance.

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

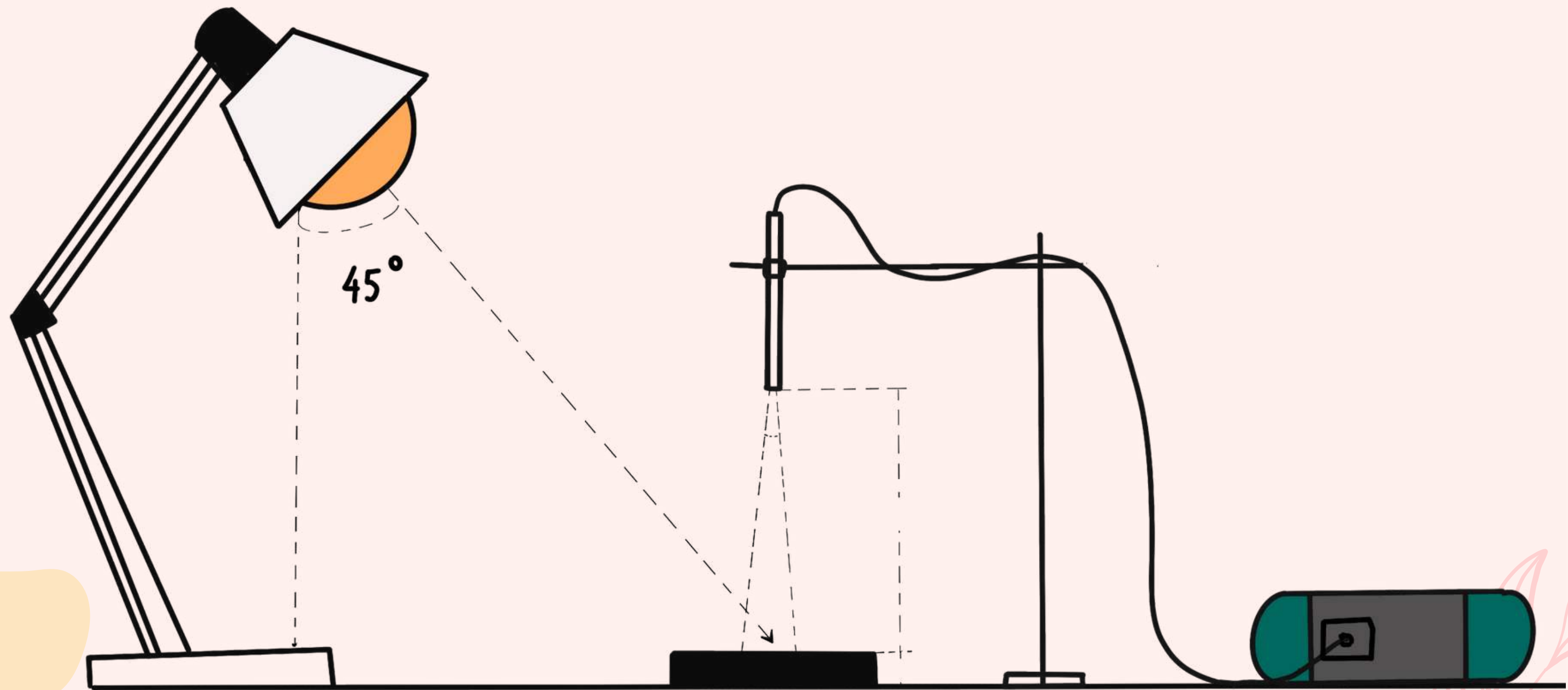




# MATERIALS

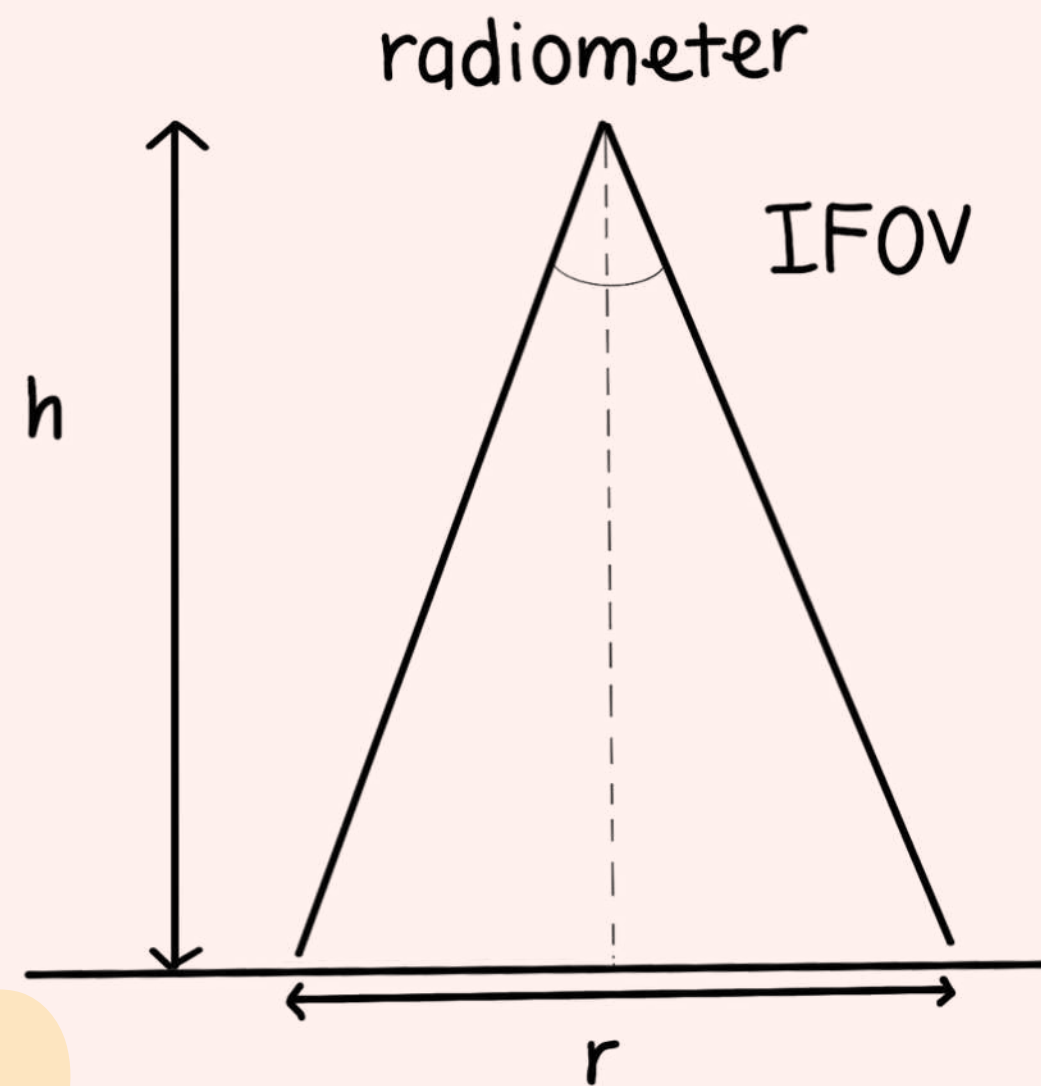


# PREPARATION





# IMPLIMENTATION



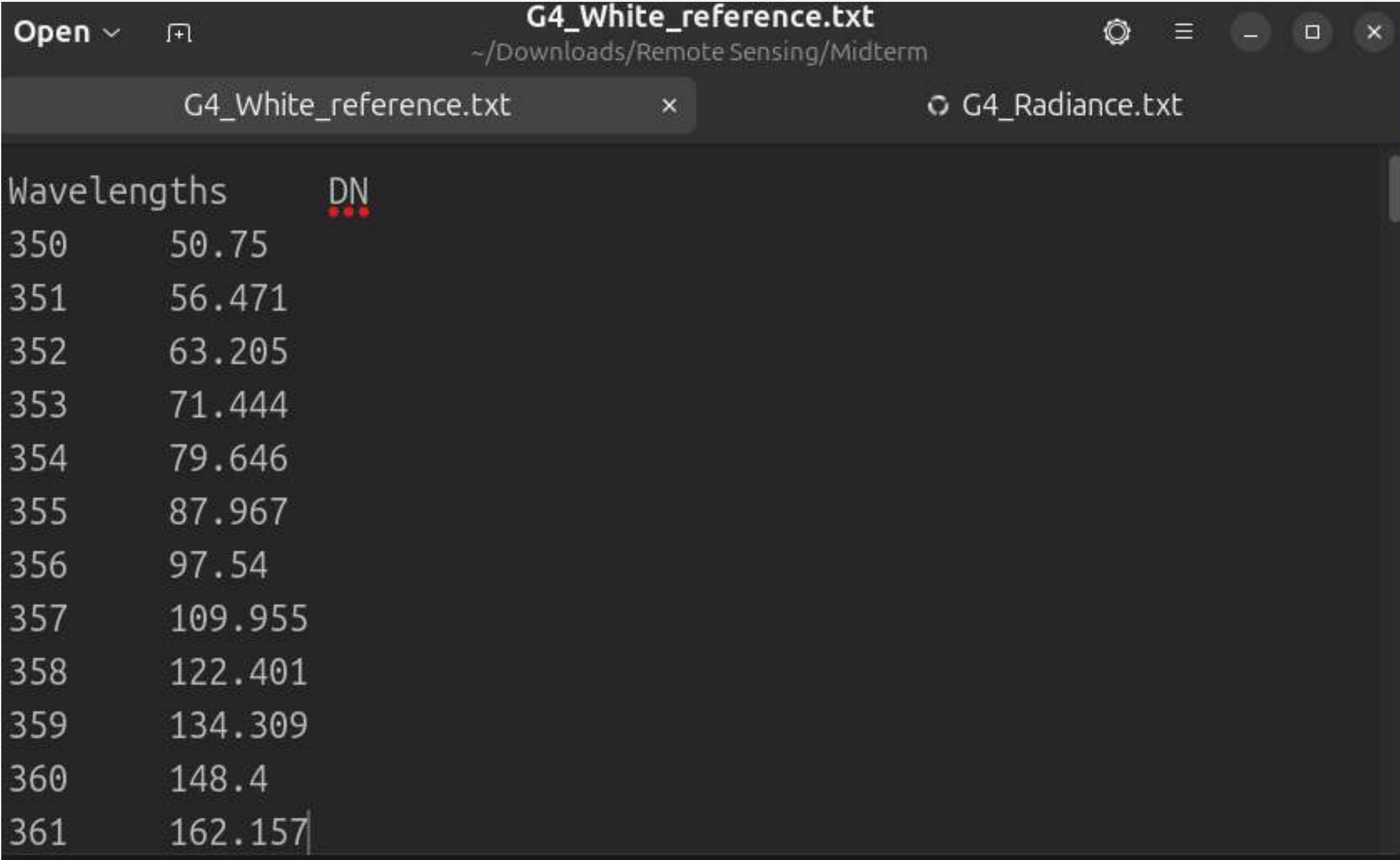
$$\tan \frac{\theta}{2} = \frac{r}{2h}$$

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

$$\approx 2,797 \text{ cm}$$




# DATA EXPORTED



The screenshot shows a text editor window titled "G4\_White\_reference.txt" with a file path of "~/Downloads/Remote Sensing/Midterm". The window contains a table with two columns: "Wavelengths" and "DN". The data is as follows:

Wavelengths	DN
350	50.75
351	56.471
352	63.205
353	71.444
354	79.646
355	87.967
356	97.54
357	109.955
358	122.401
359	134.309
360	148.4
361	162.157

# DATA EXPORTED

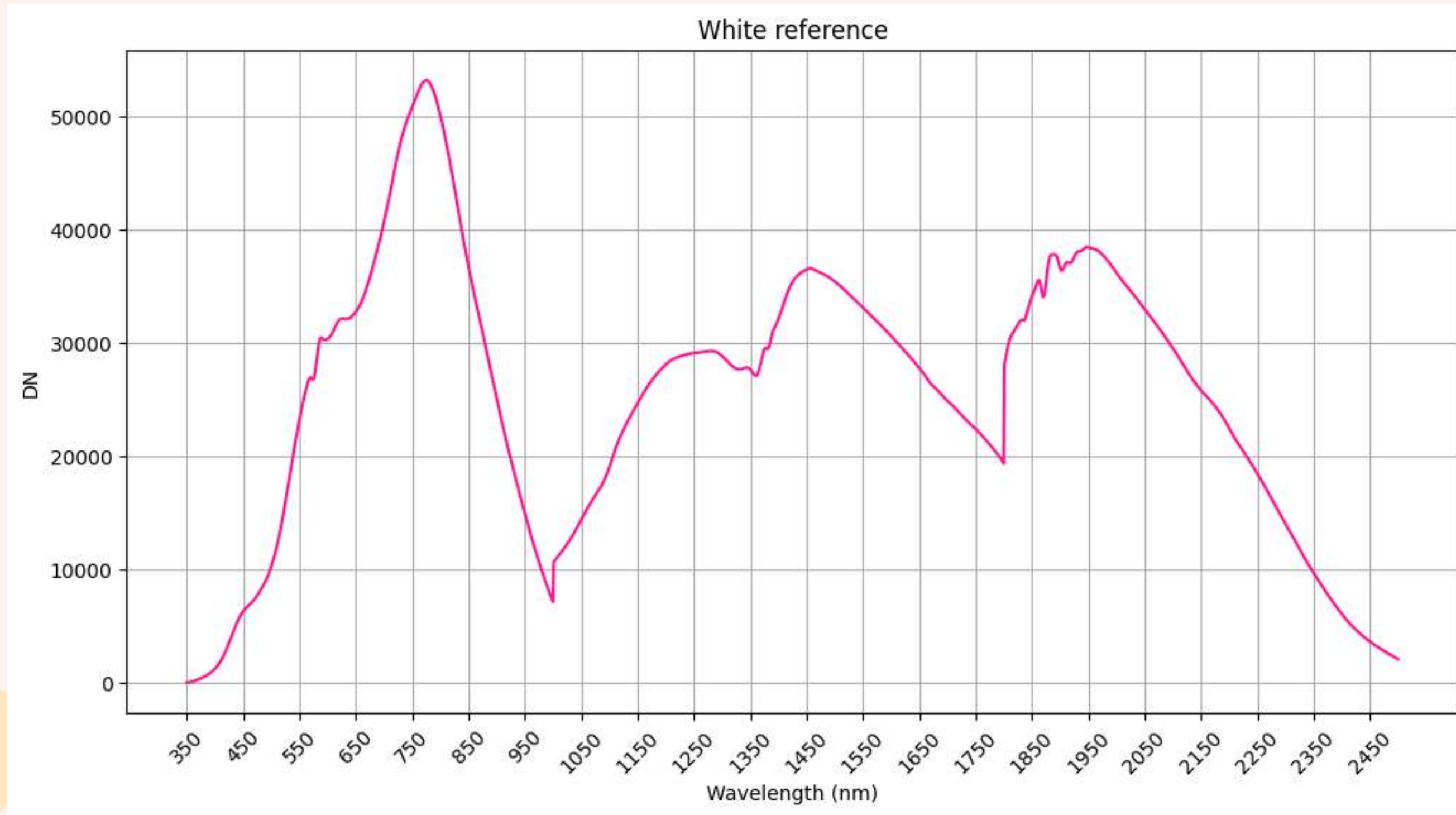
Open ▾  G4\_Radiance.txt  
~/Downloads/Remote Sensing/Midterm

Wavelengths, G4\_cam000000.asd, G4\_dat1000000.asd, G4\_dat2000000.asd, G4\_dat3000000.asd, G4\_nau000000.asd, G4\_nuoc1000000.asd, G4\_nuoc2000000.asd, G4\_nuoc3000000.asd, G4\_tim000000.asd, G4\_vang000000.asd, G4\_xanh000000.asd

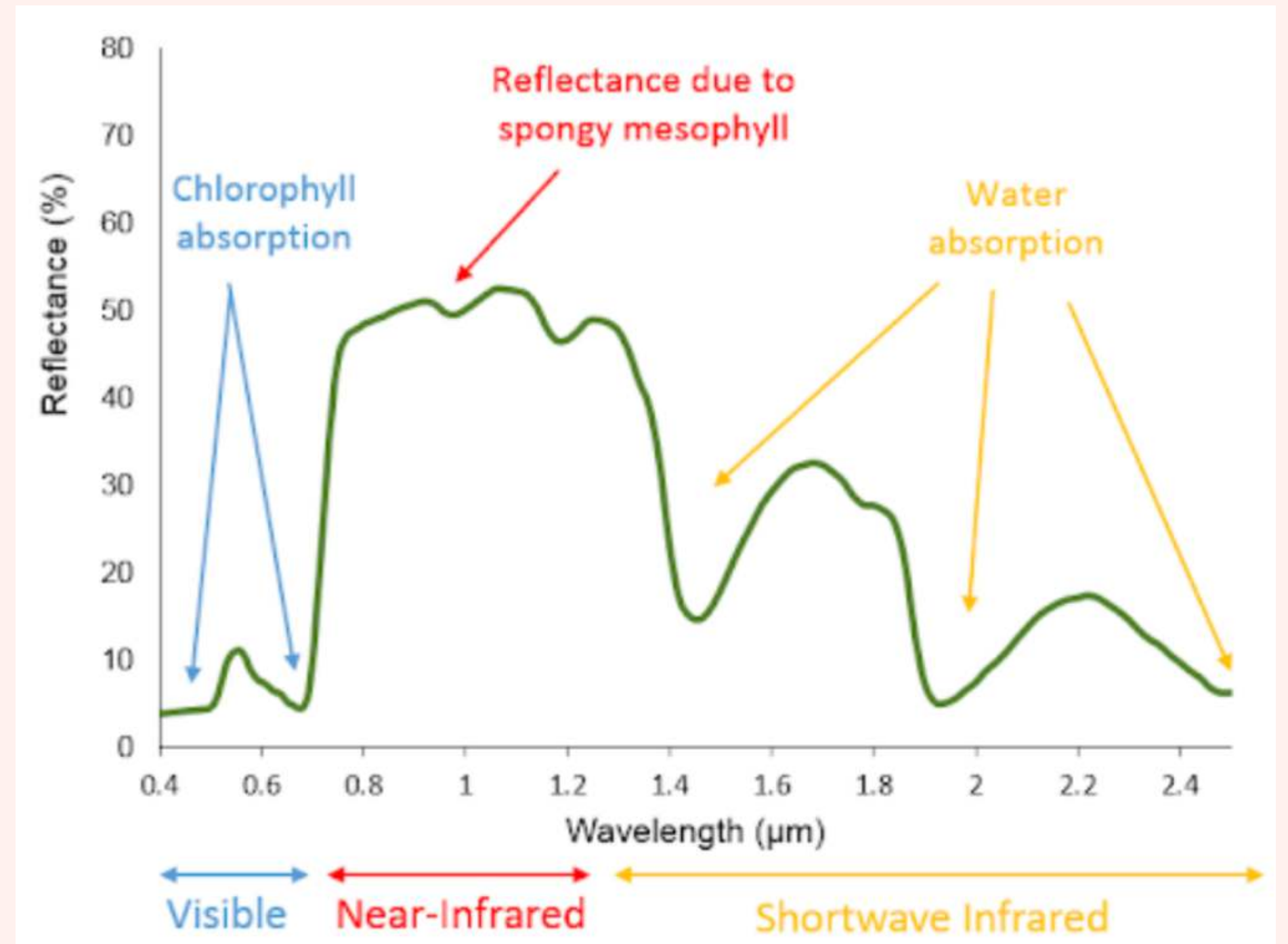
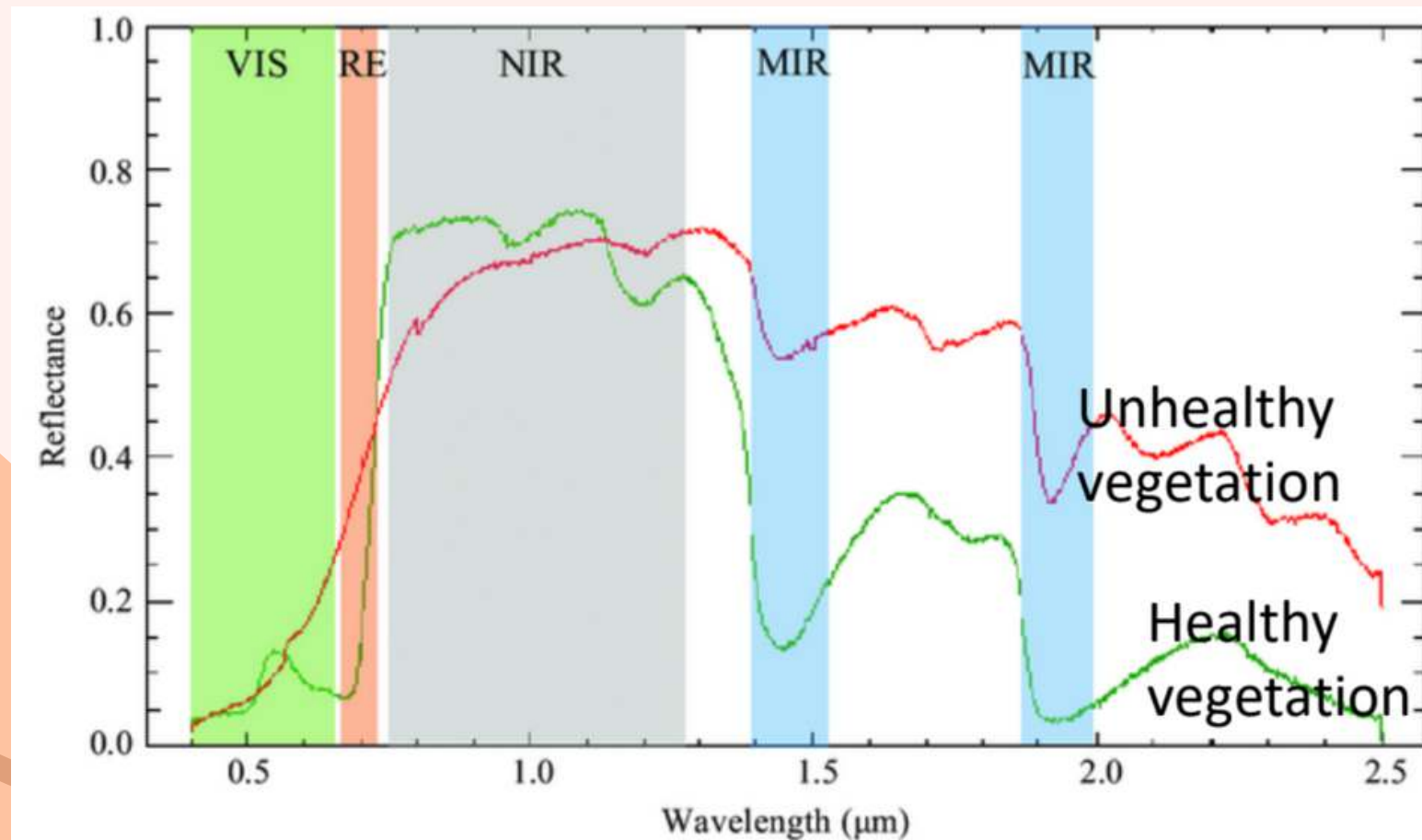
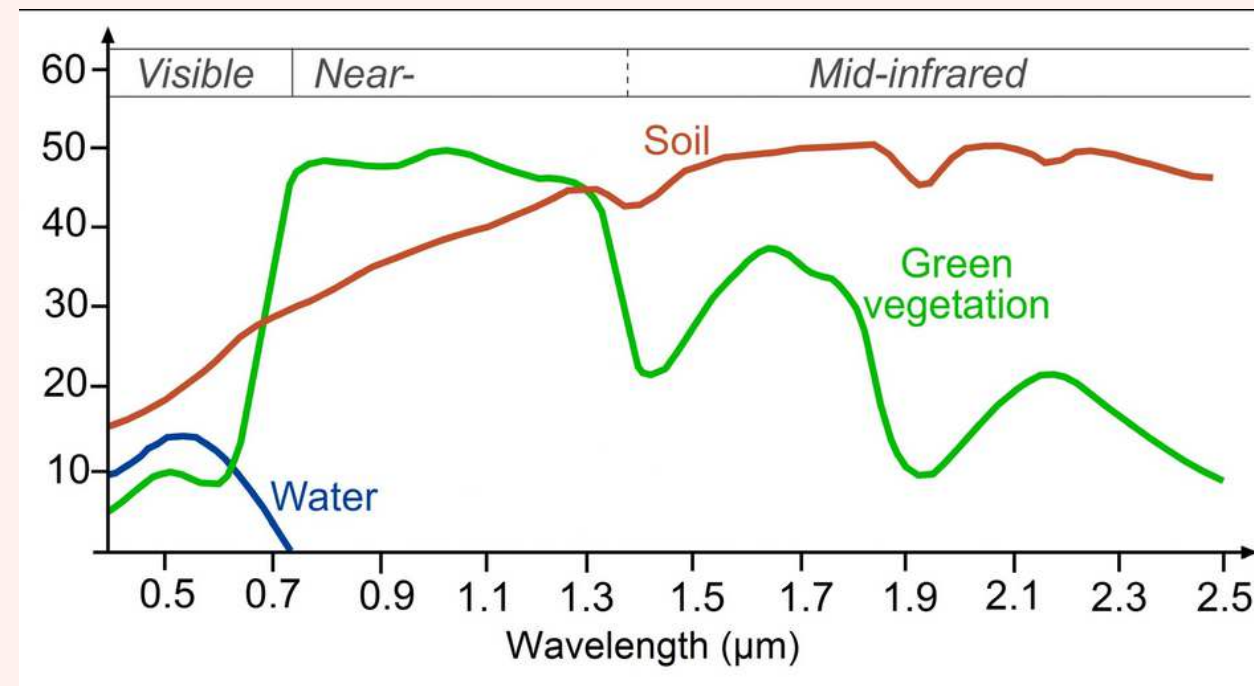
350	2.104	0.536	0.673	0.711	3.406	2.775	1.886	1.389	2.123	1.711	2.927
351	2.654	0.674	0.788	1.441	2.738	2.335	1.373	0.526	2.13	1.405	2.709
352	3.574	0.126	1.058	1.928	4.609	3.654	0.739	0.688	2.909	2.423	2.198
353	2.723	1.1	1.629	1.663	5.371	4.13	1.713	0.994	3.042	3.118	2.702
354	2.747	0.846	1.563	1.546	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



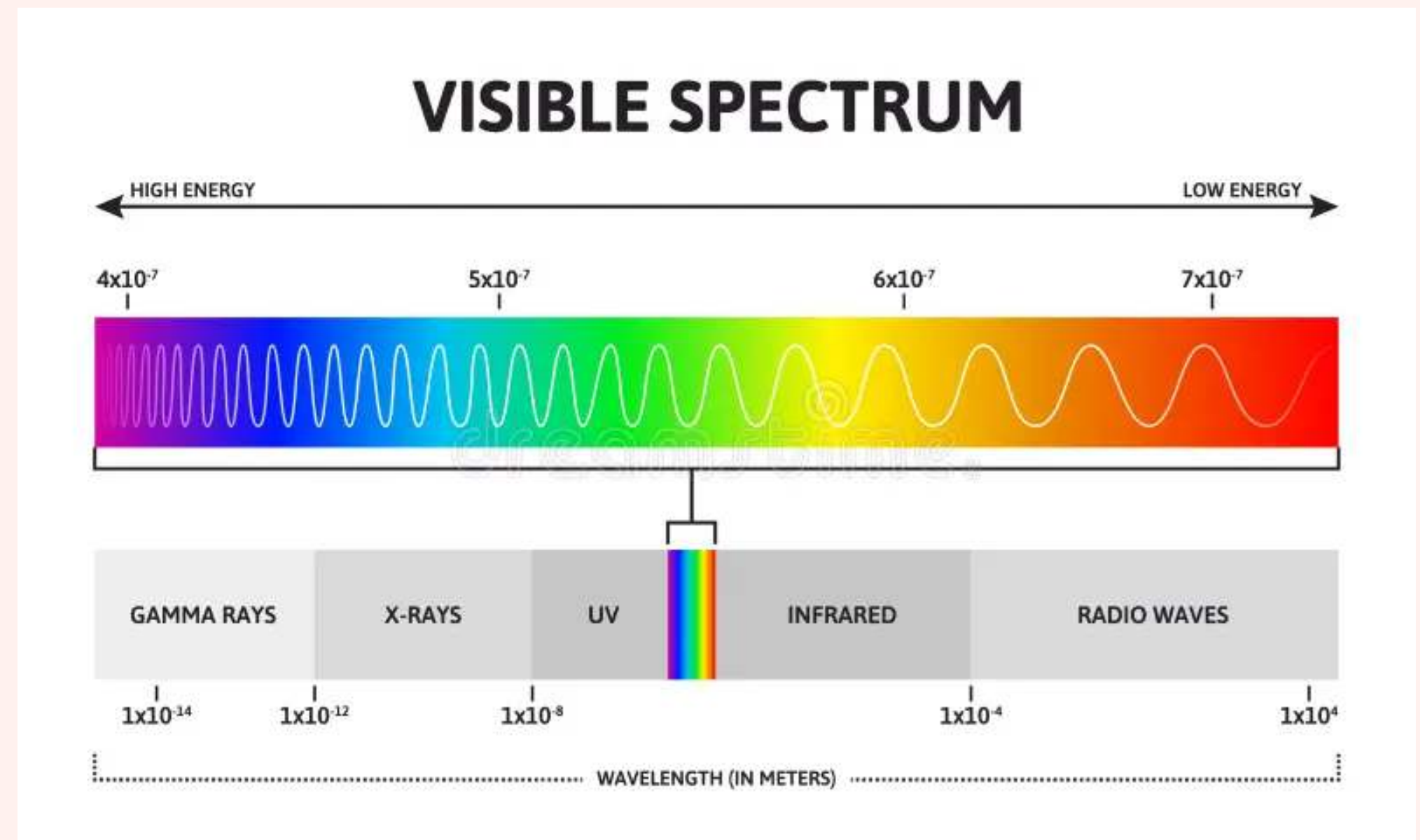
# RESULTS & DISCUSSION



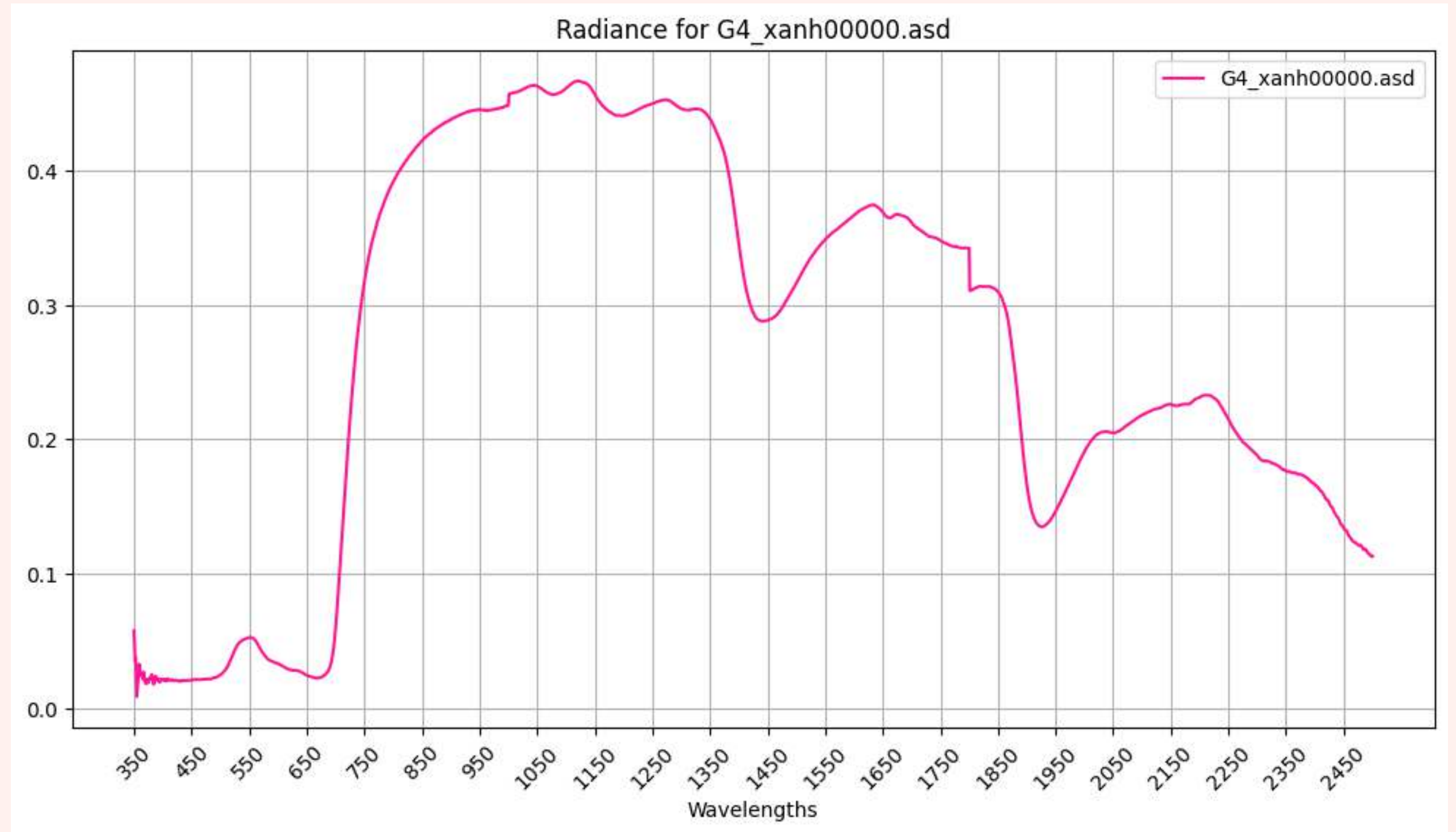


# RESULTS & DISCUSSION

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

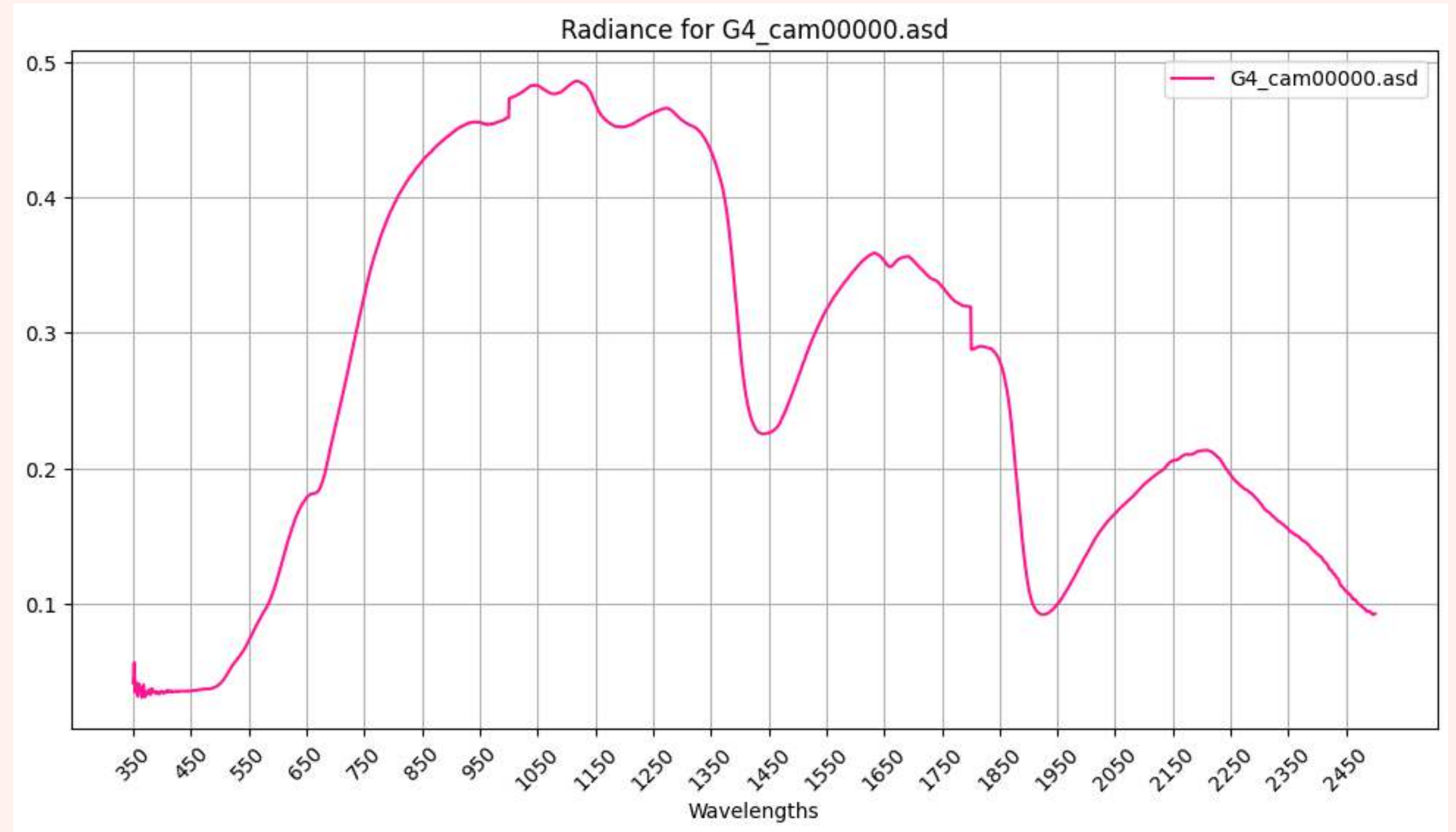


# RESULTS & DISCUSSION



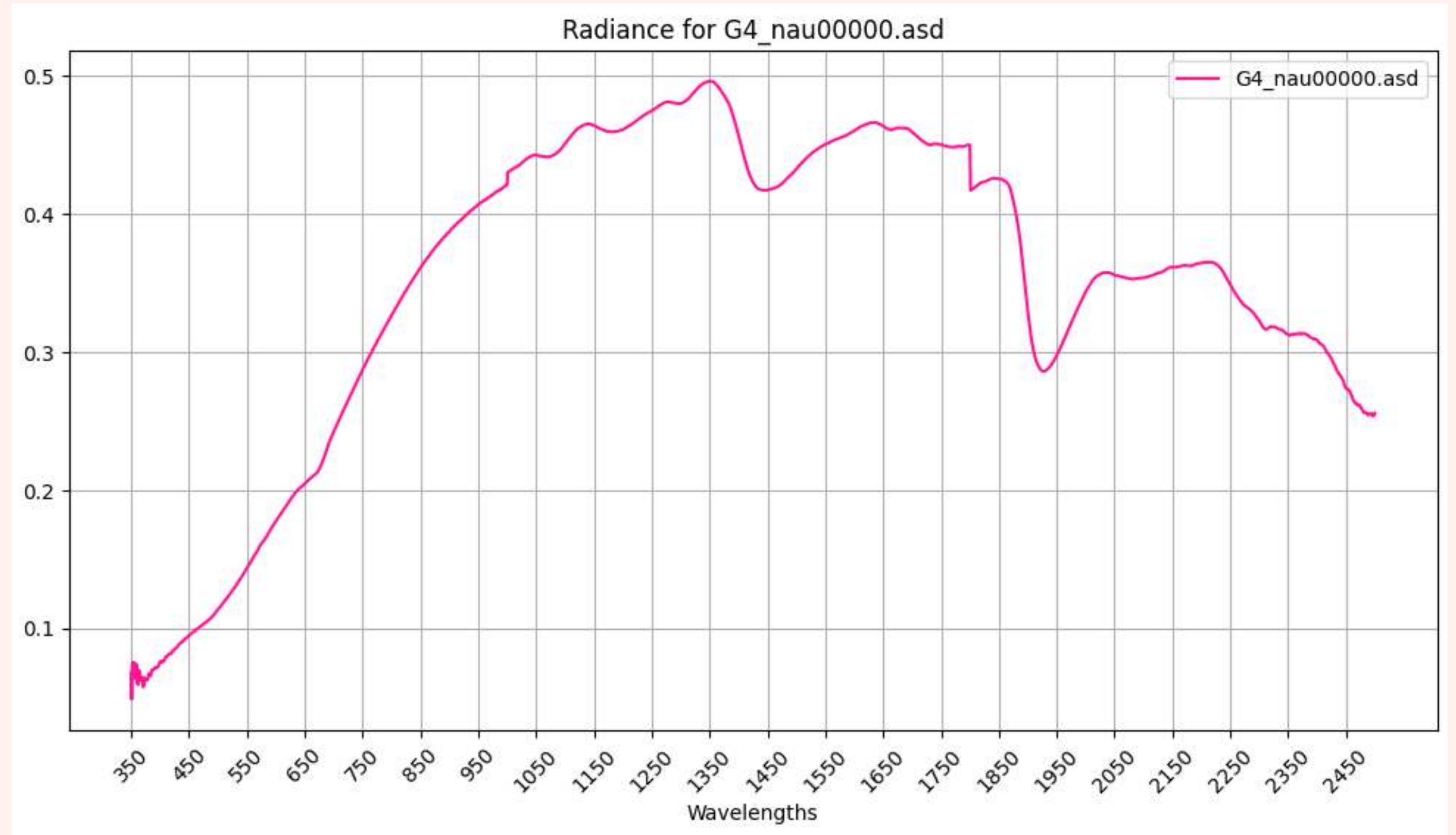


# RESULTS & DISCUSSION



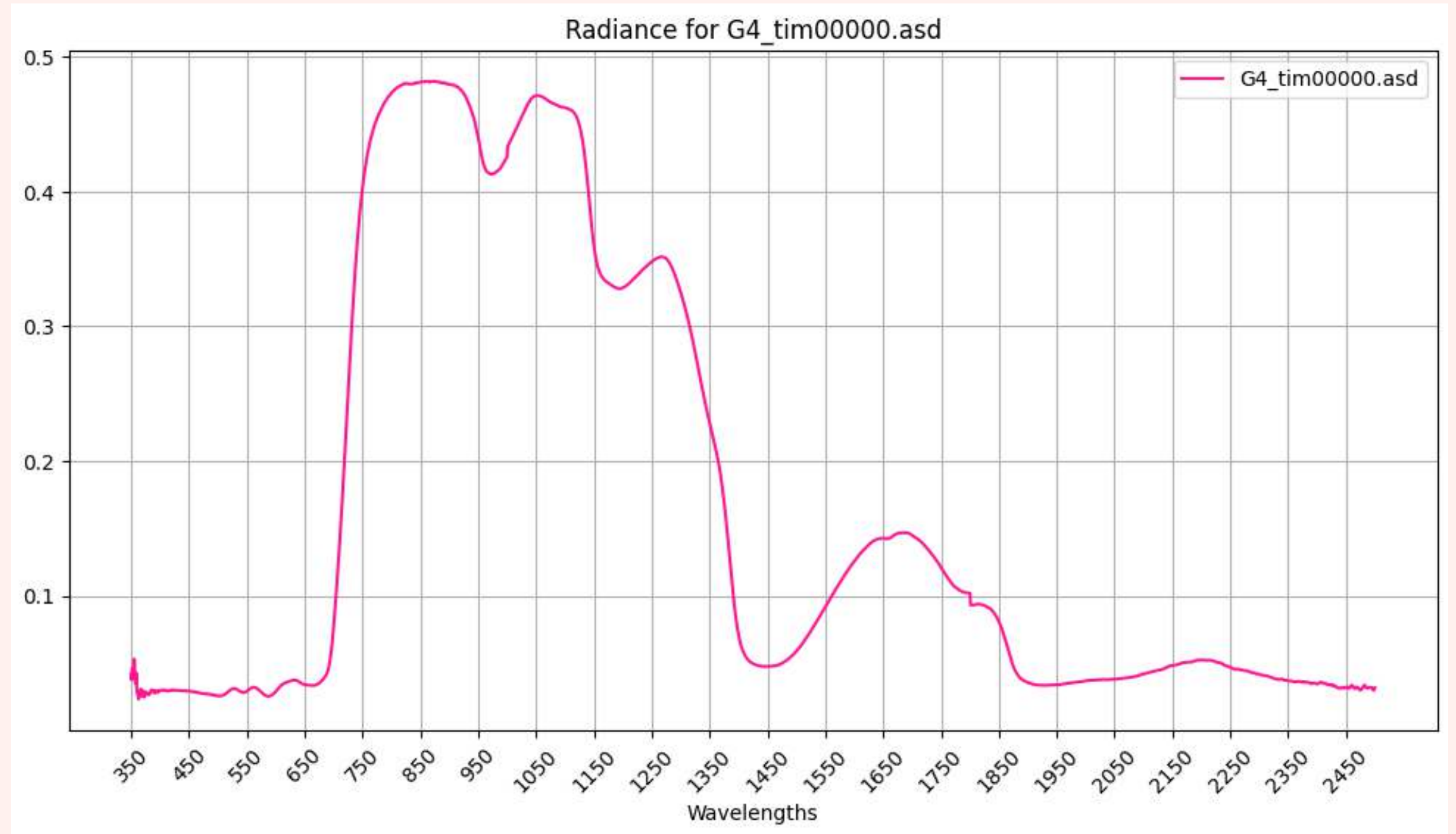


# RESULTS & DISCUSSION



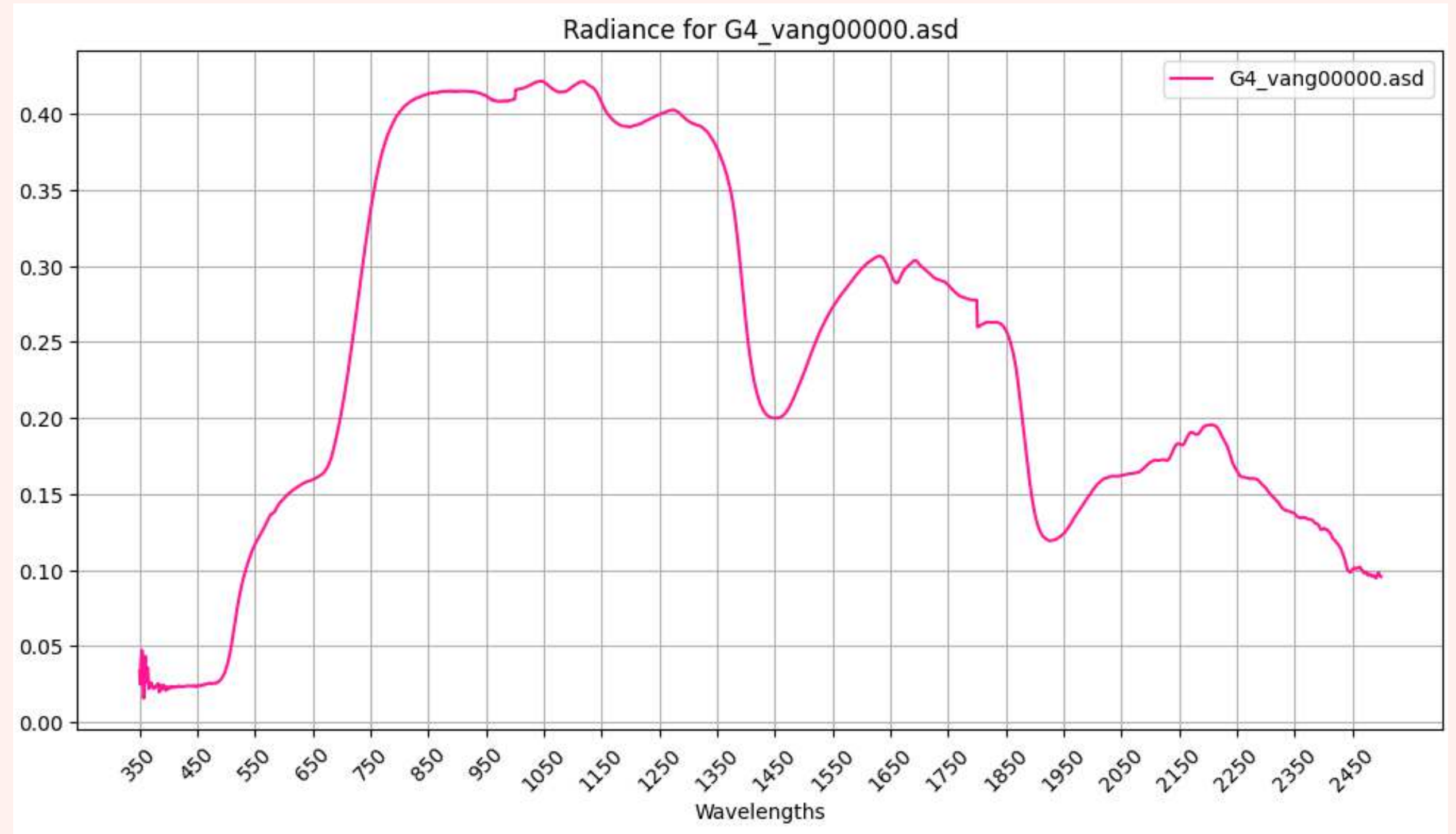


# RESULTS & DISCUSSION



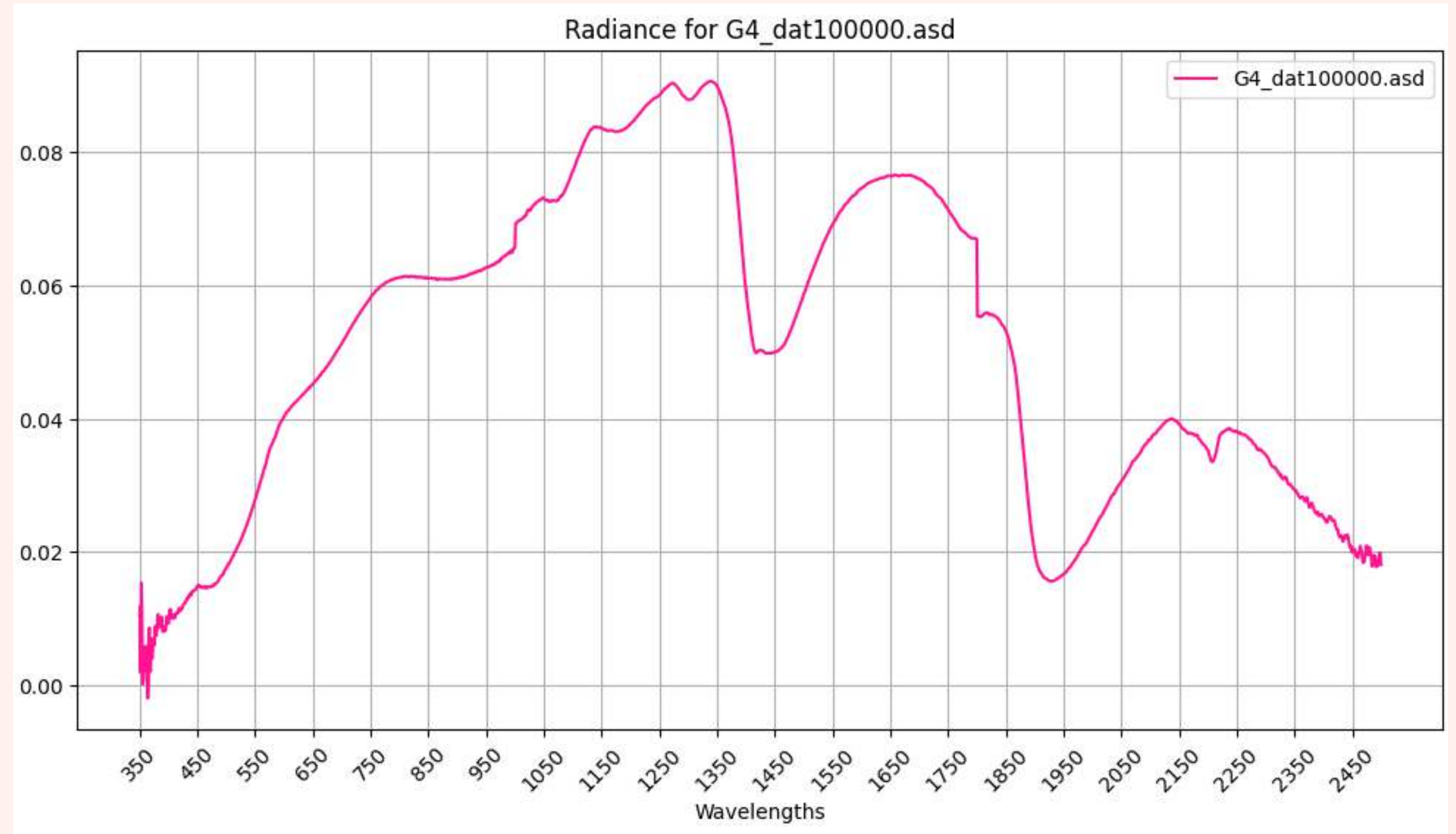


# RESULTS & DISCUSSION

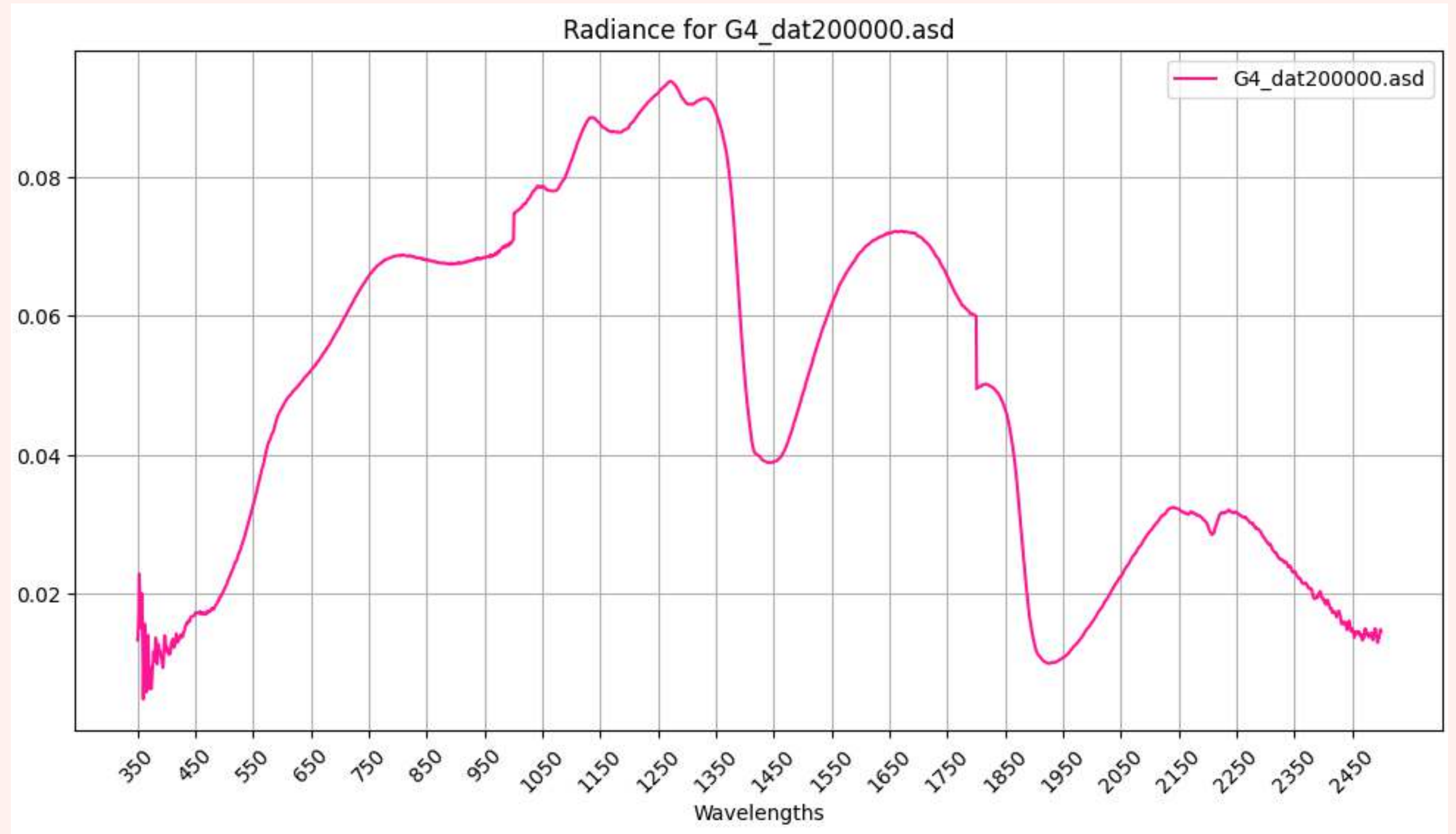




# RESULTS & DISCUSSION

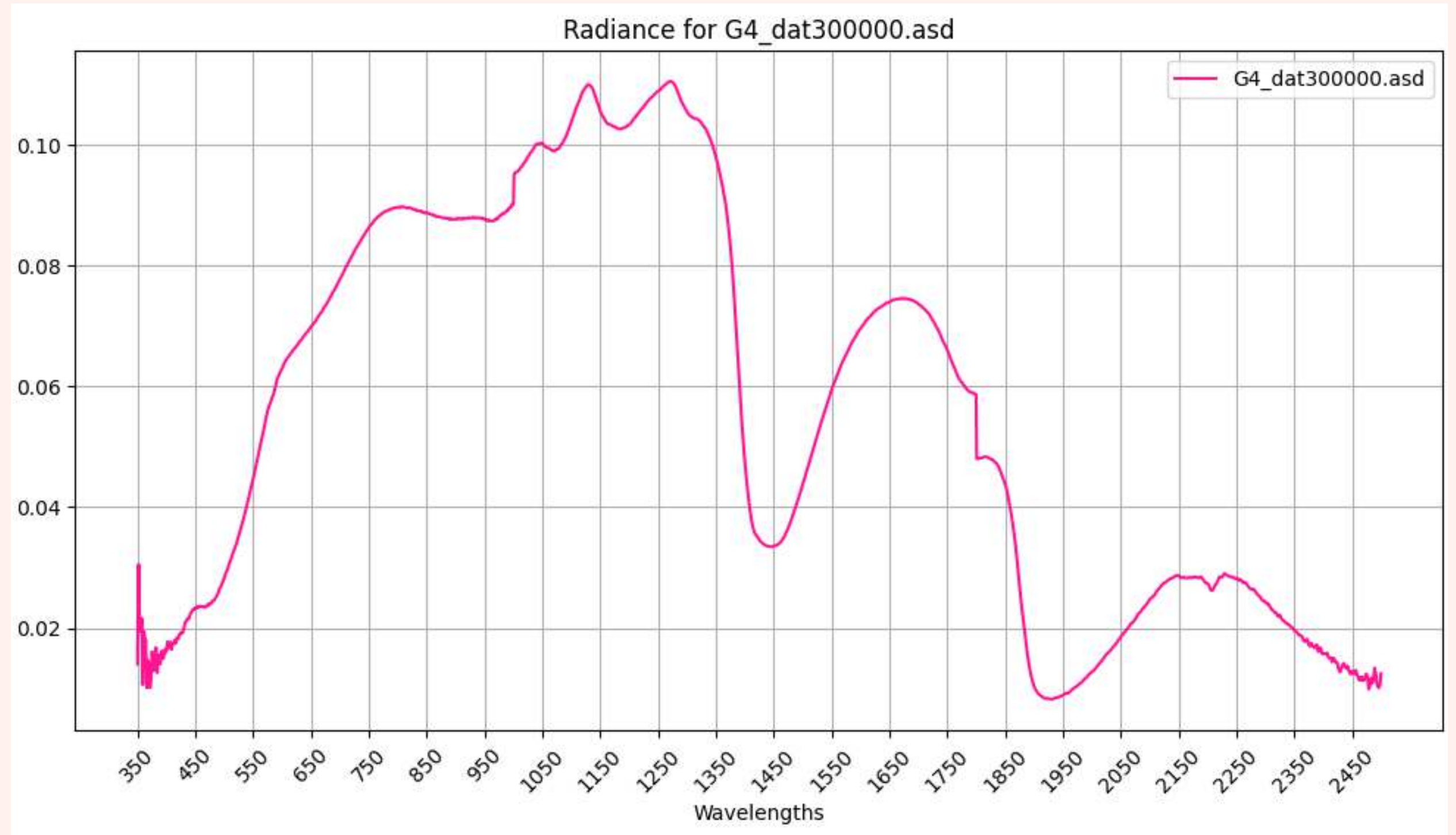


# RESULTS & DISCUSSION

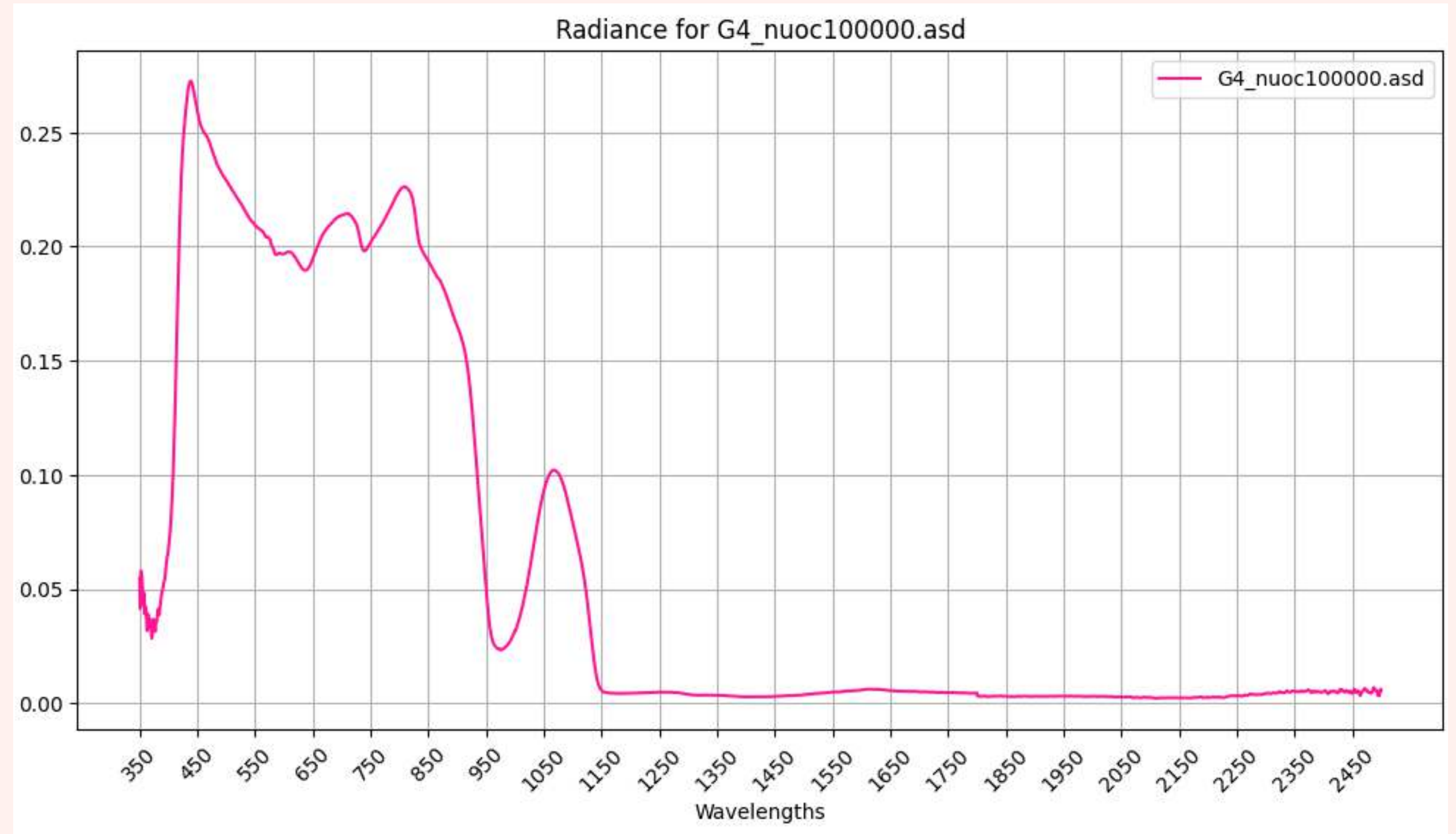




# RESULTS & DISCUSSION

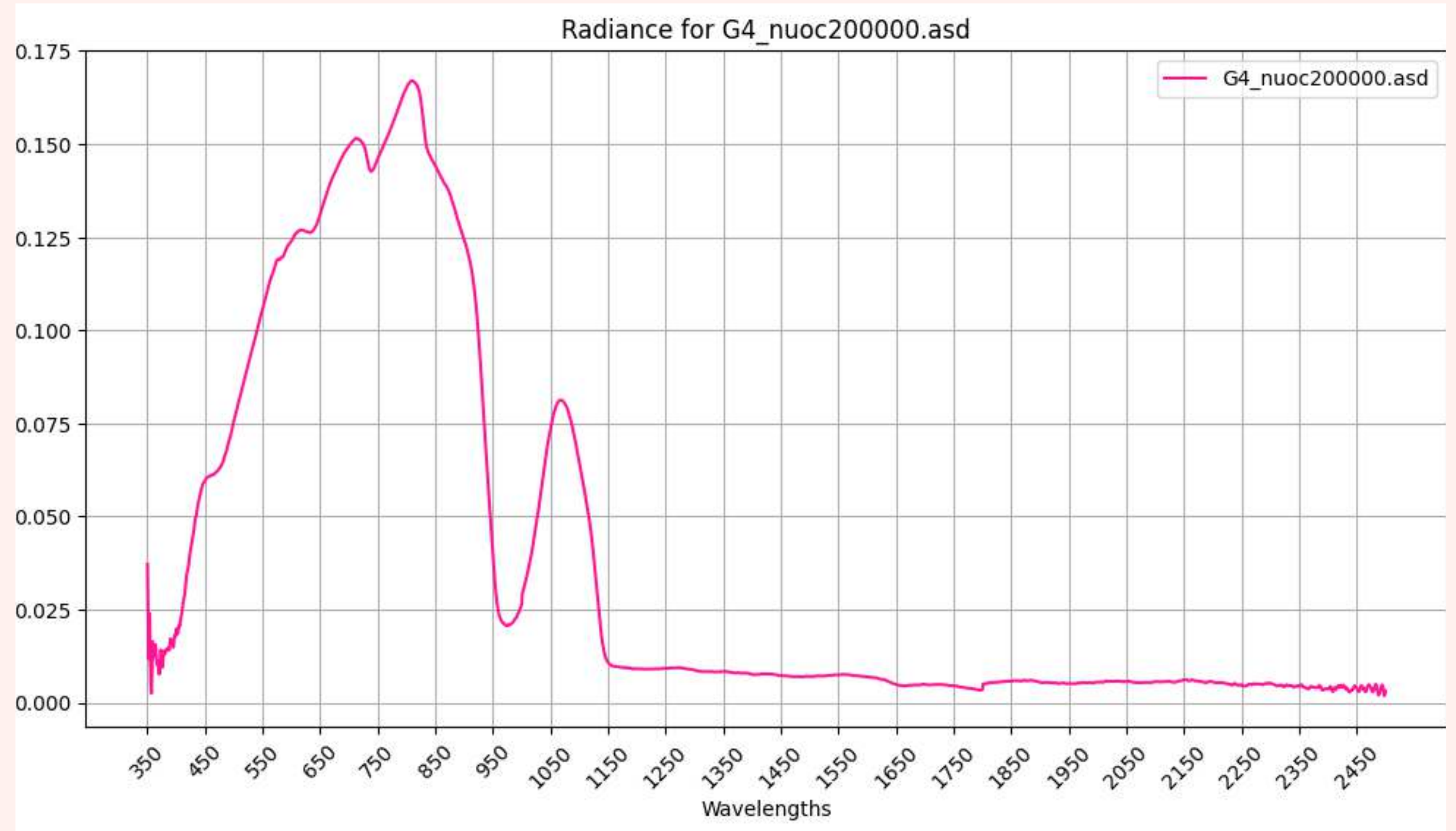
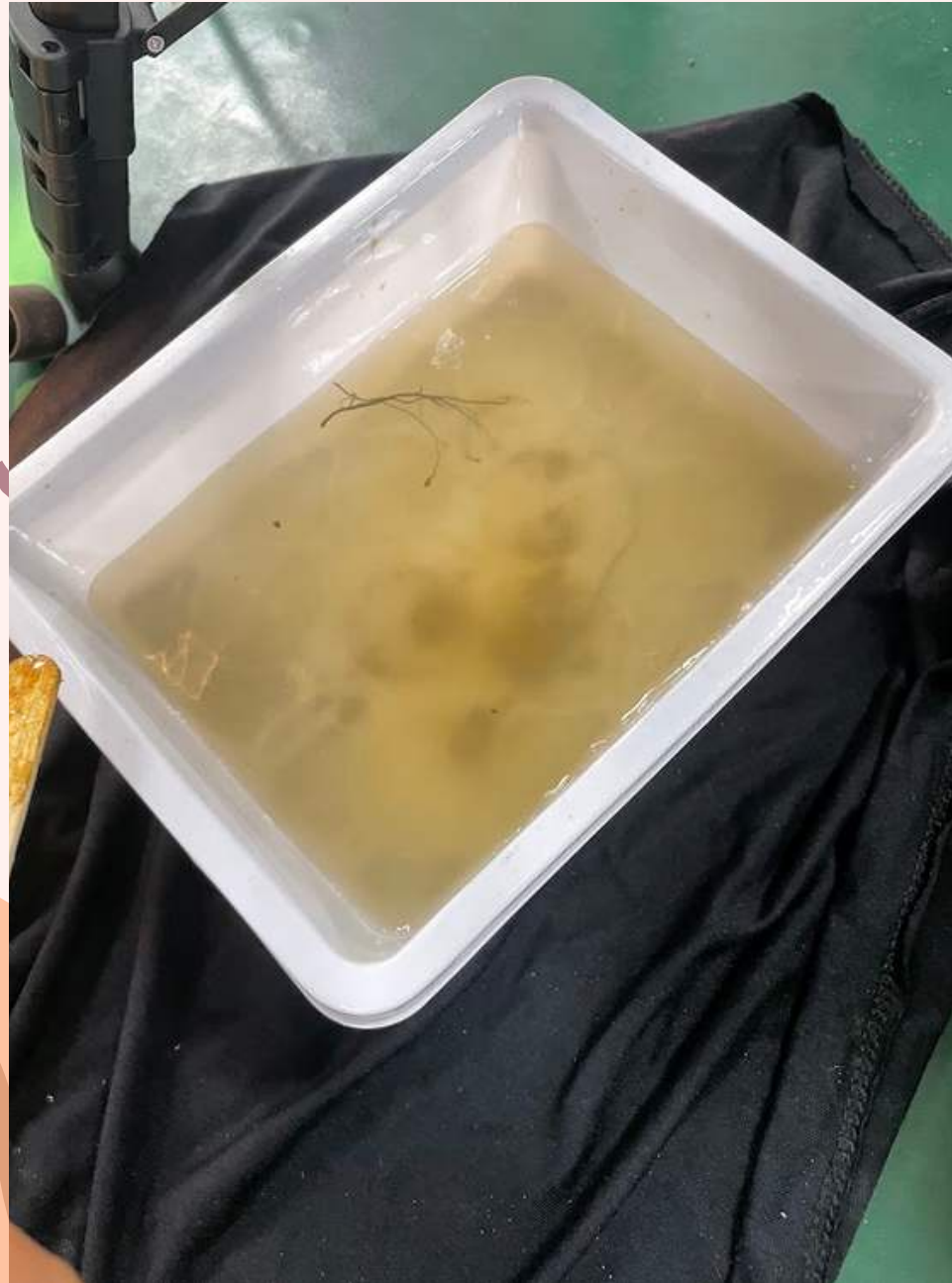


# RESULTS & DISCUSSION

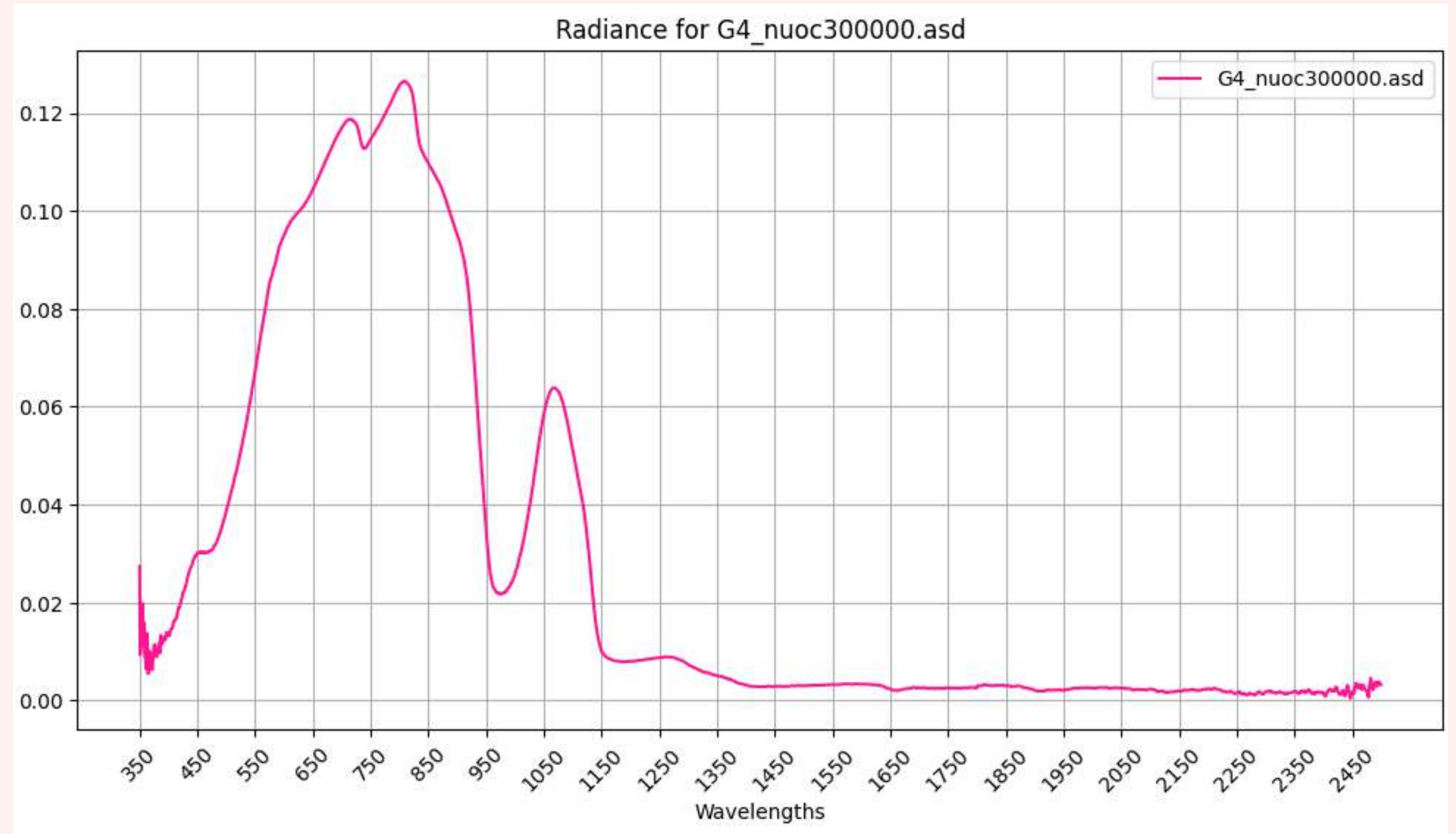




# RESULTS & DISCUSSION

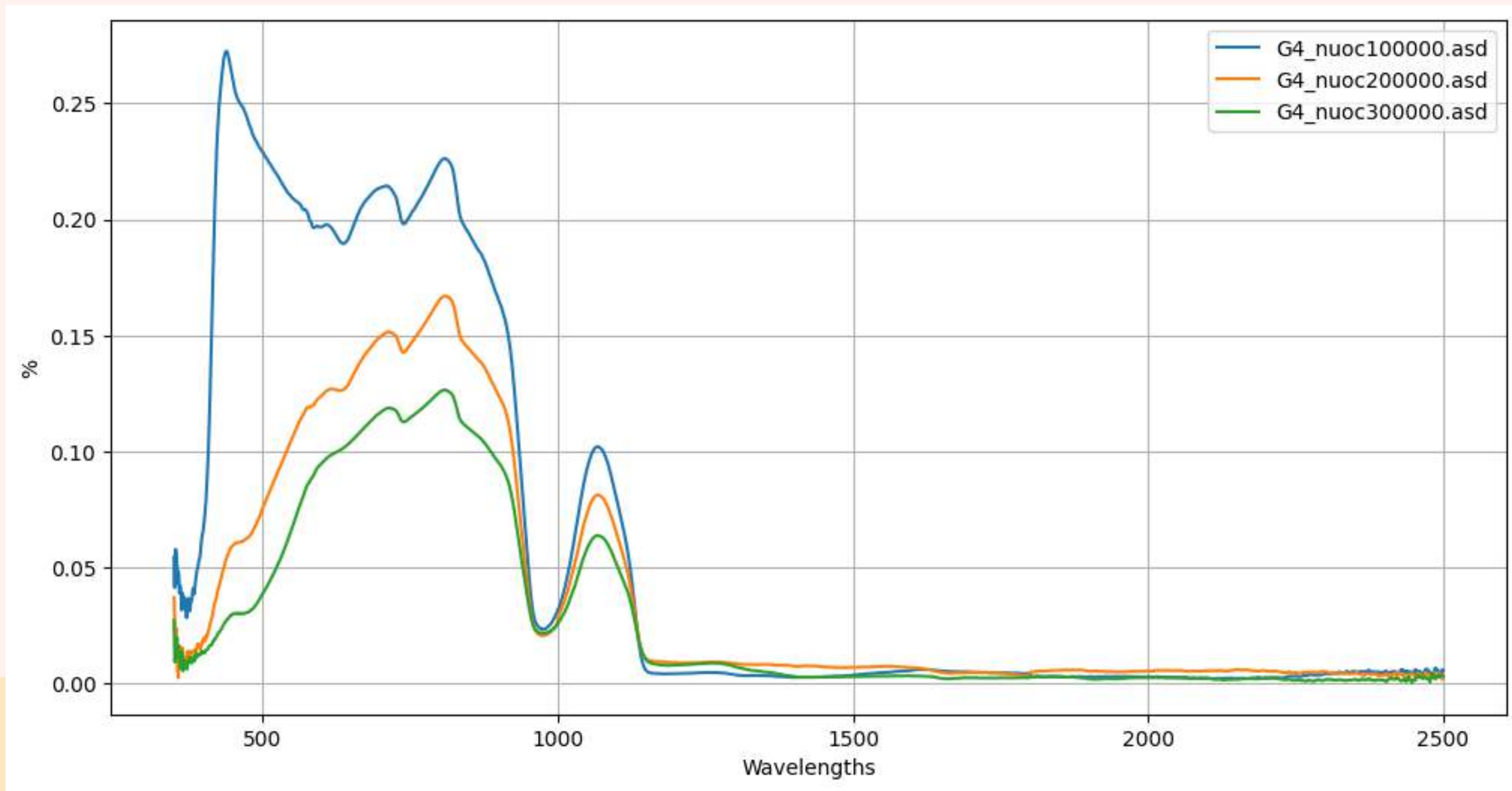


# RESULTS & DISCUSSION

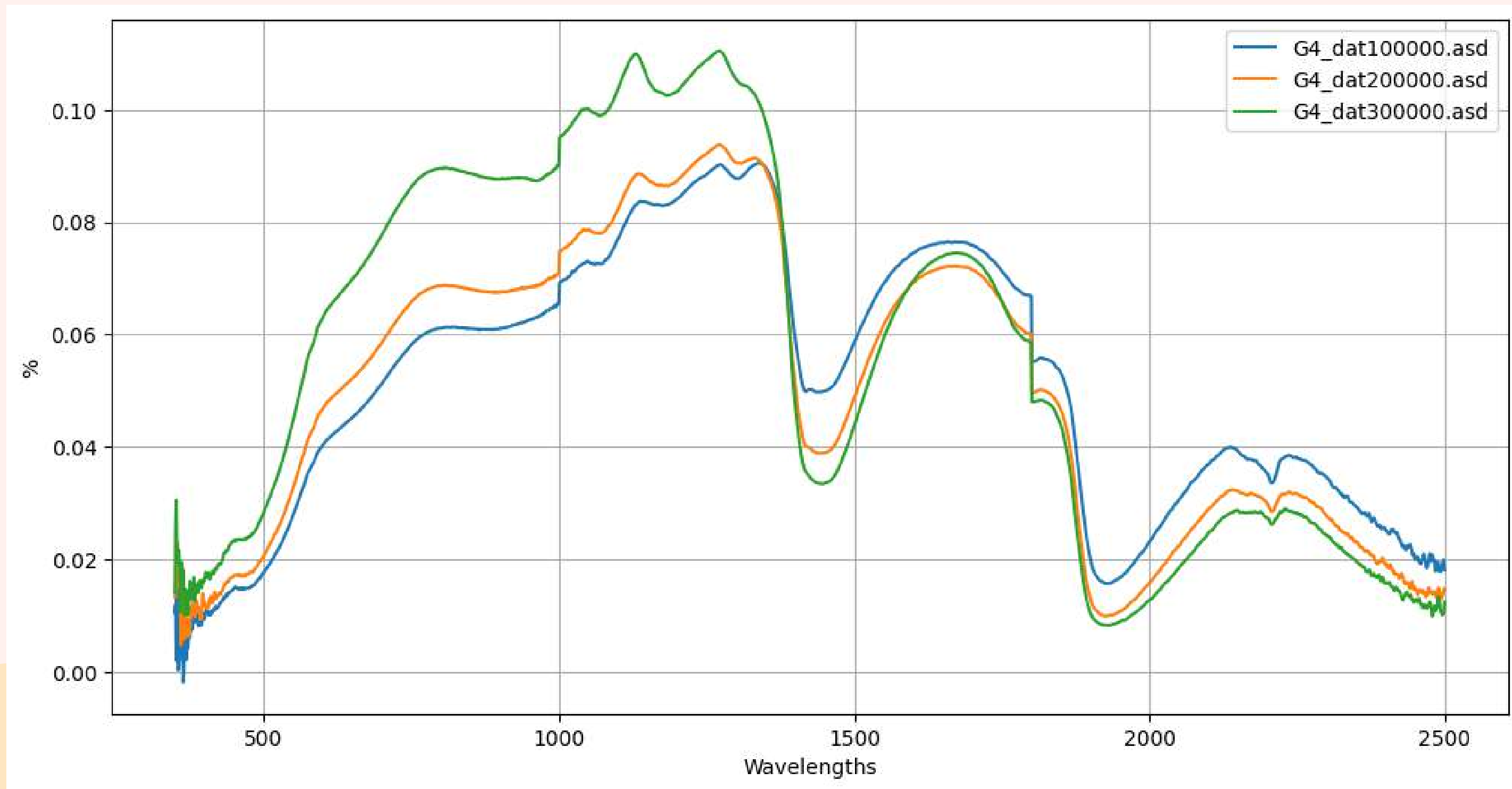




# RESULTS & DISCUSSION

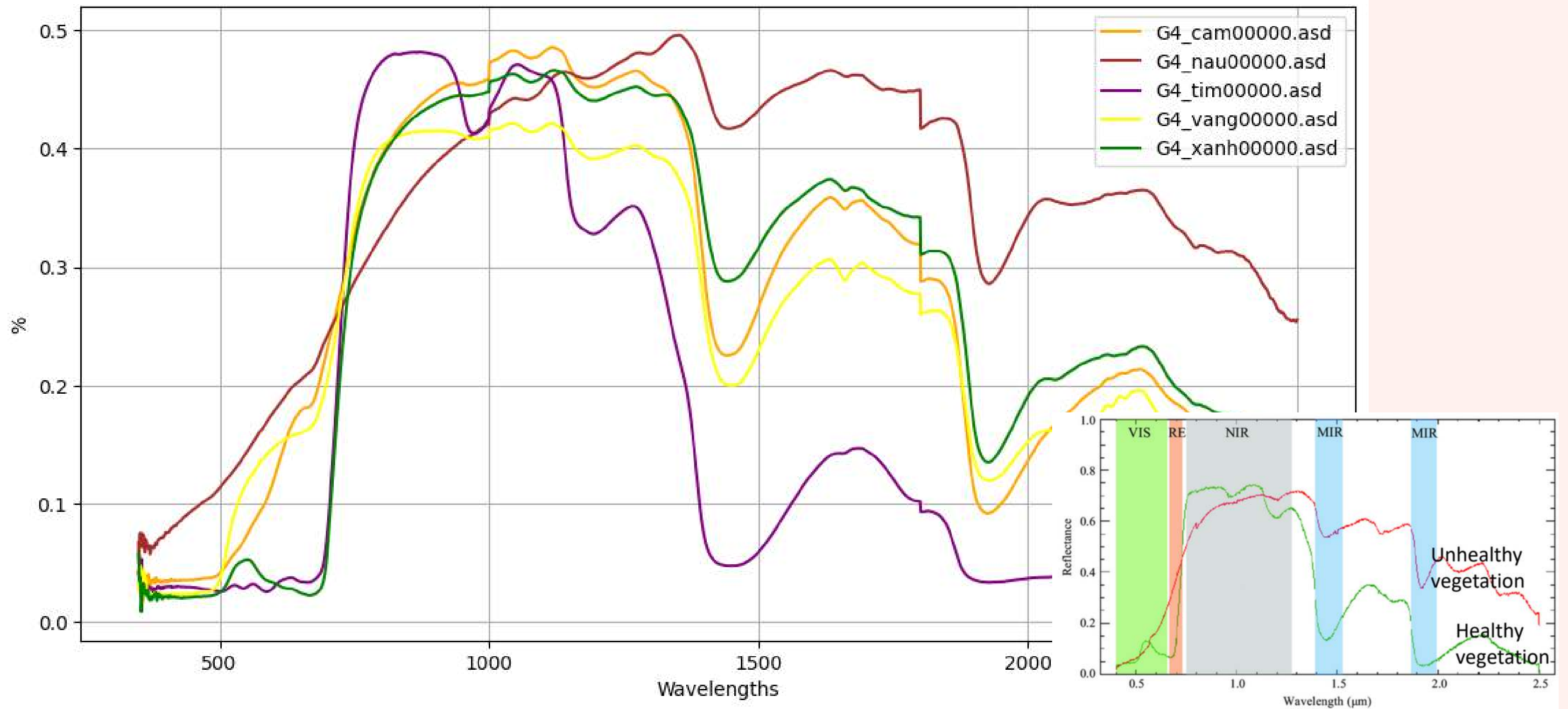


# RESULTS & DISCUSSION





# RESULTS & DISCUSSION

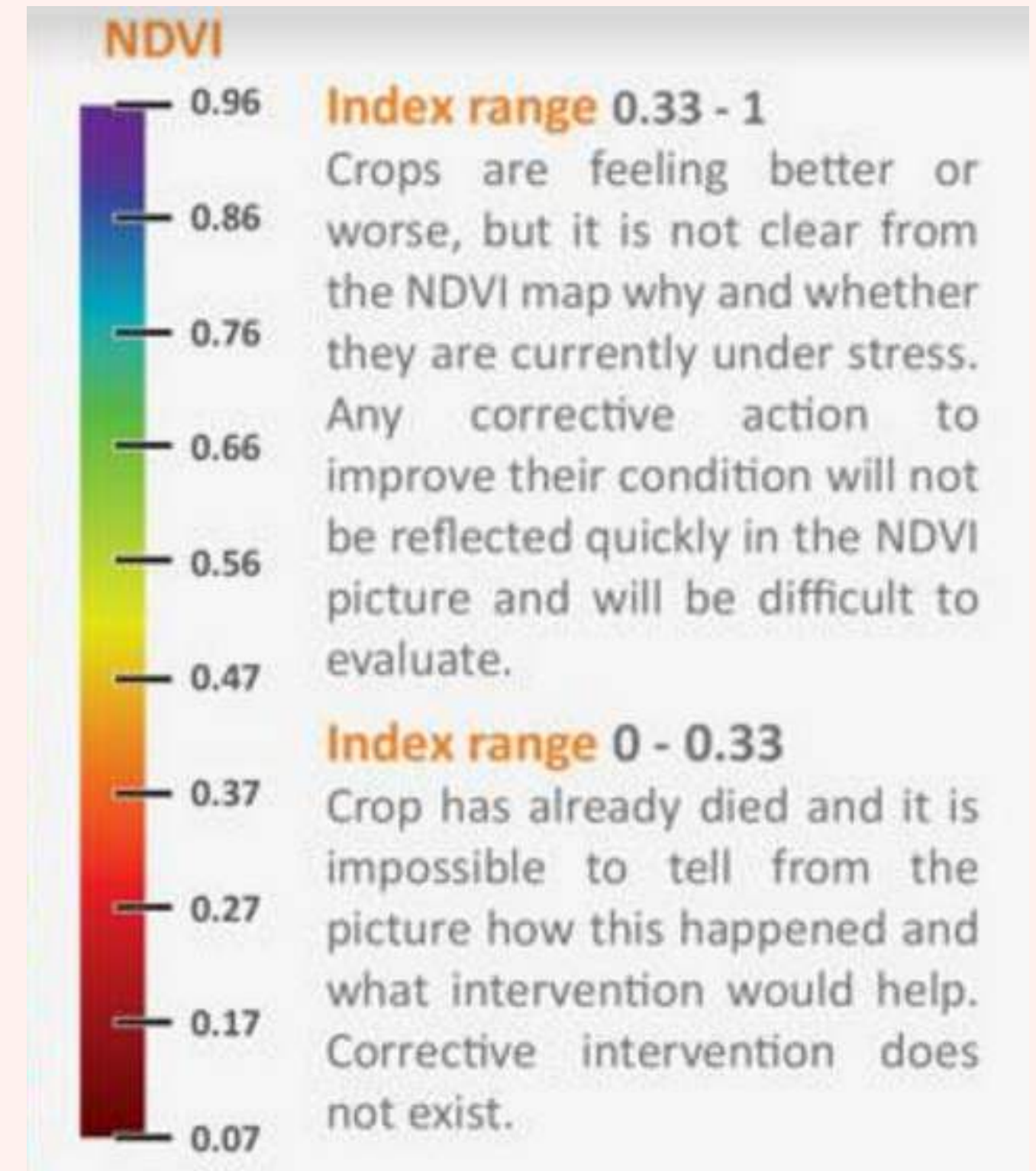


# RESULTS & DISCUSSION

## 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

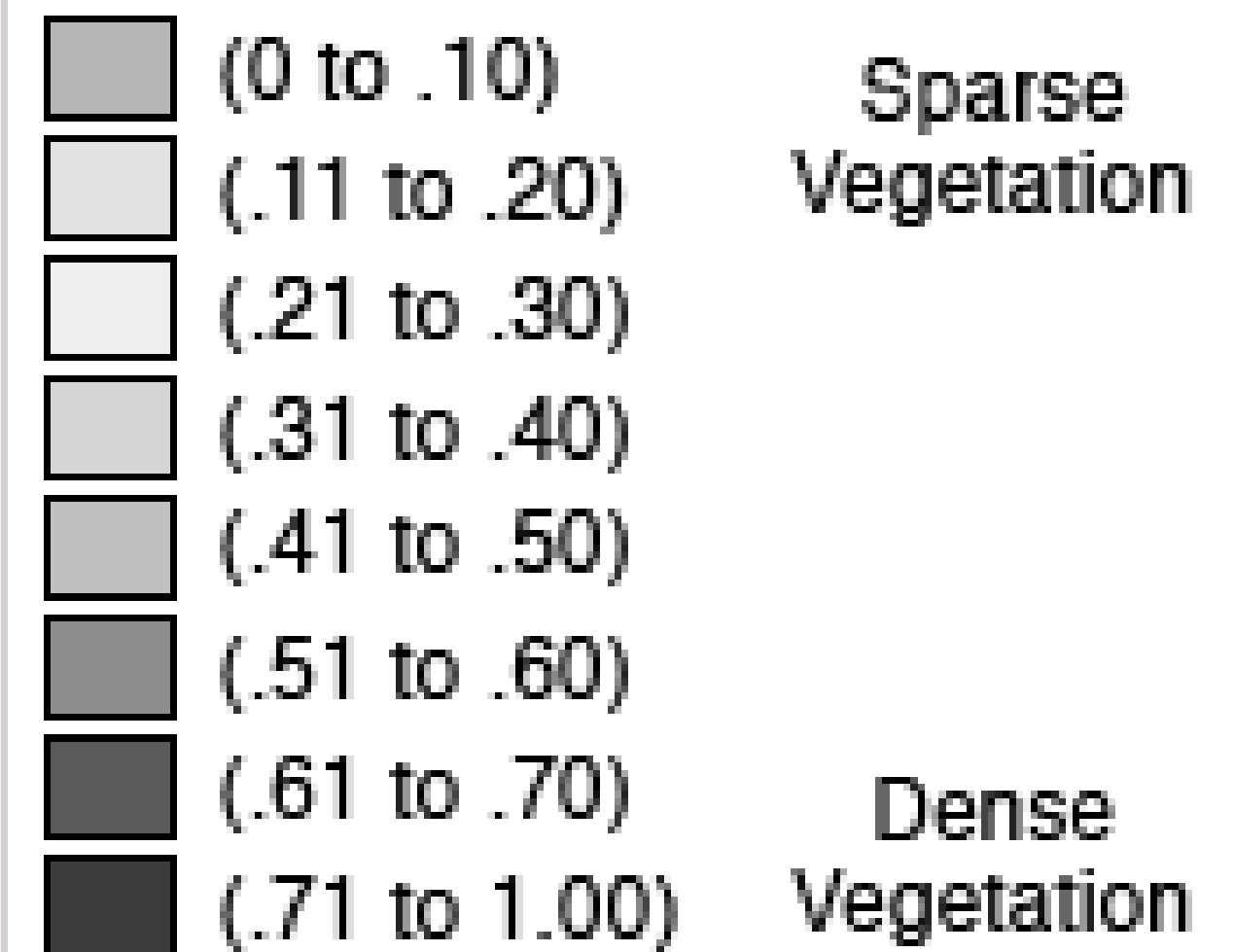
## Enhanced Vegetation Index

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**