Handheld Off-The-Shelf Multispectral Spectrometer for improving Water Quality Estimations from Satellite-Based Earth Observation

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Background

This study is conducted over the course of two semesters (Fall 25 – Spring 26). This first research compares the reflectance of calibration panels using two STELLA 1.1 spectrometers.

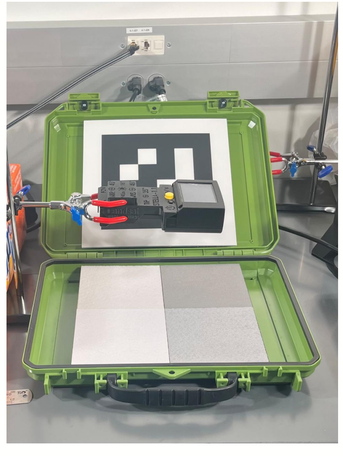

Fig. 1:
Laboratory setup for calibration plate data collection

Procedure

- Collect irradiance measurements from panels
- Convert irradiance values to reflectance using calibration plate reference data for every plate
- Plot reflectance according to wavelength according to panels used for calibration

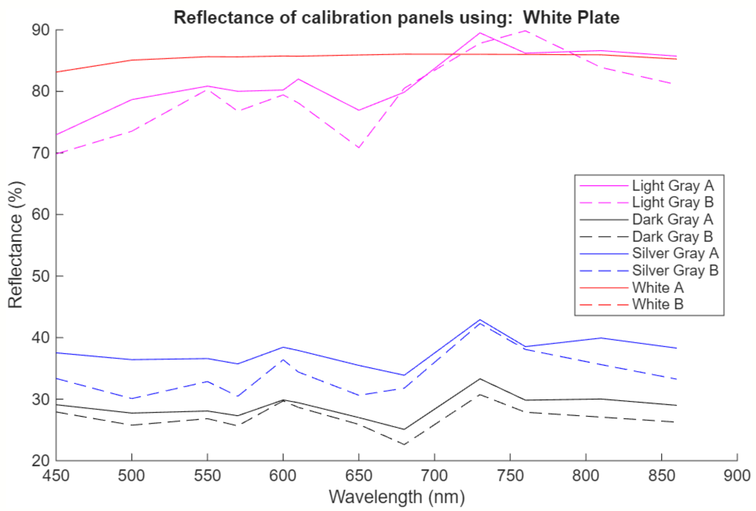

Fig. 2:
Reflectance plot obtained from STELLA

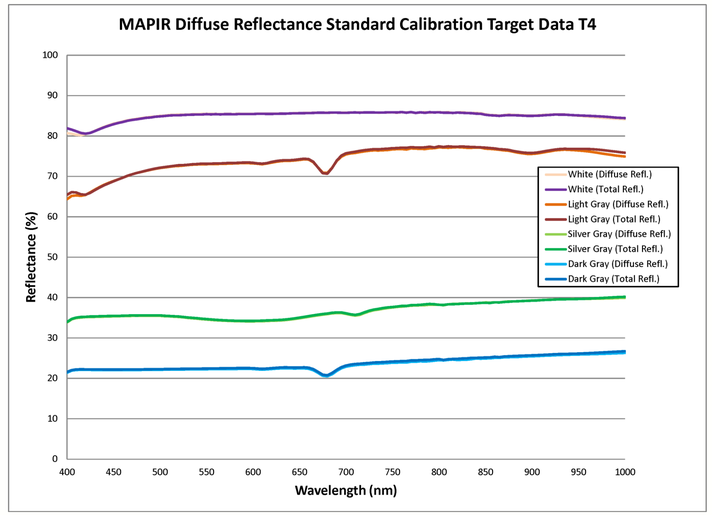

Fig. 3:
Reflectance plot from reference calibration plate data

Conclusion

Both devices follow the general pattern seen in the reference data. Inconsistencies are noted due to machine error from the sensor and experimental conditions. The limited spectral data collected by STELLA can be combined with a hyperspectral imager for improved resolution.

Future Work

- Compare results to those from hyperspectral imager
- Collect reflectance data for soil and water using STELLA
- Integrate soil reflectance data from STELLA and hyperspectral imager to satellite data

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Acknowledgments:
I would like to thank Dr. Kumar for his guidance throughout this experience.
I also thank the members of the WaterDMD lab for their help and the Ahmed Family for sponsoring this project

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