

Evaluation of Calibration Intervals for Spectrometers and Photometers

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Abstract

Manufacturers of lighting photometers and spectrometers typically specify an annual calibration interval for their instruments. The calibration process often involves returning the instrument to the manufacturer and can be costly if multiple instruments are maintained. The goal of this work is to a) discover if there is a technical basis for annual calibration, b) develop an easy to use, low cost in-house procedure for monitoring photometer/spectrometer performance. The testing setup utilizes a standard LED A19 lamp and a power meter. The photopic lux, CCT, and S/P ratio have been charted over 1.5 years for numerous meters and have shown no significant performance differences thus far. Further, light meters which were last calibrated in 1996 still provide potentially acceptable performance depending on required accuracy. Based on these results, it can be certainly questioned whether an annual calibration is required if you monitor your equipment.

Objectives

- Develop a low-cost testing station for lighting measurement
- Create a control chart to monitor photometer and spectrometer spectral performance
- Compare measured versus expected data
- Evaluate performance among various light meters

Spectrometer & Photometer



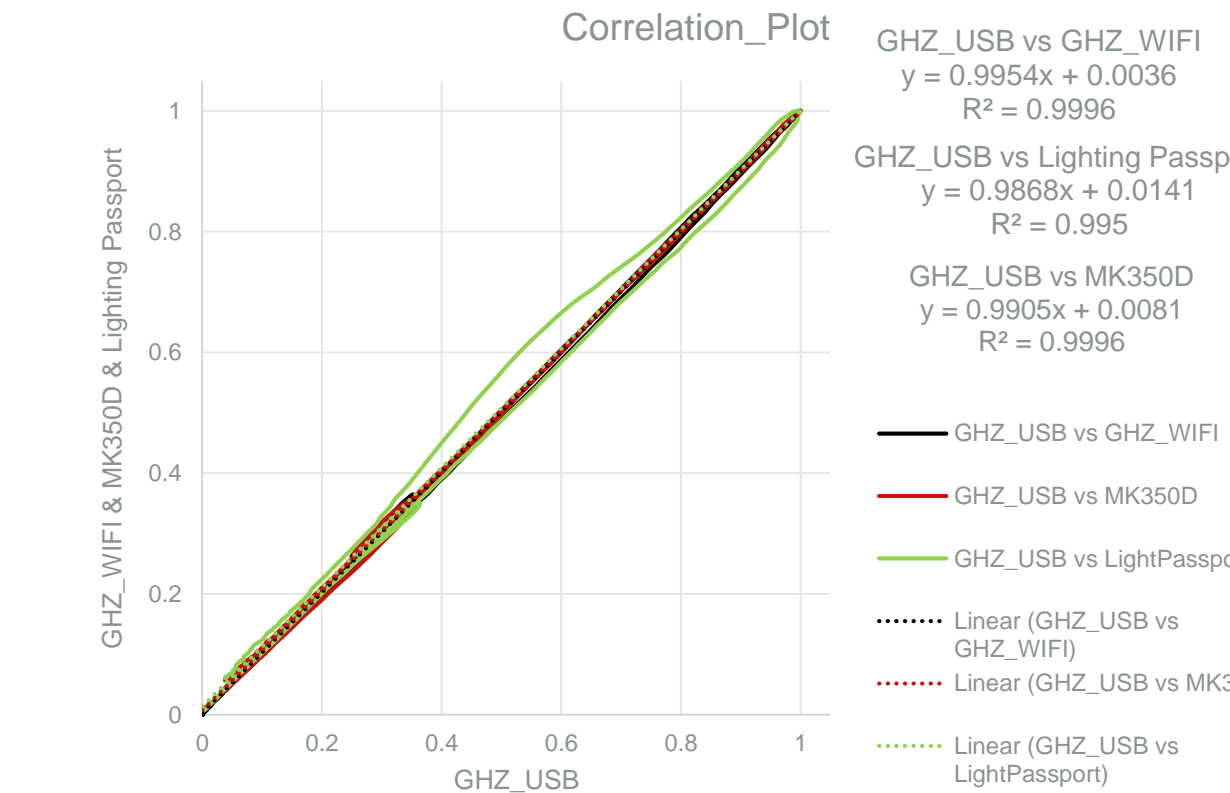
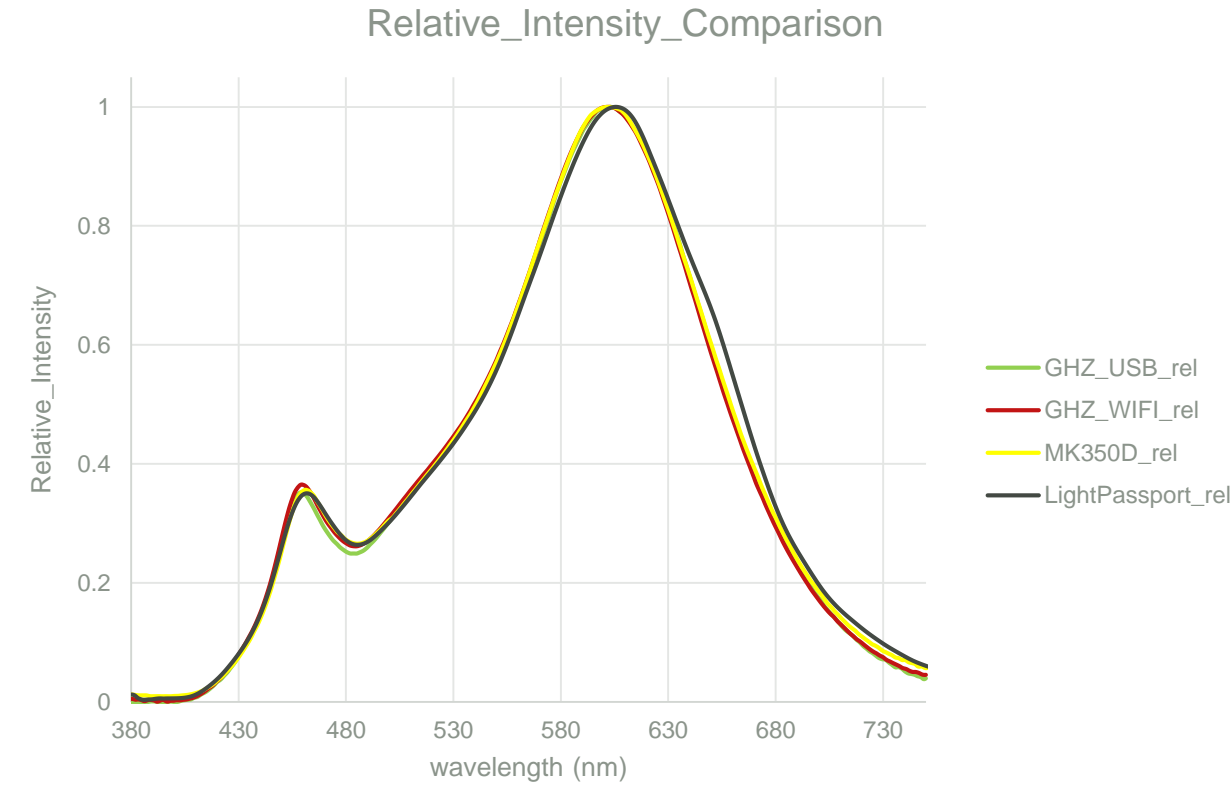
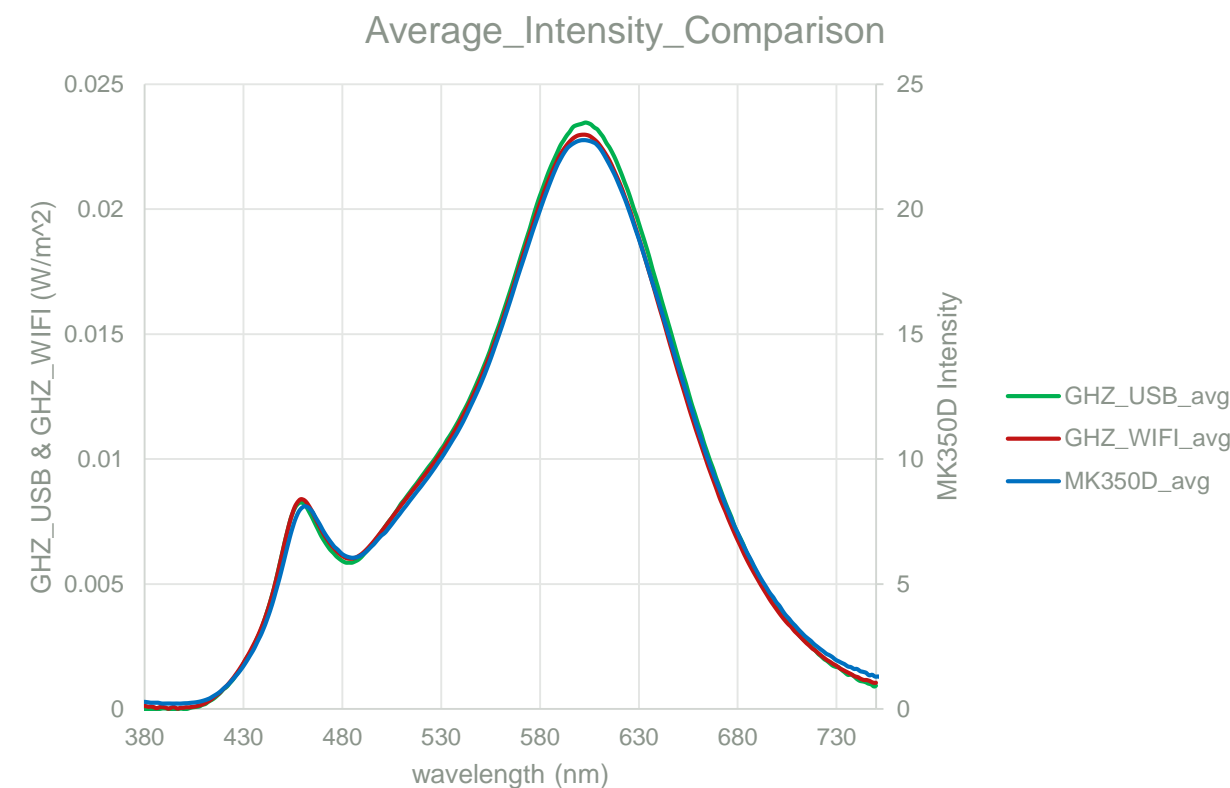
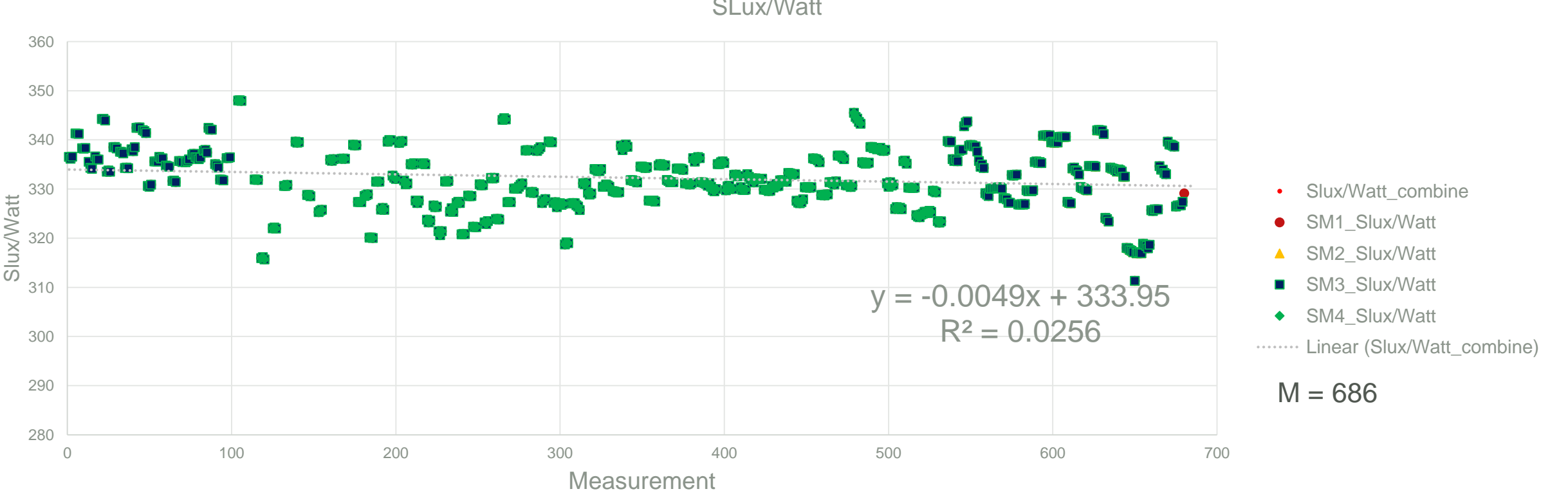
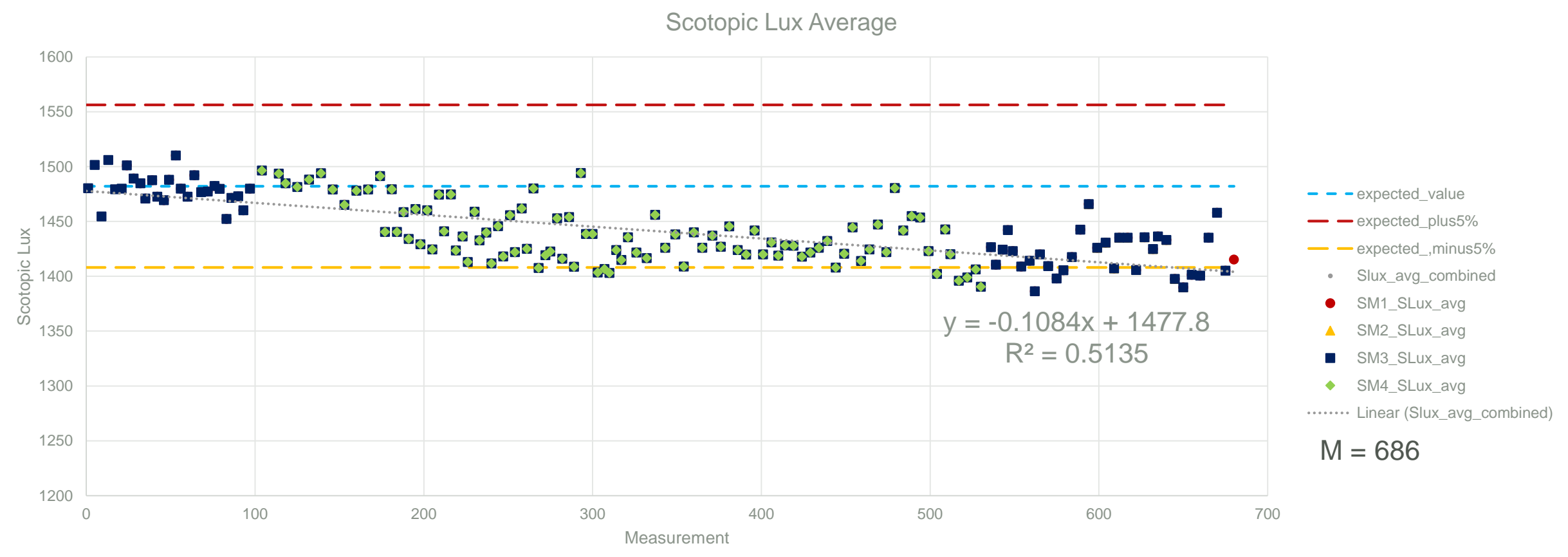
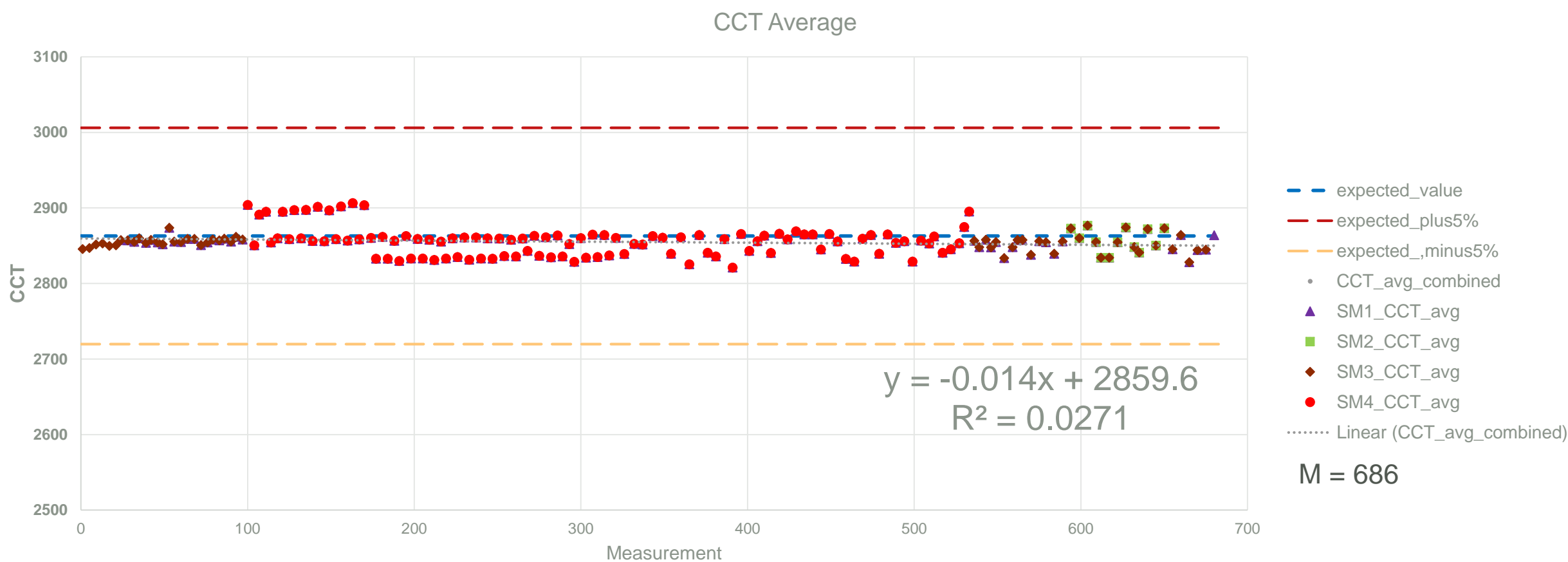
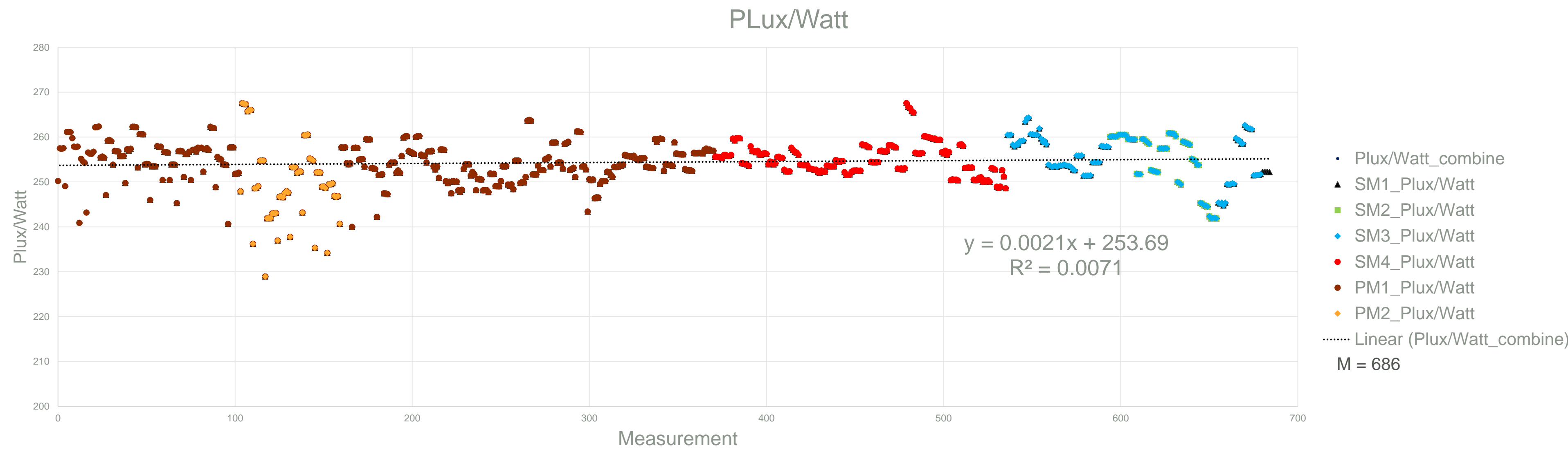
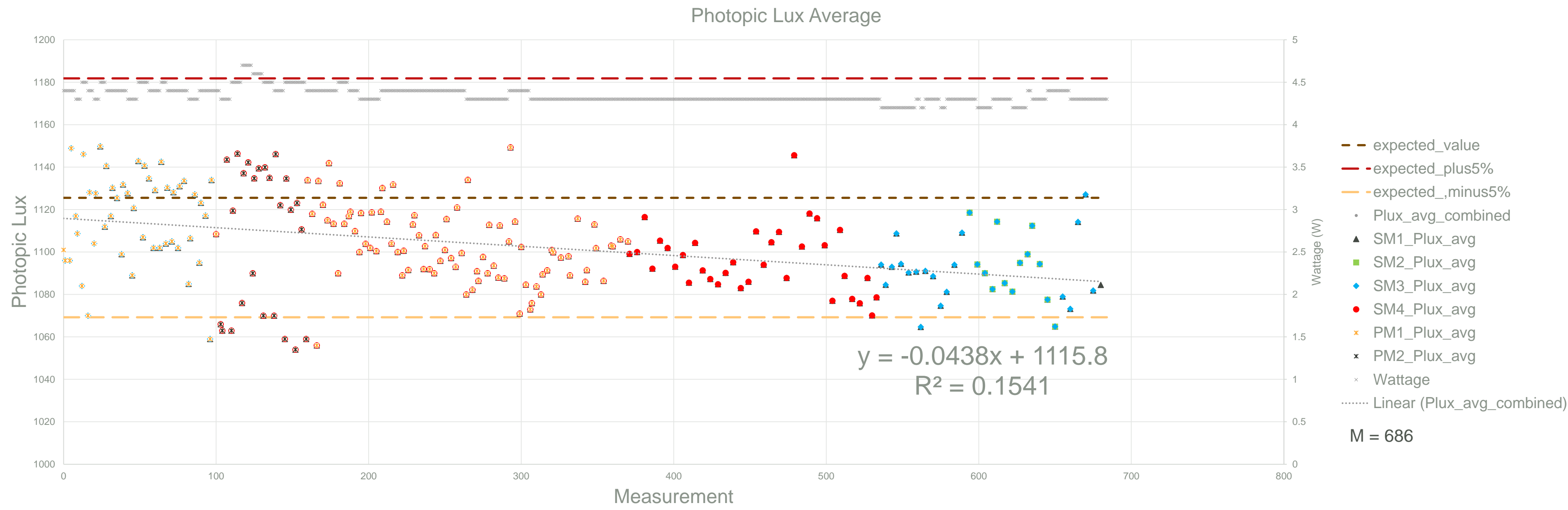
Spectrometer:

1. Gigahertz Optik BTS256E
2. Gigahertz Optik BTS256E - WIFI Enabled
3. UPRtek MK350D
4. AsenseTek Lighting Passport
5. UPRtek MF250N
6. Ocean Optics STS-VIS
7. Pasco PS-2600
8. NanoLambda NSP32_V1

Photometer:

1. Ideal Light Meter
2. Extech Environ Light Meter
3. Amprobe Solar-100 Solar Power Meter
4. HDE LX-1010B Digital Luxmeter

Control Charting (since Mar. 22, 2018)



Light Measurement Setup

- 32 x 34 x 40 inch chamber isolates selected light source and light measurement instrumentation from environment
- Light meter is placed perpendicular to the light source at a distance of 12 inches from the instruments light's sensor



Summary

- A standard LED light source can be used to monitor spectral measurement of photometers and spectrometers
- Control chart is a useful tool to identify long term performance of light meters and can provide traceability
- Based on the results of the current study, photometer and spectrometer calibration intervals can be delayed for longer periods of time
- Significant reduction in calibration cost with acceptable performance(+/- 5%)
- Confirm different manufacturers quality control

Acknowledgments

I would like to thank the Dept. of Technology and College of Engineering at NIU for instrument funding and for allowing us access to do this work.
I would also like to thank the graduate student, Justin Cathey and Matthew Bikun, for their help and guidance.

Disclaimer

The mention of any manufacturer or instrument is for informational purposes only and does not constitute endorsement by the authors or NIU