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Li-Cor Lamps Comparison Experiment at SGP on April 12, 2007

Three Li-Cor lamps ORL-787, ORL-1205, ORL-1204 were measured using RSS105 on April12, 2007.   The sequence of measurement was as follow:

> PortCal P128
> Li-Cor ORL-787
> PortCal P128
> ORL-1205
> PortCal P128
> ORL-1204
> PortCal P128

Each measurement was performed with standard RSS calibration procedure that consists of multiple exposures. The data then was reduces by removing spikes and retrieving non-linearity constant. The final counts were linearized using this constant. In Figure 1 averaged and linearized counts vs. wavelength from all seven measurements are presented.
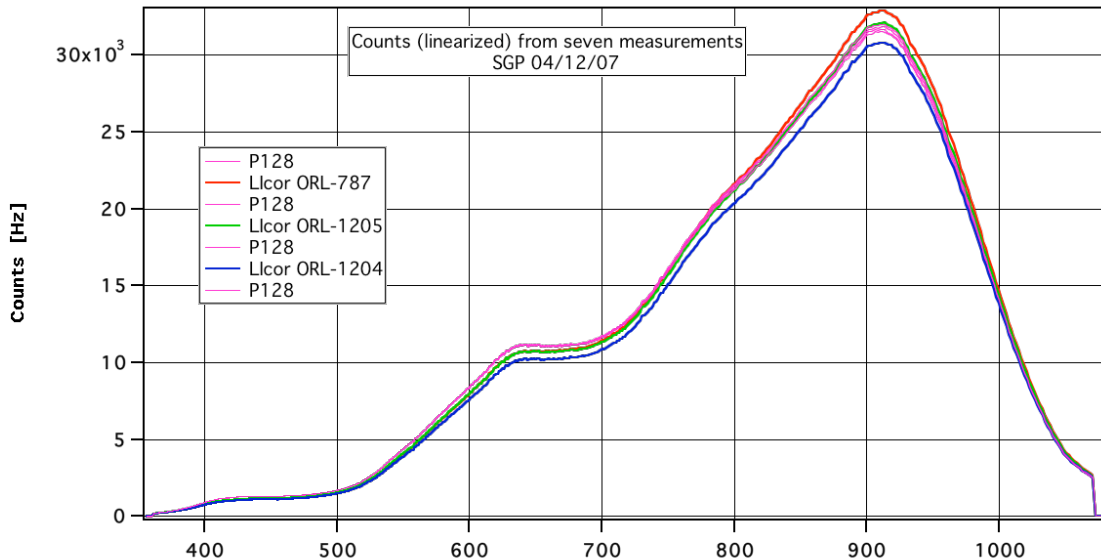

Figure 1. Averaged and linearized counts from all seven measurements.

To verify instrument stability during the experiment we calculated average of counts from four measurements with P128 and then ratioed each P128 measurement to that average.   The result is in Figure 2.   Note that stability is within ±1% however there is almost 2% change between last two measurements in NIR region. Exceptionally good stability was maintained for shorter wavelengths.
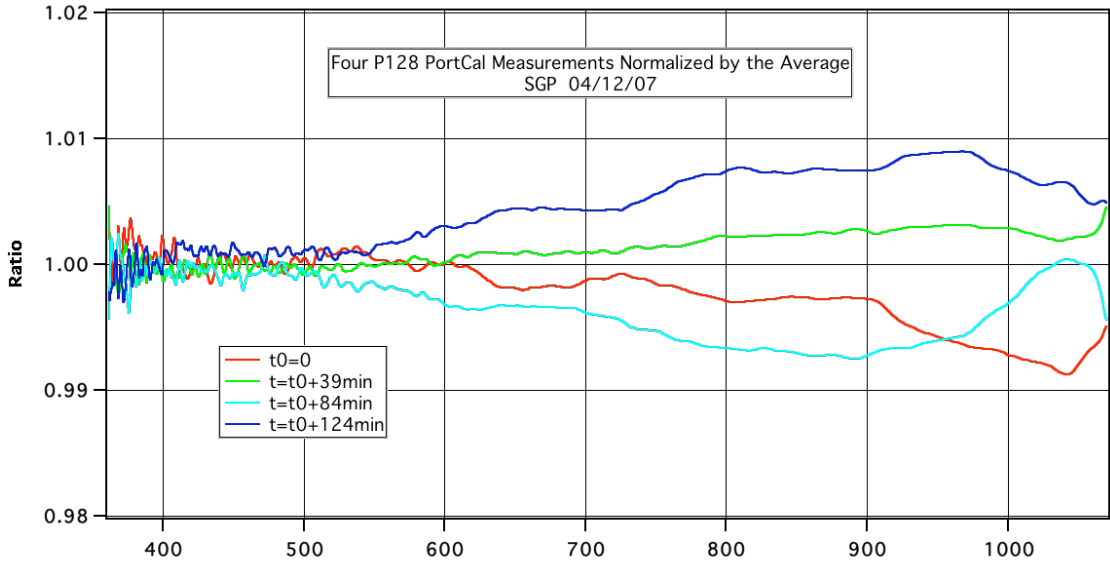
Figure 2.   Ratio of P128 counts by the average of four.

The old ORL-787 lamp and two new lamps ORL- 1204 and 1205 come with assigned irradiances scales.   The irradiances are plotted in Figure 3.
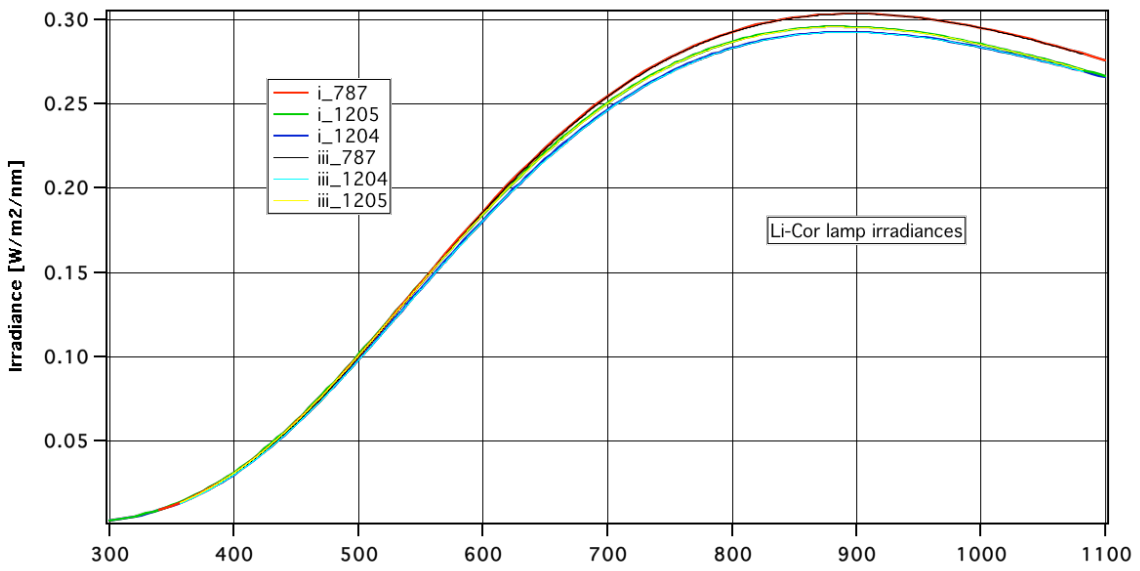

Figure 3.   Irradiance of three Li-Cor lamps according to Li-Cor.

For each lamp we calculated responsivity as ratio of counts-to-irradiance.   The three responsivities are in Figure 4.   The responsivities of the two new lamps were divided by

the responsivity of the old lamp ORL-787. The results imply that the irradiances of three lamps are within the specifications.
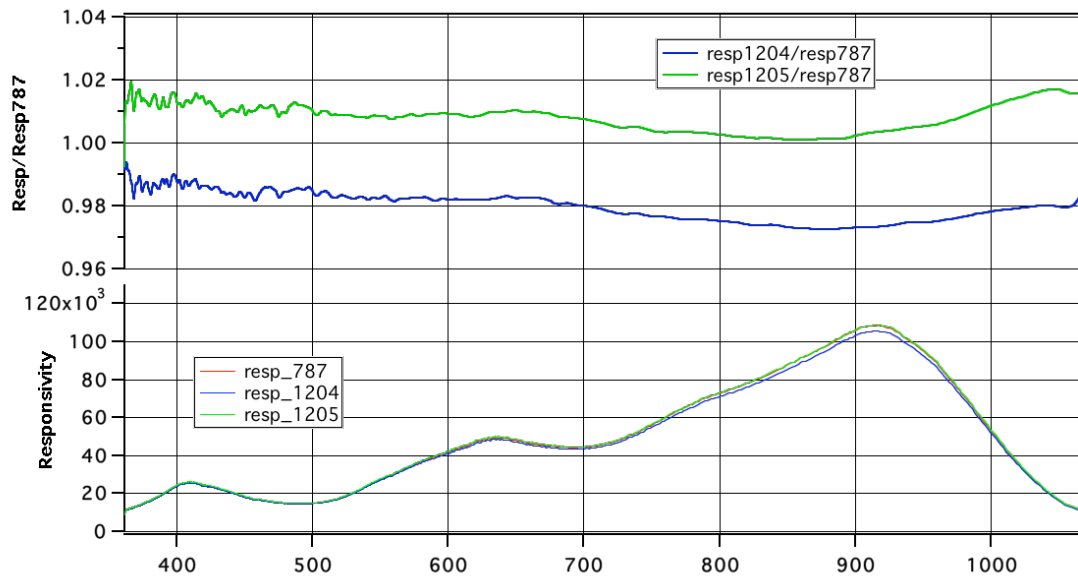

Figure 4.   Responsivities from three Li-Cor lamps and the ratios of new-to-old lamps.

Conclusions:

The experiment was successful.   RSS was stable and suitable to transfer/compare irradiance scales between lamps. New Li-Cor lamps meet specifications. The new lamp ORL-1024 will be used in Li-Cor calibrator to calibrate RSS and other instruments from now on. The old lamp ORL-787 goes to semi-retirement from which it might be recalled for other tests to help resolve ambiguities in irradiance scales if such a situation arises.

Additional data:

In Figure 5 value of Dark offset and slope, temperatures of CCD and Prism block and nonlinearity coefficients are plotted for 7 cases.   The results confirm that was instable conditions during the experiment.
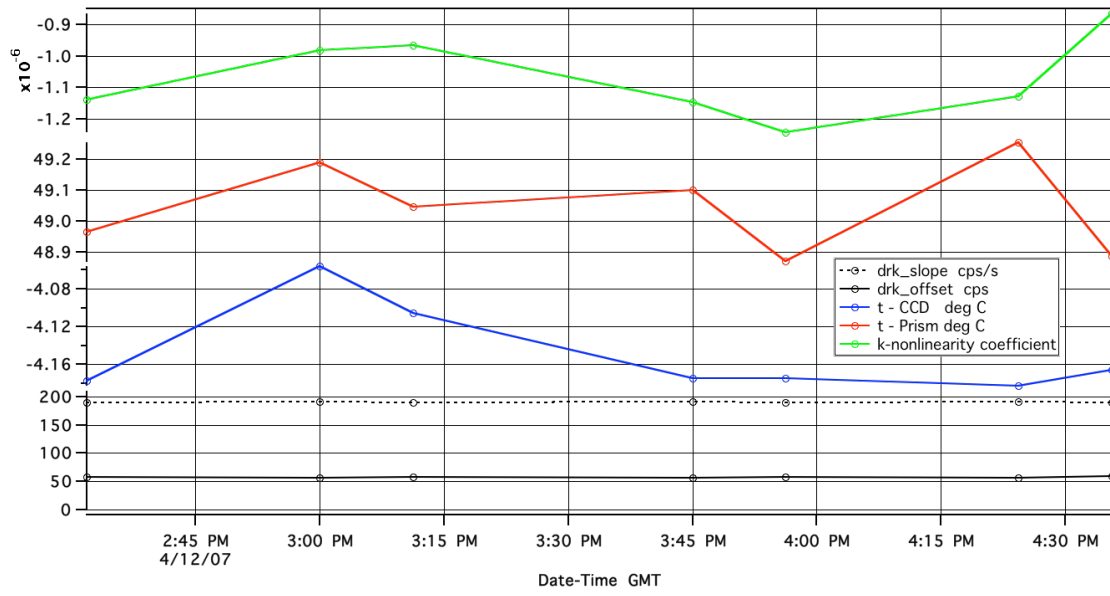
Figure 5.   Several RSS parameters extracted from calibration files.