Evaluation of the Cosine-Response of the Apogee Instruments' Cosine Corrected Head

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INTRODUCTION

The Apogee spectroradiometer package includes a cosine corrected head. The white diffusion disc of the head is threaded to allow adjustment of the height of the filter. The height of the disc affects the amount of light that reaches the sensor cable, which affects irradiance measurements.

MATERIAL AND METHODS

Measurements were then taken outside using the sun as a light source and then inside using high-pressure sodium lamps. Measurements taken from the StellarNet spectroradiometer were then compared to a LI-COR quantum sensor. The height of the filter disc was adjusted to a height at which the readings of the two instruments were equal.

Without changing the height of the filter disk, measurements were then taken in a Conviron E-15 growth chamber with fluorescent lights. The light source was placed at five distances between 13 cm and 88 cm from the sensors.

RESULTS

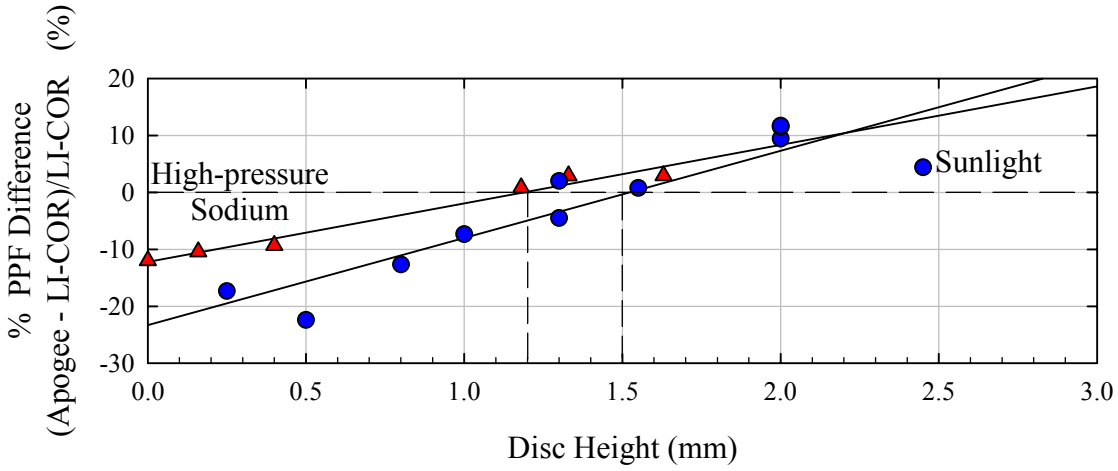

Figure 1. Optimal disc height of the Apogee cosine corrected head. In sunlight (around 2:00 PM) the optimal height was 1.5 mm. Under High-Pressure Sodium lamps the optimal height was closer to 1.2 mm.

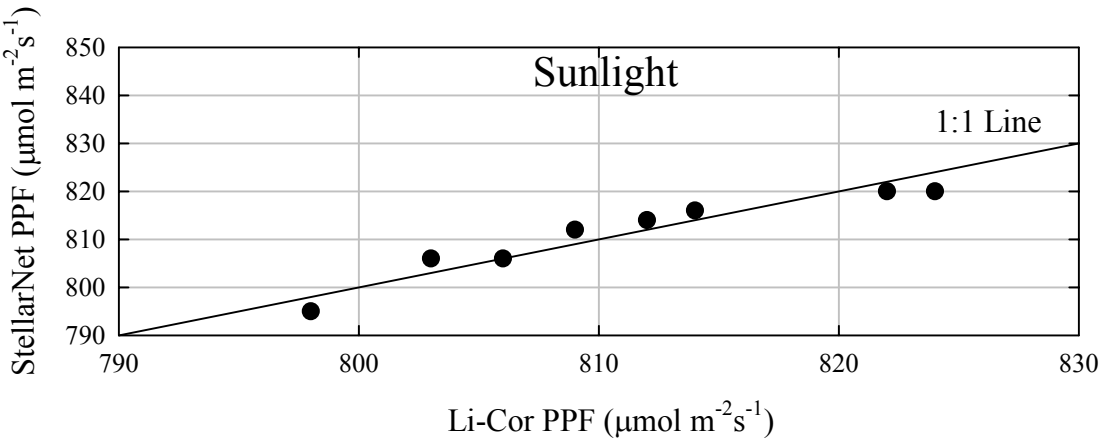

Figure 2. PPF measurements taken outside on a sunny day. Both sensors were level.

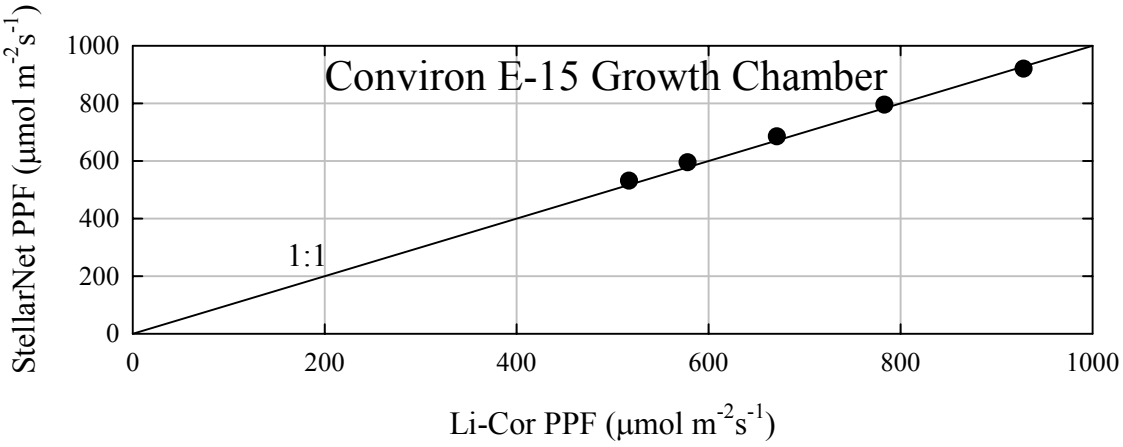

Figure 3. PPF measured by StellarNet spectroradiometer and the LI-COR quantum sensor in the Conviron E-15 growth chamber. The PPF intensity was changed by lowering the lamps in the chamber. Integration time was 40 ms.

DISCUSSION

Measurements of irradiance with StellarNet spectroradiometer correlate well with the LI-COR quantum sensor. The maximum difference was less than 5% in sunlight. Most differences were less than 2%. The filter disc height in the Apogee cosine-corrected head that most closely corresponded to the LI-COR quantum sensor was 1 mm, which corresponds to one full rotation up from flush.