**INTRODUCTION**

- LI-COR solar radiation measurements:
  - Designing solar radiation sensors for over 40 years
  - Sensors used at thousands of locations around the world
  - Used for solar resource assessment, photovoltaic efficiency monitoring, meteorological and agricultural studies
- Silicon photovoltaic design advantages of LI-200 Pyranometer:
  - Low-maintenance, proven field performance [2, 3]
  - Lower cost than thermopile designs
  - Lower sensitivity to dust and dirt compared to thermopile designs
  - Response time less than 1μS (2m cable terminated into 147 Ω load)

**REFERENCE LI-200 PYRANOMETER**

![Spectral Response of LI-200 Pyranometer](image)

The LI-200A Pyranometer spectral response along with the energy distribution in the solar spectrum.

**NEW LI-200R PYRANOMETER**

- Detachable sensor head
- Easy removal for calibration w/o unwiring
- Larger drain for improved water shedding
- High-speed, fully cosine corrected
- Designed for continuous monitoring
- μA and mV (with adapter) output
- Sensitivity typically 90μA per 1000 Wm⁻²

**PERFORMANCE OF NEW vs OLD DESIGNS: LATEST RESULTS**

**Daily Irradiance**

<table>
<thead>
<tr>
<th>Time</th>
<th>New Design Current Output (µA)</th>
<th>Reference Sensor: Irradiance (Wm⁻²)</th>
<th>y = 0.0774x + 0.0013</th>
<th>R² = 0.9999</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:37:00</td>
<td>3651 data points per each of 5 sensors</td>
<td>Reference Irradiance (Wm⁻²)</td>
<td>Current (µA) output from new LI-200R sensors as function of reference LI-200 sensors</td>
<td></td>
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<tr>
<td>11:37:00</td>
<td></td>
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<td>3:37:00</td>
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**Irradiance Response**

In 1:1 comparison, new LI-200R performed well vs reference LI-200 at 1 minute intervals with no averaging

**New Design Output vs. Reference**

New LI-200R performed well vs reference LI-200 (data for 1 minute intervals with no averaging)

**New Design Cosine Response**

The sensitivity of new LI-200R sensors as a function of angle of incidence

Cosine response is corrected well up to 82° angle of incidence

**New Design Azimuth Response**

Errors were below 1% in new LI-200R over 360° at 45° elevation

* A sensor without an accurate cosine correction can give a severe error at low solar elevation angles. The cosine error at angle θ is the percent difference of the ratio of the measured output at angle θ and normal incidence (angle 0°) as compared to the cosine of angle θ

**REFERENCES**