TWST-COD Sensor

Accurate and Precise Continuous Monitoring of Cloud Optical Depth (COD)

- Measures VIS-IR spectra (400-1000 nm)
- Provides true 1 Hz sample rate
- Resolves thick/thin cloud ambiguity

**Attributes**

- High Temporal Resolution; Typical SNR (530 nm) > 1000 at 1 Hz
- Proven radiometric stability under harsh field conditions; frequent recalibration not required
- Sealed IP66 enclosure and backup battery allow for long term autonomous field operation
- Includes radiometric calibration and a laptop computer fully loaded with executable software for control, data processing and user calibration
- Demonstrated agreement with co-located AERONET sensors within 1% when comparing in-band solar radiance at 440 and 870 nm

**Applications**

- Accumulation of COD data for inclusion in climatology models
- Capture of cloud edges and fast evolution of cloud properties
- Study of cloud-aerosol interaction effects
- Collecting ground truth measurements for space-based earth-observing sensors
- Real-time measurement of COD for any event requiring a ‘GO – NO GO’ decision based upon knowledge of local cloud conditions

**Operating Principles**

A calibrated spectroradiometer stares at a narrow segment of the sky directly overhead, recording the spectral radiance in the visible wavelength regime with high temporal resolution. The heart of the sensor consists of a single fiber-optic spectroradiometer with an entrance aperture that is well shielded from the sun. Dark spectra collection is done automatically with a conventional shutter. The equivalent width of the 760 nm oxygen A-band is utilized to resolve the thick/thin cloud ambiguity, thus providing superior performance to AERONET cloud mode.
# SPECIFICATIONS

## MEASUREMENT SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td><strong>Spectral Range</strong></td>
<td>400-1000 nm</td>
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<tr>
<td><strong>Spectral Resolution</strong></td>
<td>~2 nm</td>
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<td><strong>Field of View</strong></td>
<td>0.5 deg. FWHM</td>
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<td><strong>Spectral Bands Used in COD Retrieval</strong></td>
<td>440, 760, and 870</td>
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<td><strong>COD Precision</strong></td>
<td>1% (typical, depends on update rate)</td>
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<tr>
<td><strong>Operating Range</strong></td>
<td>Blue sky to COD &gt; 100</td>
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<tr>
<td><strong>Data Logging Rate</strong></td>
<td>1 Hz (typical), variable sampling interval from 1 to 60 seconds</td>
</tr>
</tbody>
</table>

1 Year Manufacturer's Warranty

## PHYSICAL SPECIFICATIONS

- **Weatherproof Box:** IP66, NEMA 4X sealed enclosure with desiccant
- **Temperature Range:** -10 ºC to +40 ºC
- **Precipitation:** Slanted optical window design drains water effectively; periodic cleaning with distilled water may be needed in some environments.
- **Power Usage:**
  - Mains: 100-240 VAC (50-60 Hz), 65 W
  - Laptop provides 5 VDC, 250 mA via USB cable to spectrometer
- **Weight:** 9 kg (20 lbs)
- **Size:**
  - Box: 38 cm x 33 cm x 18 cm (L x W x H) [15” x 13” x 7”]
  - Baffle: 30 x 5 cm (L x W) [12” x 2”] tube

## DATA OUTPUT

- **Communication:** USB 2.0 connection to host computer for power and data
- **Display:** Simple, effective browser interface
- **On-Board Storage Capacity:** > 10 years continuous operation

## REFERENCES