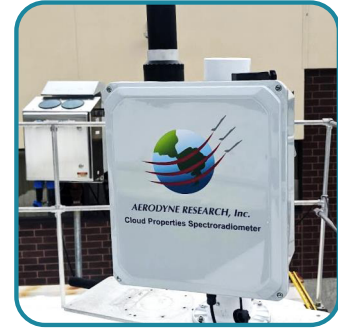


TWST-CPS Sensor

Accurate and Precise Continuous Monitoring of Cloud Properties: Optical Depth, Effective Radius, Phase

- Measures VIS spectra (400-1700 nm)
- Provides 1 Hz sample rate
- Resolves thick/thin cloud ambiguity



Deployed at Aerodyne Research

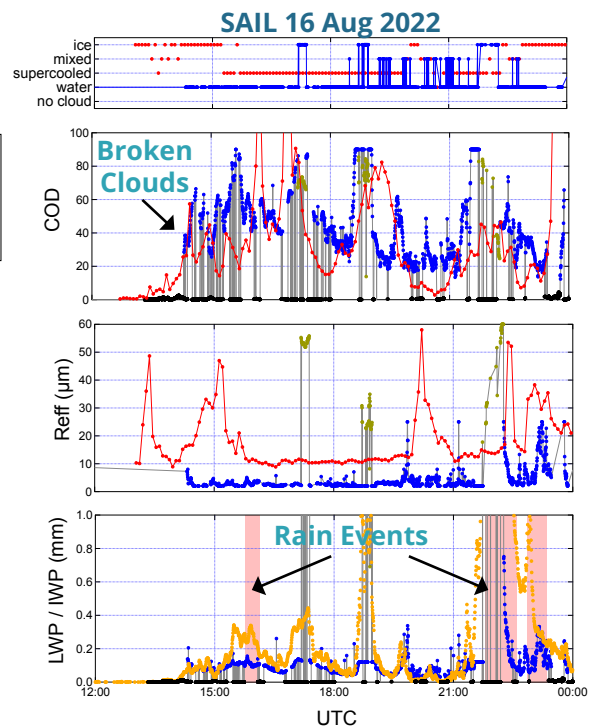
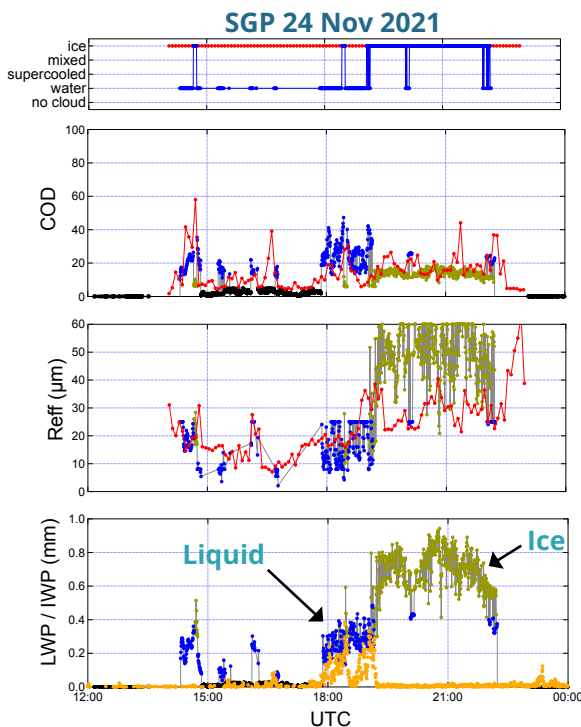
Attributes

- 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, Phase, and R_{eff} 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

Results: Cloud Properties Retrievals



TWST-CPS Sensor

Specifications

MEASUREMENT SPECIFICATIONS	
Spectral Range	400-1000 nm / 950-1700 nm
Spectral Resolution	~2 nm / ~6 nm
Field of View	0.5 deg. FWHM
Spectral Bands used in COD Retrieval	440, 760, and 870 or 780 nm
COD Precision	1% (typical, depends on update rate)
Operating Range	Clear sky to COD > 100
Data Logging Rate	1 Hz (typical), variable sampling interval from 1 to 60 seconds
Method for Phase Retrieval	1600 nm spectral band
Phase Designations	Ice, Mixed, Liquid
Method for R_{eff} Retrieval	Minimization of error between spectral radiance measurements and forward model

1 Year Manufacturer's Warranty

Physical Specifications

Weatherproof Box:	IP66, NEMA 4X sealed enclosure with desiccant
Temperature Range:	-10 °C to +40 °C
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

"Application of oxygen A-band equivalent width to disambiguate downwelling radiances for cloud optical depth measurement". Edward R. Niple, Herman E. Scott, John A. Conant, Stephen H. Jones, Frank J. Iannarilli, and Wellesley E. Pereira. Atmos. Meas. Tech., 9, 4167-4179 (2016)



45 Manning Road
Billerica, MA 01821
(978) 663-9500
www.aerodyne.com