Biospherical Instruments’ GUV-511 and GUV-541 Ground-based Ultraviolet (UV) Radiometer Systems are designed to monitor UV radiation, providing key UV wavelength data for biological exposure studies. These data also allow the extraction of cloud optical thickness and total column ozone—two critical variables used in modeling the solar spectrum.

Biospherical Instruments has pioneered efforts in designing and manufacturing ground-based and underwater UV radiation instruments. We are currently responsible for the design and maintenance of the United States National Science Foundation (NSF) UV Radiation Monitoring Network (Booth et al., 1994; Stamnes et al., 1991; Lubin et al., 1989). The heart of the network is BSI’s SUV-100, a double monochromator-based spectroradiometer system designed for high spectral resolution measurements of UV radiation. The SUV-100 has proven itself at three sites in Antarctica, one site in Argentina, and two sites in the United States (Barrow, Alaska and San Diego, California).

The GUV instruments, developed with funding from the Office of Naval Research SBIR Program, are an economical and portable alternative to the SUV-100 for ground-based monitoring of key UV wavelengths.

Originally introduced in 1992, the GUV radiometers are now well established in the field. The systems can be deployed individually or in networks and are being used to monitor geographic variations in UV exposure in countries such as Argentina, Norway, and the United States.

Key Features

* Measures 5 channels of surface UV irradiance (305, 320, 340, and 380 nm, and either Photosynthetically Active Radiation (PAR: 400-700 nm) or 313 nm

* Specialized, highly accurate, low-noise sensors with optimized interference filters detect radiation in the UV-B (290-320 nm) and UV-A (320-400 nm) regions of the spectrum, as well as PAR

* Aluminum housing that can be mounted on a mast for long-term UV monitoring

* Environmentally sealed and temperature-stabilized for long-term operation in harsh environments

* Internal sensor that measures photodiode array temperature

* RS-232 serial output for connection to a PC

* Can be easily deployed individually or in networks
Specifications

Physical
Dimensions: 15 cm D x 30 cm H
Materials: Certified 6061 T6 aluminum with Teflon® endcap for temperature isolation; double-jacketed and foam insulated for greater temperature stability
Weight: 7 kg
Temperature Rating: -50°C to +40°C
Photodiode Array Temperature: 40°C ±0.5°C

Sensors
Standard: Downwelling irradiance and internal temperature sensor (to monitor photodiode array temperature)
Optional: instrument inclinometer

Optical Features
GUV-511 Wavelengths: 305, 320, 340, 380 nm and PAR (400-700 nm)
GUV-541 Wavelengths: 305, 313, 320, 340, and 380 nm
Bandwidth: 10 nm FWHM standard; 20 nm FWHM optional

Irradiance Array
Filter Type: Custom low-fluorescence interference
Cosine Collector: Teflon®-covered quartz
Collector Area: 2.1 cm diameter
Out-of-band Rejection: 1x10⁻⁶
Angular Response: 0-5% from 0° to 70°; ±10% from 71° to 85°
Typical Saturation: 10⁵ µWcm⁻²nm⁻¹
Noise Equivalent Irradiance: 10⁻¹¹ Wcm⁻²nm⁻¹
Temperature Coefficient of the Dark Signal:
Less than ±3 µvolts/oC
Response Temperature Coefficient: Less than ±0.15%/oC

Heater
Silicon heater blanket equipped with over-temperature cutoff; maintains constant internal temperature.

System Electronics
System Data Rate: 2 Hz
Interchannel Sampling Delay: 500 µsec ±175 nsec

Data Acquisition
Output: 2-byte RS-232; 11-bit resolution plus 4-bit exponents plus sign
RS-232 Requirements: 9600 baud, N81

Desktop Controller
Dimensions: 43 cm W x 30.5 cm L x 7 cm H
Materials: Aluminum
Power: AC powered; universal voltage requirements (85-264 VAC, 47-63 Hz)
Temperature Controller: Programmable, solid-state digital temperature controller
Cable: 50 m RS-232 serial interface weather-resistant shielded cable (custom lengths available by request)

Software
Windows®-based LOGGER software is supplied and all data files are compatible with MS / Access 2000

Calibration
Using a NIST-traceable 1000-watttype FEL Standard of Spectral Irradiance. Can be calibrated using the sun by intercomparison with a high-resolution scanning spectro-radiometer. Annual recalibration recommended.

References

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