Table 1: Instrumentation descriptions

Measurement	Instrument	Units	Wavelengths (μm)	Network[1]
Passive Radiation Measurements				
Direct shortwave irradiance	Pyrheliometer	W/m^2	0.2-4.0	BSRN
Diffuse shortwave irradiance	Pyranometer	W/m^2	0.2-4.0	BSRN
Global shortwave irradiance	Pyranometer	W/m^2	0.2-4.0	BSRN
Longwave irradiance	Pyrgeometer	W/m^2	5.0-50.0	BSRN
PAR irradiance			0.4-0.7	
Global and diffuse narrowband irradiance	UVMFRSR	W/m^2	0.300-0.368 (7 bands)	
Global and diffuse narrowband irradiance	MFRSR	W/m^2	0.415-0.936 (6 bands)	
Narrowband radiance	Spectrophotometer	$\mu W/cm^2$ nm sr	0.355-1.025 (17 bands)	
Direct and diffuse narrowband radiance	Sunphotometer		0.340-1.020 (7 bands)	AERONET
Microwave Radiometer	MWR		Multiple	
Sky and Sea Surface Temperature	Infrared Thermometer	Kelvin	9.6-11.5	
Diffuse Black and White Pyramometer	B & W Pyranometer	W/m^2	0.30– 3.0	
Active Radiation Measurements				
Aerosol backscatter and extinction profiles	Lidar		0.523	MPLnet
Total column precipitable water vapor	GPS-IPW	cm		GPS-MET
Aerosol In Situ Measurements				
Number density	Condensation Particle Counter (CPC)	$\#/cm^3$		
Potential Cloud Nuclei	Cloud Condensation Nuclei Counter	$1/cm^3$		
Aerosol absorption coefficient	Aethalometer	$\mu g/m^3$	0.37,0.47,0.52,0.59, 0.66,0.88,0.95	
Aerosol extinction coefficient	Nephelometer	1/m		
Average aerosol diameter	Electrical Aerosol Detector (EAD)	mm/cm^3		
Meteorology Measurements				
Temperature	Camp. Sci. HMP 50	Degrees C		BSRN
Relative Humidity	Camp. Sci. HMP 50	Percent		BSRN
Barometric Pressure	Vaisala PTB101B	mb		BSRN
Wind Direction	Young 05013	0-360°		
Wind Speed	Young 05013	m/s		

3 axis sonic anemometer/thermometer	App. Tech. 3D wind		
Derived Measurements			
Calculated Global (Cosine SZA * direct + diffuse)	pyranometer	W/m^2	0.2 – 4.0

1. BSRN – Baseline Surface Radiation Network; AERONET – Aerosol Robotics Network; GPS-MET – Ground-Based Meteorology Observations with no network association are NASA Langley projects.

Glossary

Radiant Energy

Radiance Radiant energy confined to a solid angle or cone. The angular measure to define the cones uses steradians. Radiance units are energy per area per time per frequency and per steradian (for example, $W/m^2/nm/sr$, recall W = joules sec^{-1}). The collection cone is oriented in space so radiance observations are always associated with a direction.

Irradiance Radiant energy incident upon a surface. Irradiance units are energy per time and per area (for example, W/m^2). Atmospheric sensors view an entire hemisphere (2pi sr).

Spectral Regions

Shortwave Wavelengths containing energy emitted by the sun (sometimes called solar wavelengths). This spectral region spans wavelengths from 0.2-4 microns.

Longwave Wavelengths containing energy emitted at terrestrial temperatures (sometimes called infrared thermal wavelengths). This spectral region spans wavelengths from 5-50 microns.

Broadband Radiation measurements over the entire shortwave or longwave spectral regions.

Narrowband Radiation measurements over a discrete spectral range of wavelengths, for example from 0.50 to 0.55 microns.

PAR Photosynthetically-active radiation; the spectral region from 0.4 - 0.7 microns, this range includes wavelengths efficiently absorbed by various types of chlorophylls found in plants and phytoplankton.

Field of View

Global Irradiance measurement, hemispheric field of view, includes direct and diffuse components.

Direct Irradiance measurement of solar beam typically limited to 5 degree field of view.

Diffuse Irradiance measurement with an instrument shaded from the direct solar beam (hemispheric field of view).

Instruments

Aethalometer Measures the concentration of black or elemental carbon aerosol particles at 7 optical wavelengths.

B&W pyranometer	Black and White pyranometer; Detector's thermopile is both blackened and whitened. Measures irradiance of shortwave energy.
EAD	Electric Aerosol Detector; measures total aerosol length. Can be thought of as # concentration times average diameter, or as d^1 weighting. It is ideally suited for particles in range of 0.10 – 1.0 μm.
CPC	Condensation Particle Counter; measures # concentration of submicrometer airborne particles larger than 0.01μm in diameter
GPS-IPW	Measures integrated precipitable water vapor in the total column above the instrument.
IR Thermometer	Measures sky and sea temperatures; if the emissivity of the measuring substance is known, the temperature of the substance can be determined by measuring its infrared radiation.
Pyranometer	Irradiance measurement of shortwave energy.
Pyrgeometer	Irradiance measurement of longwave energy.
Pyrheliometer	Irradiance measurement of direct component of the solar energy.
Lidar	Also known as Micro-Pulse Lidar (MPL); basic measurements include cloud layer and aerosol height.
MFRSR	Multifilter Rotating Shadowband Radiometer; shaded and unshaded narrowband irradiance measurements.
MWR	Microwave Radiometer; give water vapor profiles of the atmospheric column directly above the instrument.
Nephelometer	Measures the light scattering extinction coefficient.
Spectrophotometer	Makes 17 spectral measurements in the 0.355-1.025μm range.
Sunphotometer	Direct narrowband radiance measurements at multiple wavelengths.
UVMFRSR	Ultraviolet Multifilter Rotating Shadowband Radiometer; shaded and unshaded narrowband irradiance measurements in UV.
3D wind	3-axis anemometer/thermometer; a solid-state ultrasonic instrument that measures wind velocities from three orthogonal axes (U,V, and W) and provides sonic temperature.

Other

SZA	Solar Zenith Angle. Angle measured at the earth's surface between the sun and the zenith.