

# SPECTRAL EVOLUTION

## Measuring Albedo in the Field with a Portable Spectroradiometer

Albedo is a measurement of the electromagnetic solar radiation reflected by the earth's surface divided by the radiation incident on its surface. It is a fraction of the incident sunlight that a surface reflects. Albedo has a value from zero to one, with zero being a black totally absorbing surface and one being a mirror-like completely reflecting surface. Bright earth albedos like snow, clouds and ice have albedos ranging from 50% to 90% while dark surfaces such as asphalt roads, dark soils and forests have albedos ranging from 5% to 20%. Surface temperature is controlled by albedo and the atmospheric greenhouse effect. Measuring albedo is critical for applications including snow and ice measurements and road and roof materials to cut down on heat retention. Hot materials warm the environment around them. An increase in albedo values of urban materials worldwide would result in a larger portion of total incoming solar radiation being reflected and could have a beneficial effect on global warming. Albedo measurements also provide information on vegetation health, soil analysis, and climate change.



*PSR+ with straight diffuser.*

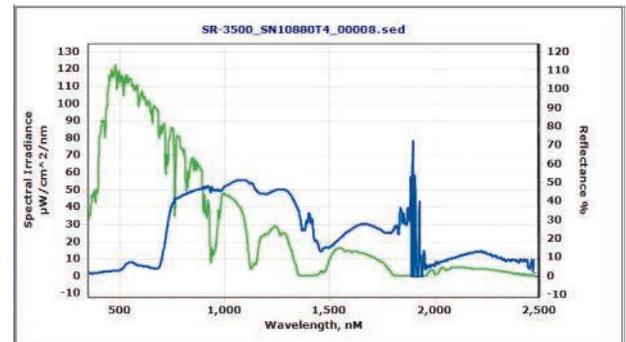
Albedo depends on the spectral and angular distributions of the incident light, which are governed by atmospheric composition, the direction of the beam of light from the sun and the composition of the surface. Surface albedo is an essential climate variable and affects agriculture, hydrology, glaciology, urban studies and more.



*PSR-1100f with right angle diffuser.*

SPECTRAL EVOLUTION provides portable spectroradiometers that can be used to take albedo measurements in the field. Spectroradiometers include the SR-6500, RS-8800, RS-5400, PSR+, RS-3500 and PSR-1100f. These spectroradiometers and FOV lenses are calibrated to NIST standards for absolute radiance measurements. Using a calibrated straight or right angle difuser, a spectra of the downwelling irradiance can be accurately measured. The RS-8800 is a full range (350-2500nm) high resolution/high sensitivity system including an Internet of Things (IoT) operating system that allows you to operate the system by iPhone, Android device, or tablet. In combination with our new *Sensaprobe™* grip, researchers can access and store more important field data in addition to their scans, including:

- ◆ A picture of the exact sample Field of View that you want to scan
- ◆ The angle of the scan
- ◆ The sun height angle
- ◆ The GPS location



*DARWin SP Data Acquisition software multiple scan plot showing upwelling and downwelling, taken by a PSR+.*

All our portable spectroradiometers have the following features:

- ◆ Wide range of accessories including direct attach lenses, FOV lenses, contact probes, pistol grip and unique leaf clip
- ◆ Auto-shutter, auto-exposure and auto dark correction
- ◆ Rugged design with no moving optical parts for field use
- ◆ Optional rugged tablet with digital camera, voice note recording, GPS and more.
- ◆ DARWin SP Data Acquisition software stores all scans and associated data as ASCII files for use with other third party programs, like ENVI or chemometrics software such as Unscrambler from Camo Analytics

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