

# SPECTRAL EVOLUTION

## Marine Ecosystem Research with a Field Spectroradiometer

Marine ecosystem research addresses many areas of concern about our ocean resources and their habitat. It includes *in situ* measurements to gauge reflectance data from the water's surface, measure phytoplankton biomass and pigments, judge water clarity, and provide ground reference data to verify atmospheric correction. It also includes hyperspectral data from satellite imagery, such as the planned NASA PACE mission ocean color sensor to help refine measurements of phytoplankton pigments, biological communities and ecosystem structures.

Satellite, flyover and ground truthing also play important roles in discovering and tracking algal blooms in inland lakes and rivers that affect water supplies and fisheries. Radiometric ground measurements of downwelling irradiance and water leaving radiance can be made to compare hyperspectral imaging capabilities to accurately measure water reflectance. A white reference target is measured to assess changes in ambient light and used as ground reference to verify atmospheric correction. *In situ* measurements can also be taken of algal blooms to provide spectra for comparison with hyperspectral data.

The PSR+ field spectroradiometer is a full range system that delivers high resolution/high sensitivity scans for marine ecosystem studies. The PSR+ features:

- ◆ 350-2500nm spectral range
- ◆ High resolution: 3nm @ 700nm; 8nm @ 1500nm, 6nm @ 2100nm
- ◆ High sensitivity
  - 0.5x10<sup>-9</sup> W/cm<sup>2</sup>/nm/sr @400nm
  - 0.8x10<sup>-9</sup> W/cm<sup>2</sup>/nm/sr @1500nm
  - 1.0x10<sup>-9</sup> W/cm<sup>2</sup>/nm/sr @2100nm
- ◆ Keypad and LCD display—stores 1000 scans without a computer
- ◆ One-touch operation with autoexposure and autoshutter
- ◆ Compact, lightweight, handheld unit—7.5 pounds (3.4 kg)
- ◆ Snap-in rechargeable battery
- ◆ Choice of direct attach lenses or fiber optic field-of-view (FOV) lenses
- ◆ Accessories that include contact probes, right angle and straight diffusers, custom designed leaf clip, submersible fiber optic
- ◆ Easy-to-use DARWin SP Data Acquisition software saves scans as ASCII files for use with third party software, including chemometrics without pre-processing
- ◆ Available with optional GETAC microcomputer that stores an unlimited number of scans along with GPS, altimeter, voice notes, digital images from a built-in camera, along with a sunlight readable display

With optional EZ-ID sample identification software, the PSR+ allows researchers to take scans of known samples and build a custom library for matching against new target samples. In this way a spectral library for algal blooms could be built for specific geographic areas.

There are also spectroradiometers available that cover 280-2500nm for additional UV measurements.



**SPECTRAL EVOLUTION**  
*PSR+ field spectroradiometer  
with direct attach lens*



**PSR+ with pistol grip and field-of-view (FOV) lens.**

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