

# SPECTRAL EVOLUTION

## Soil Mapping

Soil mapping is an important technique for evaluating, conserving, and improving soil characteristics to assure a stable ecological status and protect environmental and agricultural resources.

Both hyperspectral and field spectroscopy play critical roles in accurate and timely soil mapping. Using flyover and satellite imagery, a researcher can sketch a broad outline of a region's soil properties. In the field ground truthing with a portable spectrometer or spectroradiometer is essential for the collection of accurate soil properties and an understanding of conditions and factors affecting the soil in a region.

*In situ* collection of spectra is critical especially in areas that are not bare and dry where hyperspectral imagery will show vegetation and not soil. Using a system such as the PSR+ spectroradiometer in the field, a researcher can analyze the following soil parameters:

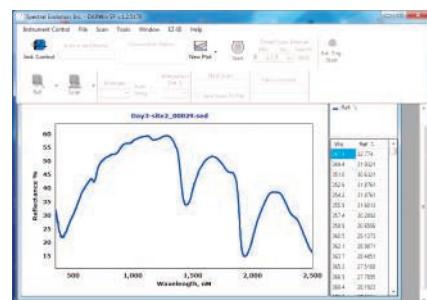
- ◆ Soil moisture—which can affect vegetation and crop health, erosion from runoff, irrigation practices, and more
- ◆ Soil texture—identify soil components such as sand and clay and soil health
- ◆ Minerals—identify minerals in the soil that affect composition, fertility, drainage, etc.
- ◆ Organic carbon—including biomass can provide important data on ecosystem health for an area
- ◆ Salinity—salt quantities can indicate everything from weathering to over-fertilization
- ◆ Degradation and contamination—whether from man-made or natural sources including agricultural and irrigation practices, mining, contamination from toxic chemicals including hydrocarbons from petrochemical seepage or spillage, and more

The PSR+ is a lightweight, reliable high resolution spectroradiometer designed for field use. The PSR+ covers the full UV/VIS/NIR range from 350-2500 nanometers with unmatched sensitivity and accuracy. It is easy for one person field use with an optional handheld microcomputer and direct attach lenses, or fiberoptic connection to a pistol grip or sample contact probe. The PSR+ includes DARWin SP Data Acquisition software with access to the USGS spectral library and 19 vegetation indices. It can work in standalone mode to store up to 1000 field scans before offloading. It is supplied with two rechargeable lithium-ion batteries each capable of up to 4 hours of use for a total of 8 hours of scanning.

Optional EZ-ID sample identification software includes access to mineral identification libraries including the USGS, SpecMIN and GeoSPEC libraries. Using pattern matching algorithms, EZ-ID matches your target scan to known samples and provides a matching “confidence level” percentage. It also allows you to quickly take scans of known samples and create your own region-specific library. For ease in handling soil samples, it can be equipped with a benchtop probe with sample compactor.



*Soil analysis using NIR spectroscopy can measure water, carbon, nitrogen, clay, pH, and organic matter.*



*DARWin SP Data Acquisition software is included with every SPECTRAL EVOLUTION spectroradiometer.*

### Typical Soil Applications:

- ◆ Topsoil fertility
- ◆ Erosion risk
- ◆ Hydraulic properties
- ◆ Soil degradation
- ◆ Total and inorganic carbon
- ◆ Organic matter in soil
- ◆ Total nitrogen and mineralized nitrogen
- ◆ Cation exchange capacity (CEC) measurement as an indication of soil fertility and nutrient retention capacity
- ◆ Moisture content
- ◆ Indirectly measure soil pH