

# SPECTRAL EVOLUTION

## Measuring Moisture in Soil

NIR field spectrometry is an important tool for characterizing several soil properties in one scan including organic and inorganic content, salinity, soil mineralogy, clay content, pH, cation exchange capacity (CEC) and moisture. Water moisture measurement is critical for crop production based on an accurate measurement of soil conditions and soil moisture content. Agricultural water management through irrigation scheduling relies on soil moisture control to ensure that crops are getting the right amount of moisture from the soil for high production levels.

Proximal soil analysis using a field spectrometer or spectroradiometer like the PSR+ provides a window into the health of the soil and subsequent health of vegetation growth. By taking *in situ* measurements rapidly and without preparing or in any way affecting the sample, spectral information related to the main water absorption features at 1450-1460nm and 1920-1930nm provide not only indications of soil water content but also can be used to derive information on leaf and canopy water content. The data obtained from the soil spectrum can also be used in ground truthing airborne or satellite hyperspectral images.

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 in the field to use with an optional handheld microcomputer and direct screw-on lenses, or fiberoptic connection to a pistol grip or sample contact probe. The PSR+ includes our exclusive DARWin SP Data Acquisition software with access to the USGS spectral library and 19 vegetation indices including water-related 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. The PSR+ is also available with a benchtop probe and sample compactor for soil analysis use in the lab.

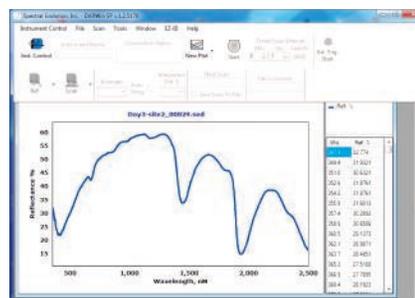
Optional EZ-ID sample identification software includes access to mineral identification libraries including the SpecMIN library—very useful for identifying clays in soil. Using pattern matching algorithms, EZ-ID matches your target scan to known samples and provides a matching “confidence level” percentage. 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.

Since DARWin saves all your spectra as ASCII files, it can easily be imported into 3rd party analysis or chemometric programs like TSG and R<sup>2</sup>.

In addition to measuring moisture content, other soil analysis applications can include: Topsoil fertility, erosion risk, hydraulic properties, soil degradation, total organic carbon, organic content in soil, total and mineralized nitrogen, CEC, and indirect measurement of soil pH.



*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.*



*An optional benchtop contact probe with sample soil compactor is useful for lab-based measurements.*

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