SPECTRAL EVOLUTION

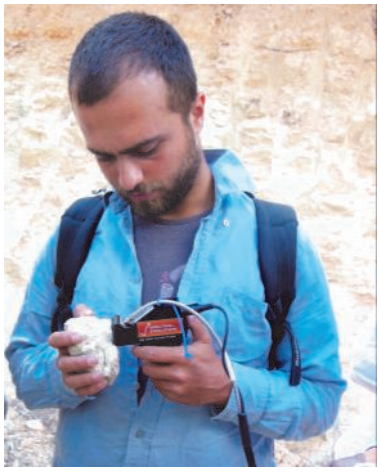
Measuring Mica Alteration with a portable NIR spectrometer

The alteration path from montmorillonite through smectite/illite, illite/smectite, illite, sericite and muscovite can be identified using spectroscopy. These alteration minerals, sometimes referred to as white micas, can be measured and identified using a field spectrometer like the Spectral Evolution oreXpress with EZ-ID mineral identification software. As the minerals alter from smaller to higher percentages of aluminum, essentially from the clay illite to the mica sericite to muscovite, the change can be seen and measured as a spectral shift at the 2200nm wavelength. This type of alteration path is a fine indicator of proximity to an ore zone. This spectral shift is indicative of changes in aluminum hydroxide content. Using these tools, a geologist can better map and analyze alteration zoning and provide the basis for more efficient and cost effective drilling for initial holes or post-core logging follow-up.

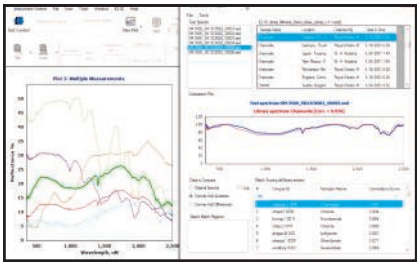
White mica identification is shown in spectra primarily in an aluminum hydroxide absorption feature at 2200nm. The depth, breadth and position of this feature can indicate the composition of the white mica. Phengetic muscovite (magnesium and iron rich) can appear at 2207nm and have a longer wavelength while muscovite at 2205nm has a shorter wavelength. The presence of acid in the mica pushes the identification toward muscovite; neutral pH pushes it toward phengite. In samples where the white mica is mixed with chlorite, the chlorite can be identified with absorption peaks near 2250nm and 2350nm.

The oreXpress is a full range (350-2500nm) high resolution/high sensitivity field portable spectrometer. It is lightweight and easy to operate — designed for rugged field mineral identification. It is equipped with two lithium-ion batteries for 8 hours of use in a rugged backpack. With no moving optics it is highly reliable. Field spectra can be collected quickly by a single –user. An ergonomically designed contact probe is provided and all spectra are stored as ASCII files for further analysis with any 3rd party software. The DARWin SP Data Acquisition software allows the user to view high resolution spectra for absorption features.

Using optional EZ-ID software with the USGS and SpecMIN libraries, a geologist can quickly identify an alteration mineral that may not be readily identifiable by sight, matching an unknown sample against a known spectral library. With EZ-ID the geologist can select specific spectral regions to fine-tune the matching process for a more precise ID. If the geologist wants to look at a particular absorption feature, the geologist can highlight that or other features and EZ-ID provides new matches. For example alteration in the white micas with the addition of potassium and depletion of sodium is consistent with phengitic sericite and often coincident with elevated gold grades. The USGS library contains 466 spectra for 226 minerals; SpecMIN has 1528 spectra for 500 minerals. By ordering EZ-ID with both libraries, a geologist has access to a wide range of match possibilities for exploration projects in iron, gold, copper, silver, nickel, uranium, and rare earths. In the core shack, the speed of the instruments is ideal for core logging. In some cases, a single geologist has been able to log as much 400 meters at 1meter intervals in a day. The data can be used to show mineralogy versus alteration type versus mineral assay.



oreXpress spectrometers are used to better understand and map mineral alteration zones quickly and accurately.



EZ-ID software identifies minerals in real-time by matching your target spectra against a known spectral library such as the USGS library, or the SpecMIN library.

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