SPECTRAL IMAGING OF DRILL CORE

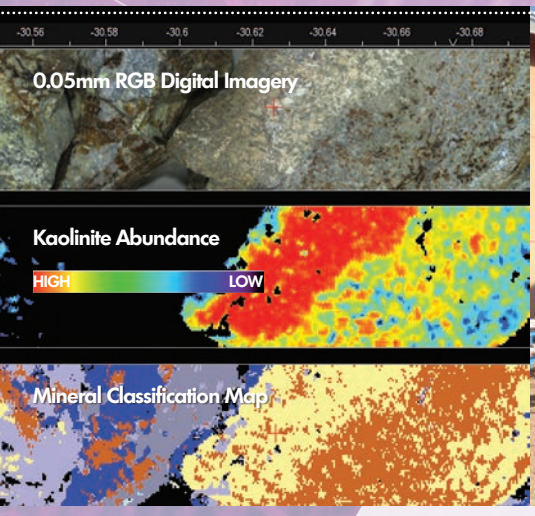
Applications In Mineral Exploration

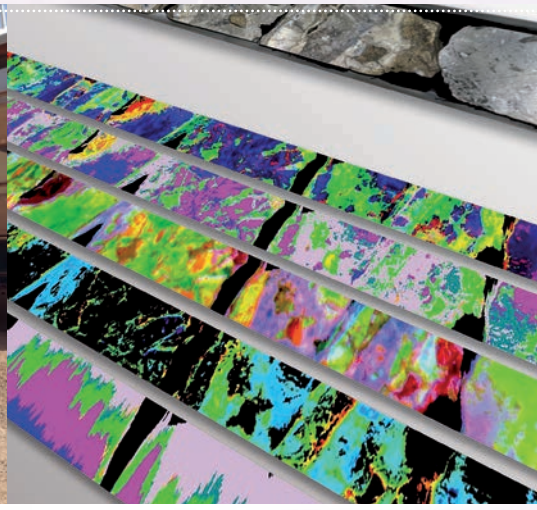
Core Logging Services

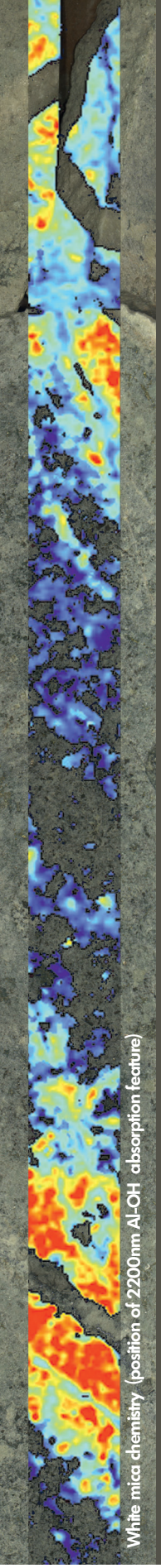
The logging of drill core and cuttings is one of the most important aspects of mine development and mineral exploration. Corescan provides a turn-key drill core scanning, processing and interpretation service, using specialist geoscientists and the latest scanning technology. Our services are available both onsite or via a local bureau facility.

Alteration minerals and assemblages, and the way in which they vary with respect to mineralisation, offer the explorer and mining professional important vectors towards mineralisation. In exploration, this influences the positioning of new drill holes or curtailing the progress of current holes to preserve precious exploration expenditure. In mining, ore and gangue are tracked while textural and mineralogical variables reveal key mechanical rock properties leading to consistent metallurgic and mine planning.

Less experienced geologists can find discriminating different clay alteration species difficult. Even experienced geologists are often unable to determine the geochemical variations within single alteration mineral species that provide meaningful exploration vectors. In both situations, consistency is key but difficult to achieve. For these reasons, spectral core logging is now becoming an integral part of drilling programmes.







Geological Advantages

Corescan's HCI-3 instrument's ability to spectrally image drill core at sub-millimetre resolution offers distinct advantages in the processing, analysis and interpretation of spectra as well as in the derivation of trends in both the alteration assemblage and the geochemical variations of individual alteration minerals.

Unlike traditional spectral systems, the fine spatial resolution of HCI-3 is able to capture a large number of pure pixels within the image providing a comprehensive and easily determined group of end member minerals that can subsequently be mapped. Furthermore, the location of these end member minerals is immediately apparent from the image itself.

Textural information is present in the image data which, at HCI-3's high resolution, can be likened to hyperspectral petrography. Thus, as individual minerals are altered or replaced by others associated with mineralisation, the process can be identified in the image and the degree of alteration quantified.

Similarly, by mapping compositional parameters for individual alteration minerals present throughout a section of core, compositional variations that relate to pre- and syn-mineralisation phases can be distinguished from those relating to post mineralisation events.

Using the calculated mineral map for a section of core, relative amounts of each alteration mineral within a scan line, and hence within an assemblage, can be computed. This objective approach replaces the qualitative estimate of the onsite geologist, or the estimate derived from modelled spectral mixtures from traditional low resolution spectral measurements.

Corescan's HCI-3 products allow the geologist to quickly compile a paragenesis of the alteration and mineralisation and so determine the minerals and parameters that are important in providing exploration vectors or even ore grade estimates.

Deliverables

Corescan provides a turnkey service that not only acquires the hyperspectral core imagery, but processes the data and produces mineral maps of core and various derived parameters useful to the exploration or mine geologist.

Initial detailed imaging work through mineralised sections of core is useful in determining key alteration minerals and assemblages that relate to mineralisation and deriving specific parameters that are useful in vectoring towards mineralisation or are associated with ore grade.

These parameters may be the relative proportion of two minerals such as chlorite and illite in shear-zone hosted gold systems for example or it may be the composition of either mineral as manifested in changes in the mineral's absorption wavelengths.

These key alteration minerals and assemblages can then be mapped throughout the core and quantitative proportions of the minerals present in any assemblage presented graphically in a down-hole log showing the true high resolution image of the core itself, the alteration mineral map that details the assemblage with the quantitative proportions of individual minerals scaled in the hole profile alongside.

In addition, where compositional variations in a mineral are important, variations as a function of depth and ore grade can be shown in a thematic image with the average composition and geochemistry shown graphically alongside the spectral log and visual record of the core.

Mineralogical interpretations may be exported as digital logs with common export formats available for use with third party 3D visualisation or mine planning software.

Real-time interpretation and visualisation during scanning identifies areas of significance for mineralisation and/or ore grade, such as an alteration mineral being present in the assemblage or a particular composition, rapidly delineating sections of core that require assay, or conversely, eliminating the need to assay core with no economic mineralisation.

Digital imagery and numerical abundances can be accessed company wide through Corescan's comprehensive electronic core library, Coreshed (www.coreshed.com).

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