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Beyond the Naked Eye: The Role of Spectral Imaging in RC Chipbox Analysis

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Introduction

Visual classification often leads to subjective interpretations when geologists are logging chip samples obtained by reverse circulation drilling. It is quite difficult to establish and standardize geological logging between different geologists to retrieve the fingerprint of geological processes. Indicators are limited, ambiguous, or biased by factors such as small sample volume, fragmentation, and colour misinterpretation along the borehole. Hyperspectral imaging is an effective tool in geological logging, offering detailed mineralogical insights beyond what is possible through visual observation, supporting data-driven interpretation of the samples. Additionally, it may reduce the need to send samples to elemental laboratory analyses, facilitating the geological workflow.

Method and/or Theory

This study evaluates the spectral response of more than 80.000 meters of reverse circulation (RC) chipbox samples using VNIR (400–1000 nm) and SWIR (1000–2500 nm) hyperspectral data analyzed under the Geotek Hyperspectral core imaging system-box (HCIS-B) from the hyperspectral core scanning facility in CTF-Vale (LEEAP).

Results and Conclusions

Applying hyperspectral analysis to RC samples helps provide clear contact boundaries defined by changes in lithology and detailed mineral quantification comprising geological domains of itabirites, carbonates and hematitites. The results highlight the key role of spectral scanning in improving the reliability of RC-based geological descriptions and support the integration of such methods into early-stage exploration.