SEG 2024 Conference: Sustainable Mineral Exploration and Development

Lithogeochemistry and Magnetic Susceptibility for Stratigraphy and Alteration Identification in the Western Foreland Shelf of the DRC

Amanda M. Stoltze[2], Tim Dunnett[1]
1. Ivanhoe Mines Exploration, Sandton, South Africa, 2. Ivanhoe Mines Exploration, Kolwezi, Democratic Republic of the Congo (Kinshasa)

The Western Foreland Shelf (WFS) is located at the western edge of the Central African Copper Belt (CACB) of the Democratic Republic of Congo. Sedimentation onset was triggered by rifting and deposition of conglomerate and mass flow sediments and sandstone (Mwashya) and finalised with the deposition of the Kundelungu Group at 630 Ma. A 1.8-km-thick package of Grand Conglomerate was deposited on the shelf during rifting. The Grand Conglomerate on the WFS is dominated by diamictite, conglomerate, sandstone, and siltstones layers. Variations in diamictite are subtle, making the identification of their stratigraphic position difficult to assign, especially in parts of the shelf with limited prior exploration. Alteration of sediments is also observed associated with mineralisation but is also only subtly manifested.

For this reason, alternative methods of characterising stratigraphy such as magnetic susceptibility, whole-rock geochemistry, and VNIR-SWIR spectroscopy have been investigated. Magnetic susceptibility is carried out on all drill core, with distinct magnetic signatures associated with stratigraphic horizons, which has been invaluable for locating units during regional drilling. Whole-rock geochemistry has also identified changes in sediment provenance with evolution of the shelf, along with identifying alteration.

A distinct high-Fe-P group of samples was identified at a consistent stratigraphic location near the top of the Ng 1.1.3 subgroup. These elevations in Fe-P within layers of the Nguba have been identified at other localities in the CACB. These layers are proposed to have formed by oxidation of iron to precipitate Fe-oxyhydroxides, which absorb phosphate. These distinct layers may be useful for correlation of widely distributed occurrences of diamictite, as changes in oxygenation of the continental sea could be large-scale events.

Alteration has been identified in both whole-rock geochemistry and VNIR-SWIR spectroscopy as being characterised by muscovite proximal to mineralisation with more distal alteration of chlorite.