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3D Lithological and Structural Geo-Modelling: A Case Study of The Mudilandima Deposit, Tenke Fungurume Mining District, Lualaba Province, Democratic Republic of Congo

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1. Introduction

- Background

The Mudilandima deposit or Mudi is a complex structured deposit located within the northern apex of the larger Central African Copperbelt, primarily extending from Zambia to the Democratic Republic of Congo. Despite the existence of a production geological model, the excavation of the copper-cobalt ore still faces challenges, leading to suboptimal ore recovery, loss, and dilution. Integrated approaches have significantly enhanced the high-resolution, accurate, and detailed representations of complex structured mineral deposits and have improved their understanding. Therefore, this research will attempt to construct a 3D lithological and structural model to mitigate the challenges induced by the high variability of the Mudilandima subsurface.

- Objectives

The main objective of this research is to produce an integrated three-dimensional model, based on a pit geological map and RC drill hole data, focusing on the lithological, alteration, and structural aspects in the ore delineation of the Mudilandima deposit. Specific objectives include: (i) to explore the lithologies and the alteration footprint; (ii) to explore the geologic structures (faults, folds, caverns); (iii) to investigate the influences on the ore mineral redistribution and the geometry of the ore.

2. Methodology

A field trip has been conducted on the Mudilandima deposit to investigate the lithologies, alteration, and geological structures from outcrops at the faces of the pit. It has resulted in a 2D geological map. Additionally, an RC chip tray logging campaign was undertaken to establish the spatial variation of lithologies in the 3rd dimension. Additional data has been collected from the 3D exploration geological model provided by Tenke Fungurume Mining SA. From the above 3 sources of data will derive The Integrated Geological Model. Complementary information will be sourced from the literature, thin section observations, and data acquired through XRD, XRF, and SEM analyses conducted on samples.