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## **Overview, Challenges, Opportunities, and Developments in Definition Geophysics for Iron Ore**

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## **Overview, Challenges, Opportunities, and Developments in Definition Geophysics for Iron Ore**

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### **Introduction**

The exploration of iron ore presents challenges not only in the stages of discovery and addition of new deposits but also in the extension of the Life-of-mine of existing operations. The sustainability of operations is a strategic driver for companies engaged in the commercialization of this commodity. The advancement of data acquisition and processing technologies, driven by the development of new sensors and the power of machine learning, has revolutionized the sector, promoting greater efficiency, sustainability, and precision in the identification and characterization of mineral deposits.

### **Method and/or Theory**

This work presents in-depth the execution of the Geophysics Definition program for Iron Ore, covering non-conventional multimethod airborne survey campaigns for mineral prospecting; implementation of hyperspectral core scanning; geophysical logging; and the integration of geophysical and geological data and products. This integration is carried out under an advanced analytics approach, aiming to support the stages of the mining value chain, including exploration in brownfield areas, drilling programming, and geological modeling.

### **Results and Conclusions**

The integrated multimethod data strategy allowed the definition of exploratory targets confirmed by geological drilling, adding potential mining operations and accelerating the data-driven decision-making process.