

MULTI-SOURCE REMOTE SENSING DATA FUSION TECHNOLOGY FOR MINING

Maria Mavroudi ^{*1}, Rushaniia Gubaidullina ¹, Michael Tost ¹, George Barakos ²

¹ *Montanuniversitaet Leoben, Mining Engineering and Mineral Economics, Erzherzog-Johann-Straße 3, 8700, Leoben, Austria*

² *Western Australian School of Mines, Curtin University, Australia*

*Corresponding author: maria.mavroudi@unileoben.ac.at

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Earth observation (EO) technology is a powerful tool that can support the extractive sector with relevant information which can be exploited throughout the whole mine life-cycle for efficient resource exploration and management, monitoring of the mining activities and risk assessment. Technological advances have led to the development of new sensors and processing methods with more diverse capabilities, higher-quality data acquisition, and improved characteristics. These various sensor types provide complementary information, enabling more comprehensive and precise analysis. However, constraints may arise when relying only on single source data, such as gaps caused by cloud cover for optical data or other factors. By combining multiple data sources, data fusion helps to overcome these limitations, offering a more comprehensive and reliable dataset.

This research investigates the enhancement of single-source remote sensing data products through data fusion, with a focus on applications in the mining sector. The literature review of applied methodologies with multi-scale and multi-source EO data fusion, provides insights on how different combinations of remote sensing data can be effectively used to address different tasks across all phases of the mine life-cycle. Furthermore, the study explores the strengths, limitations, and challenges associated with it. In addition to sensor improvements, the study shows that advancements in machine learning and deep learning techniques have significantly enhanced the processing of remote sensing data, contributing to both pre-processing and processing, by optimizing algorithms, delivering more accurate results. An optimal combination of sensors and processing workflows is therefore proposed, ensuring higher precision and better decision-making across various applications.