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MOSMIN: Multiscale Observation Services for Mining Related Deposits

René Booyesen, Sandra Lorenz, Moritz Kirsch, Richard Gloaguen
Helmholtz Institute Freiberg for Resource Technology, Freiberg, Germany

The shift toward a sustainable economy has led to a heightened demand for raw materials, typically obtained through mining operations. Mining operations produce byproducts like rock waste, tailings, and stockpiles, which pose environmental and safety hazards. It's crucial to effectively manage these materials throughout their lifespan, prioritizing stability and the prevention of water and soil contamination. Earth-observation (EO)-based techniques are rarely used for monitoring these deposits, and multi-sensor field data are commonly not integrated despite recent technological advancements. We aim to establish holistic, full-site services for geotechnical and environmental monitoring, along with the valorization of mining-derived deposits. This will be achieved through an integrated approach utilizing both EO data and in situ geophysical data. The work will be accomplished under the MOSMIN project: "Multiscale Observation Services for Mining Related Deposits," and funded by the European Union Agency for the Space Programme (EUSPA) with project number 101131740. MOSMIN services will use Copernicus EO data for time-resolved, spatially extensive, remote monitoring of ground deformation and surface composition. Cutting-edge algorithms for change detection will pinpoint displacements and identify environmental hazards. Satellite data will be integrated with real-time, high-resolution data obtained from drones and sensors installed on site, leveraging the power of machine learning for fusion and resolution enhancement of multi-scale, multi-source data. Novel geophysical techniques such as distributed fibre-optic sensing will provide subsurface information to identify potential risks such as internal deformation and seepage. MOSMIN will collaborate with international partners and mining companies to leverage pilot sites located in the EU, Chile, and Zambia. These sites will serve as testing grounds for the development of comprehensive monitoring services. The MOSMIN integrative services and tools will improve the efficiency and reliability of monitoring, maximise resource utilisation, and help mitigate environmental risks and the impact of mining operations. Submitted on behalf of the MOSMIN Consortium.