1 PUBLISHABLE SUMMARY

This progress report of the MultiMiner project describes the work performed between 1.1.2023 – 31.12.2023.

General objectives of the 42-month project are as follows:

- Develop scalable and automated approaches for mineral exploration based on multi-source EO data and sparse in situ data, focused on mineral deposits hosting CRMs across EU.

- Leverage novel EO data analysis methods to make the most of scarcely available in situ data for timely mine site monitoring, reducing both disruptions to mining activities and environmental impacts.

- Demonstrate novel exploration and monitoring methods for the whole mining life cycle in 6 test sites across Europe, emphasizing their potential to increase access to critical raw materials across Europe.

- Share the innovative MultiMiner methods broadly with European value-adding industry to stimulate further research and developments, and ensure their exploitation by the European mining industry.

The project has five work packages which all have progressed according to the project plan during the first twelve months. The progress of each work package is briefly summarized in the following:

The main achievements of WP1 (Project management) were the signing of the Consortium agreement and the organization of three project meetings: the kick-off meeting in January Espoo, Finland, the first progress meeting in May in Hochfilzen, Austria and the second progress meeting on-line in November. The project has produced 4 deliverables during the first 12 months of operation.

In WP2 (Scalable Mineral Prospectivity Tools) of a working prototype of the mineral mapping algorithm was developed. The main pipeline and preliminary GUI are implemented while the concept of the AI driven modality fusion will be substantiated in the upcoming months. To fulfil the objectives of the WP2, the recent developments of the Mineral Mapping Algorithm have implemented the analysis of drone, airborne and spaceborne hyperspectral data by rescaling the spectrum to the needed form in the harmonization process. The main component is the HyperSpectralSuite, a python library, which is used by the Prospectivity Wizard.

In WP3 (Timely Mine Site Monitoring Methods), a first prototype of the Generic Mine Site Monitoring (GMSM) algorithm was developed, as a minimal version addressing two common EO data combinations. In all thematic applications, most available free data (Sentinels, PRISMA, ...) has been downloaded, pre-processed and at least partially analysed for most sites, and all thematic applications were able to present preliminary results at the progress review meeting in November 2023. Further developments will intensify in the coming months, combining drone imagery with EO image time series, and adapting the GMSM algorithm to the thematic applications.

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In WP4 (Site Demonstrations), the main achievements were the following: i) Meeting the M10 milestone and completing the first draft version of the Field Guidebook (T4.1; D4.1 part 1), ii) Agreeing on the content and structure of D4.1 part 2 (T4.2) and iii) successful field and laboratory work in the following sites (T4.3-T4.4): Hochfilzen (Austria), Kallyntiri (Greece) and Ihalainen (Finland).

In WP5 (Communication, Dissemination and Exploitation), the various communication channels for the project were set-up (website, social media, internal communication channels) in the first months of the project, as well as its visual identity. The communication strategy was developed and submitted (D5.1) along with the identification of the list of key stakeholders for project. MultiMiner has started to advertise the project and engage with stakeholders and sister projects through website posts, social media, newsletters, and by attending clustering events (EU SuperCluster Lapland Geoconference). Project partners have also started to disseminate project outputs at different scientific meetings (IGARSS 2024, Winter Satellite Workshop 2024). Finally, the Data Management Plan was developed and submitted in the first months of the project.

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