



**MultiMiner**  
Earth Observation for Smart Mining

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Dear MultiMiner Community,

We're excited to bring you some key updates from the MultiMiner project as we continue to push the boundaries of sustainable mining practices across Europe.

In this edition, we're diving deep into the **Kirki fieldwork campaign**, where our team tackled the environmental challenges left by historic mining operations. From advanced drone-based water sampling to real-time XRF analysis, the Kirki site is a prime example of how MultiMiner is integrating cutting-edge technology with environmental rehabilitation.

We're also thrilled to announce the formation of **ESMIN** (European Sustainable Mining & Innovation Network), a collaborative network of EC-funded projects. By joining forces with four other projects, we aim to advocate for policy change and develop more sustainable mining practices across Europe. We're also looking forward to presenting at the **European Raw Materials Clustering Event (EURAW)** in Seville this month, where we'll be showcasing the progress of MultiMiner to a broader audience.

Finally, as we continue our fieldwork across various sites—such as Hochfilzen, Ihalainen, and Chalkidiki—you can expect more in-depth coverage in future newsletters and on our blog. Stay tuned for exciting updates on how our project is making an impact on the mining lifecycle and promoting responsible resource extraction.

Thank you for being part of this journey with us, and be sure to follow our progress on the MultiMiner blog!

Warm regards

The MultiMiner Team



# Fieldwork Spotlight: Tackling Environmental Challenges at Kirki

In May 2024, the MultiMiner team undertook a critical field campaign at the historic Kirki mining site in Northern Greece, a region plagued by environmental challenges from past mining activities. The site, with its abandoned mines and severe Acid Mine Drainage (AMD), required innovative solutions—and our team delivered!



Using **cutting-edge drone technology** and **traditional sampling methods**, we gathered vital water and sediment data, crucial for assessing contamination and developing remediation strategies. With drones flying over hazardous areas and real-time XRF technology in action, we're pushing the boundaries of sustainable mining practices.

👉 Want to know more about how we're addressing these challenges?  
Read the full blog post for an in-depth look at our fieldwork and its impact on  
mining rehabilitation efforts!

[Read the Kirki Blog Post](#)



# MultiMiner Co-Founds ESMIN: Welcoming New Projects to Join!

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We're excited to announce that **MultiMiner** has co-founded **ESMIN** (European Sustainable Mining & Innovation Network) alongside our sister projects **AGEMERA**, **m4mining**, **S34I**, and **GoldenRAM**. ESMIN brings together cutting-edge EC-funded initiatives, all working towards reshaping mining practices across Europe through sustainability, innovation, and responsible resource management.





Our network is growing, and we warmly welcome other projects to join us on this journey! By collaborating and sharing expertise, we can amplify our efforts to promote sustainable mining and create positive change for the future of Europe's raw materials sector.

Stay updated with ESMIN's progress by subscribing to the newsletter and following our [LinkedIn page](#) for the latest news and insights. If you're interested in joining or learning more about **ESMIN**, please don't hesitate to reach out. Let's build a greener, more responsible future for European mining together!

Subscribe to the ESMIN Newsletter



## MultiMiner to present at #EURAW in Seville!





We are thrilled to announce that **MultiMiner** will be presenting remotely at the **European Raw Materials Clustering Event (EURAW)** in Seville on **16th to 17th October 2024!** This prestigious event brings together key players in the raw materials sector to discuss advancements, challenges, and collaborative opportunities in sustainable mining practices.

As one of 25 innovative projects participating, MultiMiner is eager to showcase our latest findings and methodologies aimed at enhancing sustainability and safety in the mining industry. Our team is committed to promoting responsible mining practices and sharing insights gained from our ongoing fieldwork.

We look forward to engaging with fellow projects and stakeholders, exchanging knowledge, and exploring potential partnerships that can further our collective mission of transforming the mining lifecycle in Europe.

Stay tuned for updates from the event, and we hope to connect with everyone virtually!

EURAW Programme



## Fieldwork: What have we been doing?

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At MultiMiner, 2024 has been a landmark year for fieldwork activities across Europe. Our project has brought together cutting-edge technologies and a collaborative network of partners to tackle the environmental and safety challenges of modern mining. Below, we provide a snapshot of the **key fieldworks** we've undertaken so far, showcasing the innovative tools and methodologies used at each site.

### 1. Kirki, Greece: Addressing Acid Mine Drainage (AMD)

In May 2024, we conducted an in-depth fieldwork campaign at the **Kirki mining area** in Northern Greece, a site plagued by acid mine drainage (AMD) caused by the interaction of rainwater with mine waste. The site, abandoned in 1995, has become a significant environmental concern, affecting nearby water bodies and ecosystems.

To address these challenges, the MultiMiner team utilised a range of **innovative technologies**:

- **Drones equipped with Drosens samplers** were deployed to collect water samples from hazardous locations such as the steep pit lake, improving safety and efficiency.
- **Portable XRF technology** was used for real-time analysis of mine waste and tailings, providing immediate insights into metal concentrations and environmental risks.
- **Spectral data collection** from drones helped gather detailed information about the water quality, enabling us to develop spectral libraries to improve future Earth Observation (EO) monitoring efforts.

This combination of drone-based sampling, real-time data collection, and EO validation has allowed us to better assess contamination levels and begin formulating rehabilitation strategies for the site.



## 2. Ihalainen, Finland: Comprehensive Dust Monitoring and Soil Moisture Calibration

At the **Ihalainen site** in Finland, the focus of our fieldwork has been on **dust pollution control** and **soil moisture monitoring**, crucial elements for ensuring the sustainability of mining operations in this region. This summer, we implemented several key activities to monitor and mitigate environmental risks. Key technological highlights:

- **Dust traps** were placed strategically around the site to capture and analyse seasonal variations in dust levels, helping to monitor air quality and identify trends in dust pollution.
- **Advanced soil moisture sensors** were deployed across various soil types to gather comprehensive moisture data, essential for predictive modelling and understanding the impact of mining activities on land subsidence and erosion.



- **Drone-mounted VNIR-SWIR spectrometers** were used to assess dust accumulation on vegetation, providing insights into how mining affects the surrounding ecosystem.

These innovative methods have allowed us to create more accurate models for predicting environmental changes and mitigating the long-term impact of dust and soil degradation in mining areas.



### 3. Chalkidiki, Greece: Tailings Characterisation and Spectroscopy

In September 2024, MultiMiner conducted **tailings characterisation** and **spectroscopy** at the **Chalkidiki mining site** in Greece. This site, with its active mining operations, offers a unique opportunity to study waste management and the potential for recovering valuable minerals from tailings.

Our fieldwork in Chalkidiki featured:

- **Field spectroscopy**, where we collected samples directly from tailings to understand their mineralogical composition. These measurements were vital for validating remote sensing data and ensuring that environmental assessments are accurate.
- **Advanced spectral imaging** using drones provided real-time data on the tailings' chemical composition, giving us critical insights into the sustainability of waste management practices and opportunities for resource recovery.

By integrating spectral data with satellite imagery and machine learning models, we aim to improve waste management techniques and reduce the environmental footprint of mining operations.



## 4. Hochfilzen, Austria: Vegetation and Biodiversity Monitoring

Last year at the **Hochfilzen site** in Austria, our fieldwork was focused on **vegetation and biodiversity monitoring**, essential for evaluating the ecological impact of mining activities and ensuring effective land reclamation strategies. Key activities included:

- **Comprehensive in-situ measurements** of diverse vegetation types, including recultivated meadows and naturally transitioning areas. We quantified vegetation structural parameters such as Leaf Area Index (LAI) and Fraction of Vegetation Cover (FVC).
- **Drone technology** was used to upscale this in-situ data, allowing for a broader analysis of vegetation health across the landscape.
- A special emphasis was placed on **assessing plant biodiversity**, documenting species richness to help guide future reclamation efforts and ecological restoration.

By integrating drone-based monitoring with ground data, we are developing a detailed understanding of how mining activities impact local ecosystems and how these areas can be rehabilitated more effectively.





# Stay in Touch!

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Our fieldwork across Europe is laying the foundation for more sustainable mining practices. The advanced technologies we've employed—from drone-mounted sensors to real-time data collection tools—are helping us mitigate environmental damage, enhance safety, and push the boundaries of responsible mining.

Want to know more about each of these exciting fieldwork campaigns? **Stay tuned** for deep dives on each site in upcoming newsletters, and be sure to check out our [blog](#) and [LinkedIn page](#) for detailed updates on the technologies and strategies that are reshaping the mining industry.



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