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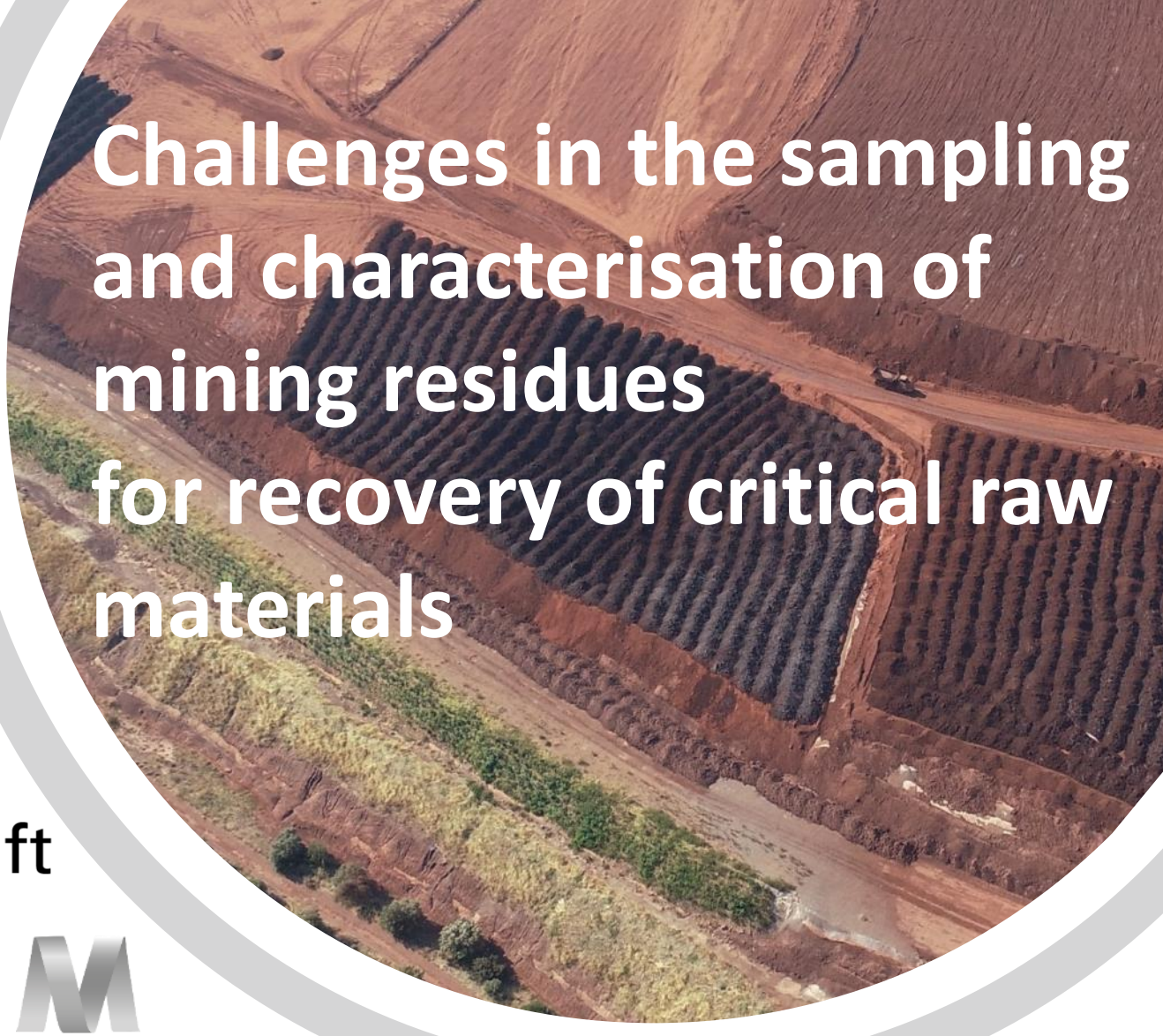
INCO-Piles
International Consortium to recover CRMs from stockpiles/tailings targeting RIS

Challenges in the sampling and characterisation of mining residues for recovery of critical raw materials



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This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation

Adriana Guatame-Garcia, Mike Buxton, Sara Kasmaee, Francesco Tinti, Rachel Horta Arduin, Aina Mas Fons, Francoise Bodenan, and Joachim Schick

Presentation for vEGU Gather Online | 19 - 30 April 2021

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Recovering minerals from mining residues

- The mining industry produces millions of tons of residues every year
- The cut-off grade changes upon
  - Market conditions
  - Technological capabilities for mineral extraction and processing
- It is necessary to find alternative sources of minerals:
  - Bigger challenges in mineral recovery from traditional sources
  - Increasing demand of minerals (including critical raw materials - CRMs)
- Some mining residues need to be stabilised to limit environmental impact

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INCO-Piles 2020

INCO-Piles
International Consortium to recover CRMs from stockpiles/tailings targeting RIS

International consortium to recover Critical Raw Materials (CRMs) from stockpiles/tailings targeting RIS

- Project segment → Matchmaking and Network Regional Innovation Scheme: RIS
- Innovation themes → Exploration, Mining and Processing
- Innovation area → Sustainable Discovery and Supply
- Strategic Objective → Securing Raw Material Supply
- Project duration → 1 January 2020 – 31 December 2021

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Objectives

Establish and develop innovative technologies for the sustainable extraction of CRMs from mining residuals (RIS strategic areas).

1. Review of sampling, characterisation and processing techniques;
2. Data collection from mining wastes;
3. Valorisation of a real application;
4. Economic and sustainability analysis on recovery of CRMs.

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Consortium

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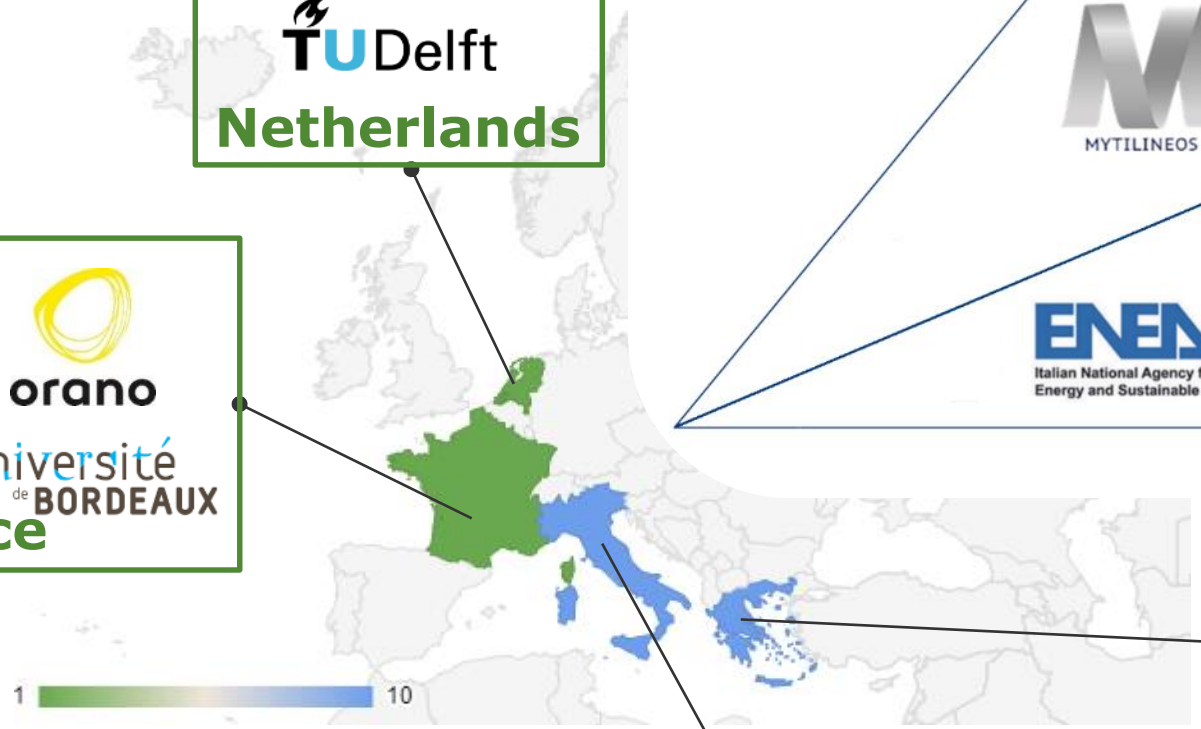

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Project timeline

WP	M 1-6	M 7-12	M 13-18	M 19 -24
1 – **Management** WP Leader: UNIBO	General project management, facing COVID-19 situation			
2 – **Round Tables** WP Leader: BORDEAUX	Round Table n°1 – Challenges 2020 Round Table n°2 – Opportunities 2021			
3 – **Technical Review** WP Leader: NTUA	Sampling, Characterisation and Processing reviews			
4 – **Pilot Site** WP Leader: ORANO			Pre-feasibility study for one selected pilot site	
5 – **Market and Env.** WP Leader: ENEA	Market scenarios, environmental issues Special focus on the pilot site			
6 – **Comm. and Diss.** WP Leader: UNIBO	Internal communication and with EIT RM External promotion: conferences, workshops, website			

Results achieved so far

- State of the Art and Review:
  - → Sampling techniques
  - → Characterisation techniques
  - → Processing techniques

- Preliminary field studies and database of potential sites for CRMs recovery in the RIS area
- Selection of a case study for field investigation: Bauxite Residues from Aluminium of Greece
- Round Table involving more than 70 experts (December 2020)

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1st Round Table | **Challenges on the recovery of Critical Raw Materials (CRMs) from tailings**

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Key organisers: ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA; université de BORDEAUX

Date December 11, 2020

Place Hybrid event | Online and in Bologna, Italy

Time 8h30 – 19h00 | Central Europe Time

Panel A	Challenges on the sampling and characterisation from mining residue
Panel B	Extraction and processing challenges
Panel C	Economic and environmental challenges

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Countries of origin of the participants that subscribed to the event

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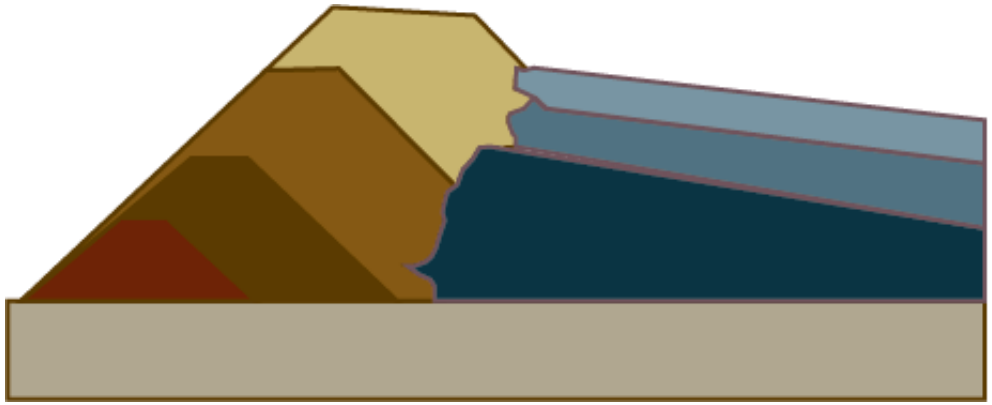
Challenges on the sampling and characterisation from mining residue

Challenge 1: Heterogeneity & lack of historical data



Heterogeneity due to:

- Mineral processing of the primary ore
- Deposition history
- Post-depositional weathering reactions

Lack of historical data:

- Data lost for abandoned sites
- No recording of data
- No vision of future for active sites

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Challenge 2: Fit-for-purpose data

Everything must depend on the aim of the characterisation campaign

Geochemistry

Mineralogy

What kind of data?
Is it representative for the spatial scales we are working on?
Can we get access to the site to collect samples?
Can we cover the entire waste deposit?
How to avoid material mixing while collecting the samples?

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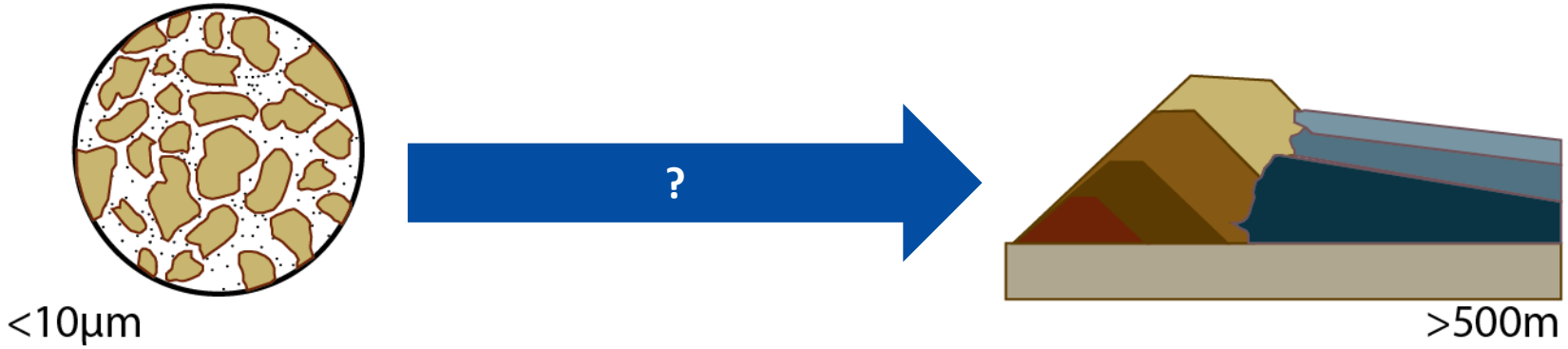
Challenge 3: Up-scaling



Possible strategies

1. Lab analyses + in-the-field surveys + remote sensing techniques

2. Combination of modern analytical instruments for geochemistry and mineralogy (e.g., pXRF, LIBS and portable infrared spectrometers)

3. Implementation of machine learning, artificial intelligence and resource modelling techniques

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Challenge 4: Safety

- Uncapped waste deposits → higher risk for health and safety
- Unstable deposits → high risk for sampling
- Pollution on water mixing with the tailings
- Impact on society: Social acceptance
- Even bigger challenges/difficulties in re-mining and re-processing

Monteponi Mine red muds, Italy (Lucarini et al. 2020)

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What is next for INCO-Piles?

- Pre-feasibility study for one selected pilot site
- Market scenarios, environmental issues
- 2nd Round Table I **Opportunities for technology transfer to foster the recovery of CRM from tailings**

Date September 8, 2021

Place Hybrid event | Online and in Athens, Greece

Time Half day event | Afternoon

Special session of

RawMat2021

www.rawmat2021.gr

Key organisers:

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

université de BORDEAUX

National Technical University of Athens

Stay tuned of any update!

https://site.unibo.it/inco-piles-2020/en

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INCO-Piles

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