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Geochemical and mineralogical characterization of secondary ores in mafic fluvial sands from the Emilia - Romagna region (Italy) - potential SRMs recovery.

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Strategic raw materials (SRMs) play a pivotal role in energy transition projects. To secure these resources, the European Union promotes local exploration through the Critical Raw Materials Act. The Emilia-Romagna region (Northern Apennines) presents significant potential, hosting ultramafic rocks (ophiolites) and volcanogenic massive sulfide (VMS) deposits associated with the external Ligurides formation [1].

This study investigates the potential SRM enrichment in river sediments with high mafic input through a combined geochemical and mineralogical approach. Sediment samples from the fine sand fraction (250–63 μm), where heavy minerals are naturally hydraulically sorted, were processed using a Frantz isodynamic magnetic separator to concentrate potentially fertile ores. Preliminary assessments of mafic input were conducted via X-ray powder diffraction (XRPD) and X-ray fluorescence (XRF) on molten powder discs. Among the various geochemical indicators examined, the Cr/Al_2O_3 ratio demonstrated robustness in assessing mafic detritus-related enrichment. [2]. Trace element analyses on concentrated heavy mineral fractions were further performed using inductively coupled plasma mass spectrometry (ICP-MS) to explore a potential SRM enrichment.

Three case studies, Dragone Creek (MO), Taro River (PR), and Nure River (PZ) were selected based on varying mafic inputs and mineral assemblages. Initial results indicate differing degrees of SRM concentration correlating with local lithology and sediment transport dynamics.

These findings indicate that fluvial sediments may serve as secondary sources of SRM. To optimize resource exploration, integrating geochemical proxies with detailed mineralogical characterization is crucial. Future research will investigate the preservation and accumulation of Platinum Group Elements (PGEs) minerals within these sediments, assessing their potential economic viability-

REFERENCES

[1] Kiss G., Molnàr K., Skoda P., Kapui Z., Garuti G., Zaccarini F., Palcsu L. and Czuppon G. 2023. Tracing the Source of Hydrothermal Fluid in Ophiolite-Related Volcanogenic Massive Sulfide Deposits: A Case Study from the Italian Northern Apennines. Minerals, 13 (1).

[2] Amorosi A., Sammartino I., Scott R. A., Smyth H. R., Morton A. C., Richardson N. Tracing provenance and pathways of late Holocene fluvio-deltaic sediments by heavy-metal spatial distribution (Po Plain–Northern Apennines system, Italy) *Sediment Provenance Studies in Hydrocarbon Exploration and Production* 2013 *386* Geological Society, London, Special Publications First published online June 11, 2013