

REE levels in abandoned mining sites

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Introduction: The pollution of environmental sites by different types of contaminants, such as rare earth elements (REEs) is a major environmental concern in many parts of the world. Anthropogenic REE contamination can be of great concern for the environmental health in areas like ore mine tailings and abandoned mines [1], as well as for human health since they correlated to several diseases [2]. Previous studies have shown that there can be significant environmental contamination of REEs in abandoned mining areas [3]. In this research, we investigated the environmental REE-content on three abandoned mining sites in the region of Puglia, Southern Italy (Gargano, Otranto and Spinazzola).

Methods: Samples of soil, sediments, water, biota and rocks were collected from the three abandoned mining sites. Soil, sediment and rock samples were digested by MARS6 assisted-acid microwave system using the method US EPA 3051a. Biota samples were digested following the method of [4]. Water samples were acidified by adding HNO₃. The REE-content in the samples was analyzed by TXRF Picofox S2, Bruker and ICP-MS Aurora M90, Bruker.

Results: Out of all REEs analyzed, six were detected by TXRF (Y, La, Ce, Nd, Yb and Lu). More specifically, Y, La and Ce were detected in all samples of soil, sediment, rock and biota, while Nd, Yb and Lu were detected in some of the samples of soil, sediment and rock. No REEs were detected in the water samples. The rest of the REEs were not detected by TXRF in any of the samples. Ce was the most abundant REE in the samples of Gargano and Otranto, while La was the most abundant in the samples of Spinazzola. Analysis of the same samples with ICP-MS is currently ongoing.

Conclusion: REEs in environmental samples from abandoned mining sites are still in detectable levels and can be considered as a threat for both human and environmental health.

References

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