

Exploration of REE-bearing mineral resources at the Canary Island Volcanic Province: Gran Canaria Island and neighboring seamounts of Amanay, Banquete, and Conception Bank

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Rare-Earth Elements (REE) show an increasing interest for high-tech industries and interdisciplinary research teams to take advantage of their physical-chemical properties, and thus resulting in a wide variety of new applications, as for instance, in biomedical and energy sciences. In this sense, REE-enriched, mineral-based resources can be found at particular locations under specific geological settings. Hence, we explore both subaerial (i.e.: Gran Canaria Island) and submarine (i.e.: Amanay, Banquete, and Conception Bank) materials as potential REE mineral sources from the Canary Island Volcanic Province (CIVP) based on prior literature¹. A set of silica-undersaturated and felsic, alkaline rocks and related soils and paleosols from the Mio-Pliocene, intraplate volcanic island of Gran Canaria was analyzed for geochemical studies, as well as igneous rocks, sedimentary rocks and deep-sea sediments from nearby seamounts. As a result, REE total contents were constrained, in ascending order, as follows: (i) submarine sediments (<60 ppm); (ii) alkaline picrites, basalts, basanite-tephrites of seamounts (<400 ppm); (iii) subaerial Mio-Pliocene, per-alkaline syenites, trachytes, rhyolites, hauyne-phonolites (400-600 ppm) and phonolite-nephelinites (<1000 ppm); (iv) B-horizon and saprolites (1300-1600 ppm); and (v) ferromanganese crusts (1500-2500 ppm). In general, LREEs abundances are higher than HREEs. REE-enrichment is significant for deep-sea ferromanganese crusts and subaerial soils. Positive correlations between REE and Mn-oxides are inferred, thus involving REE mobility by Mn leaching and precipitation as Mn-oxides, but also Ca-phosphates (e.g.: fluorapatite, brytholite) with granular habits and dendritic textures in soils; as well as by ionic substitutions of Fe-Mn-oxyhydroxides (e.g.: todorokite, goethite) in crusts. This work is financially supported by the Spanish Ministry of Economy and Competitiveness projects ENE2013-47826-C4-1-R and ENE2016-74889-C4-2R.

¹ Mangas, J., et al., "Rare earth minerals in carbonatite of Basal Complex of Fuerteventura (Canary Islands, Spain)", in Mineral Deposits: Research and exploration - where do they meet?. Papunen, H. (Ed.), Balkema, Rotterdam, 475-478 (1997).