Goldschmidt 2026 Abstract
https://doi.org/10.46427/gold2026.37099

Karst bauxites of the Sierra de Bahoruco (Dominican Republic) as an alternative source of high-value rare-earth elements

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The implementation of low-carbon energy technologies entails a considerable increase in the demand for metals, especially those considered critical. Rare-earth elements and yttrium (REY) are the most sought-after among these critical metals due to their unique properties, crucial in the manufacturing of green energy technologies. Because of their importance in the development of permanent magnets and defense industries, the REY elements with the highest market value are the middle REE (MREE: Sm, Eu, Gd) and heavy REE (HREE: Tb, Dy, Ho, Er, Tm, Yb, Lu). Most of the MREE and HREE are mined from ion adsorption deposits in South China and Myanmar, in which REY are found in the order of hundreds to few thousands of ppm (median of ~500 ppm), and are easily leachable because they are adsorbed onto clay minerals [1].

The karst bauxite deposits of Sierra de Bahoruco (Dominican Republic) contain anomalously high REY contents oscillating between 514 and 28,787 ppm (median of 1,489 ppm) [2]. In these deposits, REY are predominantly adsorbed onto Al-oxyhydroxides (mainly gibbsite), however, REY-bearing phosphates (e.g. monazite, xenotime, rhabdophane, churchite) and/or carbonates (bastnäsite group) are also found [2]. The karst bauxites from Sierra de Bahoruco represent an unprecedented anomaly in terms of REY compared to other karst bauxites worldwide, with median REY contents that duplicate and quadruplicate those found in the Mediterranean or China, respectively. Moreover, these bauxites might become as important as ion adsorption deposits [2 and references therein], as they are much more enriched in MREE (median of 98 ppm; median of ion adsorption deposits is 27 ppm) and HREE (median of 113 ppm; median of ion adsorption deposits is 22 ppm).

References:

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