

REE disturbance caused by lanthanite-(Nd) precipitation

LUÍS ANTÔNIO ROSA SEIXAS¹, JEAN-PAUL LIÉGEOIS²
BERNARD BONIN³, JACQUES-MARIE BARDINTZEFF³

¹Universidade Federal de Ouro Preto, Brazil,
(*correspondence: seixas.luis@ufop.edu.br)

²Royal Museum for Central Africa, Tervuren, Belgium (jean-paul.liegeois@africamuseum.be)

³CNRS-UPS UMR8148 GEOPS, Université Paris-Sud,
France (bernard.bonin@u-psud.fr,
jacquesmarie.bardintzeff@u-psud.fr)

This work combines whole rock geochemical, Nd isotopic composition, microprobe and scanning electron microscopy to demonstrate the supergene origin of anomalous contents of the rare earth elements (REE) found in boulders of metaultramafic (komatiites) samples from southeastern Brazil. In a collection of apparently fresh samples, the whole rock compositions showed a “continuum” from a pristine, igneous, chondrite-normalized depleted LREE pattern [total content of REE < 5 ppm, (Pr/Yb)_N ≤ 0.6], to a highly LREE enriched pattern, with up to 581 ppm of total REE content, 281 ppm Nd, (La/Yb)_N up to 9.6 and a very strong negative Cerium anomaly (Ce/Ce* lower than 0,1). The other samples presented REE compositions between these two extremes. The anomalous REE contents were concentrated on micron-sized microcracks cutting silicate grains. There is a strong similarity between the REE composition of the microcracks and the REE composition of the most enriched samples. The most pure REE analyses obtained by the microprobe (up to 80% REE₂O₃) revealed a composition similar to that of the supergene mineral lanthanite-(Nd), which was already described in soils from Curitiba, southern region of Brazil. It can be shown that the most enriched whole rock analysis is the result of the contamination of the pristine LREE depleted metakomatiites by the precipitation of up to 0.1 weight percent of the lanthanite-(Nd) mineral. The anomalous REE content of the other samples are supposed to result from lesser quantities of the lanthanite-(Nd) mineral introduced in the rocks. The Nd isotope composition of the two most REE enriched samples revealed respectively a ¹⁴⁷Sm/¹⁴⁴Nd ratio of 0.126504 and 0.132287, and a ¹⁴³Nd/¹⁴⁴Nd ratio of 0.512566 and 0.512511, with the $\epsilon_{Nd}(0)$ value of -2.48 and -1.40, and the TDM model age of 1.2 and 1.0 Ga. These results are in contrast with the depleted Nd isotopic composition of the pristine igneous compositions, for which the preliminary results indicate a TDM model age of ca 3.1 Ga. These data are interpreted as the results of subtle supergene processes accompanying weathering.