

Distribution, speciation and enrichment processes of scandium in lateritic profile of New Caledonia

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Scandium is considered as a strategic metal and is critical for modern technologies (electric cars, wind turbines, etc.). Among the different sources of REE, weathering horizons are particularly investigated (Dequincey et al., 2006). In New Caledonia, Audet (2009) shows a progressive Sc-enrichment from ~8 to ~100 ppm through weathering profiles developed on ultramafic rocks. Such an enrichment may be compatible with mining operation, and the characterization of Sc-speciation will help implementing innovative extraction protocols with limited environmental impact (Wang et al., 2011, 2013).

We aim at understanding the concentration processes of Sc with respect to mineral distribution and other transition metals. The distribution and speciation of Sc in silicates and oxyhydroxide minerals were characterized by SXRF and XANES spectroscopy. Samples were collected along the lateritic profile of the East-Alpha open pit mine in Tiébaghi (N-W of Grande Terre), developed on a serpentinite bedrock. The characterization Sc-bearing phases was based on synthetic model compounds. Our results show that, 1) Sc is mainly concentrated in the limonite horizon, 2) the speciation models for Sc, coupled to results from leaching experiments, clearly highlight affinity with iron oxyhydroxides in which scandium is structurally incorporated. In addition, textural information and elemental distribution suggest that Sc concentration is mainly controlled by the vertical progression of the pH front.

References

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