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**A review of scandium in carbonatites and alkaline igneous rocks of Africa.**

Siegfried, P. R. <sup>1</sup>

<sup>1</sup>GeoAfrica Prospecting Services, Box 24 218, Windhoek, Namibia, [geoafrica@yahoo.com](mailto:geoafrica@yahoo.com)

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A compilation review of published and unpublished scandium (Sc) geochemical data will be presented. Relatively few analyses in the published literature include geochemical data for Sc, however, recent rare earth element (REE) exploration has utilised ICP-MS analytical methods and Sc has often been included. This review presents some select examples from recent exploration programmes focused upon alkaline silicate and related carbonatite targets. The lithological host settings of Sc enrichment include the pegmatite, under-saturated alkaline silicate, carbonatite and mafic families of igneous rocks. Sc may be preferentially concentrated within more mafic units or members of the silicate rocks directly associated with carbonatite [1], [2]. The rock types identified as important hosts of Sc in alkaline complexes include clinopyroxenites, essexites and apatite-enriched hydrated rocks including vermiculites and glimmerites.

Within carbonatite and related alkaline rocks, there is a clear association of Sc with early crystallised mineral phases such as apatite. Sc appears in minor but anomalous quantities (20 – 50 ppm) in almost all the examples investigated. Highly enriched and potentially economic quantities of Sc (200 – 300 ppm) were identified at a number of localities associated with mixed carbonatite and silicate facies. Examples include Glenover in South Africa and Karingarab in Namibia. Further enrichment during weathering through either eluvial or supergene processes of regolith development is identified as an important mechanism in enrichment to potential economic levels of Sc. The role of fluorine and chlorine is fundamental in the transport process of Sc in the weathered zone or regolith.

The behaviour of Sc in both magmatic and weathering systems has previously been assumed to largely follow that of the REE due to their similar incompatible nature. However, examples will be presented to show that the processes controlling Sc behaviour in carbonatites and alkaline silicate rocks, both in the melt and during later dissolution and precipitation in the weathering environment, may occur independently of the REE.

It is clear that both undersaturated alkaline silicate as well as carbonatite rocks have the potential to host economic deposits of Sc. Further research and exploration should allow for better definition and identification of the mineral and rock hosts for these deposits. Simply following REE mineralisation may not be the answer to successful exploration for Sc.

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*References:*

[1] Amlı R (1977) *Econ Geol* 72: 855-859

[2] Eby D (1973) *Am Mineralogist* 58: 819-825

