Geophysical Research Abstracts
Vol. 21, EGU2019-18906, 2019
EGU General Assembly 2019

Making new geomodels for critical raw materials in alkaline rocks and carbonatites

Frances Wall
Camborne School of Mines University of Exeter, Penryn Campus, Penryn, Cornwall, TR10 9FE, UK

As we use an ever greater proportion of elements in the Periodic Table to manufacture our digital and environmental technologies, exploration geologists must produce new geomodels for a wider range of rocks and for minor elements that have received little previous attention. I use the example of a current EU-funded project to illustrate some of the challenges and opportunities that this can involve.
The HiTech AlkCarb project (www.carbonatites.eu) is making new geomodels to help explore for 'high-tech' raw materials in alkaline rocks and carbonatites. Despite much attention to rare earths and other critical elements over the last several years, there is still a huge gap between the research effort that has been given to such specialist raw materials and the body of exploration knowledge about the major commodities. For our project we started working with Alan Woolley's compilation of alkaline rocks and carbonatites of the world, which will be made available on line and by defining several areas where key geological knowledge for exploration is lacking. Examples include the potential use of metasomatic (fenite) aureoles around carbonatites and alkaline rocks, and the understanding of the importance of roof zones. We convened a series of Expert Councils to bring together academic and industry expertise, often taking the group into the field to 'natural laboratories' to discuss key points. Writing up the results of these discussions proved challenging, and required academics to move well away from their normal geological 'comfort zone' of dealing with their own studies. At Kaiserstuhl in Germany, we concentrated on improving the use of geophysics to understand the geology and will produce a detailed model of this complex. We are making two other kinds of more general geomodel. First, a mineral systems approach – taking best practice from previous minerals exploration and the oil industry and, second, a set of 3D pdfs of more conceptual models that will update diagrams such as that of Le Bas (1977) and Frolov (1971). Consideration of geology alone is no longer enough, even at early exploration stages, and we are working to incorporate process mineralogy, environmental and social considerations into our new geomodels.

Frolov, A., A. (1971) Vertical zonation in deposition of ore, as in ultrabasicalkaline rocks and carbonatites, International Geology Review, 13:5, 685-695.
Le Bas, M.J. (1977) Carbonatite-Nephelinite volcanism: an African case history. John Wiley & Sons, London, 347 pp.