REE mineralisation in Sweden: 222 years of discovery?

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The increased global interest in rare earth element (REE) resources over the past few years has led to new exploration activities and on-going re-evaluation of many previously known mineralisations.

Through the discovery and subsequent publication by Finnish-Swedish chemist J. Gadolin in 1794, on the World´s first known rare earth element ("yttria", from Ytterby, north of Stockholm), the history of the REE was to be interconnected with Sweden. Indeed, during the end of the 18th and the better part of the 19th century, Sweden was at the centre of REE discoveries

Over the intervening 222 years since Gadolin´s publication, we have come to know a variety of genetically different types of REE mineralisations and occurrences that are relatively widely distributed over the Swedish part of the Fennoscandian shield and its cover units. In fact, the shield is one of the more promising areas in Europe for the exploration after hard-rock REE resources (cf. Goodenough *et al.* 2016). In this presentation, the spatial distribution of REE mineralisations in Sweden will be summarised and discussed, based on genetic classifications. The major types comprise primary mineralisations, encompassing intrusive as well as hydrothermal mineralised systems, whereas secondary mineralisations are represented by sediment-hosted types, including palaeoplacer deposits.

Currently, one of the most promising projects within the EU is the nepheline syenite-hosted Norra Kärr deposit in southern Sweden. Among others is the possibility of exploiting by-product REE-substituted fluorapatite and associated phosphates during mining of apatite-iron oxide ores. The recently discovered high-grade, high-HREE mineralisations in the Olserum area, SE Sweden (see presentation by S. Andersson et al., this volume), may however be hampered by the presence of radioactive elements.

References:

Gadolin, J. 1794: Undersökning af en svart tung stenart ifrån Ytterby stenbrott i Roslagen. *Kongl. Vet. Acad. Handl.* 15, 137–155

Goodenough, K.M. et al. 2016: Europe's rare earth element resource potential: an overview of metallogenetic provinces and their geodynamic setting. *Ore Geol. Rev.* 72, 838-856.