Petrography, geochemistry and P-, Nb-, and REE-mineralizations in the Kaulus region, Sokli carbonatite complex, Finland

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The Kaulus study area of GTK is situated in the southern part of the Devonian Sokli carbonatite complex in northern Finland. We have studied the petrography, geochemistry and P_2O_5-, Nb- and REE-mineralizations in the Kaulus region. In addition, the regional lithology and the petrogenesis of the carbonatites are examined (Pynttäri 2015).

The predominant rock types in the study area are carbonatite dikes that intrude fenitized tonalites, gneisses and amphibolites. No significant P_2O_5-, Nb- or REE-mineralizations were found in the fenites.

Metacarbonatites and metaphoscorites originally represent alkaline mafic or ultramafic rocks that have undergone carbonatization and alkali metasomatism. Metacarbonatites are enriched in P_2O_5 (2.6–4.0 %). Metaphoscorites occasionally have elevated Nb contents (up to 1799 ppm), which may originate from magmatic phoscorite. As CO_2 concentrations increase in metacarbonatites, their REE-concentrations rise up to the REE-concentrations in carbonatites.

Carbonatites probably originate from metasomatized mantle at the depth of 70–80 km. Ferrocarbonatites and magnesiumcarbonatites may have acted as a source for the REE-carbonatites of magmatic Stage 5. The richest P_2O_5-concentrations are in calciumcarbonatites and ferrocarbonatites (3.3 % and 4.4 %, respectively). The richest Nb-concentrations are found in REE-carbonatites, ferrocarbonatites and calciumcarbonatites (1834 ppm, 1790 ppm and 1636 ppm, respectively). The average REO-concentration of the REE-carbonatites is 1.63 % and the maximum content is 1.94 %.

References:

Pynttäri, J. 2015. Soklin karbonatiittikompleksin Kauluksen alueen petrografia, geokemia sekä P-, Nb- ja REE-mineralisaatiot. Dept of Geosciences and Geography, Uni Helsinki, unpubl. M.Sc. Thesis, 129 p. (in Finnish)