# Iron distribution in the clay of weathering crust of Katalambinskoe ore field

Y.S. SIMAKOVA*, V.P. LIUTOEV AND A.Y. LYSIUK

Institute of Geology of RAS , Syktyvkar. 167982, Russia
(*correspondence: yssimakova@rambler.ru)

Samples of the so-called structureless clays from mature weathering crust of Katalambinskoe ore field have been studied. Kaolinized white clay and ocher brown clay characterized using infrared (IR), EPR and Mössbauer spectroscopy. X-ray diffraction (XRD) study indicates that raw materials consists of low-ordered kaolinite (up to 70%), well-ordered muskovite and minor relics of initial chlorite. Major impurities in ocher clay are goethite, lepidocrocite, magnetite and uncrystallized iron oxide.

Kaolinite substituted muscovite and paragonite in the initial rocks. IR spectra in the region of stretching vibrations of OH groups are also indicated presence of structurally imperfect kaolinite. Chemical analysis of the kaolinized sample show content $Fe_2O_3 = 3, 10\%$, $FeO = 0, 35\%$, in ocher sample - $Fe_2O_3 = 20, 64\%$ and $FeO = 0, 44\%$, respectively.

Mossbauer spectrum of white kaolinized clay can be described by a superposition of two doublet of three-and ferrous iron. According to [1], the doublet can be attributed to the octahedral position of ferric iron in the kaolinite structure. High linewidth of the doublet of ferric iron indicates a low ordering kaolinite. Ferrous doublet has parameters typical of octahedral cis-positions in muscovite present in the samples according to the x-ray analysis. It accounts for about 15% of the total iron content in the sample.

Sextet structure shows the presence in the brown clay of the two magnetically ordered phases, characterized by the values of magnetic hyperfine fields 500 and 470 kOe. It should be noted that the doublet spectrum can be observed in goethite, if present by nanoscale particles. According to X-ray analysis is goethite is the dominant Fe-containing phase.

Thus, in the process of weathering crust Katalambinskoe ore field iron can form oxide-hydroxide secondary phases and enter the structure of usually iron-free phyllosilicates (ex. kaolinite).

[1] Castelein et al. (2002) J. Eur. Ceramic Soc. 22, 1767–1773.

# Biogeochemical footprint of the Ta-, and Nb-bearing carbonatite, Blue River Area, British Columbia, Canada

GEORGE J. SIMANDL[1,2], ROBERT FAJBER[1] AND COLIN E. DUNN[3]

[1]British Columbia Geological Survey, Victoria, BC, Canada
[2]University of Victoria, School of Earth and Ocean Sciences, Victoria, BC, Canada
[3]Consulting Geologist/Geochemist, Sidney, BC, Canada

This orientation survey demonstrates that coniferous trees are suitable sampling media in the exploration for carbonatites and related rare earth elements (REE), Ta, Nb, and phosphate deposits.

Twenty four samples of twigs with needles from Subalpine Fir (Fir) and White Spruce (Spruce) were collected over the Upper Fir carbonatite and surrounding amphibolites and paragneisses. Twigs and needles were analyzed separately. Twigs were milled using a Wiley mill. The resulting pulps were digested in $HNO_3$, then Aqua Regia and then analyzed by ICP-MS/ICP-ES. Needles were ashed, digested in Aqua Regia and then submitted for ICP-MS/ICP-ES analysis.

Light rare earth elements (LREE), Y, Zr and P in both twigs and needles are good exploration vectors for carbonatite-related REE and apatite mineralization. The highest concentrations of LREE are detected directly over carbonatites or fenites. Concentrations of heavy rare earth elements (HREE) are near or below the detection limit. Tantalum is found in detectable concentrations only in spruce twig samples spatially related to carbonatite. Detectable Ta concentrations range from 0.001 to 0.003 ppm. Niobium concentrations range from 0.02 to 0.24 ppm in Spruce twigs, 0.005 to 0.071 ppm in Spruce needles (dry weight normalized), and 0.012 ppm to 0.030 ppm in Fir needles (dry weight normalized).

Spruce twig data show a positive correlation between Fe, REE and Zr; Nb correlates positively with Fe, Ti, Ce, and Nd. Fir twigs were not analysed. Spruce needle data suggest strong positive correlations between P, Mg and Ti, as well as Nb and REE, and Zr and Fe, and a moderate positive correlation exists between P and Ca. There are not enough Fir needle samples for formal statistical analysis, however, strong positive correlations are suspected between Fe and REE, Fe and Ti, and P and Zr.