Unusual platinum group element (PGE) mineralisation in the peripheral parts of Monchegorsk Layered Massif (MLM)

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The cross-section of MLM comprises a complete differentiated series of rocks (from peridotites to gabbronorite-anorthosites) typical of layered intrusions. The melts corresponding to various differentiates of the main magma chamber of the MLM sometimes form lateral sill-like apophysis up to 10 sq. km in the peripheral parts of MLM.

The critical matter of the crystallization process in these sill-like bodies was the large contact area with the Archean host rocks, which had provided significant water income (up to 12 mol%).

These specific conditions of crystallization had formed binominal rock sequence which includes the “dry” rocks (similar to those in MLM main magma chamber), and the “wet” - plagioclase-hornblende rocks in upper parts of the apophysis cross-section.

The influence of the water-saturated residual melt-fluid on “dry” rocks resulted in bulk thermal changes of the latter one similar to the metamorphic- type alteration. Remobilization of sulfides and PGE from “dry” differentiates in apophysis and from the residual melt-fluid is localized in lens-like bodies which may include the economically valued low-grade PGE-Cu-Ni mineralization. The ore zones have variable thickness and extension, crosscut petrographic boundaries, i.e. they cannot be referred to the PGE mineralization of the “reef” type neither by their genesis nor morphology.

An evaluation of the cosmogenic ^{21}Ne/^{10}Be ratio and the ^{21}Ne production rate in quartz

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Based on a compilation of over 180 published data pairs from quartz samples for which *in situ* produced cosmogenic ^{10}Be and ^{21}Ne concentrations were measured simultaneously, we evaluated the production rate ratio of ^{21}Ne/^{10}Be and thus the production rate ^{21}Ne (P21) in quartz, the latter based on the well established value for the production rate of ^{10}Be in quartz of 5.1 at*g^{-1}_{qtz}*yr^{-1} (half-life of 1.51 Ma). Using a Monte Carlo simulation approach for fitting sample points to a ^{21}Ne production rate-dependent erosion island (P10 fixed) we preliminary derive a ^{21}Ne/^{10}Be production rate ratio of ~ 3.96 and a P21 value of 20.2 at*g^{-1}_{qtz}*yr^{-1}). This value agrees very well with the currently accepted 21Ne production rate of 20.3 at*g^{-1}_{qtz}*yr^{-1} obtained from 2 samples in the Sierra Nevada, California [1,2]. The influence of samples with a possibly complex exposure history, which may contribute too high values to the P21 distribution is minimized by selecting samples with relatively high ^{10}Be concentrations (data points in the upper part of the erosion island), where a single erosion island can describe most of the samples.

This analysis also reveals that in many cases a multiple cosmogenic nuclide (TCN) approach highlights a complex nature and evolution of landscapes and emphasizes that multiple TCN analyses hold more geologic and geomorphic information than single TCN studies and allow more reliable interpretations.

1] Niedermann *et al*. (1994) *EPSL* **125**, 341-355. [2] Niedermann (2000) *EPSL* **183**, 361-364.