Origin of zircon from the Talnakh economic ultramafic-mafic intrusion (Noril'sk Province, Russia): evidence from oxygen isotope data

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Despite the long-term study of the world-class Ni-Cu-PGE sulfide deposits related to the Kharaelakh, Talnakh and Noril'sk-1 mafic-ultramafic intrusions within the Noril'sk Province they remain a subject of ongoing debate related to their origin. Recent detailed in situ U-Pb, REE, and Hf-isotope studies of zircon from the economic Kharaelakh, Talnakh and Noril'sk-1 intrusions identified different zircon populations with ages ranging from 347 to 227 Ma. Multiple magmatic events that have affected the economic intrusions preceded an extensive episode of sulfide-ore formation, as documented by the Re-Os data, and imply an extended time span for concentration of the ore components. The Hf-isotope composition of a major set of zircons from the economic intrusions is consistent with a juvenile, mantle-derived origin of their parental magma(s).

In this study we report for the first time *in-situ* oxygen isotope data (71 analyses) collected for zircons from various rocks of the Talnakh intrusion associated with economic PGE-Ni-Cu sulfide ores. These are represented by (i) massive or vein to brecciated type (close to the bottom contact of intrusion), (ii) disseminated type that occurs at two levels (in ultramafic and taxitic-textured mafic rocks), (iii) low sulfide horizon observed in the upper part of intrusion. The similarity of the oxygen isotope composition for the dominant set of zircons with that of the mantle-derived rocks ($\delta^{18}O$=5.3±0.6‰ [1]) suggests that the oxygen isotope data were not modified after crystallization of zircon. The new results imply that zircons crystallized from a mantle-derived magma, parent for the Talnakh intrusion, with a minor involvement of the crustal component ($\delta^{18}O$=6.5±0.9‰) during formation of sulfide-bearing taxitic-textured rocks.

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[1] Valley J.W. et al. (1998) *CMP* **133**, 1-11.