Contrasting magma sources in ultramafic-mafic intrusions of the Noril'sk area (Russia): Hf-isotope evidence from zircon

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World-class platinum-group-element (PGE)-Cu-Ni deposits closely linked to intracontinental paleorift-related ultramafic-mafic intrusions are located in the northwestern corner of the Siberian craton, Russia. Recent U-Pb SHRIMP studies [1, 2] identified distinct age groups of zircon from the main types of ultramafic-mafic intrusions of the Noril'sk area. Most of concordant U-Pb ages lie in the range 230-270 Ma. Minor zircon populations show older U-Pb ages, which cluster around 300 and 340 Ma.

In situ Hf-isotope data (~310 analyses) were collected on the dated spots within single zircon grains from the main lithological units of economic (Noril'sk-1, Talnakh and Kharaelakh) and non-economic (Nizhny Talnakh and Zelyonaya Griva) intrusions of the Noril'sk area. The analysis used a New Wave LUV213 laser-ablation microprobe attached to a Nu plasma MC-ICP-MS at GEMOC [3].

Zircons from economic intrusions with U-Pb ages between ca. 230-340 Ma yielded mean epsilon $_{Hf}$(T) (parts in 10^4 difference between the zircon sample and the chondritic reservoir) values of + 9.4 (n=45) at Kharaelakh, + 11.3 (n=96) at Talnakh and + 12.2 (n=83) at Noril'sk-1, close to the mean value of the depleted mantle reservoir at that time. In contrast, zircons from non-economic intrusions with U-Pb ages between ca. 215-305 Ma yielded eps $_{Hf}$(T) values +1.0 (n=80) at Nizhny Talnakh and +1.7 (n=11) at Zelyonaya Griva.

The Hf isotope data suggest that zircons from economic intrusions are characterized by the signature of a juvenile mantle-derived magma. The less radiogenic Hf isotope values of zircons from non-economic intrusions indicate mixing between mantle and crustal magma sources. Our new findings suggest the interaction of distinct magmas, indicating that ultramafic-mafic intrusions of the Noril'sk area have a more complex geological history than is commonly assumed.

[1] Petrov *et al.* (2006) *GCA* **70**, 18S, A486. [2] Malich *et al.* (2007) *GCA* **71**, 15S, A616. [3] Griffin *et al.* (2002) *Lithos* **61**, 237-269.