Mafic-ultramafic intrusions and volcanic rocks of the Noril'sk district and related PGE-Cu-Ni sulphide ores

Duration 5-7 days + travels
Tour starts August 1/08/2014 in Noril’sk
Period: pre-symposium
Minimum/maximum number of participants: 10/30.
Accommodation: Hotel in Noril’sk
Cost is 1500 Euro without price on flight tickets to Noril’sk and from Noril’sk to Yekaterinburg and depended of the Noril’sk Mining Company sponsorship (it is under consideration) and may be reduced.
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Fig. 1. Noril’sk district. Flood basalt deposits

A striking feature of the Norilsk deposits is the high-degree of concentration of sulphide-hosted Cu and Ni as well as PGE that is unique and unknown elsewhere in the world. Despite decades of researches, many questions on the origin of these deposits are still not resolved. The disputable aspects include: compositions of parental magmas and relationship between intrusions and host terrigenous and volcanic rocks; origin of geochemically contrasting ore-bearing and barren intrusive complexes; role and conditions of contamination at formation of massive sulphide ores; mechanism of high-grade PGE mineralization in the complex PGE-Cu-Ni and PGE low-sulphide types of ores. The proposed excursions will give an opportunity to consider a wide spectrum of geological facts, to appreciate the different points of view and to develop your own ideas on the origin of this unique mineralization.

We shall visit the mines of the Noril’sk Nickel Company, look at cores of the exploration boreholes through the intrusions and examine the sequences of host sedimentary rocks and flood basalts (fig. 1).

The zonal transition from pyrrhotite-rich ore through cubanite ones to talnakhite and mooihoekite varieties can be seen in the massive pyrrhotite and high-grade cupriferous orebodies of the Oktyabrsk underground mine. The textural variability of breccia-like ores (Fig. 2) and their relationships with massive ore can be also observed there. The details of massive pyrrhotite and veinlet-disseminated orebodies in the contact of the Kharaelakh intrusion can be seen in the Taimyr underground mine. The orebody is composed of two ore varieties – coarse-grained reticulate-textured ore and fine-grained magnetite-rich ore. The direct contact between disseminated sulphide mineralization in picritic and taxitic gabbrodolerite at the base of the Tahnakh intrusion and mineralization in metamorphosed and metasomatised sedimentary rocks can be observed in the
Komsomolsky underground mine (Fig. 3). Sedimentary rocks are represented by terrigenous rocks of the C<sub>2</sub> – P<sub>2</sub> Tunguska Group and Devonian carbonates.

The section of the Norilsk-I intrusion with disseminated orebodies in the lower differentiates can be observed in the Medvezhy Ruchei (Bear Creek) open pit. The complete layered sequence from olivine-free to picritic gabbrodolerites with PGE-Cu-Ni ore in the lower part (Fig. 4) and low-sulphide PGE ore in the upper endocontact zone (Fig. 5) should be available for observation.

Fig. 2. Breccia-like ores of the Oktyabrsk deposit, the Oktyabrsk mine.

Fig. 3. Millerite-bornite-chalcopyrite veinlet-disseminated ore in serpentine-hydrogarnet metasomatite after monticellite skarn.

Fig. 4. Pentlandite-chalcopyrite-pyrrhotite disseminated ore in taxitic gabbrodolerite. The Norilsk 1 deposit, the Medvezhy Ruchei mine.
The exploration cores of the Talnakh, Kharaelakh and Noril’sk-I intrusions and related PGE-Cu-Ni and PGE ores will be available in the Norilskgeology coreyard.

**Proposed excursions topics**

**I. Visits to the mines of the Noril’sk Mining and Metallurgical Combine**

1. **Massive pyrrhotite and Cu-rich ores in the Oktyabrsky underground mine.**
2. **Massive pyrrhotite and veinlet-disseminated orebodies at the exocontact of the Kharaelakh intrusion in the Taimyrsky underground mine.**
3. **Massive and veinlet-disseminated mineralization in metamorphic and metasomatic rocks as well as disseminated mineralization in picritic and taxitic gabbrodolerite in the Komsomolsky underground mine.**
4. **The sequence of the Norilsk-I intrusion with disseminated mineralization in the lower differentiates in the Medvezhy Ruchei (Bear Creek) open pit.**

**II. A visit to the Noril’sk geology Ltd coreyard**

The exploration cores through the Talnakh, Kharaelakh and Noril’sk-I intrusions with PGE-Cu-Ni and PGE mineralization will be on display.

**III. A field excursion to trap basalt sections along the Mukunai River.**