

Field trip 2

PGM placer deposits and their sources in the ultramafic and alkaline rocks of the concentrically zoned Kondyor massif, Far East, Russia

Duration: 8 days, August 1-8, 2014

Period: pre-symposium field trip

Start point: Khabarovsk, Far East, Russia

Maximum number of participants: 15

Field trip leaders: Vladimir S. Prikhod'ko (vladimir@itig.as.khb.ru) and Alexander Mochalov (mag1950@mail.ru)

Estimated Cost: 800 Euro. This payment includes costs on flight tickets from Khabarovsk to Mar-Kyuel and back from Mar-Kyuel to Khabarovsk. All other expenses for this field trip will be covered by the Amur Mining Company

The Amur Mining Company (Khabarovsk) will provide logistic support and contribute to the expenses of the excursion to the Kondyor clinopyroxene-dunite massif.

General Information. The Kondyor massif is a zoned ultramafic complex ($57^{\circ}36' N$ and $134^{\circ}37' E$, Figs. 1 and 2), situated more than 1000 km to the north of Khabarovsk in the southeastern part of the Siberian Craton (in the eastern part of the Aldan Shield). It has a round crater-like shape of about 6 km in diameter, which looks fantastically from the plane or satellite (fig. 1).

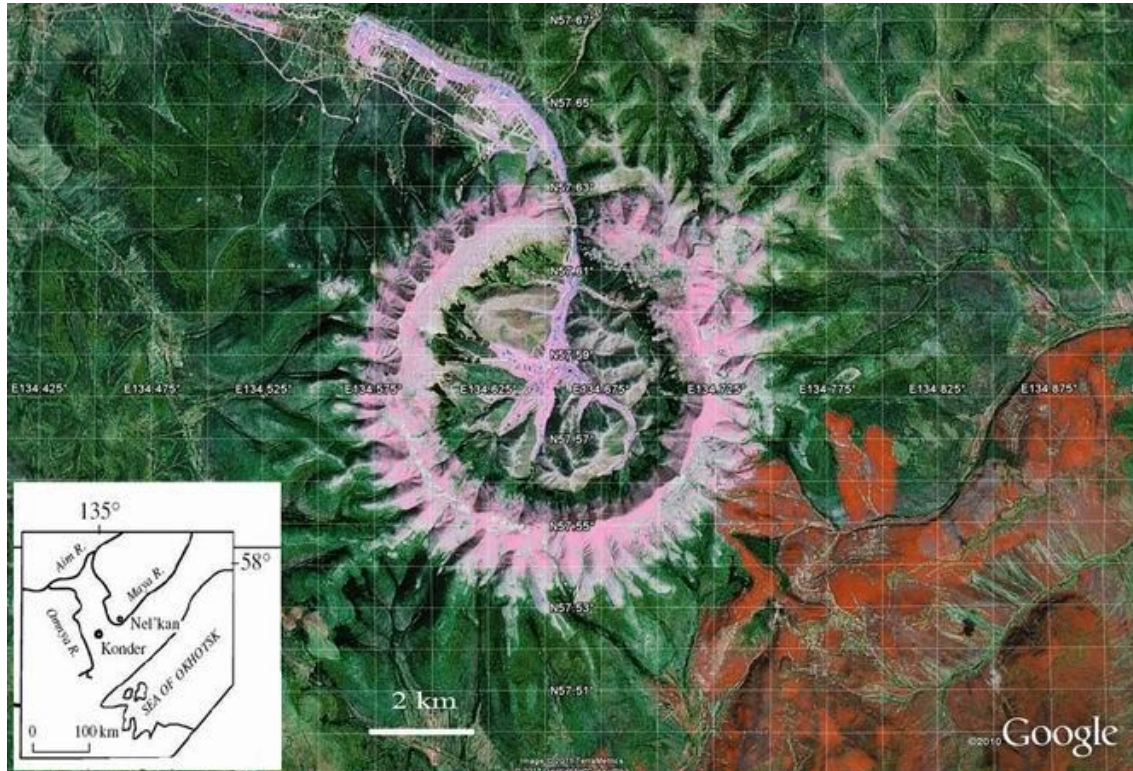


Fig. 1. Satellite image of the Kondyor crater-like clinopyroxenite-dunite massif and accompanied platinum placers, Aldan shield.

The massif as a high-temperature semi-solid diapir intrudes the Archean basement and Late Proterozoic (Riphean) terrigenous-carbonaceous rocks of the Enninsk and Omninsk suites, forming a domelike structure about 12 km in diameter.

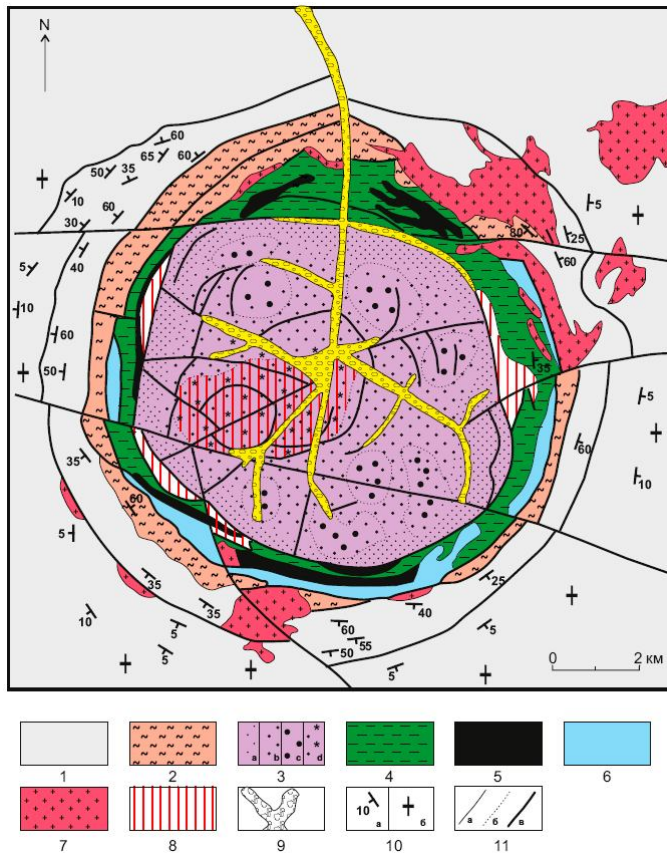


Fig. 2. Schematic geological map of the Kondyor massif (Simplified after 1:25 000 geological map by Far East Regional Geological Survey). 1 - Middle Riphean siltstone and sandstone; 2 - Early Archean gneiss, crystalline schist, marble, calciphyre and granite; 3-7 – igneous rocks: 3 – dunite of different texture; 4 – olivine clinopyroxenite; 5 – apatite-phlogopite-titanomagnetite-rich clinopyroxenite; 6 – gabbro; 7 – monzodiorite; 8 – areal of metasomatic rocks; 9 – PGM placers; 10 – dipping and strike of bedding and foliation; 11 – geological boundaries.

In the contact zone metasedimentary rocks are transformed in hornfels dipping away from the massif. These metamorphic rocks form ring-like ridge which encircles

the central ultramafic core. Dunite is a dominant rock and occupies the central part of ultramafic body (fig. 2). It consists of forsterite olivine and accessory chromian spinel and usually has coarser-grained texture. Dunite-pegmatite irregular bodies take place among the coarser-grained rocks. Towards to external zone in the contact with pyroxenite, dunite becomes fine-grained and iron rich (Fo78–88). Dunite is surrounded by an irregular, 100-750 m wide, complex rim of wehrlites and olivine-magnetite-amphibole (-plagioclase) clinopyroxenites and melanocratic gabbro in the outer zone.



Fig. 3. Dunite is cut by apatite-magnetite-rich pyroxenite and syenite dykes and associated metasomatic veins.

In the western and south-western part of the core, dunite is cut by an intrusion and stockwork of fine-, to very coarse grained apatite-titanomagnetite-rich

clinopyroxenite and by veins and dikes of hornblendite, nepheline syenite pegmatite and rarely by granite (fig. 3).



Fig. 4. PGM-rich chromitite in the central zone of dunite body.

Dunite contains schlieren and lenticular bodies of chromitite of different size, from several centimeters up to several meters in length and of variable thickness (fig. 4). Often such chromitite comprises PGE-rich mineralization which looks like as a cement of the ore chromian spinel (fig. 5). The most abundant PGE mineral in the chromitite and

placers is isoferroplatinum.



Fig. 5. PGM-rich chromitites. Ore chromian spinel is cemented by PGMs.

As is assumed such chromitites are the main source of the economic platinum placer related with the Kondyor clinopyroxenite-dunite massif. But prolonged and complex magmatic history of the Kondyor massif supposes an existence of the different genetic types of PGE mineralization related with ultramafic, alkaline and metasomatic

rocks and which all gave their own contribution in the placers. Five platinum-group element minerals such as cuproiridsite, cuprorhodsite, ferrorhodsite, konderite and bortnikovite were discovered and described in the first time in the Kondyor deposit.



Fig. 6. Platinum placer mining of the Uorgolan River, Kondyor area.

The Kondyor placer was discovered in 1979-1988 by Ayano-Maysk Prospecting Venture, which carried out all stages of the prospecting works. Prospecting resources in placers of the Kondyor River were stated to amount over 50 tons of platinum, i.e. the placer falls into category of the unique ones

(Orlov, 1991; Placer Deposits..., 1997). The placer at the Kondyor River now is almost finished and the mining is continuing in the downstream about 25-30 km from Kondyor massif along the Uorgolan River (fig. 6). The total recourses of the placer have been increased up to 100 tons. The annual production of platinum during the last years is more than 3 tons.



A general view on the central part of the Kondyor massif within the ring-ridge. The placer is situated along the Kondyor River and its tributaries.

Logistics and Preliminary Schedule:

Area at Kondyor has a continental climate. Daytime temperatures in early August are about +20-25°C, and +10-15°C at night; light rain is possible.

August 1, 2014 – Arrival to Khabarovsk.

August 2, 2014 – Flight from Khabarovsk to Mar-Kyuel (about three hours on the Antonov-26 airplane). Dinner. Transfer by car (about five hours) to the Uorgolan or Kondyor village.

August 3-5, 2014 – Gain a familiarity with the Kondyor clinopyroxenite-dunite massif, different rocks, PGM-rich chromitites, their geological relationships and mineralogy. Visit to platinum placers and concentrating factory.

August 6, 2014 – Transfer by car (about five hours) to the Mar-Kyuel. Sauna. Dinner.

August 7, 2014 – Flight from Mar-Kyuel to Khabarovsk.

August 8, 2014 – Flight from Khabarovsk to Yekaterinburg.

Terms and Conditions:

1. Participation will be confirmed on receipt of payment.
2. Preference will be given to registered IPS delegates.
3. Cancellations must be sent in writing to Vladimir S. Prikhodko (vladimir@itig.as.khb.ru) and Alexander Mochalov (mag1950@mail.ru)
4. Any refunds issued will be subject to approval by the organizing committee. Elena Anikina RegistrationFee@igg.uran.ru
5. Cancellations received before April 30, 2014 will receive a 100 % refund minus a banking fee.
6. Cancellations received between April 30 and May 31, 2014 will receive a 50% refund minus a banking fee.
7. No refunds will be issued after May 31, 2014.
8. In the event that the trip is cancelled by the organizers, a full refund will be issued.
9. All participants should have their own personal insurance cover for general travel insurance, personal liability, medical cover and dangerous activities cover. A copy of confirmation of insurance must be submitted to the organizers prior to participating in the field trip.