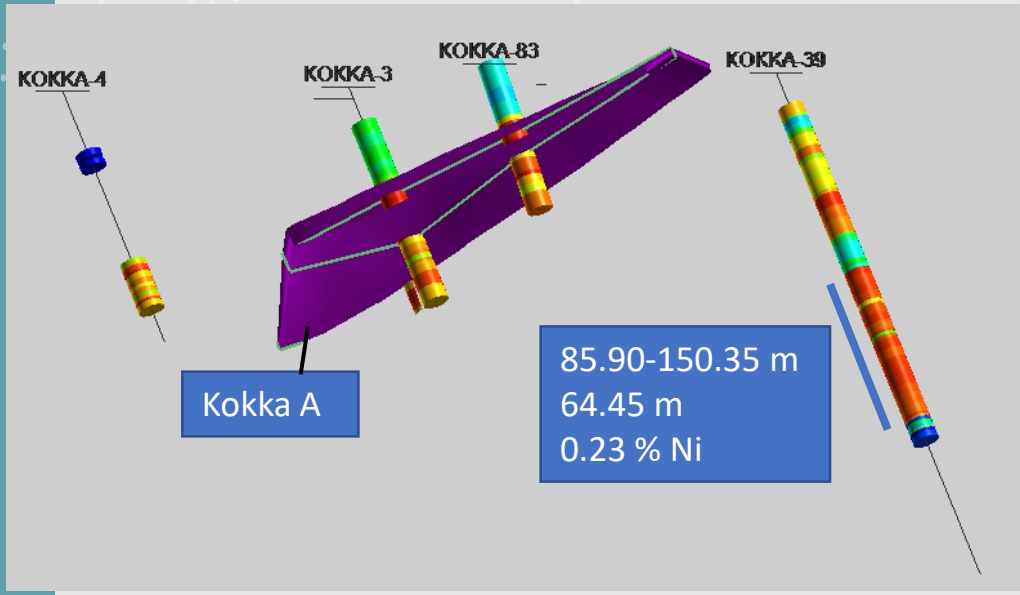
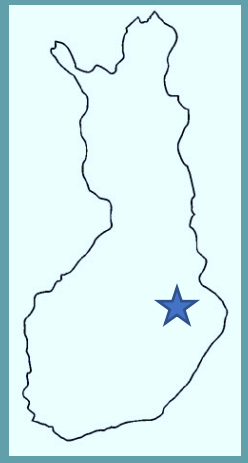
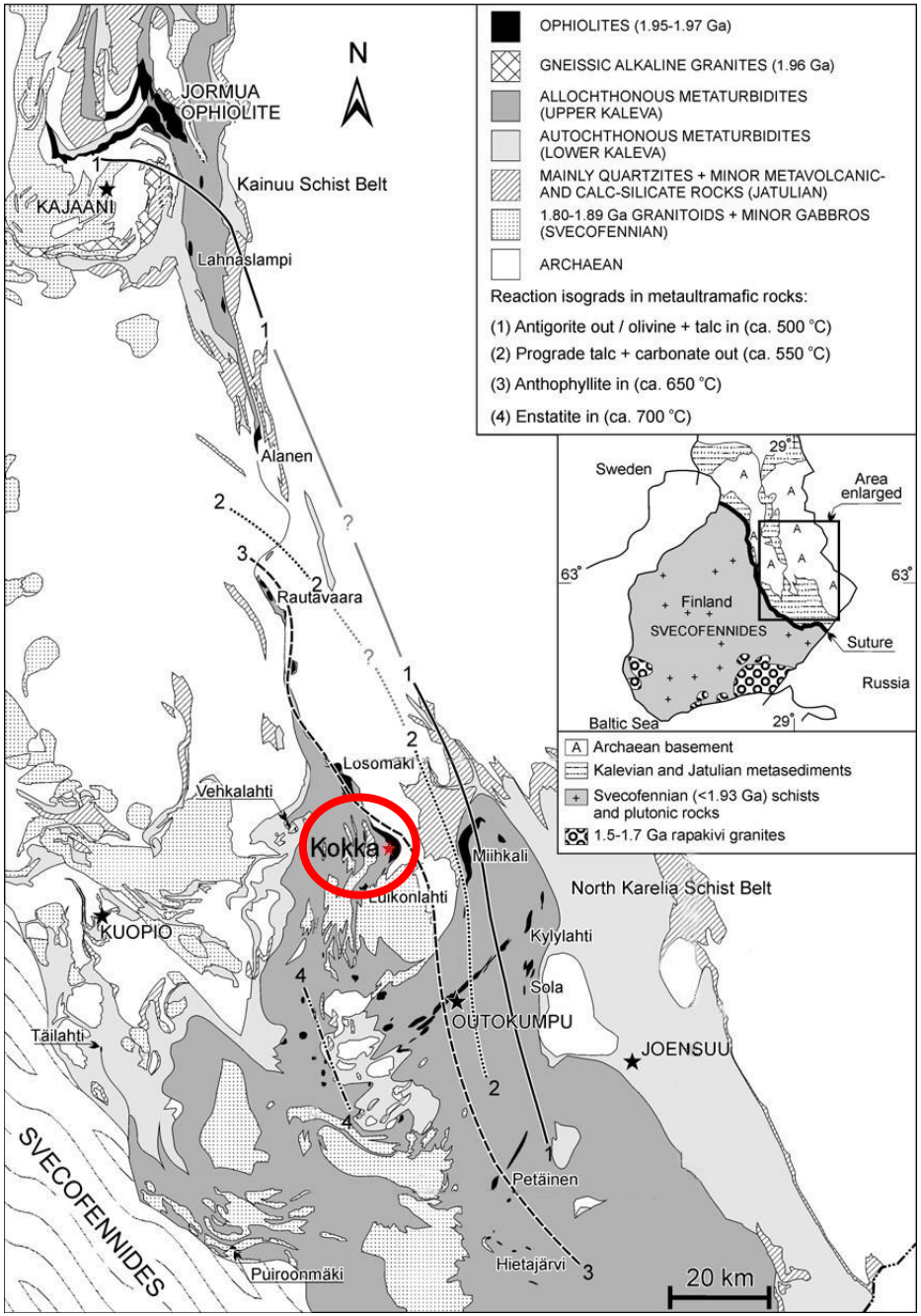
Nickel-Cobalt Prospect at Kaavi,eastern Finland

The Kokka area

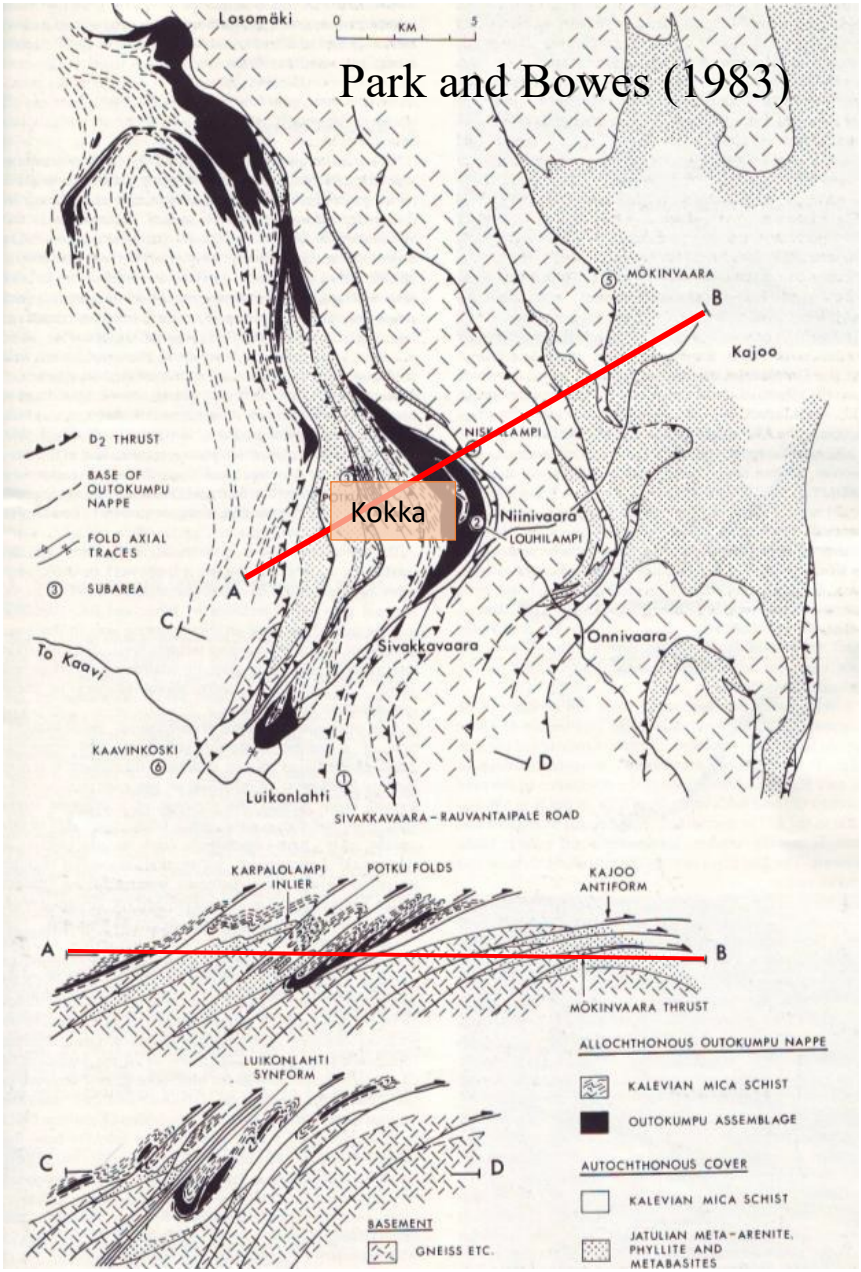




SUOMEN MALMITUTKIMUS

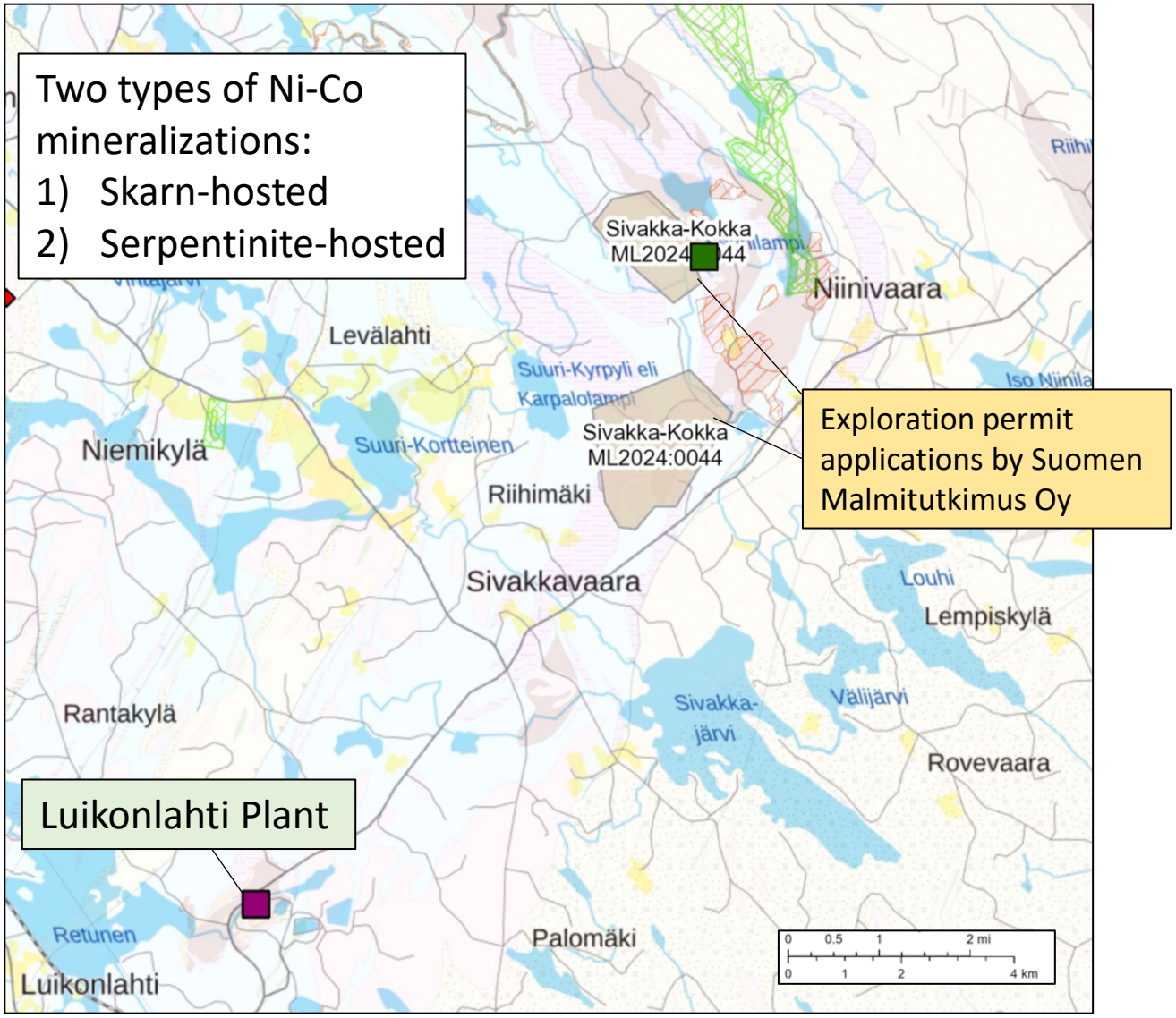


Kokka area belongs into the Outokumpu formation, which hosts the famous Outokumpu-type Cu ores (like Keretti, Vuonos, Luikonlahti and Kylylahti, together with some 56 Mt production @ 2.6 % Cu), but also many Ni-Co deposits, with limited exploration.

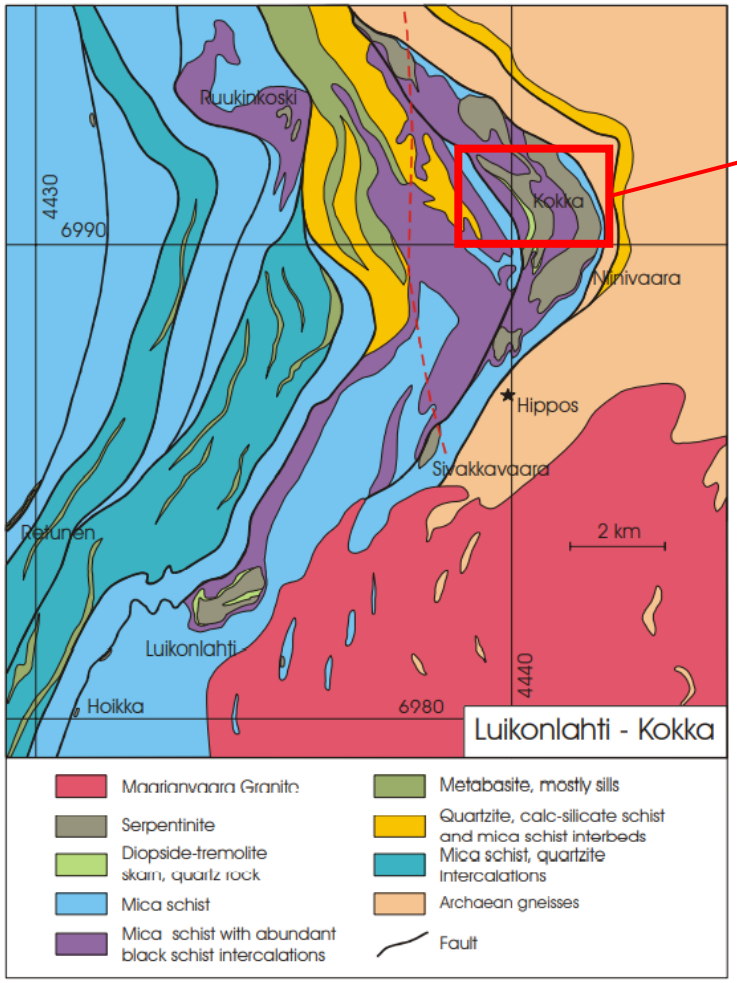


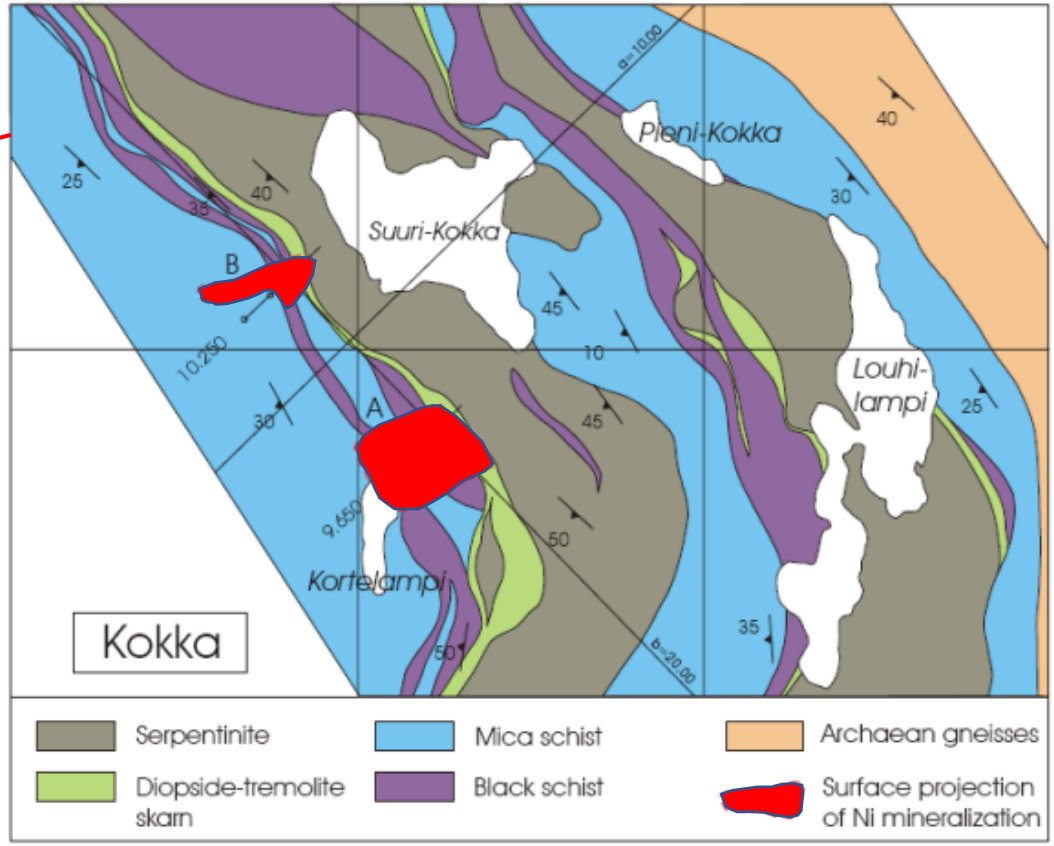
The Outokumpu assemblage lies within an allochthonous nappe complex that was emplaced onto the Karelian Craton margin during the early stages of the Svecofennian Orogeny.
In addition, the resulting thrust belt was later folded.

Kokka Ni-Co Prospects locate within the Outokumpu assemblage, and only 5 -15 km NE of the Luikonlahti processing plant, owned by Boliden.

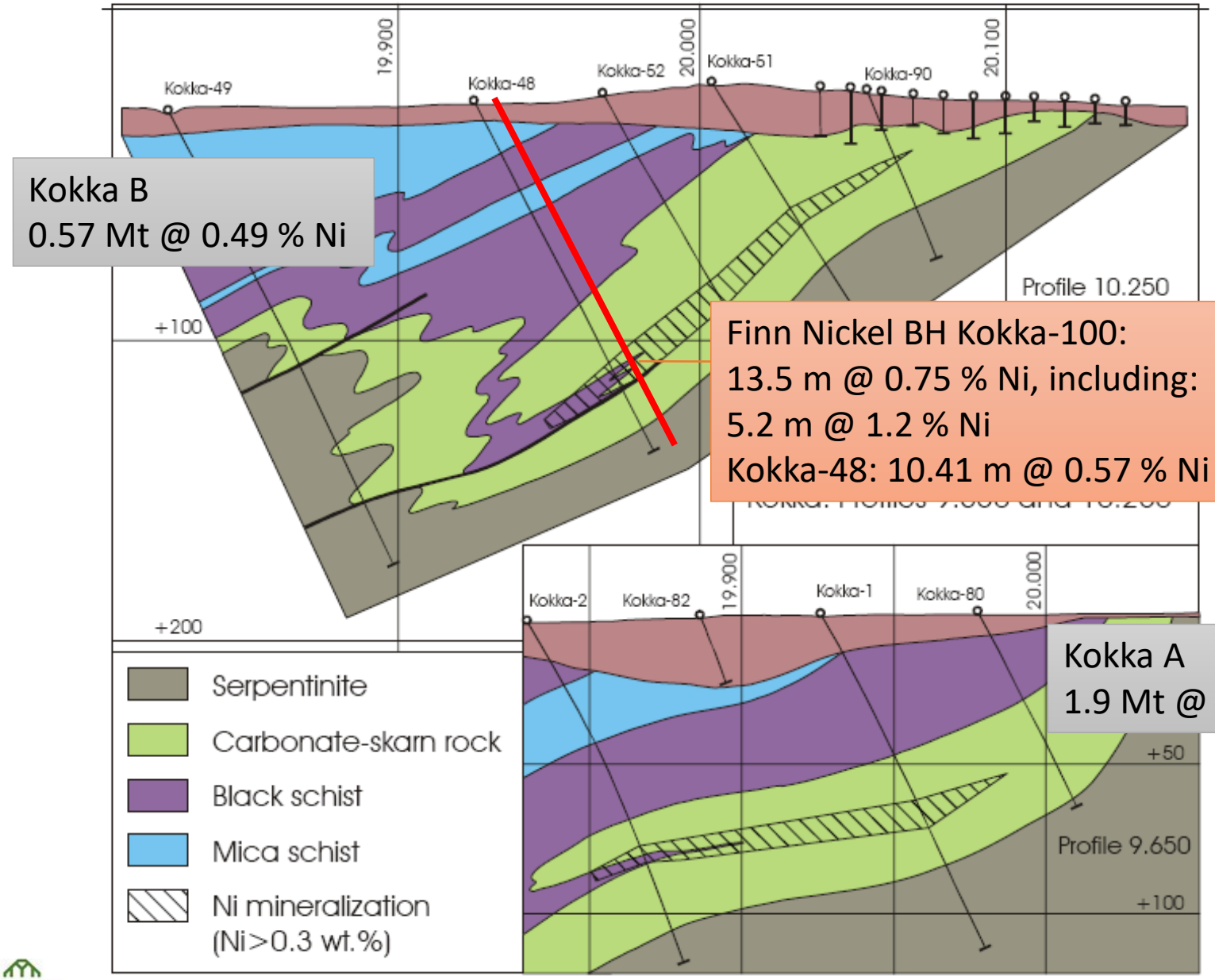


Skarn-hosted Kokka A and B orebodies (from Geomex report)





The wall rock and country rock for the skarns and serpentinites is graphite-rich, giving additional potential for the Kokka area.



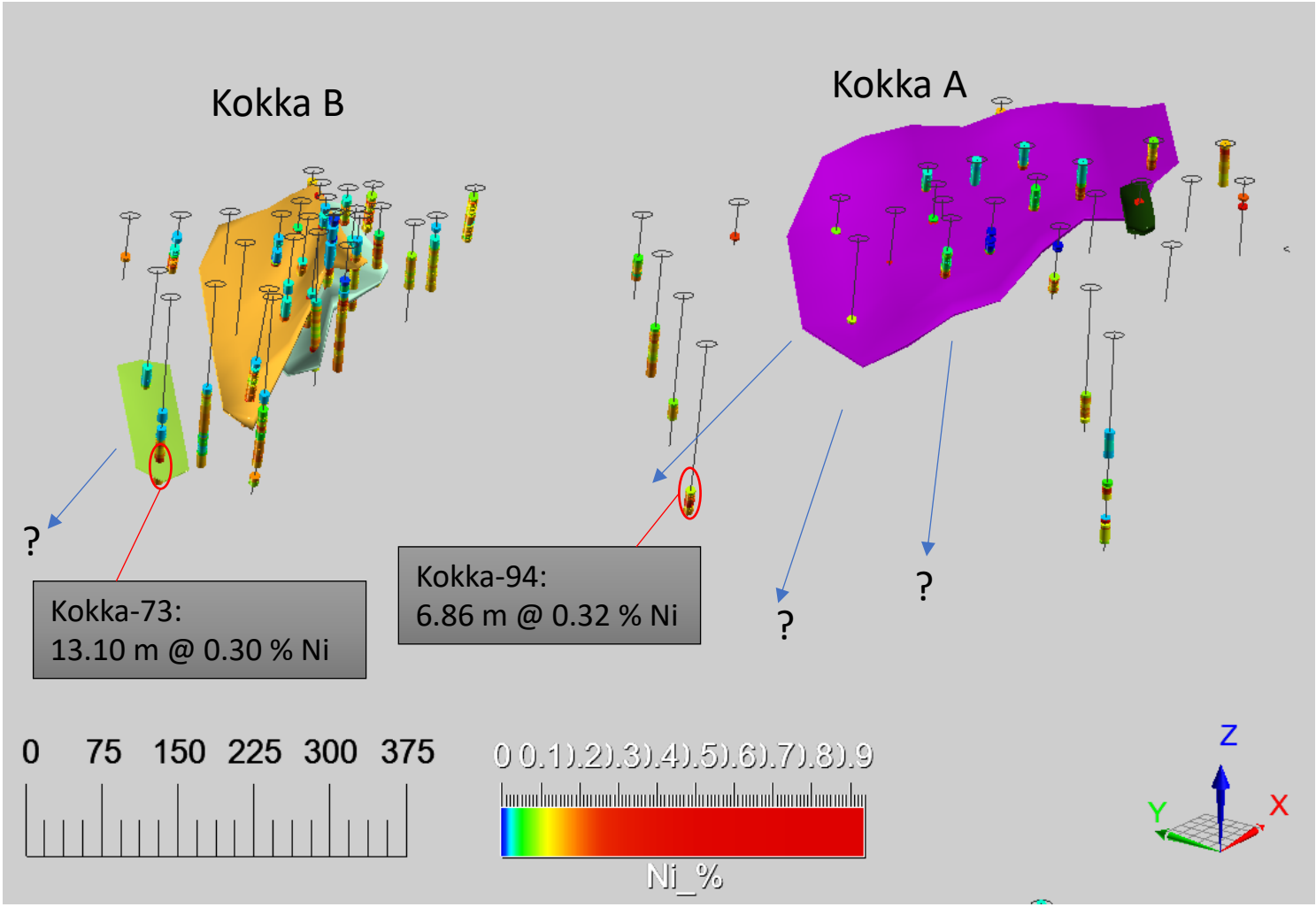
Kokka B
0.57 Mt @ 0.49 % Ni

Finn Nickel BH Kokka-100:
13.5 m @ 0.75 % Ni, including:
5.2 m @ 1.2 % Ni
Kokka-48: 10.41 m @ 0.57 % Ni

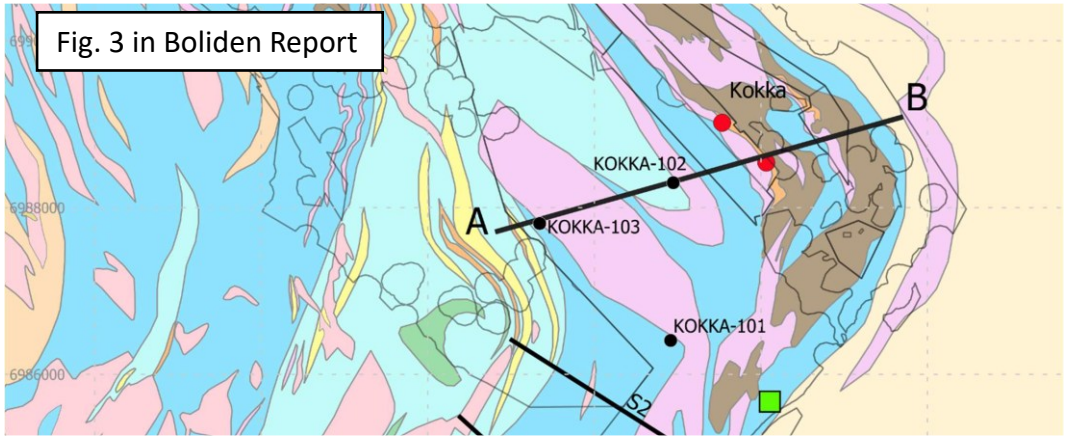
Kokka A
1.9 Mt @ 0.35 % Ni

SUOMEN MALMITUTKIMUS

Kokka A and B are open towards SW



Recent drilling by Boliden, holes Kokka-101, 102, 103



Boliden drillings suggest that the skarn-hosted Kokka Ni mineralization extends further SW with gentle dip by more than 2.5 km.

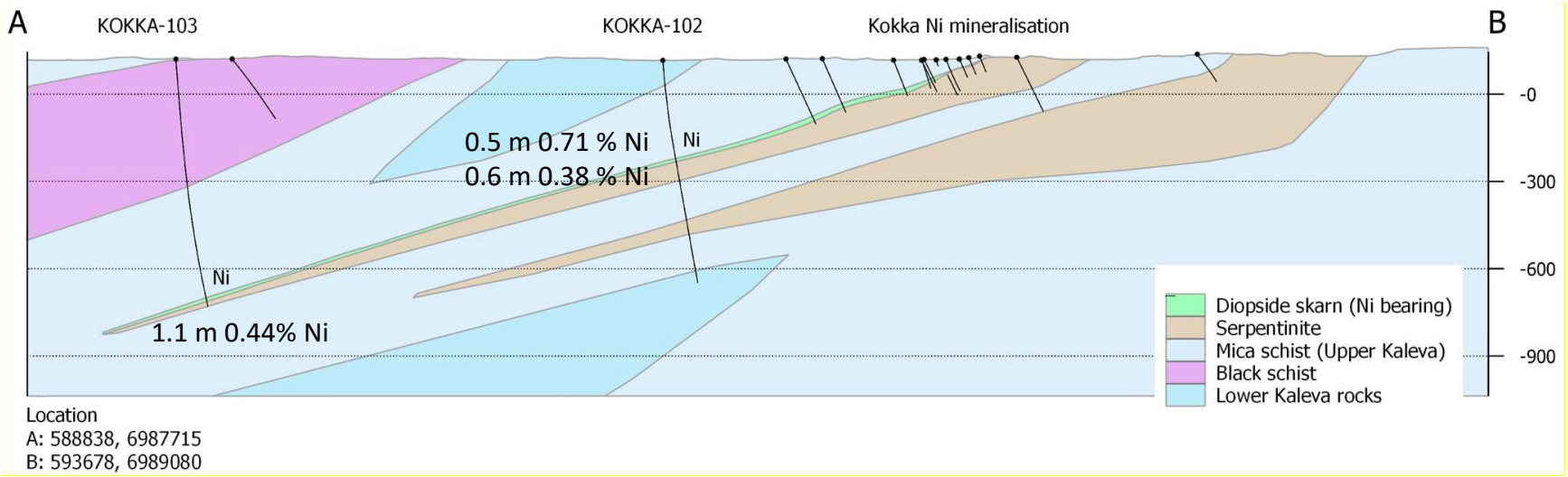
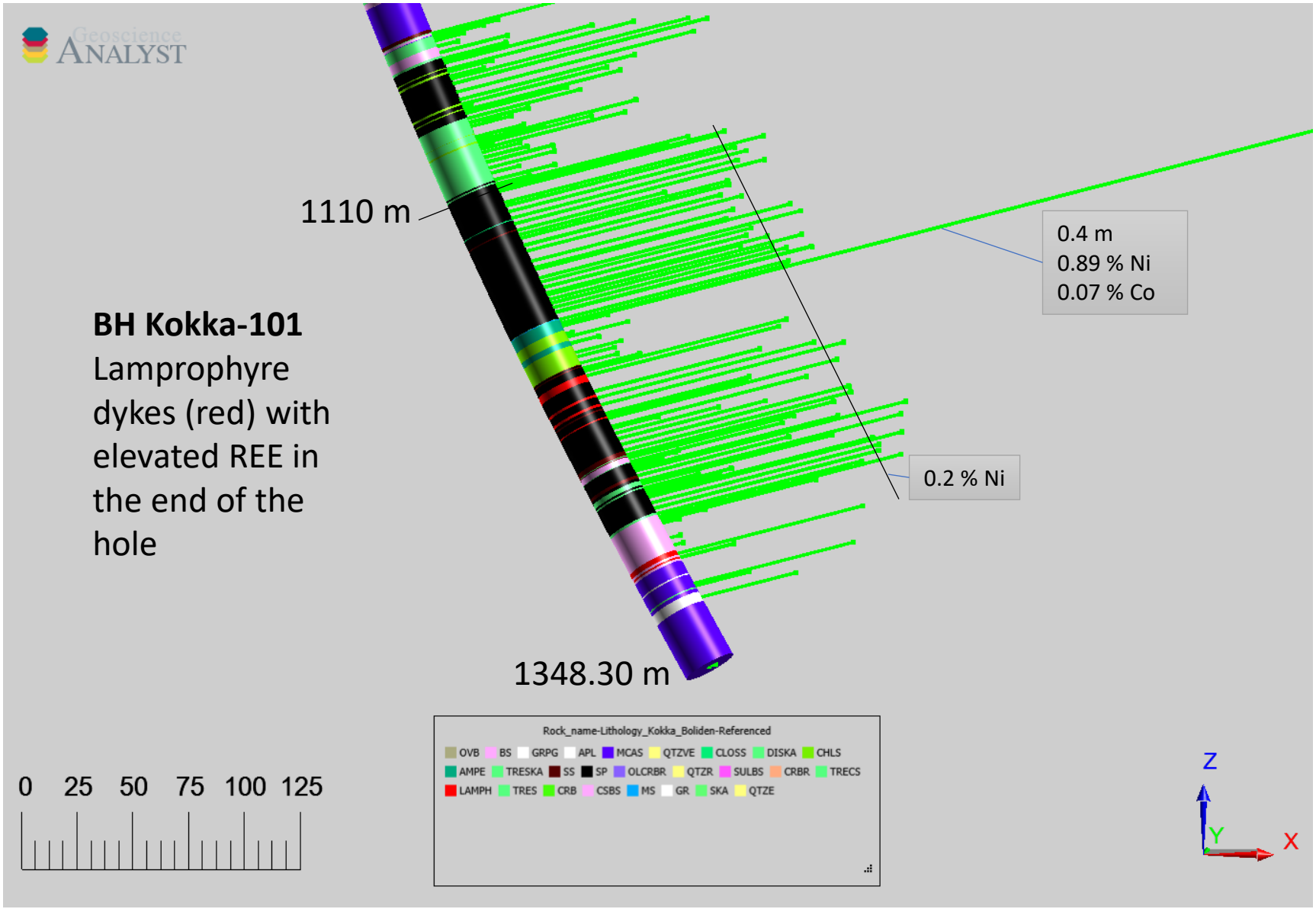
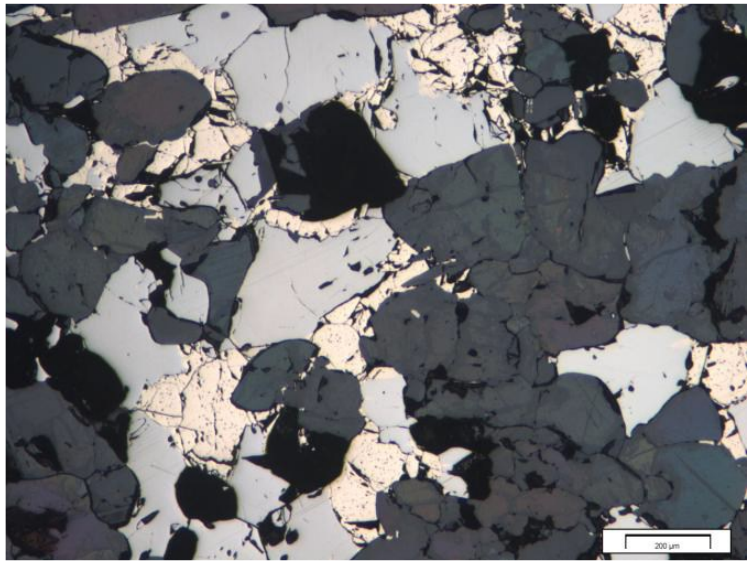


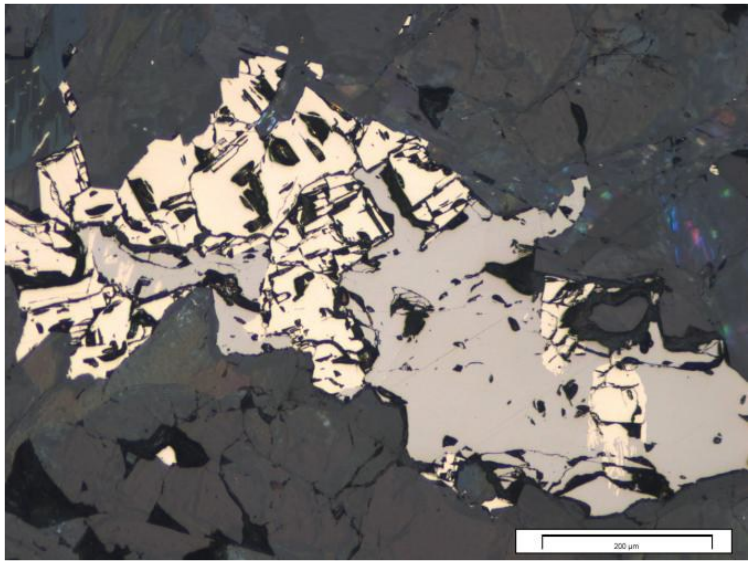
Figure 10. Schematic profile showing the main lihological units. The Ni hosting skarn is shown on the upper contact of the upper serpentinite. The same Ni-bearing unit was found in KOKKA-102 and 103. Other thin skarns and black schists are not shown. (from Boliden Kokka Report, 2023)


Geoscience ANALYST
1110 m
0.4 m
0.89 % Ni
0.07 % Co
BH Kokka-101
Lamprophyre dykes (red) with elevated REE in the end of the hole
0.2 % Ni
1348.30 m
Rock_name-Lithology_Kokka_Boliden-Referenced
OVB BS GRPG APL MCAS QTZVE CLOSS DISKA CHLS
AMPE TRESKA SS SP OLCRBR QTZR SULBS CRBR TRECS
LAMPH TRES CRB CSBS MS GR SKA QTZE
0 25 50 75 100 125
Z
Y
X

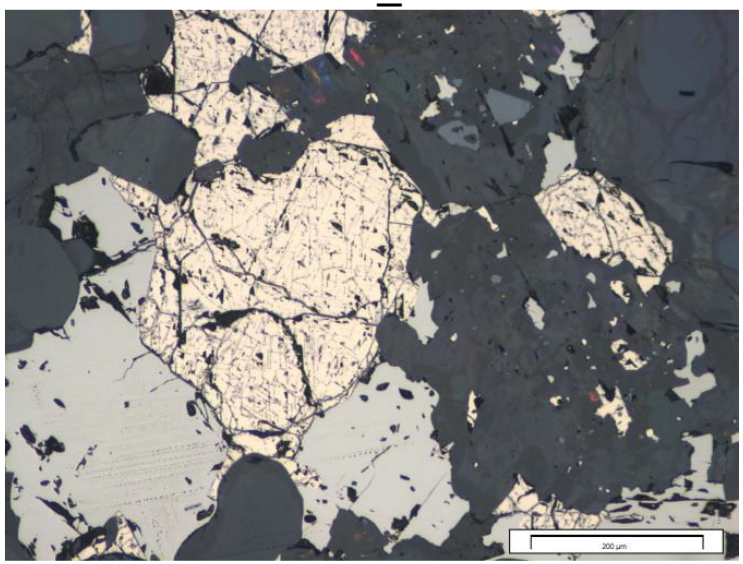
Kokka-1_77.36



Kokka-1_69.68



Kokka-1_79.34



Pyrrhotite-pentlandite assemblages in diopside skarn at Kokka (from Master's Thesis of T.Jokela, 2012)

Nickel in sulfide fraction ~ 8 -10 %
Flotation tests in 1982 positive

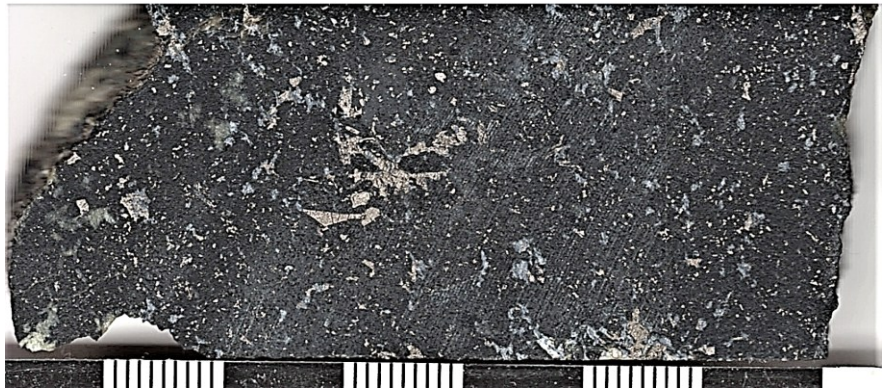
Kokka serpentinite intercepts

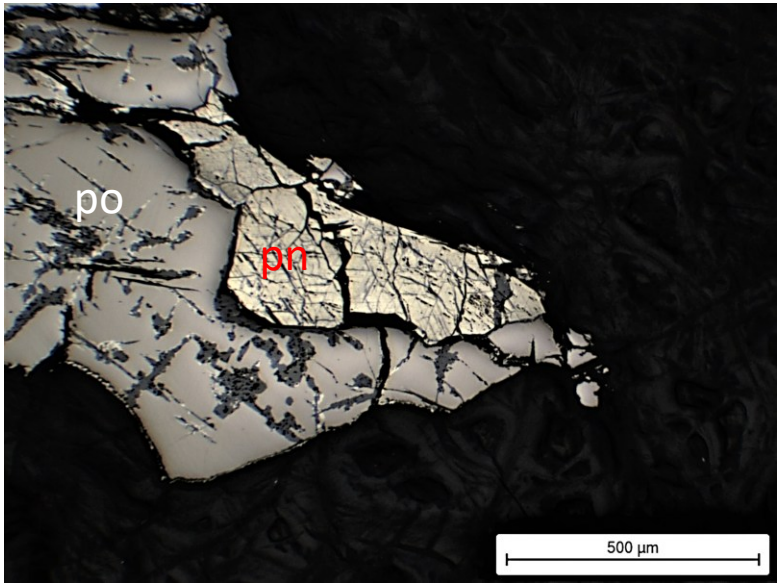
historical data from 1960's and 1970's
true thickness estimated to 70 – 95 % of the intercept length

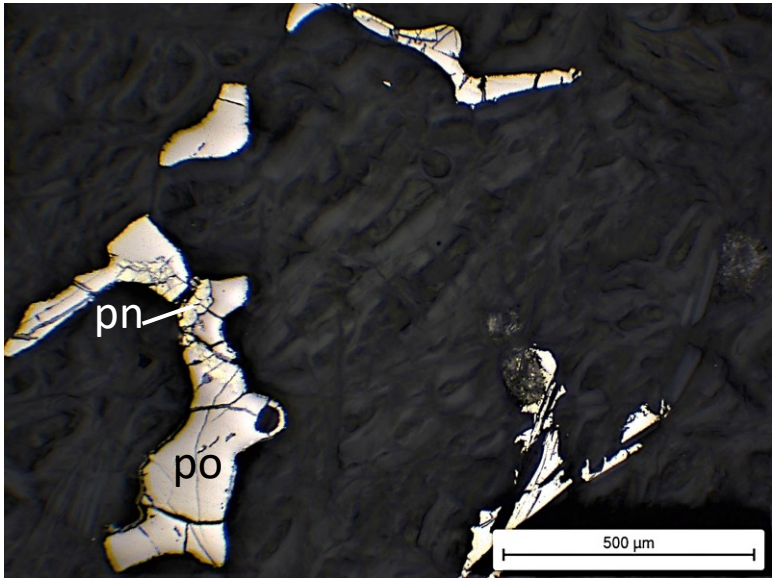
Historical								
Hole_ID	**From m**	**To m**	**Length m**	**Ni %**	**S %**	**Ni(sf) %**		
Kokka-36	83.01	419.61	336.60	0.19				
Kokka-37	25.53	323.62	298.09	0.22				
Kokka-38	7.00	201.42	194.42	0.23	0.44	19.60		
Kokka-39	85.90	150.35	64.45	0.23	0.99	8.71		
Kokka-43	51.83	144.68	92.85	0.19				
Reassayed								
Hole_ID	**From m**	**To m**	**Length m**	**Ni_total %**	**Ni_sulphidic %**	**Co ppm**	**S %**	**Ni(sf) %**
Kokka-39	85.90	132.73	46.83	0.21	0.17	97	0.97	6.56
Kokka-41	23.82	53.68	29.86	0.21	0.15	98	0.30	7.73
Kokka-43	51.83	88.13	36.30	0.17	0.15	96	2.10	2.61
Kokka-43	96.73	146.14	49.41	0.18	0.15	94	2.13	2.67
Kokka-49	100.05	169.88	69.83	0.18	0.16	86	0.95	6.08

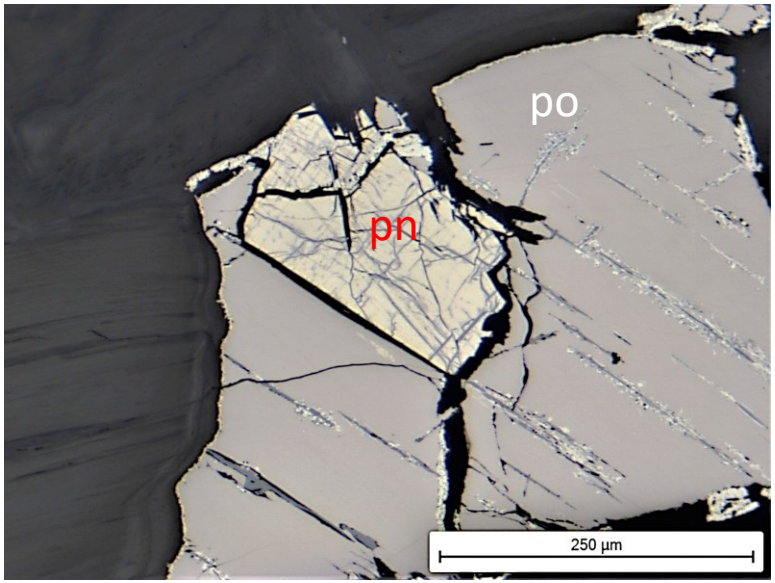
Ni_total by ALS-Method ME-OG62, Ni_sulphidic by ALS-Method Ni-ICP05 (leaching by acids that preferentially break down sulphides), Co and S by ALS-Method ME-ICP41a. Ni(sf) % calculated assuming sulphur content of 37.5 % in sulphide fraction.

Sulphides in serpentinite mainly pyrrhotite (po)+pentlandite (pn)



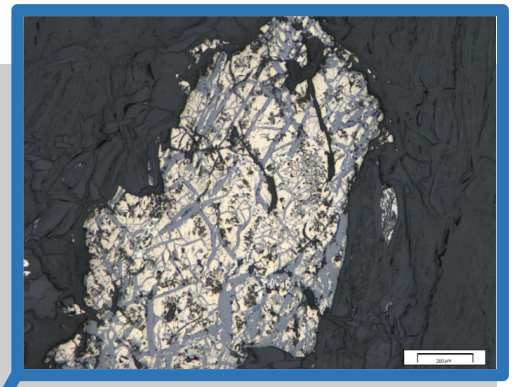






Geoscience ANALYST

View towards west, 40 m slice



Kokka A orebody

KOKKA-16
KOKKA-15
KOKKA-4
KOKKA-3
KOKKA-83
KOKKA-39

Ni in serpentinite

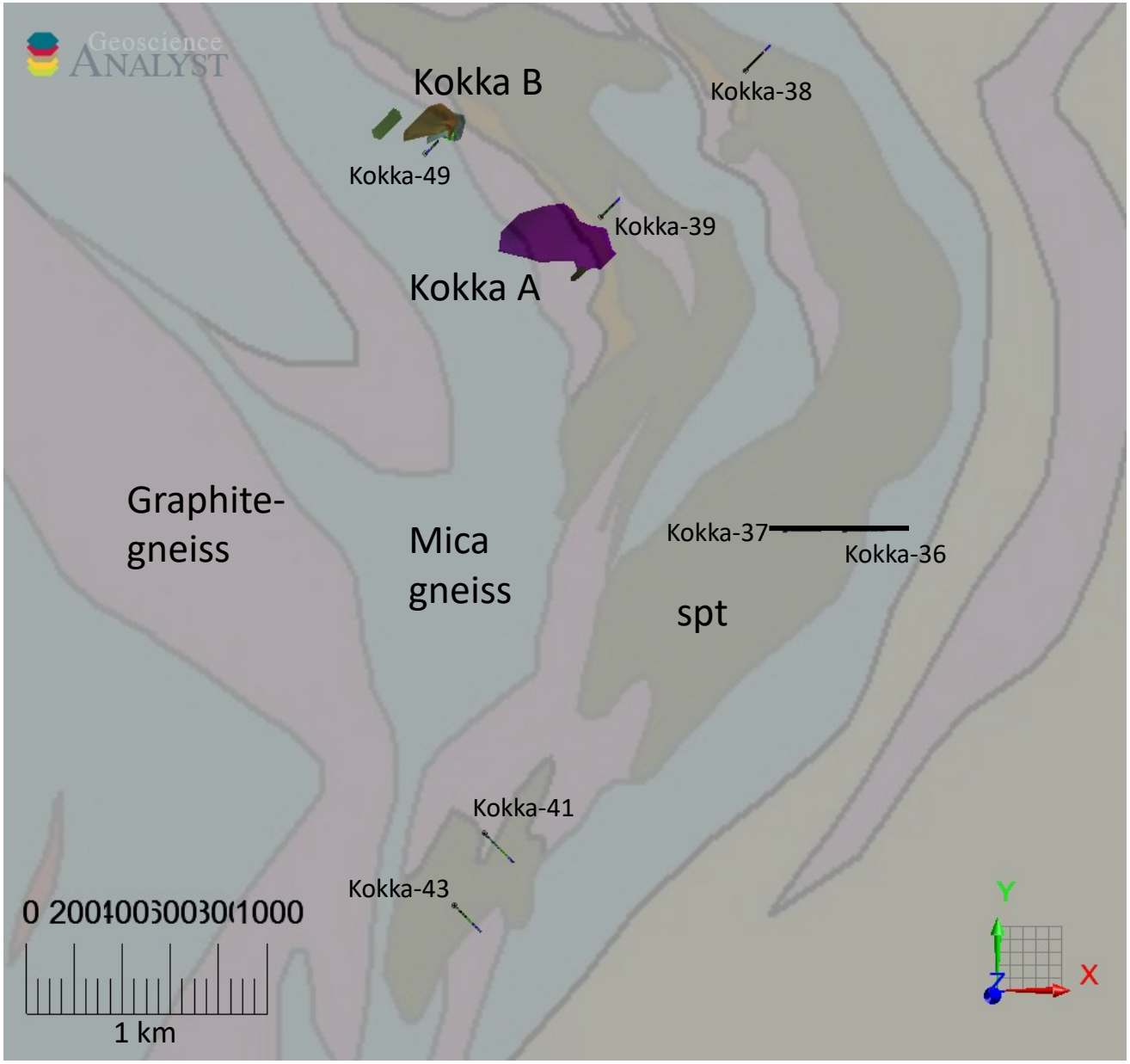
Historical:
85.90-150.35 m
64.45 m
0.23 % Ni
Reassayed:
85.90-132.73
46.83 m
0.17 % sulphidic Ni
0.01 % Co

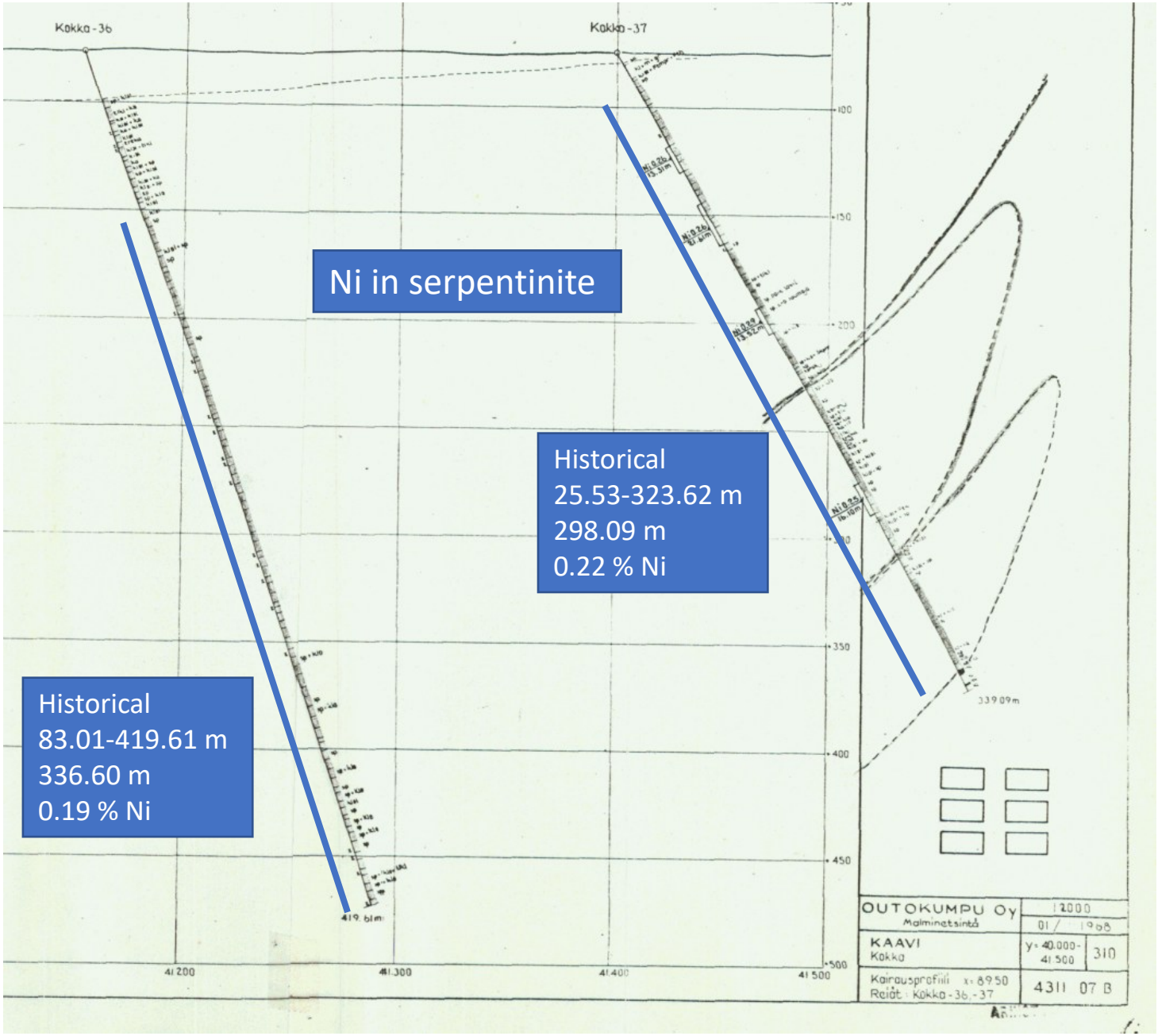
0 30 60 90 120 150

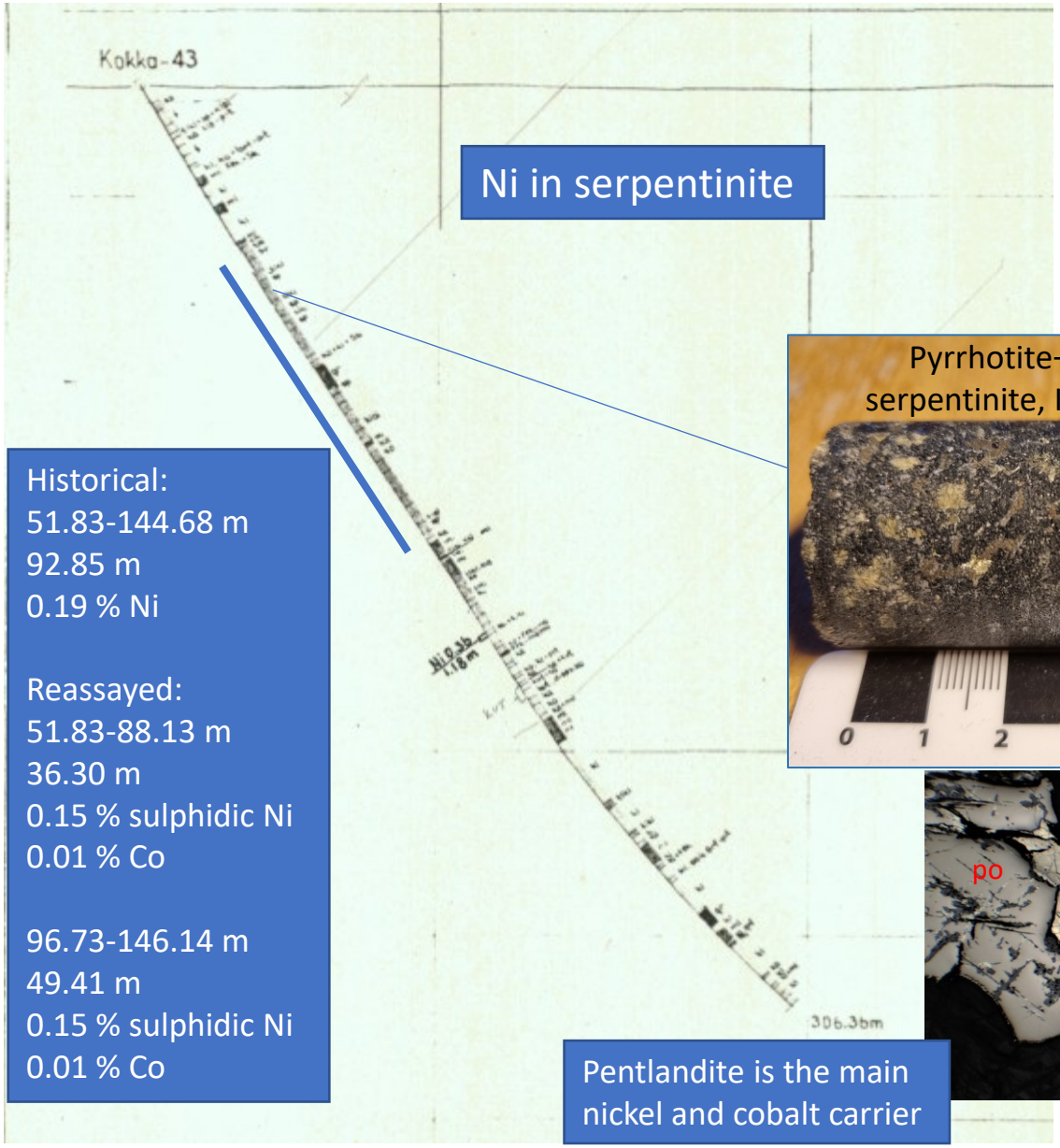
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9
Ni_%

Z
Y
X

Kokka serpentinite (spt) intercepts




Kokka-36
Kokka-37
Ni in serpentinite
Historical
25.53-323.62 m
298.09 m
0.22 % Ni
Historical
83.01-419.61 m
336.60 m
0.19 % Ni
339.09m
419.61m
41 200
41 300
41 400
41 500
OUTOKUMPU Oy
Malminetsintä
KAAVI
Kokka
Kairausprofiili
Reiät: Kokka-36,-37
4311 07 B

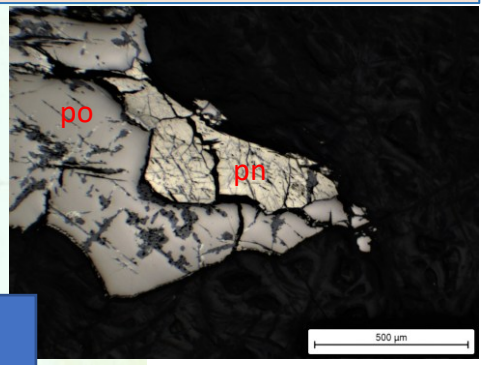


Ni in serpentinite

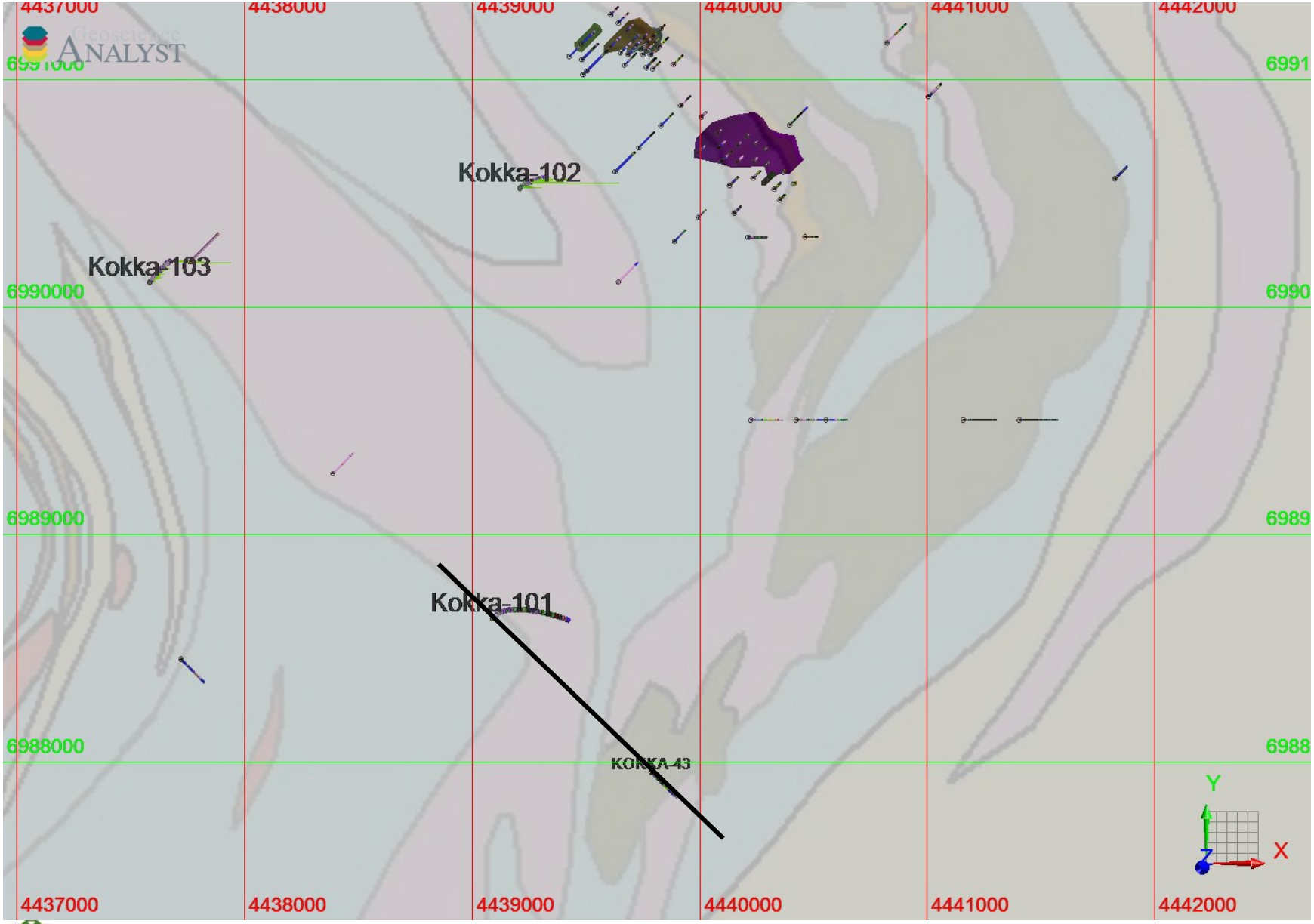
Historical:
51.83-144.68 m
92.85 m
0.19 % Ni

Reassayed:
51.83-88.13 m
36.30 m
0.15 % sulphidic Ni
0.01 % Co

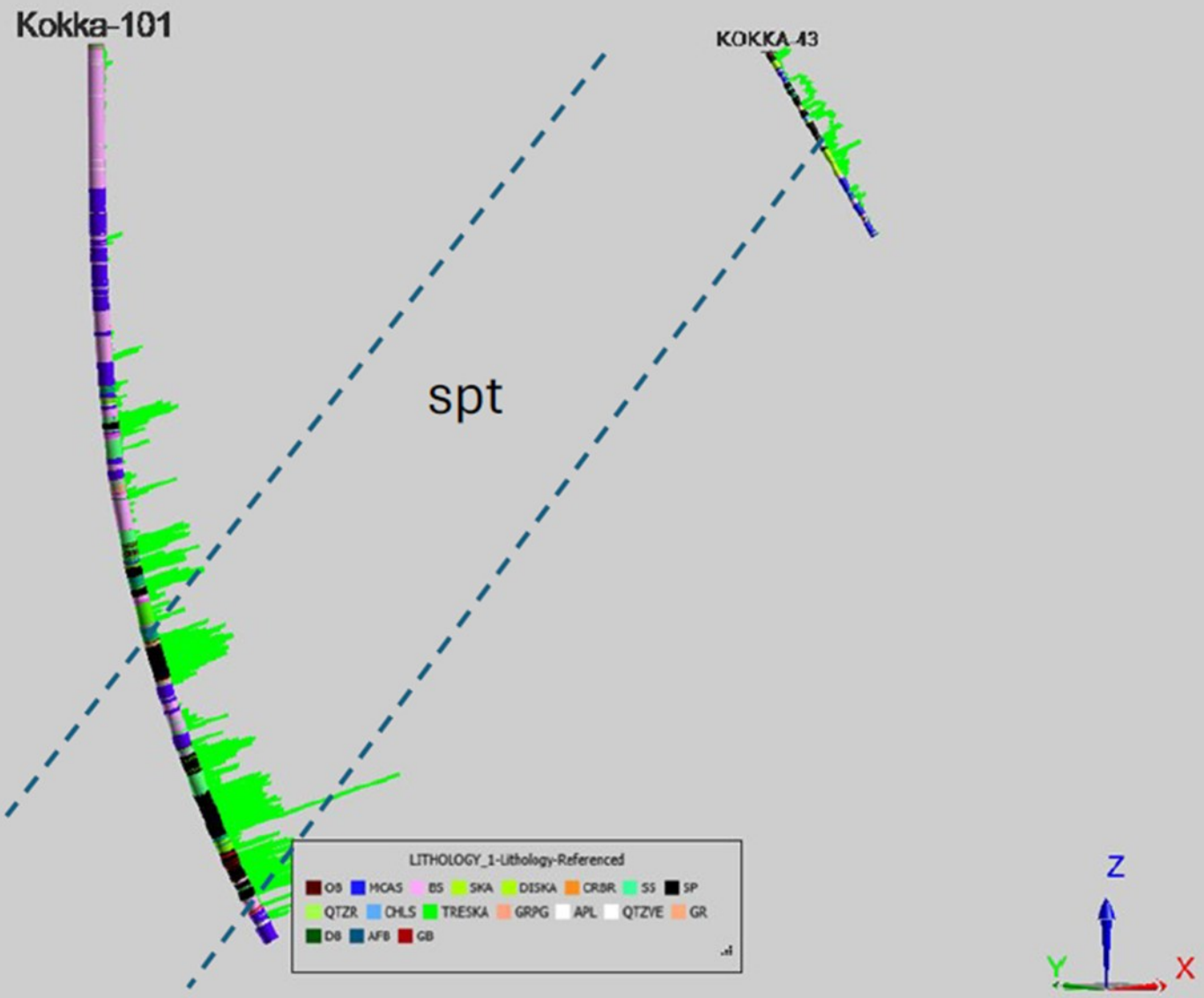
96.73-146.14 m
49.41 m
0.15 % sulphidic Ni
0.01 % Co



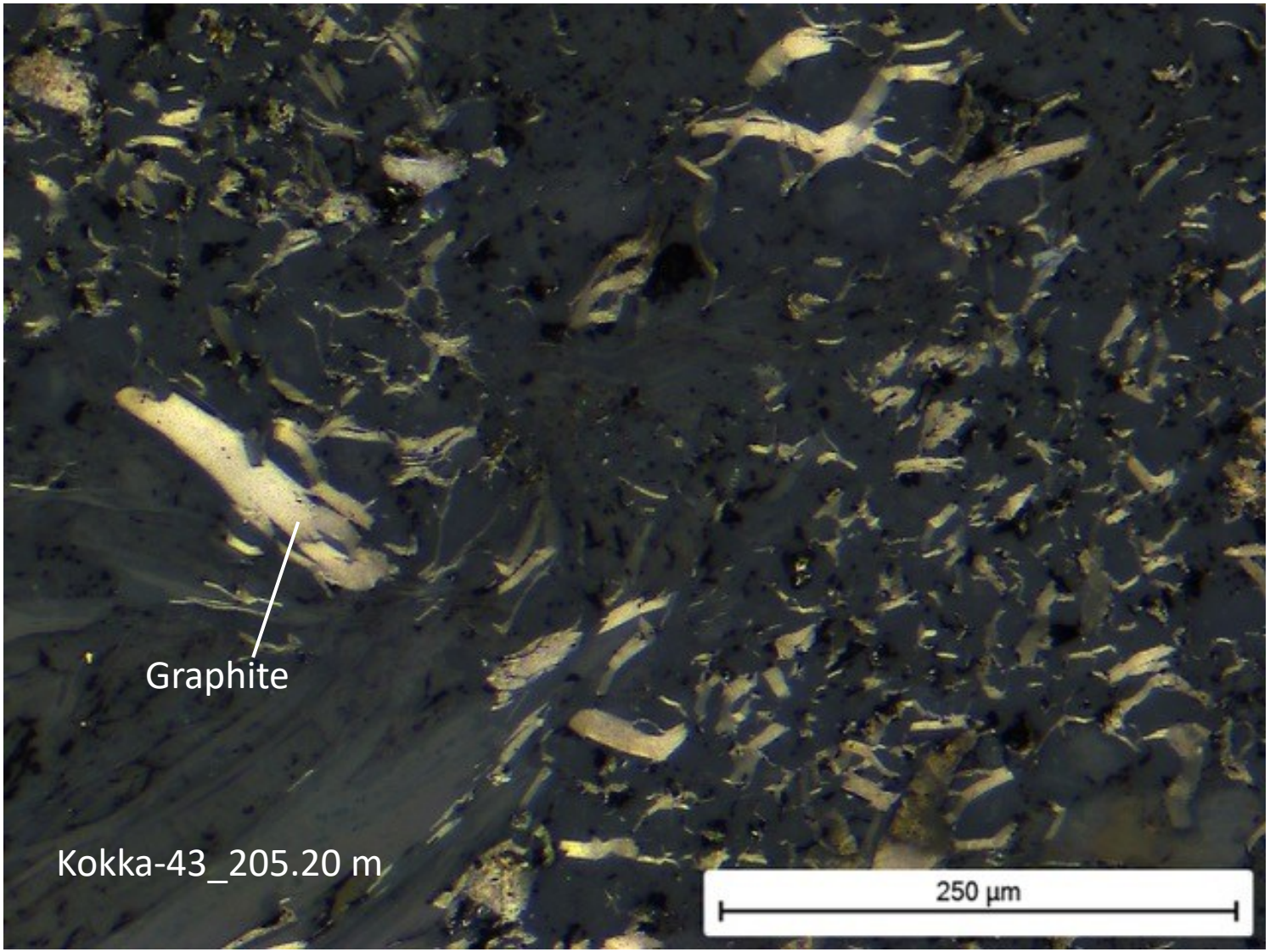
Pentlandite is the main nickel and cobalt carrier


Geoscience
ANALYST
Kokka-102
Kokka-103
Kokka-101
KOKKA-43
4437000
4438000
4439000
4440000
4441000
4442000
6991
6990
6989
6988
Y
X

Towards NE


Kokka-101
KOKKA 43
spt
LITHOLOGY_1-Lithology-Referenced
OB MICAS BS SKA DISKA CRBR SS SP
QTZR CHLS TRESKA GRPG APL QTZVE GR
DB AFB GB
Z
Y
X

Graphite in Kokka is probably mainly flake graphite => potential for battery grade graphite product



Kokka Prospect is potential for:

- **Nickel+Cobalt sulphide ore**
  - skarn-hosted ore, > 2.5 Mt @ 0.4 % Ni
  - serpentinite-hosted ore, up to 200-300 m thick spt @ 0.19-0.23 % total Ni, 0.15-0.17 % sulphide Ni

- In addition to Ni and Co production **serpentinite utilization** includes potential for
  - **magnesium source and CO2 sequestration**

  $Mg_3Si_2O_5(OH)_4 + 3CO_2 \rightarrow 3MgCO_3 + 2SiO_2 + 2H_2O$

- The wall rock for the Ni-Co mineralizations is **graphite-rich**, giving additional potential; graphite gneiss/black schist layers can be over 300 m thick

- Outokumpu type formations (voluminous serpentinite + black schist) may contain **hydrogen and helium** of commercial value (GTK studies; studies underway also by FinnAust)