Hirvilavanmaa

Alternative Names: Hirvi
Occurence type: deposit

Commodity	Rank	Total measure	Total production	Total resource	Importance
gold	1	0,31 t	NA	0,31 t	Occurrence
silver	3	NA	NA	NA	NA

Easting EUREF: 423133,571
Northing EUREF: 7515904,489
Easting YKJ: 3423275
Northing YKJ: 7519045

Discovery year: 1987
Discovered by: Geological Survey of Finland
Province: Kittilä (Au, Cu)
District: Sirkka (Cu, Au, Ni, Co)
Comments: First indication of mineralization was a polymetallic till and stream sediment anomaly with high Cu, Co, Au, As, Mo and W contents detected in 1983, mineralization was first drilled in 1987
References: 4, 15, 18, 24

Mineral deposit type

Group: Metallogenic deposit
Main type: Orogenic (metamorphic hydrothermal)
Comments: Clearly epigenetic, "mesothermal" mineralisation with a distinct structural control. Gold precipitation by phase separation and reaction between the fluid and wall rock, PT at 220-310°C and 1.0-2.2 kbar.
References: 4, 9, 10, 11, 17

Dimension

Expression: exposed
Form: discordant
Shape: irregular
Length (m): 270
Width (m): 90
Thickness (m): NA
Depth (m): NA
Area (ha): NA
Dip azim: 270
Dip: 85
Plunge azim: NA
Plunge dip: NA
Orientation method: NA
Dimension comments: The NNE-trending mineralised domain is 270 m long and 90 m wide. Open at depth

Holder history

Current holder: Rupert Exploration Finland Oy
Years: 2018-2021

Holding type: Exploration permit

Previous holders:

Company	Years	Holding type	Comments
Rupert Resources Ltd	2013	Exploration permit	NA
Lappland Goldminers Oy	2013-2016	Claim (old law)	NA
Lappland Goldminers Oy	2007-2011	Claim (old law)	NA
Scan Mining Oy	2003-2007	Claim (old law)	NA
Geological Survey of Finland	1996-2000	Claim (old law)	NA
Geological Survey of Finland	1987-1995	Claim (old law)	NA
Outokumpu Oy	1964-1965	Claim (old law)	NA

EXPLORATION ACTIVITY

Rupert Resources Ltd

Years	Activity type	Geologist	Exploration result	Ref
2019	core drilling	NA	key geological features	20
	New mineralised intercepts encountered			
	Intersections			
	HoleID	119202		
	From-To	15-19		
	Length	4m		
	HoleID	119202		
	From-To	52-90		
	Length	38m		
	gold	1,4ppm		
	HoleID	119209		
	From-To	72-125		
	Length	53m		
	gold	1,3ppm		

Geological Survey of Finland

Years	Activity type	Geologist	Exploration result	Ref
2018-2021	detailed geology	Mikael Vasilopoulos	key geological features	23
	Lithological, geochemical and mineralogical study			

Scan Mining Oy

Years	Activity type	Geologist	Exploration result	Ref
2003-2007	mining pilot	NA	key geological features	5
	The surface of the mineralization was partly exposed, geological and structural mapping and test mining done			

Geological Survey of Finland

Years	Activity type	Geologist	Exploration result	Ref
1996-1996	regional geophysics	NA	key geological features	
	Low-altitude magnetic, aeromagnetic and radiometric survey			

1987-1995	core drilling	Veikko Keinänen	NA	1, 11, 12, 14
	Core drilling (reconnaissance drilling): 62 diamond- and RC-drill holes, total 3779 m?			
	Intersections			
	HoleID	2734/88/R330		
	From-To	NA		
	Length	3,5m		

	gold	6,5ppm
	HoleID	2734/95/R702
	From-To	NA
	Length	28m
	gold	5,2ppm
	Comments	*RC drill hole*

1987-1995	excavation	Veikko Keinänen	NA	6, 8, 9, 10, 13, 19, 22
	Excavation into the overburden: no subcrops encountered, trenching was not successful; trenches were filled with water			

1986-1994	detailed geophysics	Veikko Keinänen	NA	11, 22
	A non-magnetic domain within a positive magnetic anomaly. The SIP method indicates the areas of altered rock.			

1983-1990	detailed geochemistry	Veikko Keinänen	NA	8, 11, 13
	Local Au and Cu anomaly in till and weathered surface of bedrock.			

1979-1991	regional geochemistry	NA	NA	
	Regional geochemical till survey in 1979-1982 and in 1991; Regional As, Co, Cu, As, Mo and W anomalies in till cover the area.			

Atri Oy

Years	Activity type	Geologist	Exploration result	Ref
1940-1940	detailed geology	NA	key geological features	13

1940-1940	detailed geophysics	NA	NA	13

RESOURCES AND RESERVES

Most recent

Type:	Company:	Year:	Date:	Calc Method:	Reference:
Resource	Scan Mining Oy	2002	NA	Non-compliant resource estimate	21
	Category:	**Poorly estimated mineral resource, poorly documented**			
	Tonnage:	**0,11 Mt**			
	gold	2,9 ppm			
	Cutoff:	**NA**			

GEOLOGY

Host rock: Komatiite, Dolerite, Mafic volcanic rock, Basalt
Wall rock: Black schist

Komatiite (Host rock)

Rock type: Host rock
Proportion: major
Grain size: NA
Color: NA
References: 2, 4, 6, 7, 8, 9, 10, 11, 13, 19, 23
Comments: In earlier studies, the intensely altered metakomatiites were suggested to be of sedimentary origin.

Ore minerals:

Mineral	Proportion	Mineral texture
Chalcopyrite	minor	
Chromite	minor	
Galena	present	
Gold	present	
	Native gold is present mostly as inclusions and fracture filling in pyrite and locally in vein quartz and carbonate.	
Pyrite	major	
Silver	present	
Telluride	present	
Tetrahedrite	present	

Other minerals:

Mineral	Proportion	Mineral texture
Albite	present	Alteration product
Chlorite	present	Alteration product
Dolomite	present	
Hematite	minor	
Magnesite	present	
Magnetite	minor	
	Predates gold mineralisation, is destructed by mineralisation-related alteration	
Monazite	present	
Quartz	present	
Rutile	minor	
	Product of carbonatisation related to gold mineralisation	
Talc	present	Alteration product

Structures
Breccia
Comments: Locally brecciated by auriferous quartz-carbonate-albite veining

Textures
Granoblastic

Alteration:	Distribution:	Degree:	Relation to mineralization:
albitic alteration	Pervasive	Moderate	Pre
Comments: Synvolcanic and/or early-metamorphic, pre-gold hydration + albitisation and partial carbonation of large areas was followed by synorogenic, structurally-controlled carbonation with gold mineralisation			
chloritic alteration	Pervasive	Strong	Pre
Comments: Early formation of talc-chlorite-magnesite assemblage			
silicification	Pervasive	Weak	Syn
Comments: Apparent silicification due to formation of quartz fromexcess silica liberated in carboantion of earlier silicates			
sulphidation	Pervasive	Weak	Syn
Comments: Pyrite formation			
carbonate alteration	NA	NA	Syn

Metamorphic description:

Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	greenschist metamorphic facies	low metamorphic grade	NA		
Comments: Metamorphic peak during D2, thrusting during D3 was at least partly post-peak, late metamorphic; Amphibole-chlorite-titanite-chromite-magnetite ± calcite.					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1852-1890		Y
Comments: The gold mineralisation probably took place between 1852-1890 Ma (the age determination was done from the nearby Soretiavuoma mineralization); Gold mineralisation post-dates the regional metamorphic peak.			
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

Dolerite (Host rock)

Rock type: Host rock
Proportion: major
Grain size: NA
Color: NA
References: 2, 3, 4, 7, 9, 10, 11, 13, 19

Metamorphic description:

Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	greenschist metamorphic facies	low metamorphic grade	NA		
Comments: Metamorphic peak during D2, thrusting during D3 was at least partly post-peak, late metamorphic.					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

Mafic volcanic rock (Host rock)

Rock type: Host rock
Proportion: minor
Grain size: NA
Color: NA
References: 2, 4, 7, 9, 10, 11, 13, 19

Metamorphic description:

Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	greenschist metamorphic facies	low metamorphic grade	NA		
Comments: Metamorphic peak during D2, thrusting during D3 was at least partly post-peak, late metamorphic.					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

Basalt (Host rock)

Rock type: Host rock
Proportion: minor
Grain size: NA
Color: NA
References: 2, 3, 4, 7, 9, 10, 11, 13, 19

Metamorphic description:

Type:	Facies:	Degree:	Relation to mineralization:	Min P- Max P (kbar)	MIn T- Max T (°C)
Regional	greenschist metamorphic facies	low metamorphic grade	NA		
Comments: Metamorphic peak during D2, thrusting during D3 was at least partly post-peak, late metamorphic.					

Geological age:

Geological era:	Max age - Minage (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1600-2500		N

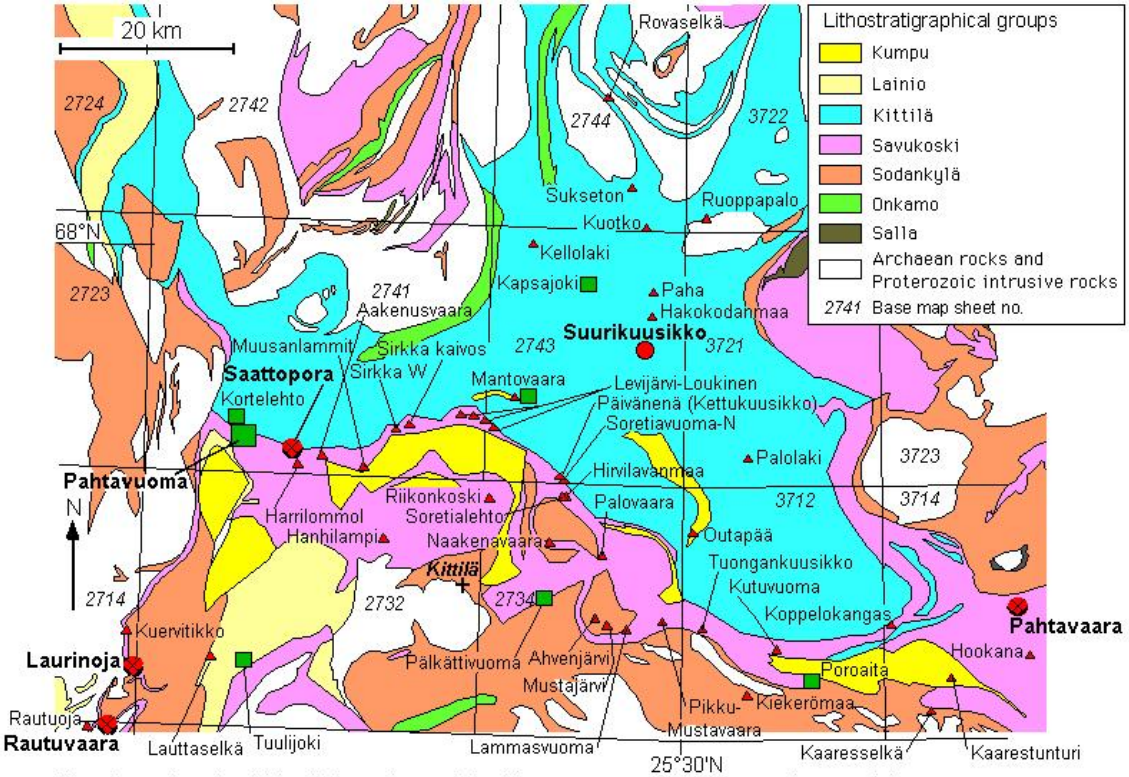
Black schist (Wall rock)

Rock type: Wall rock
Proportion: minor
Grain size: Fine grained 0.2 - 1 mm

Color: Black
References: 23

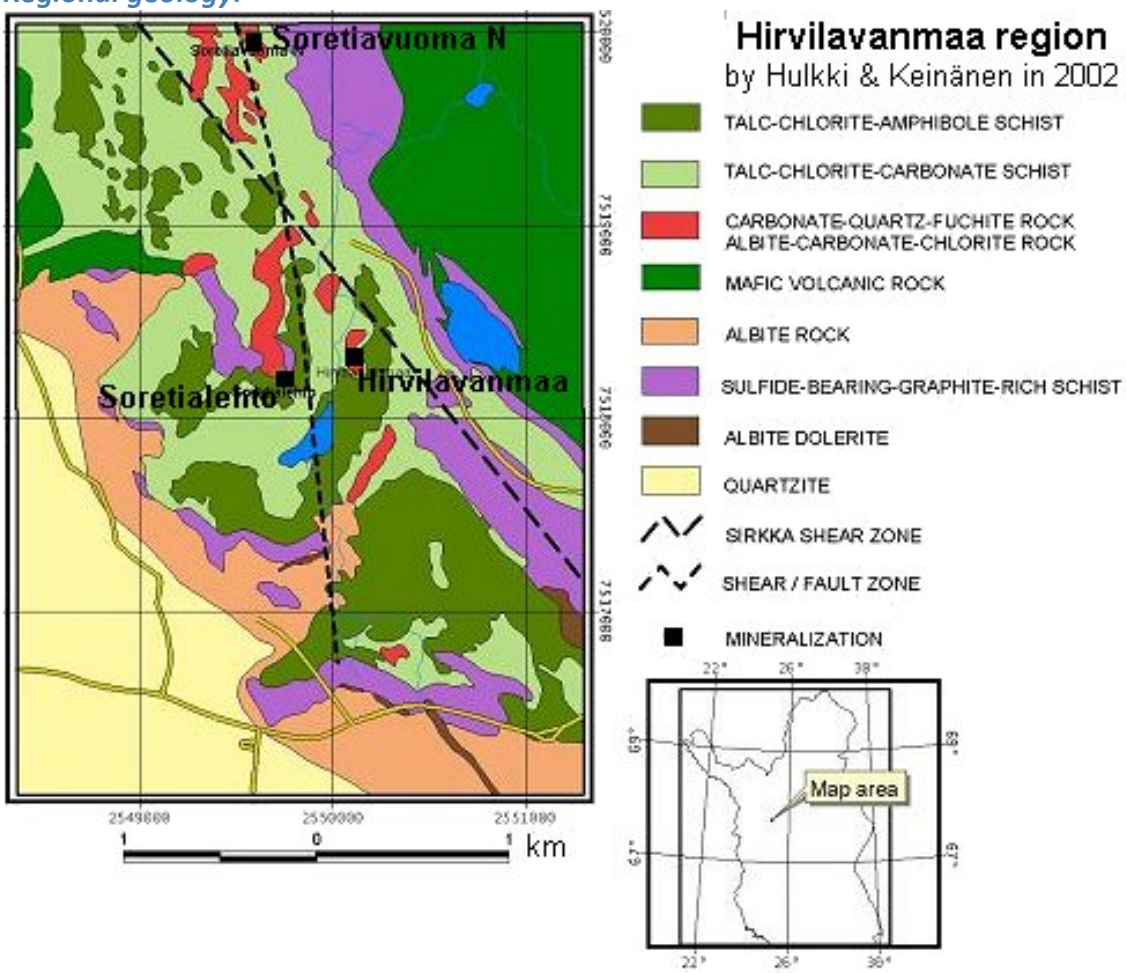
Figures

Regional geology:

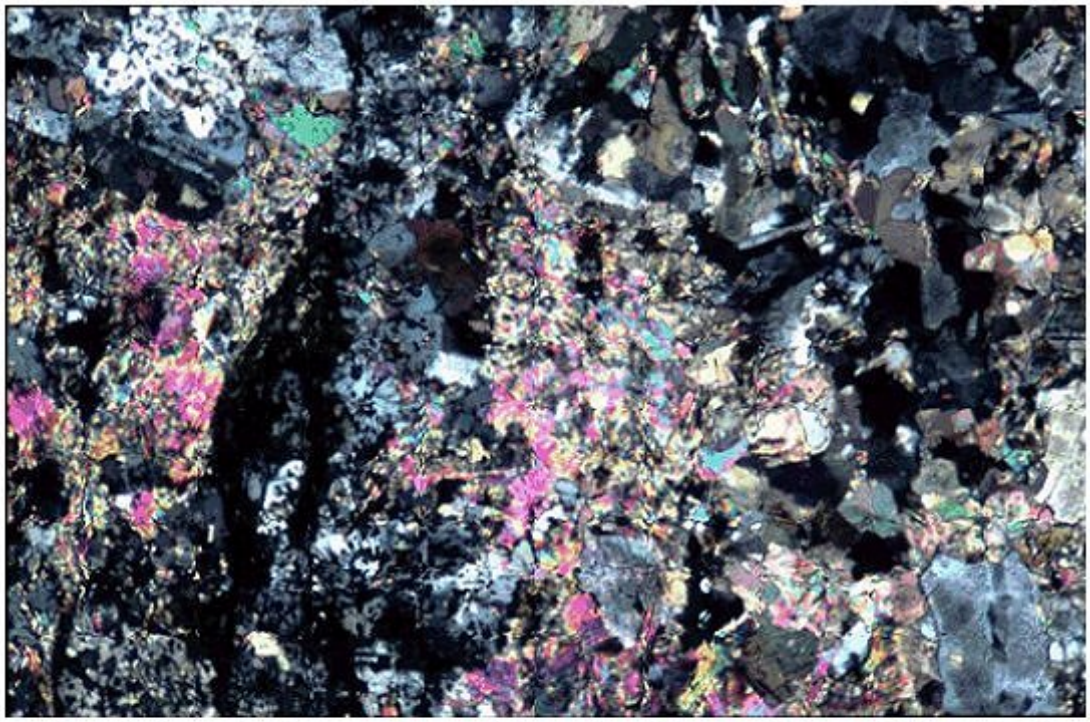


Zinc (green) and gold (red) deposits and significant prospects in the central parts of the Central Lapland greenstone belt. Lithostratigraphy from Lehtonen et al. (1998). Edited by P. Eilu (2007)

Regional geology:

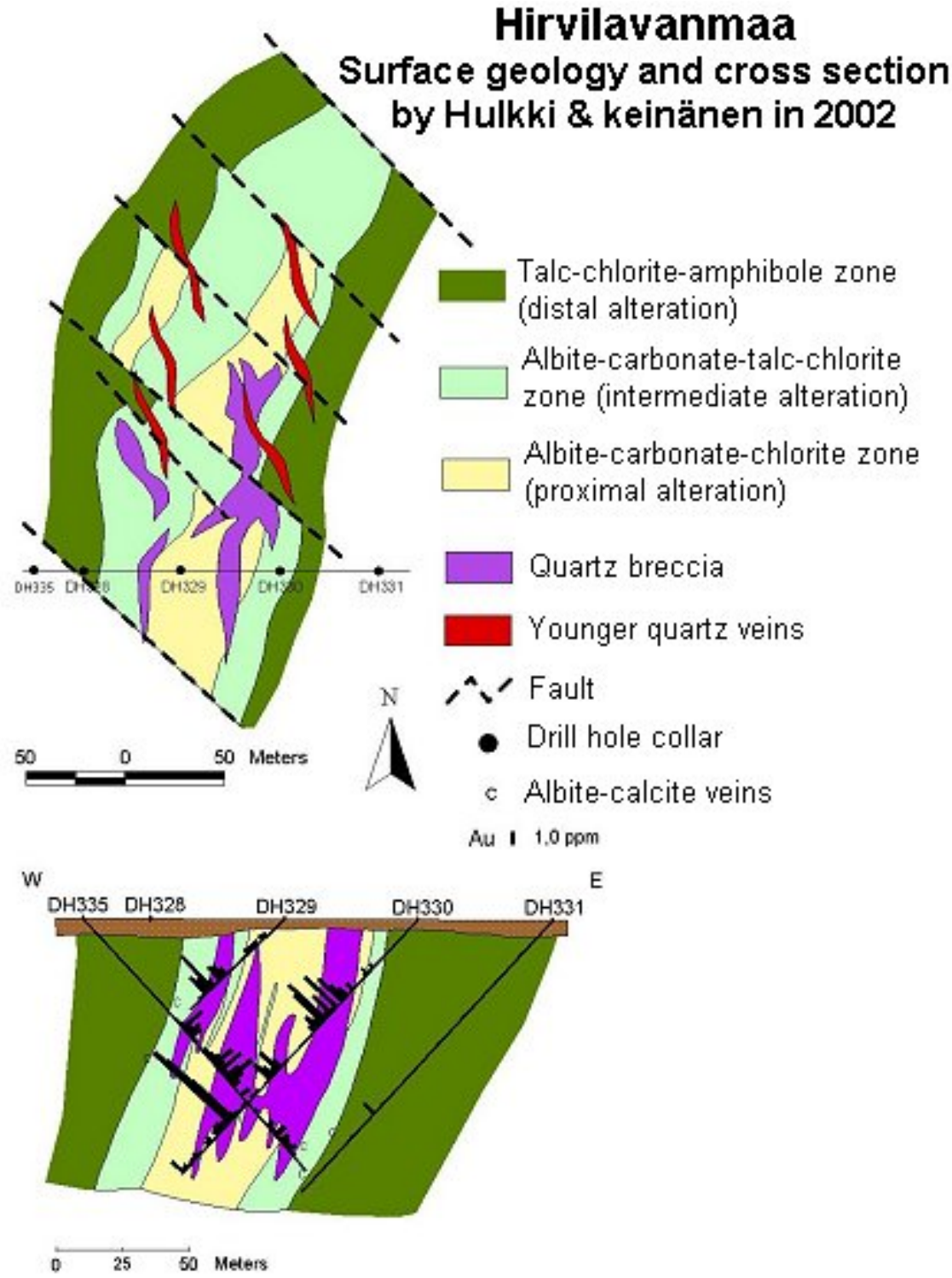


Proximal alteration in metakomatiite:

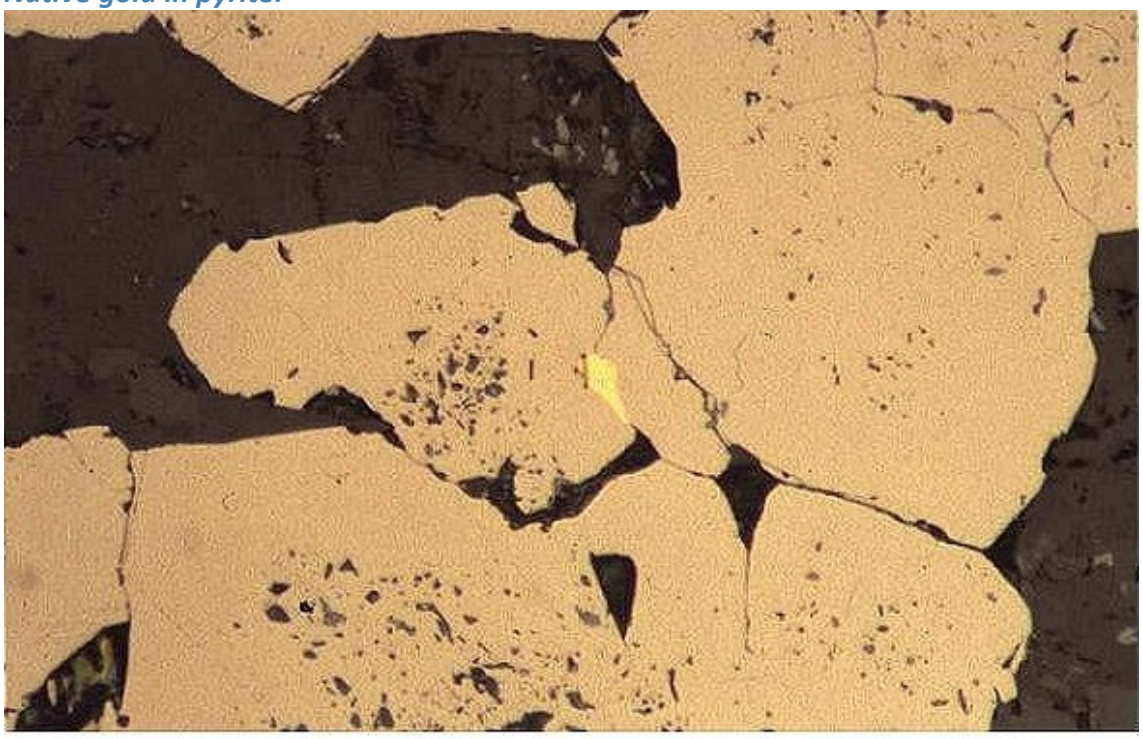


Proximal alteration in metakomatiite: mineral assemblage albite-ankerite-talc-chlorite-pyrite-quartz, Hirvilavanmaa, Kittilä. Field of view is 3.2 mm in width. (photo by P.Eilu 1998)

Local geology and a cross section of the alteration zone:

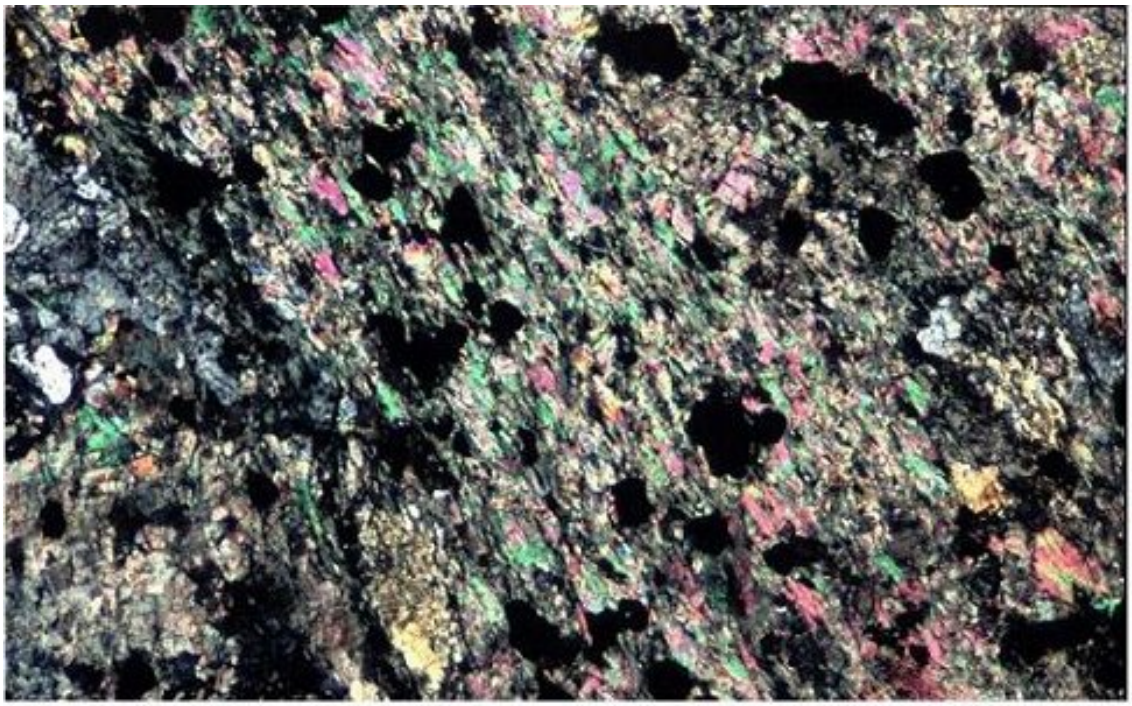


Native gold in pyrite:



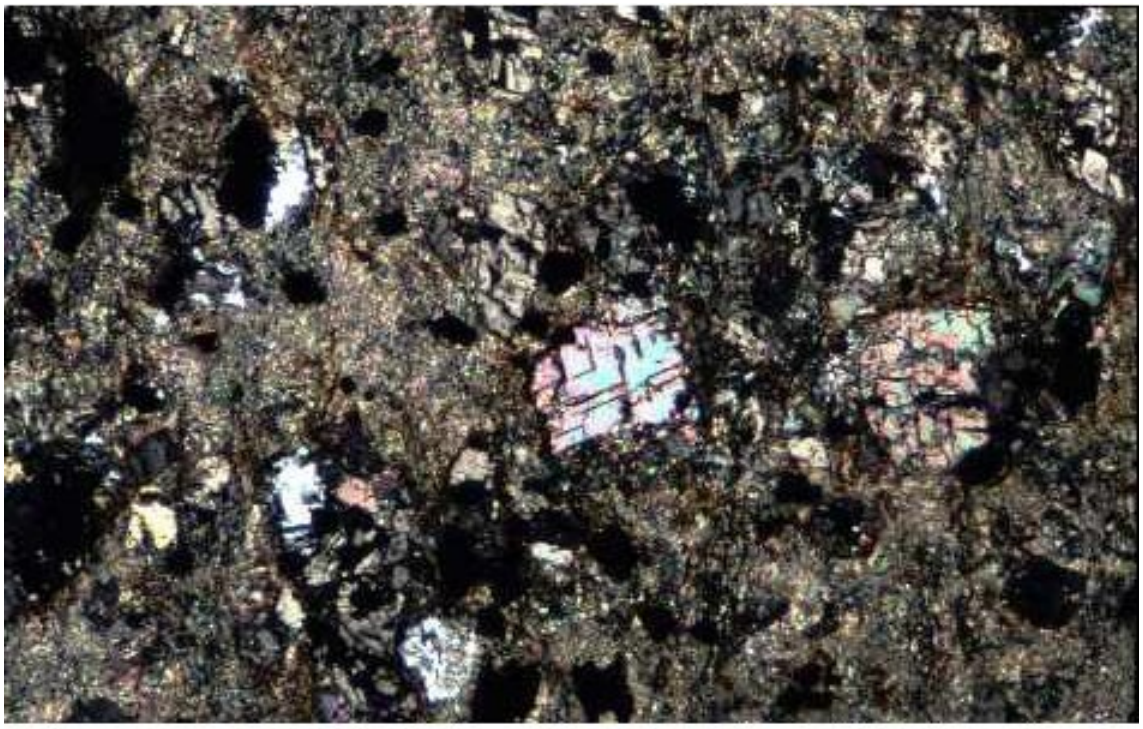
Proximal alteration and ore in metakomatiite: mineral assemblage native gold between pyrite grains, Hirvilavanmaa, Kittilä. Field of view 0.1 mm.
(photo by P.Eilu 1998)

Intermediate alteration in metakomatiite:



Intermediate alteration in metakomatiite: mineral assemblage talc-chlorite-dolomite-pyrite+/-albite, magnetite, Hirvilavanmaa, Kittilä.
Field of view 3.2 mm. (photo by P.Eilu 1998)

Distal alteration in metakomatiite:



Distal alteration in metakomatiite: mineral assemblage talc-chlorite-dolomite-magnetite, Hirvilavanmaa, Kittilä. Field of view 3.2 mm.
(photo by P.Eilu 1998)

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