

Konttiaho

Alternative Names: Mutka-Aho 8, Mehtikanansuo

Occurrence type: prospect

Commodity	Rank	Total measure	Total production	Total resource	Importance
gold	1	NA	NA	NA	NA
rare earth element	3	NA	NA	NA	NA
cobalt	3	NA	NA	NA	NA
uranium	3	NA	NA	NA	NA

Easting EUREF: 592831,042

Northing EUREF: 7341646,98

Easting YKJ: 3593041

Northing YKJ: 7344718

Discovery year: 1985

Discovered by: Geological Survey of Finland

Province: Kuusamo-Kuolajärvi (Co, Au)

District: Kuusamo (Co, Au)

Comments: Discovered by radiometric ground survey by GTK in an area of airborne magnetic anomaly; first indirect indications (1983) were an aeromagnetic anomaly and the occurrence of albite-rich rocks in the area

References: 3, 6, 8, 11

Mineral deposit type

Group: Metallogenic deposit

Main type: Orogenic (metamorphic hydrothermal)

Sub type 1: Au-Co-Cu

Comments: The auriferous fluids were transported along deep, rift-tectonic faults up to the greenschist-metamorphic environment, concentrated on the antiform; the metals precipitated in structurally controlled sites close to impermeable dolerites and metavolcanic units or in the more competent sericite quartzite units between the more plastic mafic units. The hydrothermal pipes were formed as replacement structures in low-stress locations.

References: 6, 7, 8, 9, 10, 12, 15

Dimension

Expression: exposed

Area (ha): 50

Form: discordant

Dip azim: NA

Shape: cylindrical

Dip: 80

Length (m): NA

Plunge azim: NA

Width (m): NA

Plunge dip: NA

Thickness (m): NA

Orientation method: NA

Depth (m): NA

Dimension comments: The mineralised domain, an area of 0.5 km² is in a NNE-trending shear zone which may follow the strike of the Hyväniemi-Maaninkavaara Anticline. In local scale, the hydrothermal pipes seem to be in fold hinges, in small antiforms. A few thousands of tonnes ore in the largest known, pipe-formed, ore body, however, drilled only to the depth of a few tens of metres

Holder history

Current holder: EMX Finland Oy

Years: 2022-2024

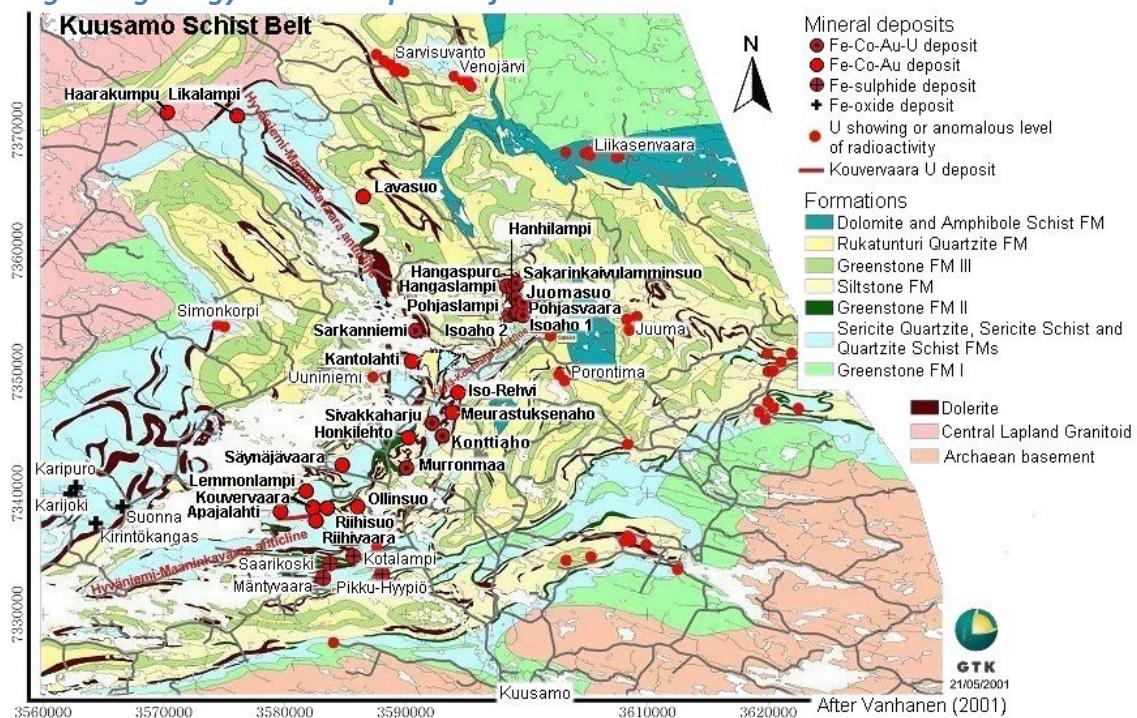
Holding type: Reservation

Previous holders:

Company	Years	Holding type	Comments
Latitude 66 Cobalt Oy	2018	Application for exploration permit	NA
Kuusamo Gold Oy	2015-2018	Exploration permit	application for exploration permit transferred from Dragon in 2015
Dragon Mining Oy	2014	Exploration permit	application for exploration permit
Polar Mining Oy	2003-2008	Claim (old law)	NA
Outokumpu Oy	1993-1998	Claim (old law)	NA
Geological Survey of Finland	1986-1990	Claim (old law)	NA

Figures

Regional geology and ore deposits of the Kuusamo area:



EXPLORATION ACTIVITY

Outokumpu Oy

Years	Activity type	Geologist	Exploration result	Ref
1994-1995	detailed geochemistry	R. Hugg, E. Ilvonen	NA	2
	<i>heavy mineral and till surveys</i>			

Geological Survey of Finland

Years	Activity type	Geologist	Exploration result	Ref
1989-1989	regional geochemistry	NA	geochemical anomaly	
	<i>Country-wide till-geochemical survey</i>			
1988-1989				
1988-1989	core drilling	Erkki Vanhanen	NA	13, 14
	<i>Core drilling (reconnaissance drilling): 12 diamond-drill holes, total 1101 m.</i>			
	Intersections			
	HoleID	R361		
	From-To	NA		
	Length	8m		
	gold	10ppm		
1985-1989	detailed geochemistry	Erkki Vanhanen	NA	1, 6, 7, 8, 9, 11, 13, 14, 15
1985-1990	detailed geology	Erkki Vanhanen	NA	1, 6, 7, 8, 9, 11, 13, 14, 15
	<i>Two pipes with a diameter of 5 and 15 m (major lodes) and two carbonate-vein related, minor lodes. In the ore: gain in As, Au, Ba, Bi, Ca, Co, CO₂, Cu, Fe, K, Mn, Mo, Pb, Rb, S, Se, Te, U, W, loss in Na, also LREE is mobilised, enriched during albitisation(?)</i>			
1985-1989	detailed geophysics	Erkki Vanhanen	NA	9, 13
	<i>Response on ground IP and radiometric methods, no direct response on airborne methods</i>			
1985-1989	excavation	Erkki Vanhanen	NA	1, 6, 7, 8, 9, 11, 13, 14, 15
	<i>21 trenches, in total 1440 m. Trench M1; 20 wide breccia pipe with 1-90 ppm Au +Mo (up to 0.23 % / 1.0 m), U and Co (200-1000 ppm). Trench M2; < 10 m wide breccia pipe with 1-12 ppm Au + Co (0.05-1.0 %) and As (up to 1 %)</i>			
1982-1982	regional geophysics	NA	key geological features	9, 13
	<i>Low-altitude airborne magnetic, electromagnetic and radiometric survey. First indirect indications were an aeromagnetic anomaly and the occurrence of albite-rich rocks in the area .</i>			

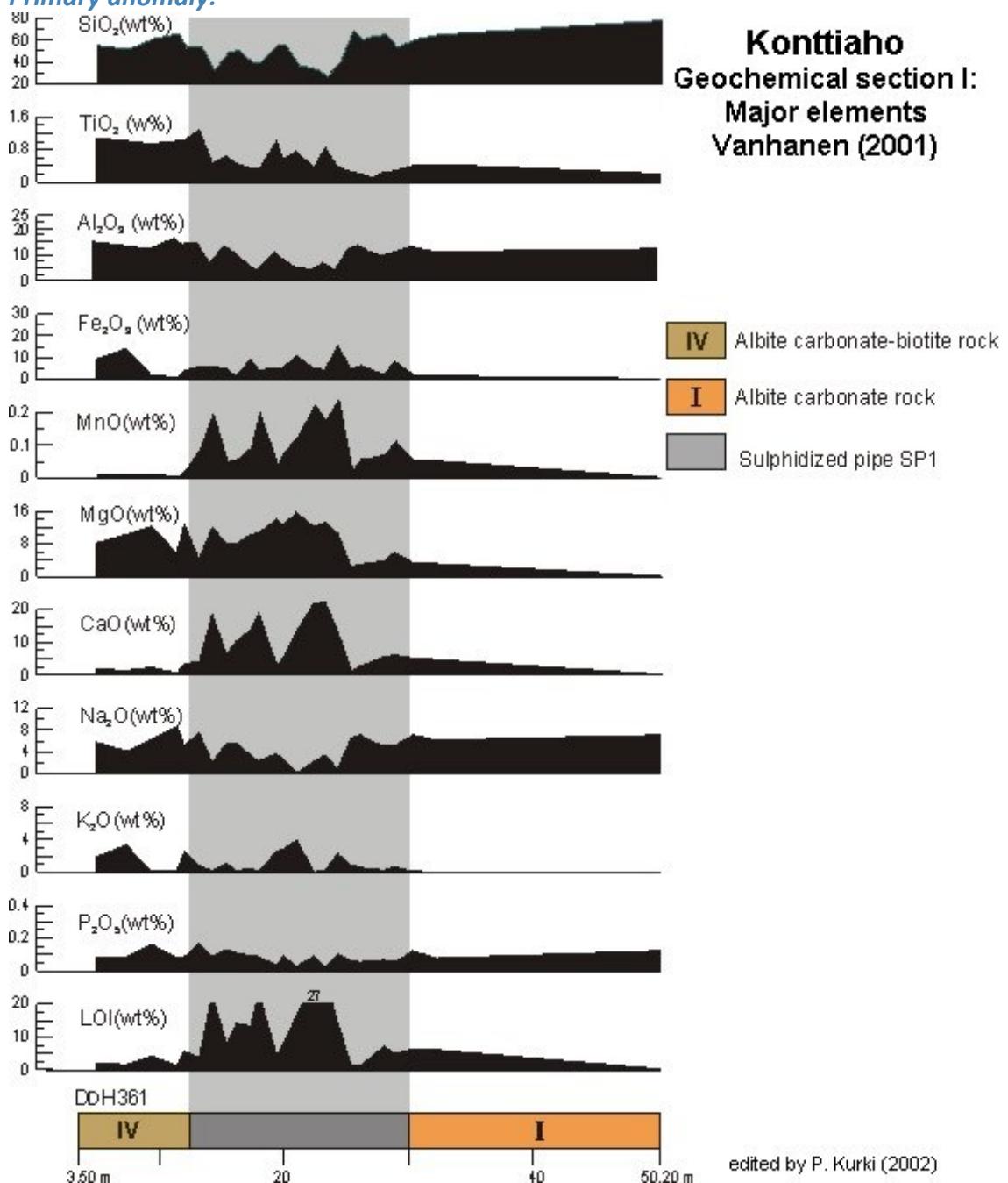
Figures

Main exploration trench at Konttiaho in 1998:

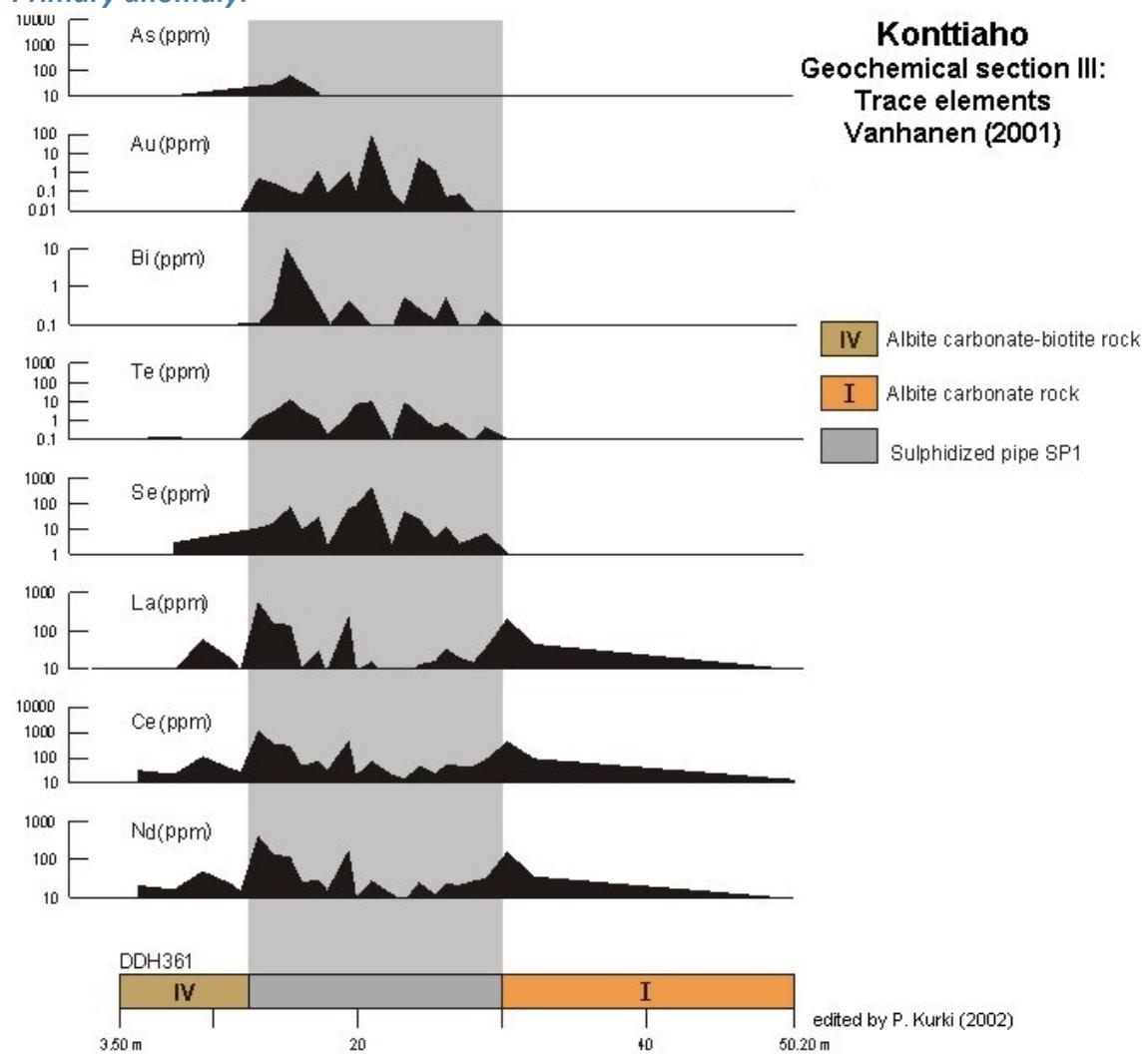


Konttiaho main trench. Exposure of one of the ore pipes. Photo Pasi Eilu 25/8/1998.

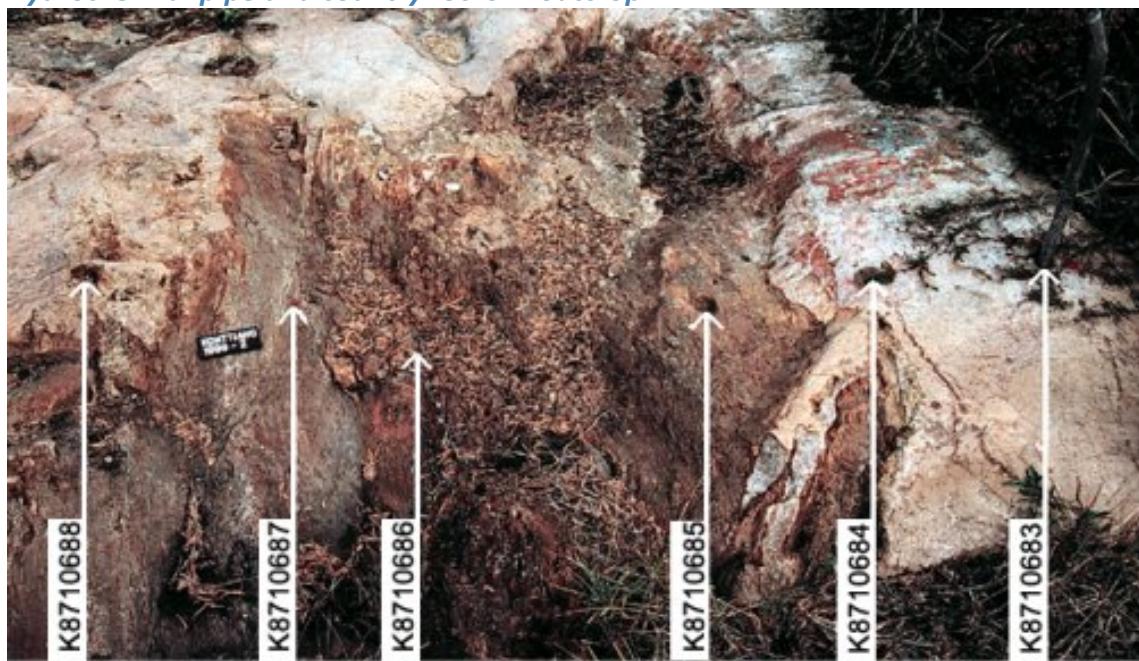
Primary anomaly:



Primary anomaly:



Hydrothermal pipe and country rocks in outcrop:

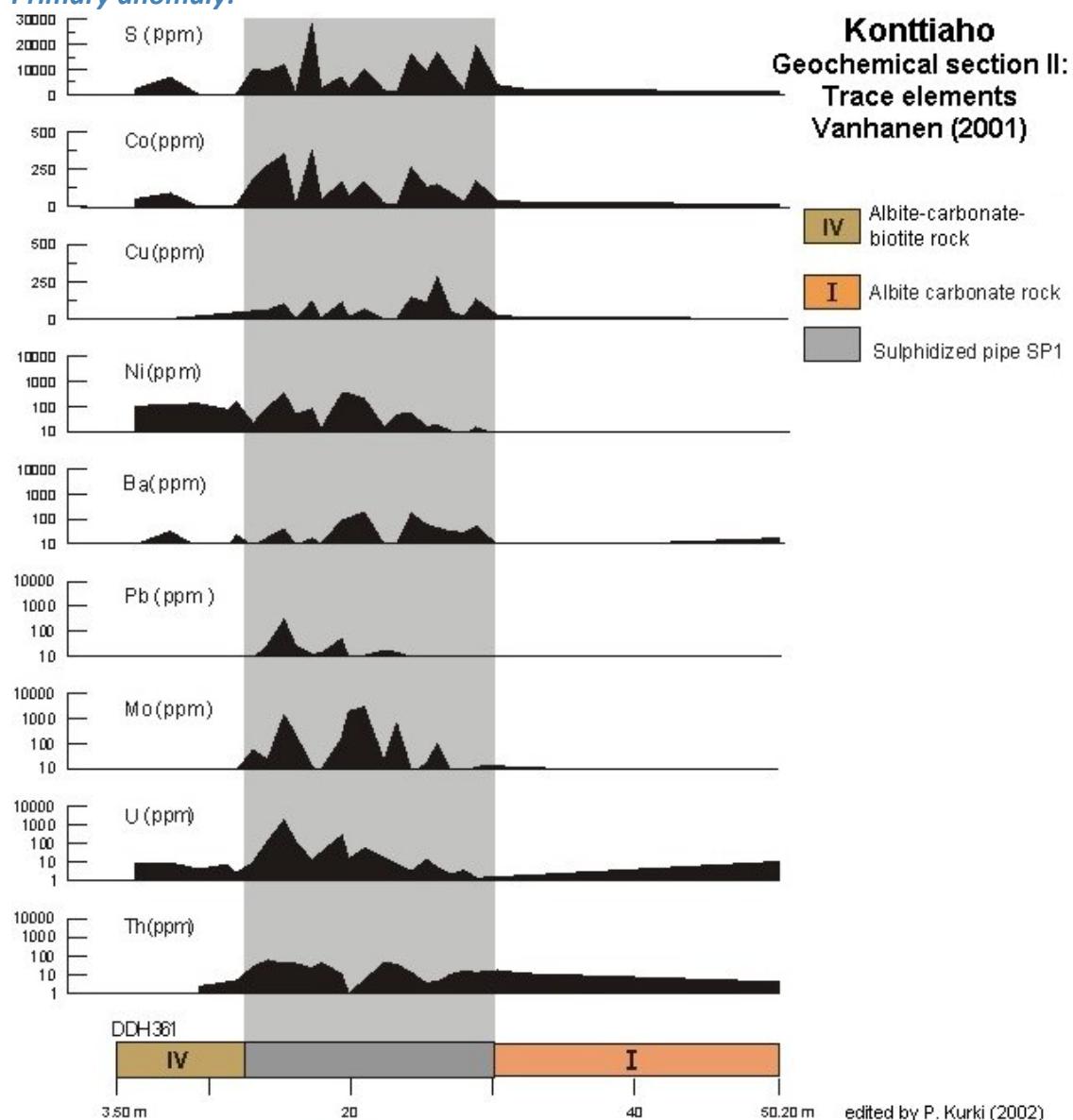


Sampling across a sulphide-poor hydrothermal pipe, Konttiaho, Kuusamo Schist Belt. Scale bar is 10 cm. Photo Reijo Lampela.

Trench:



Brecciated, totally albited metasedimentary rock (Albite rock II) at Konttiaho, Kuusamo Schist Belt. Fragment size 0.5-2 m. The hammer handle is 60 cm long. Photo Erkki Vanhanen.

Primary anomaly:

GEOLOGY

Host rock: Silicate-siltstone, Mafic volcanic rock, Dolerite

Silicate-siltstone (Host rock)

Rock type: Host rock

Proportion: major

Grain size: NA

Color: NA

References: 5, 6, 7, 8, 9, 11, 12, 13, 14, 15

Ore minerals:

Mineral	Proportion	Mineral texture
Altaite	minor	
Calaverite	minor	
Chalcopyrite	minor	
Cobaltite	minor	
Cobaltpentlandite	minor	
Galena	minor	
Gold	present	<i>Native gold occurs at quartz, biotite and carbonate grain boundaries, as inclusions in pyrite and uraninite, associated with tellurides; most of gold grains are >10 microns in diameter, and the size is up to 3 mm.</i>
Molybdenite	minor	
Pyrite	major	
Pyrrhotite	major	
Rutile	minor	
Scheelite	present	
Telluride	minor	
Tellurobismuthite	minor	
Uraninite	minor	

Other minerals:

Mineral	Proportion	Mineral texture
Albite	present	
Allanite	present	
Ankerite	present	
Biotite	present	
Dolomite	present	
Quartz	present	
Tourmaline	present	

Structures

Breccia

Comments: Multiply brecciated host rock. Most probably hydrothermal breccia

Alteration:	Distribution:	Degree:	Relation to mineralization:
albitic alteration	Pervasive	Total	Pre
<i>Comments: Pervasive alteration produced the assemblage Albite-biotite-sericite-quartz-carbonate-sulphides-rutile</i>			

sericitic alteration	NA	NA	Pre
<i>Comments: Diagenetic sericitisation of clay minerals</i>			
carbonate alteration	Disseminated	Moderate	Pre
<i>Comments: Albitisation+carbonation+chloritisation predate gold mineralisation</i>			
chloritic alteration	NA	NA	Pre
<i>Comments: Albitisation+carbonation+chloritisation predate gold mineralisation</i>			
silification	NA	NA	Syn
sulphidation	NA	NA	Syn
<i>Comments: Gold-related carbonation+biotitisation+sericitisation+sulphidation</i>			
carbonate alteration	NA	NA	Syn
<i>Comments: Gold-related carbonation+biotitisation+sericitisation+sulphidation</i>			
sericitic alteration	NA	NA	Syn
<i>Comments: Gold-related carbonation+biotitisation+sericitisation+sulphidation</i>			
biotite alteration	NA	NA	Syn
<i>Comments: Gold-related carbonation+biotitisation+sericitisation+sulphidation</i>			

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		

Geological age:

Geological era:	Max age - Min age (Ma):	Inferred age (Ma):	Age of mineralization:
Paleoproterozoic (2500-1600 Ma)	1800-2050		Y
<i>Comments: Mineralisation between 2.05-1.8 Ga; Is mineralisation synchronous with the later stages of Svecfennian deformation?</i>			

Mafic volcanic rock (Host rock)

Rock type: Host rock

Proportion: minor

Grain size: NA

Color: NA

References: 5, 6, 9, 13, 15

Alteration:	Distribution:	Degree:	Relation to mineralization:
spilitisation	NA	NA	Pre
<i>Comments: Spilitisation of volcanic units when the 2.206 Ga mafic sills and dykes heated the evaporite-bearing sequence and put hot brines into circulation</i>			

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		

Dolerite (Host rock)

Rock type: Host rock

Proportion: minor

Grain size: NA

Color: NA

References: 5, 6, 9, 13, 15

Comments: The differentiated, 2050 Ma (?), carbonated dolerites clearly predate gold mineralisation.

Alteration:	Distribution:	Degree:	Relation to mineralization:
carbonate alteration	Disseminated	Moderate	NA
albitic alteration	Pervasive	Strong	NA

Comments: Proximal alteration produced the assemblage albite-paragonite-carbonate-rutile

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: Albite-actinolitic hornblende-epidote-opaques ± titanite, quartz.

Figures

Outcrop photo:



A sharp contact between Albite rock I (above) and Albite rock III (below) at Konttiaho, Kuusamo Schist Belt. Cross bedding and load casts indicate that the top is up in the figure. Diameter of the lens cap is 5 cm. Photo Heikki Pankka.

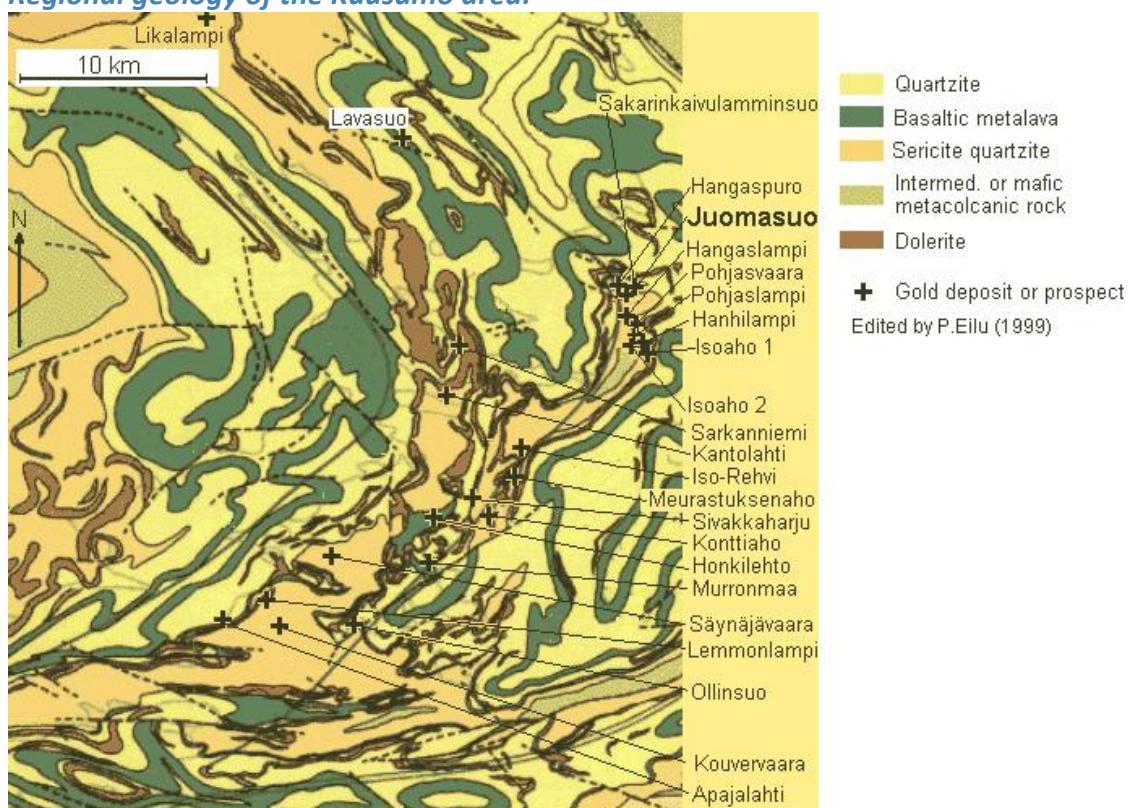
Outcrop photo:



Large angular fragments in a carbonate matrix, Konttiaho deposit, Kuusamo.
Primary bedding is visible in the albite fragments. The dark fragments are stained by a hematite pigment. Brecciation is younger than the peak metamorphism.

The length of the note book is 18 cm. (from Pankka et al. 1991)

Regional geology of the Kuusamo area:



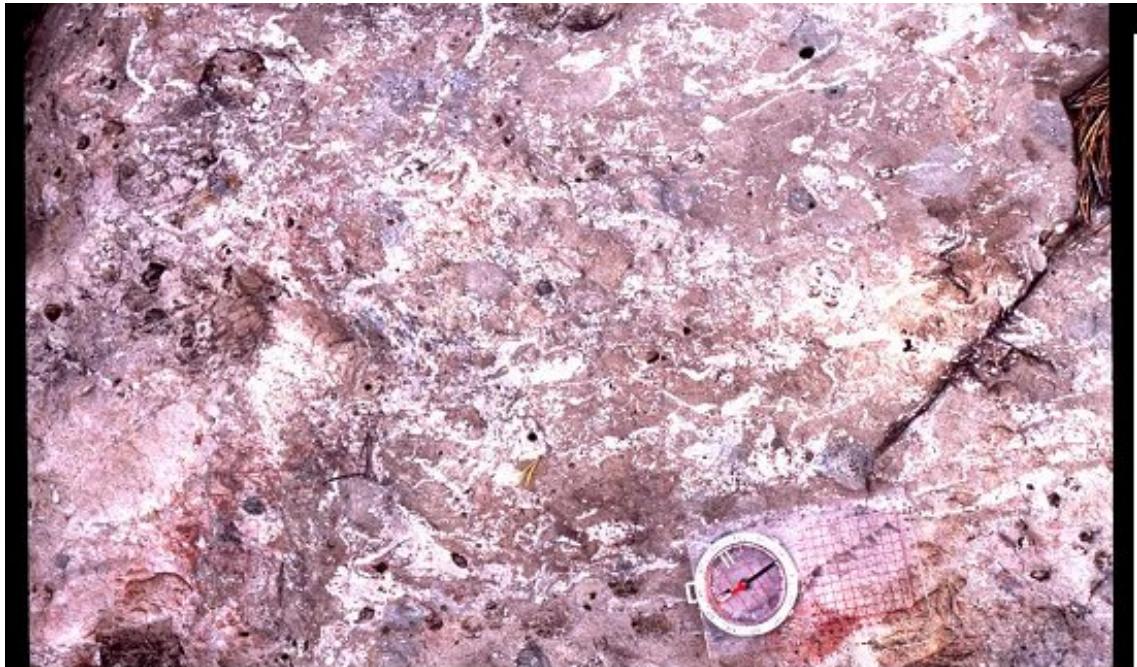
Deposits and prospects in the Kuusamo Schist Belt. Geology from Silvennoinen (1992).
Solid and dashed, curved lines indicate boundaries between lithological units, faults and shear zones

Structure:



Brecciated and albitised host rock, tuffite or metasiltstone at Konttiaho. The brown, 1-2 cm wide lines are rusted scratch marks caused by the bucket of an excavator. The compass plate is 11 cm long. Photo Pasi Eilu 25/8/1998.

Brecciated and intensely albitised sedimentary rock in outcrop:



Brecciated and intensely albitised host rock at Konttiaho. The compass plate is 11 cm long. Photo Pasi Eilu 25/8/1998.

Brecciated and intensely albitised quartzite rock in outcrop:



Large fragments of brecciated and albitised quartzite at Konttiaho, Kuusamo Schist Belt. The hammer handle is 60 cm long. Photo Heikki Pankka.

Brecciated and intensely albited sedimentary rock in outcrop:



Albite breccia, Konttiaho deposit, Kuusamo. Albite rock fragments in a chlorite- and sericite-rich matrix. The youngest albite-quartz-carbonate veins cut the breccia. Diameter of the scale is 5 cm.

(from Pankka et al. 1991)

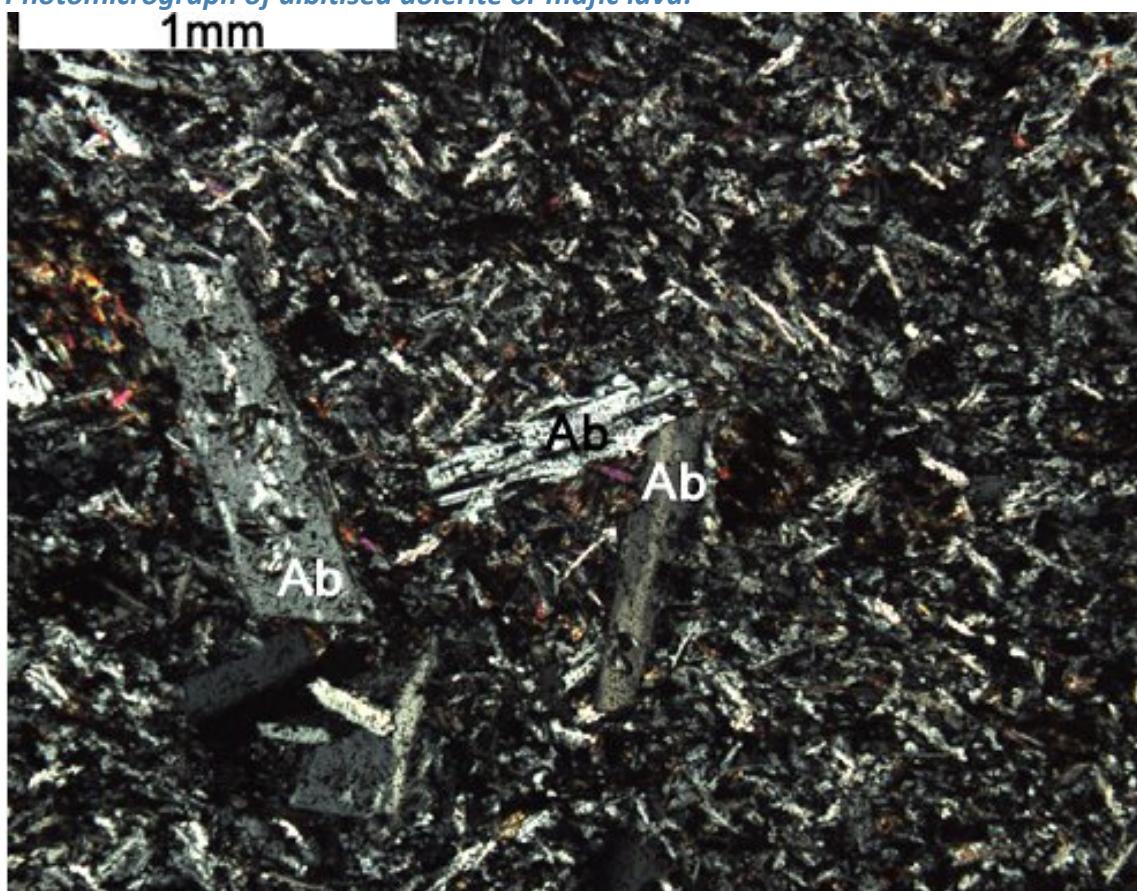
Intensely albited, layered sedimentary rock in outcrop:



Primary bedding in totally albited metasedimentary rock (Albite rock II) at Konttiaho, Kuusamo Schist Belt. The dark beds are stained by haematite and the brown beds by rutile. The small pits throughout the rock are ferrodolomite porphyroblasts. Text bar is 10 cm long.

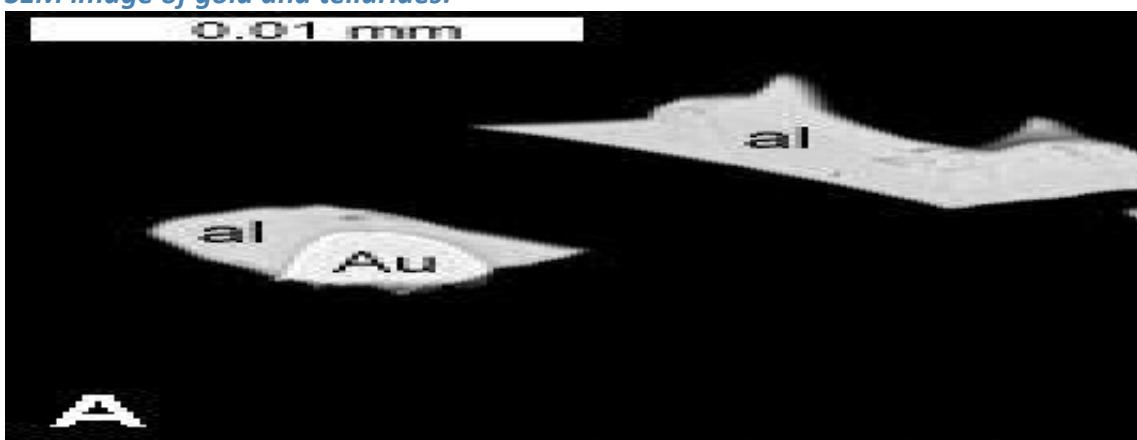
Photo Erkki Vanhanen.

Photomicrograph of albited dolerite or mafic lava:



Albite rock IV. Note the distinct volcanic texture. Corroded albite phenocrysts in albite-dominated ground mass. Red and orange are talc. Konttiaho, Kuusamo Schist Belt. Crossed polarisers. Photo Erkki Vanhanen.

SEM image of gold and tellurides:



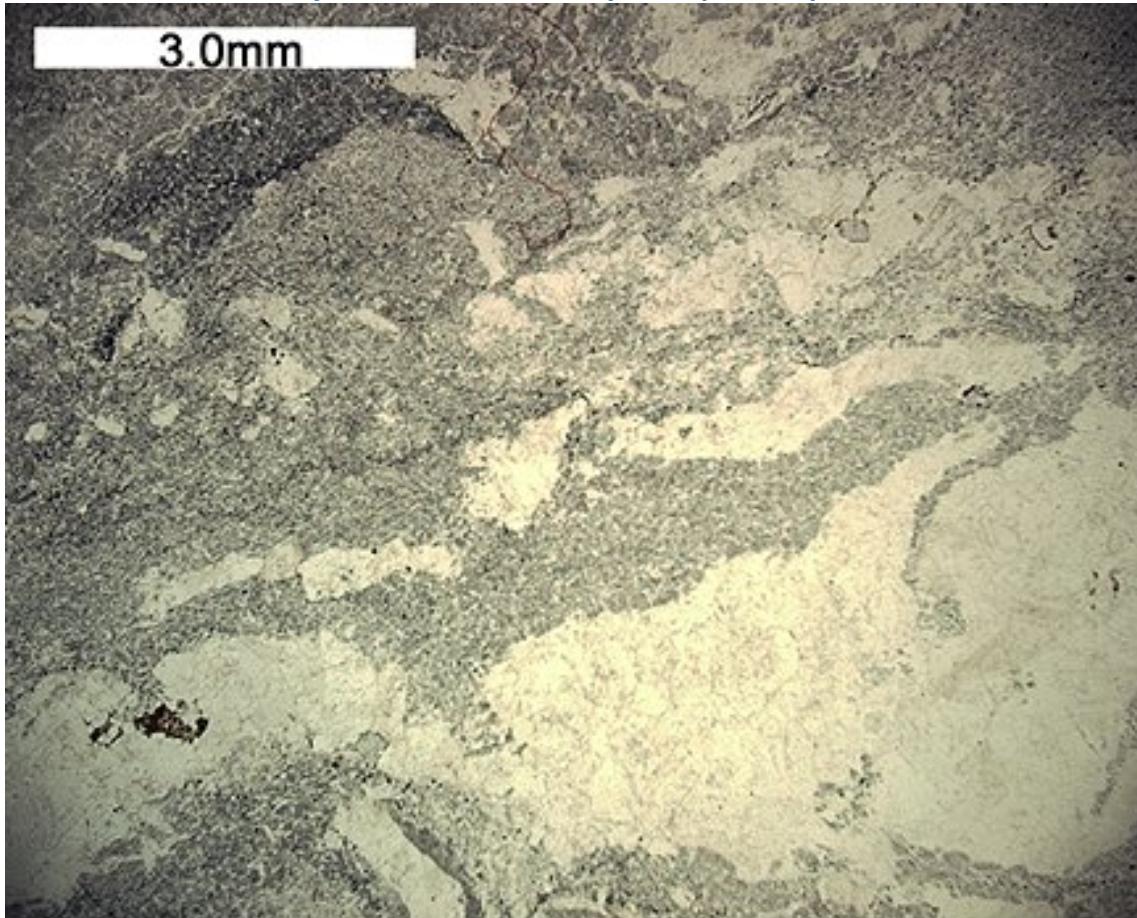
A. Intergrowths of gold (Au)
B. Intergrowths of gold (Au)
Back scatter images from

Brecciated and intensely albitised, layered sedimentary rock in outcrop:



Albite veins cut across brecciated albitised metasedimentary rock at Konttiaho, Kuusamo Schist Belt. Note the faint primary bedding. The text bar is 10 cm long. Photo Reijo Lampela.

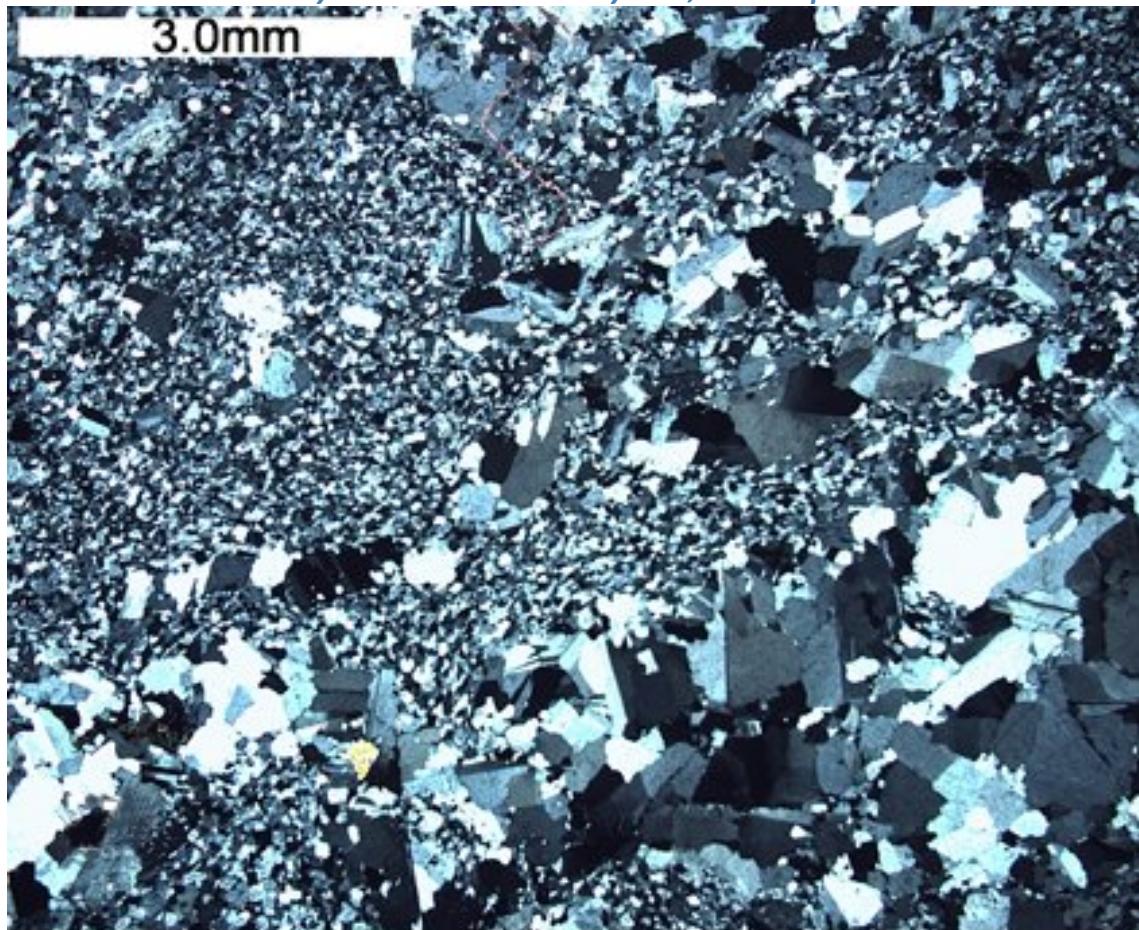
Brecciated and intensely albitised sedimentary rock, parallel polarisers:



Brecciated, totally albitised metasedimentary rock at Konttiaho, Kuusamo Schist Belt. Parallel polarisers.

Photo Erkki Vanhanen.

Brecciated and intensely albitised sedimentary rock, crossed polarisers:



Brecciated, totally albitised metasedimentary rock at Konttiaho, Kuusamo Schist Belt. Crossed polarisers.

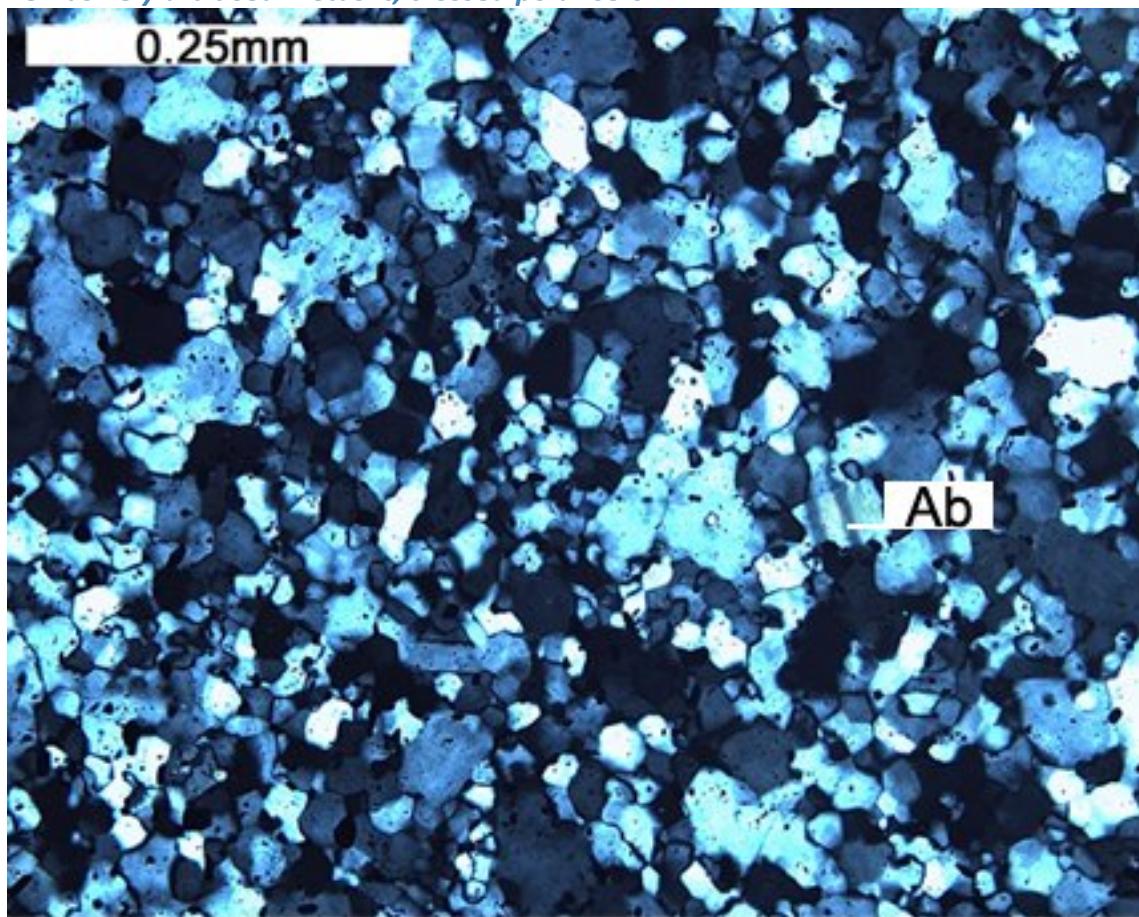
Photo Erkki Vanhanen.

Pervasively albited metasilt with dolomite porphyroblasts:



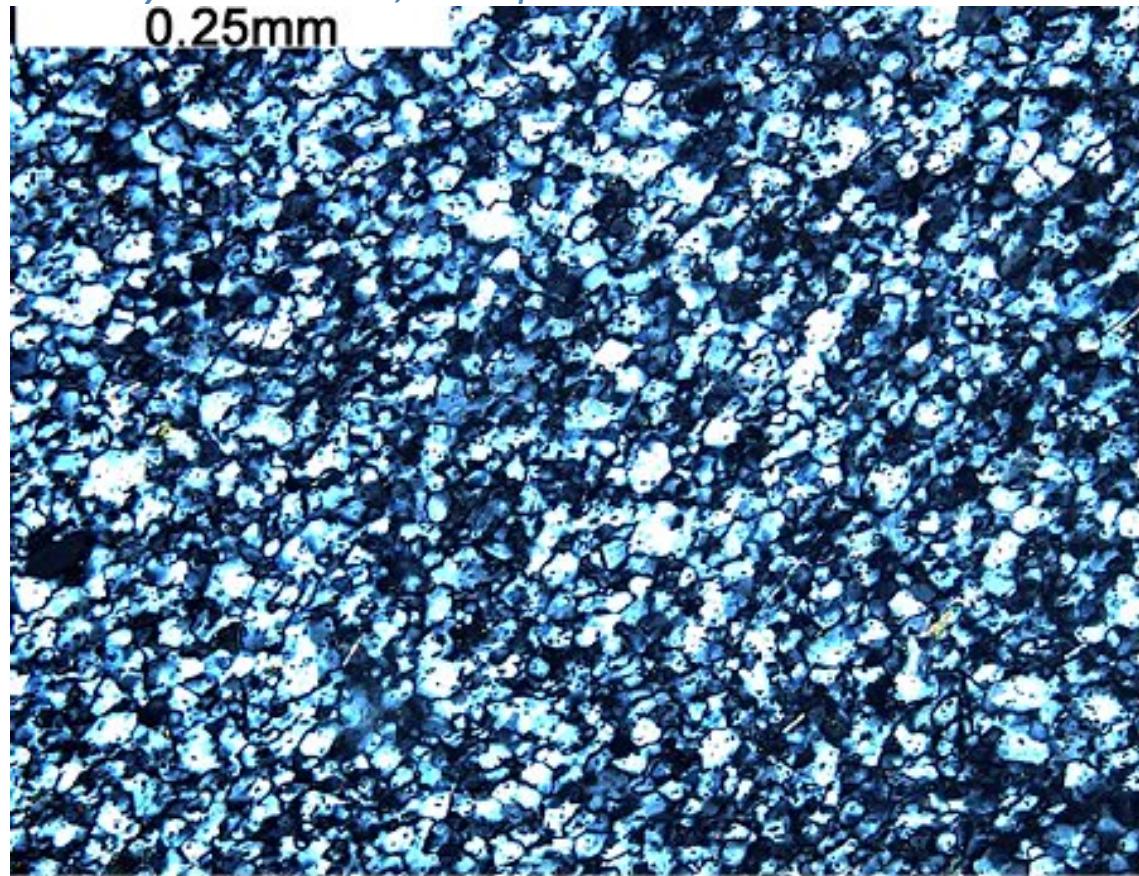
Totally albited metasedimentary rock (Albite rock III) at Konttiaho, Kuusamo Schist Belt.
Large dolomite porphyroblasts in albite matrix. Scale bar is 10 cm. Photo Reijo Lampela.

Pervasively albited metasilt, crossed polarisers:



Totally albited metasedimentary rock (Albite rock II) at Konttiaho,
Kuusamo Schist Belt. Ab = albite. Crossed polarisers.
Photo Erkki Vanhanen.

Pervasively albited metasilt, crossed polarisers:

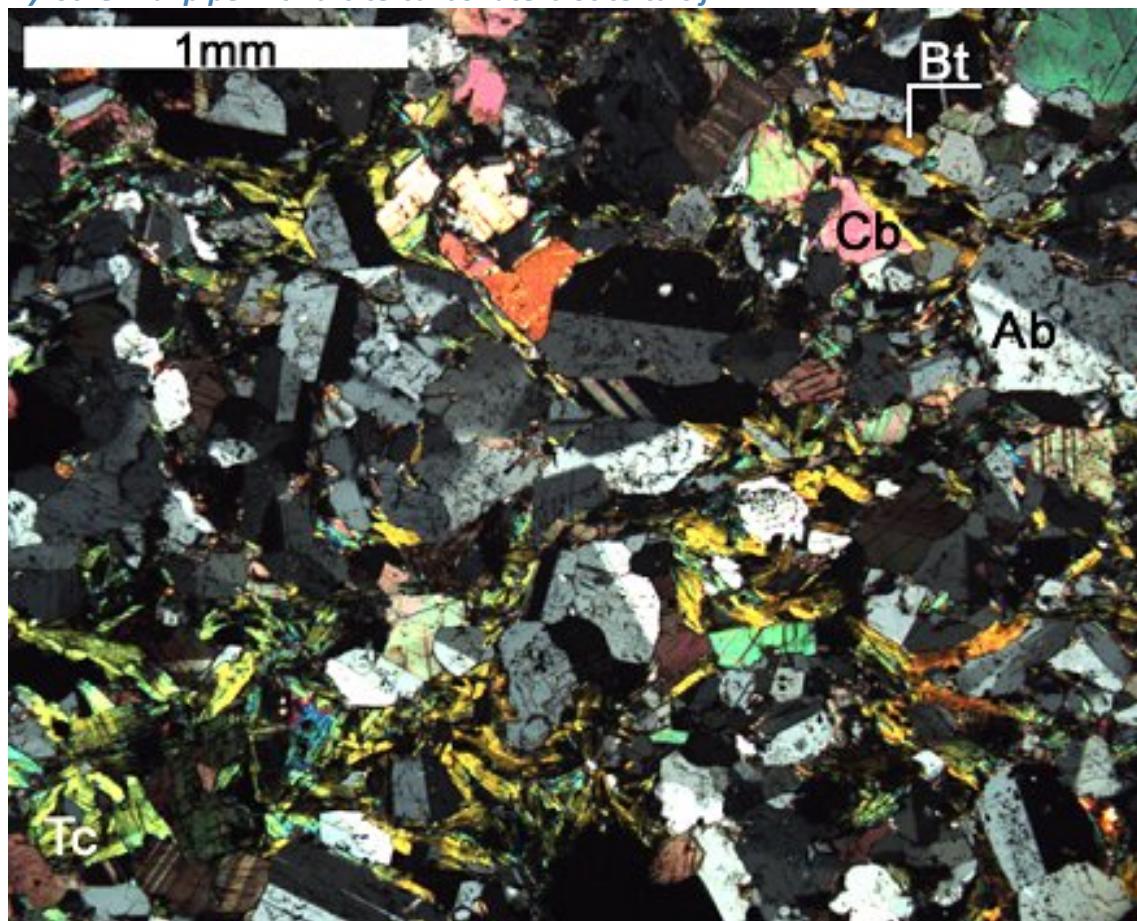


The granoblastic Albite rock III only comprising albite and rutile.

Konttiaho, Kuusamo Schist Belt. Crossed polarisers.

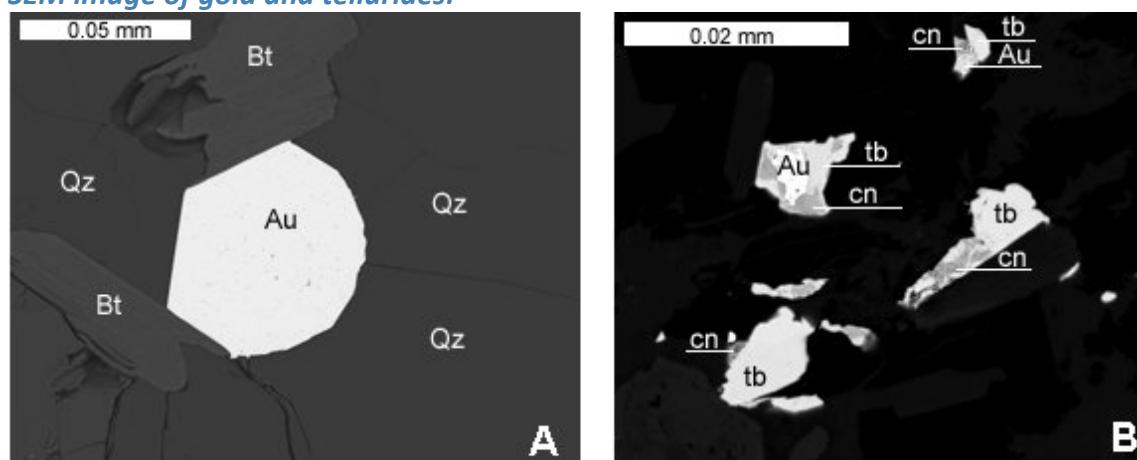
Photo Erkki Vanhanen.

Hydrothermal pipe with albite-carbonate-biotite-talc fill:



Sulphide-poor hydrothermal pipe at Konttiaho, Kuusamo Schist Belt. Ab = albite, Bt = biotite, Cb = carbonate, Tc = talc.
Crossed polarisers. Photo Erkki Vanhanen.

SEM image of gold and tellurides:



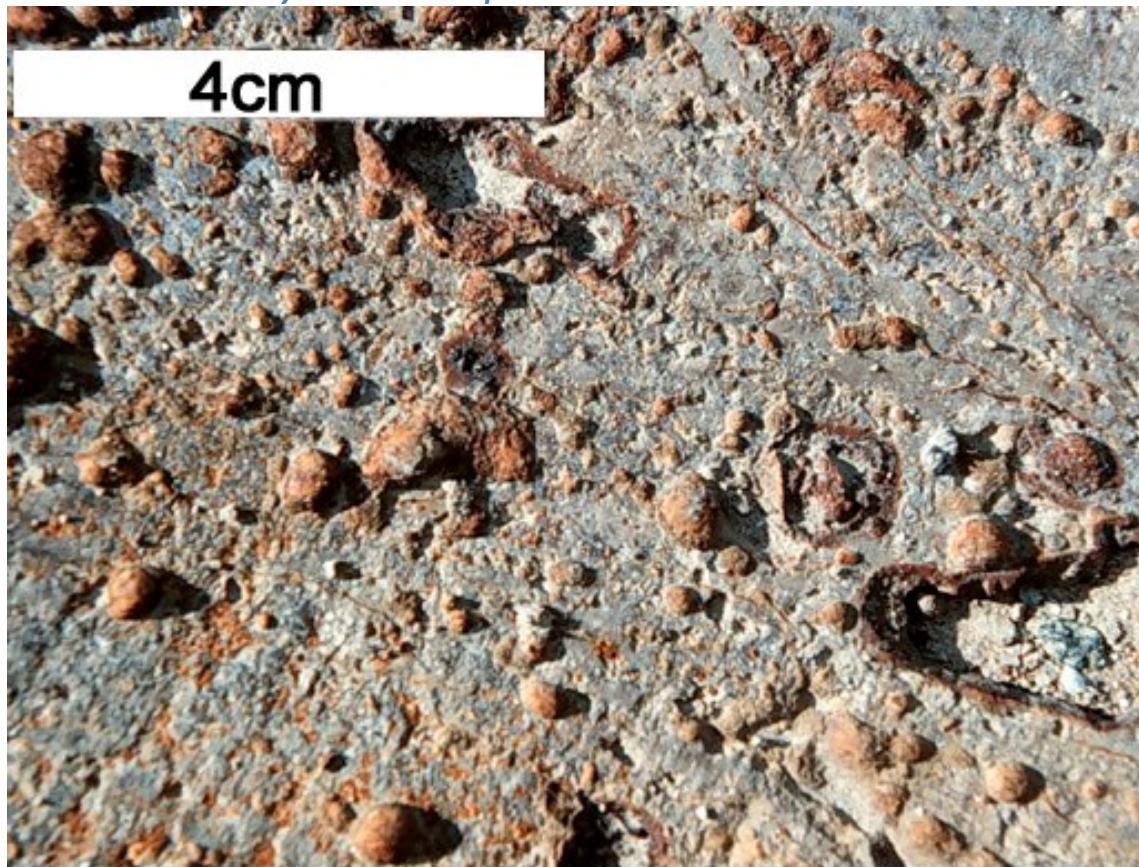
A. Partly euhedral gold between quartz and biotite.
B. Intergrowths of gold (Au), tellurobismuthite (tb) and a Co-Ni telluride (tb).
Back scatter images from Konttiaho by Erkki Vanhanen.

Small hydrothermal pipe in outcrop:



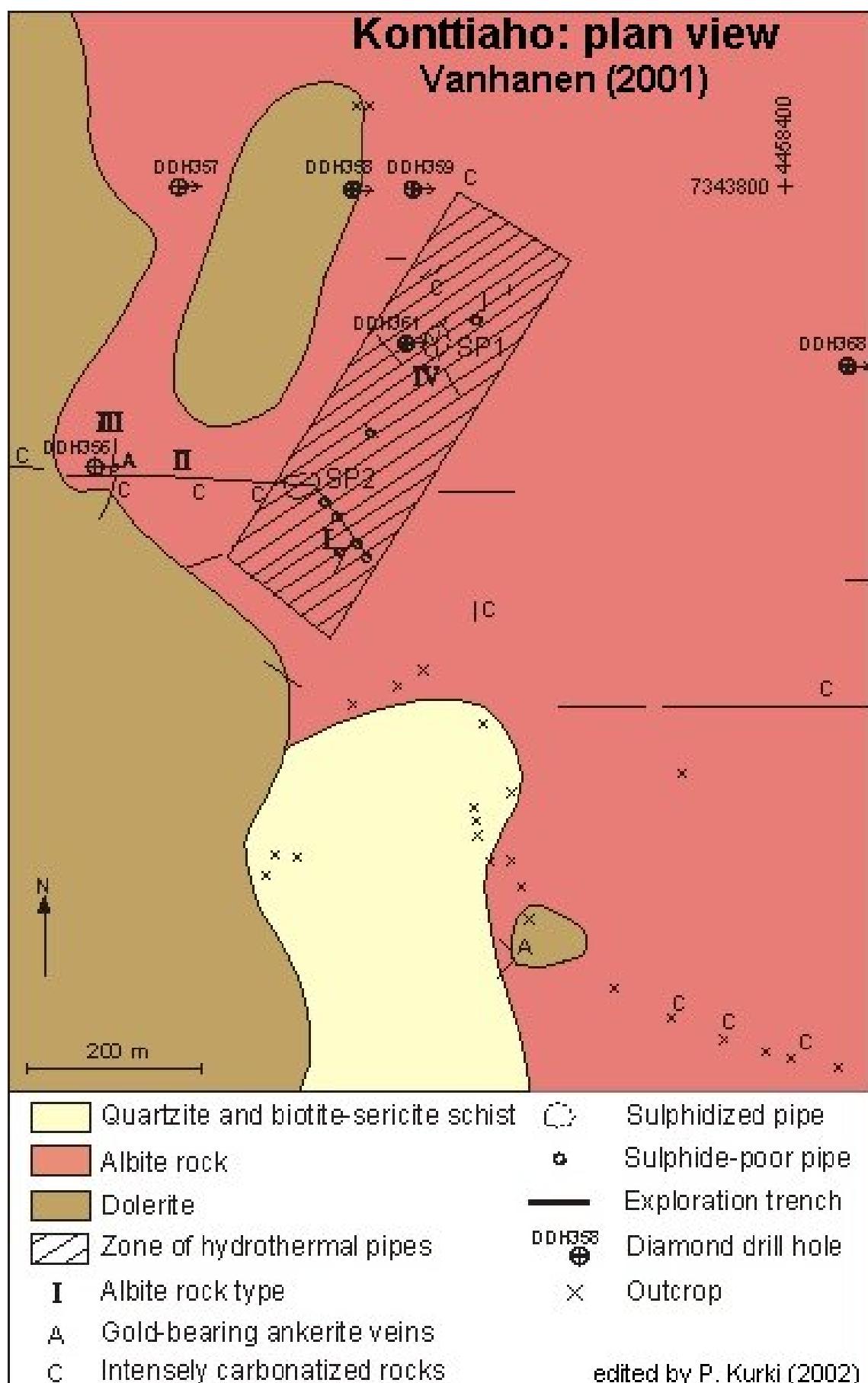
Part of a sulphide-poor hydrothermal pipe at Konttiaho, Kuusamo Schist Belt.
Note the white fragments of albite rock inside the pipe. Scale bar 10 cm. Photo Reijo Lampela.

Albitised sedimentary rock in outcrop:



Limonite encrustation on the surface of Albite rock I at Konttiaho. One year of exposure to air. Photo Reijo Lampela.

Plan view:



Intensely albitised sericite quartzite with a pervasive (but weak) haematite dissemination; hence the red colour. Sample size 3 x 6 x 7 cm. Photo reijo Lampela, GTK:



Sample from the largest pipe. Chiefly quartz-albite-carbonate brecciafill. The host rock fragments probably are intensely altered dolerite with mineral assemblage ab - para - carb

- py - rut - chlor. Photo Reijo Lampela, GTK:



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