DANMARKS OG GRØNLANDS GEOLOGISKE UNDERSØGELSE RAPPORT 1997/53

The Kangerluluk gold prospect

Shear zone hosted gold mineralization in the Kangerluluk area, South-East Greenland

Henrik Stendal

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Contents

Introduction

This report stems from the Geological Survey of Denmark and Greenland's SUPRASYD Project which was initiated in 1992 aimed at an econmic assessment of the Ketilidian orogen of South Greenland. Special focus was on the supracrustal rocks in the southern and eastern part of the orogen.

Previous reconnaissance exploration work and regional stream sediment geochemistry along the south-east coast of Greenland (Steenfelt *et al.*, 1992; Swager *et al.*, 1995) indicated, that areas of mafic volcanic and intrusive rocks could host interesting mineralization. Part of the 1996 field work was therefore dedicated to a more detailed investigation of several mafic volcanic areas of which the Kangerluluk area is one. It should, however, be noted that the Kangerluluk supracrustal sequence was not covered by stream sediment samples.

This report is a brief presentation of the field work and analyses of mineralized samples from the Kangerluluk area. Included also are a few hydrothermal altered localities from the neighbouring Julianehåb batholith. These localities are included because gold-bearing shear zones in the Julianehåb batholith are known from the Niaqornaarsuk peninsula on the south-west coast of Greenland (Stendal *et al.*, 1995).

This report is based on two weeks field work in August 1996 that included short helicopter stops at the batholith localities. The Kangerluluk gold prospect is centered around 61^0 05' 50" N and 43^0 11' 30" W(Fig. 1). The area is underlain by a Palaeoproterozoic (c. 1800 Ma) flat-lying mafic volcano-sedimentary sequence located at the southern margin of the Julianehåb batholith. The supracrustal area is approximately 4 km^2, however, only 1000 x 750 m^2 has been mapped at 1:2000 and compiled at 1:5000. The mapping is based on a grid established by using compass and tape. Only three days were used in sampling and describing the hydrothermal system.

All mineralised samples were analysed by neutron activation (INAA). Samples returning more than 100 ppb gold were re-analysed by fire assay (FA). Some of the fire assay's were doublicated. The gold values referred to in the text are the INAA analyses. Sample localities are shown on Fig. 4, however, samples from the Julianehåb batholith is shown in Fig. 2.

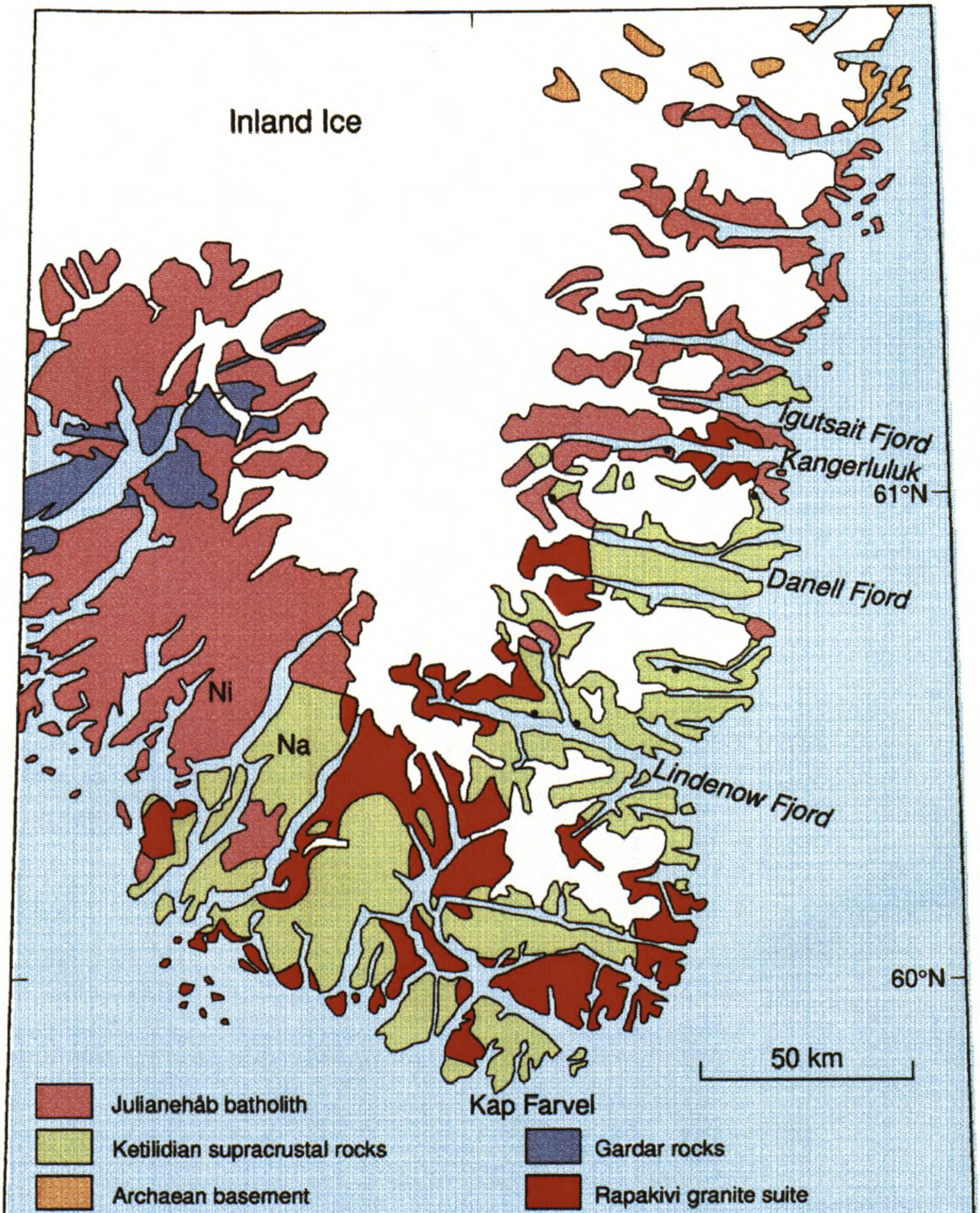

Figure 1. Simplified *geological map of South Greenland. Modified after Tukiainen & Thorning (1995).*

Geology

The Ketilidian orogenic belt of southern Greenland comprises of the calc-alkaline Julianehåb batholith and supracrustal rocks intuded by Rapakivi granite (Kalsbeek *et al.,* 1990). The Julianehåb batholith covers c. 30.000 km^2 of polyphase granitoids of mainly granodioritic composition with a clear volcanic arc affinity and with an age range from 1850 to 1800 Ma (Chadwick *et al.*, 1994a,b, 1995; Chadwick & Garde, 1996; Hamilton *et al.,* 1996).

The supracrustal rocks south of the Julianehåb batholith on the south-east coast consist of a sequence of high grade, migmatitic psammite, pelite and subordinate mafic volcanic rocks, which have been mapped on a regional scale (Garde *et al.,* in press). Previous reconnaissance exploration work in the region has shown that lode gold mineralization is hosted by mafic rocks (amphibolites and greenstones). Additionally, gold is spatially related to shear zones in the Julianehåb batholith. During the field work in 1996 special attention was therefore focused on these favourable sites for gold in the coastal areas of South-East Greenland (Stendal *et al.,* in press). Mafic-dominated volcanic and volcaniclastic rocks are located at Illukulik, Stendalen, Kutseq, Sorte Nunatak, Kangerluk and Kangerluluk (Fig. 2). This report will primarily deals with the supracrustal rocks of the Kangerluluk area.

Kangerluluk

The volcano-sedimentary sequence on the south side of Kangerluluk is a complex sequence of phenocryst-rich lava flows, stream to shallow water sediments, and pyroclastic deposits. The supracrustal area is approximately 4 km^2, but only 1000 x 750 m^2 has been mapped. The 200-300 m thick, flat-lying volcano-sedimentary succession is characterized by different facies and a mafic sill and dyke complex (Fig. 3). The supracrustal succession consists of a conglomerate-sandstone deposit, a pyroclastic deposit, a mafic volcanic flow deposit and a peperitic deposit. The sequence is intruded by a mafic sill - dyke complex.

Shear and fault zones

Three main episodes of shearing/faulting have been recognized in the area: (1) a complex pattern of décollement folds and shears; (2) a pronounced 60^0 striking set of faults which cut the décollement phase; and (3) a prominent set of north-easterly striking shear zones post-dating the 60^0 striking set.

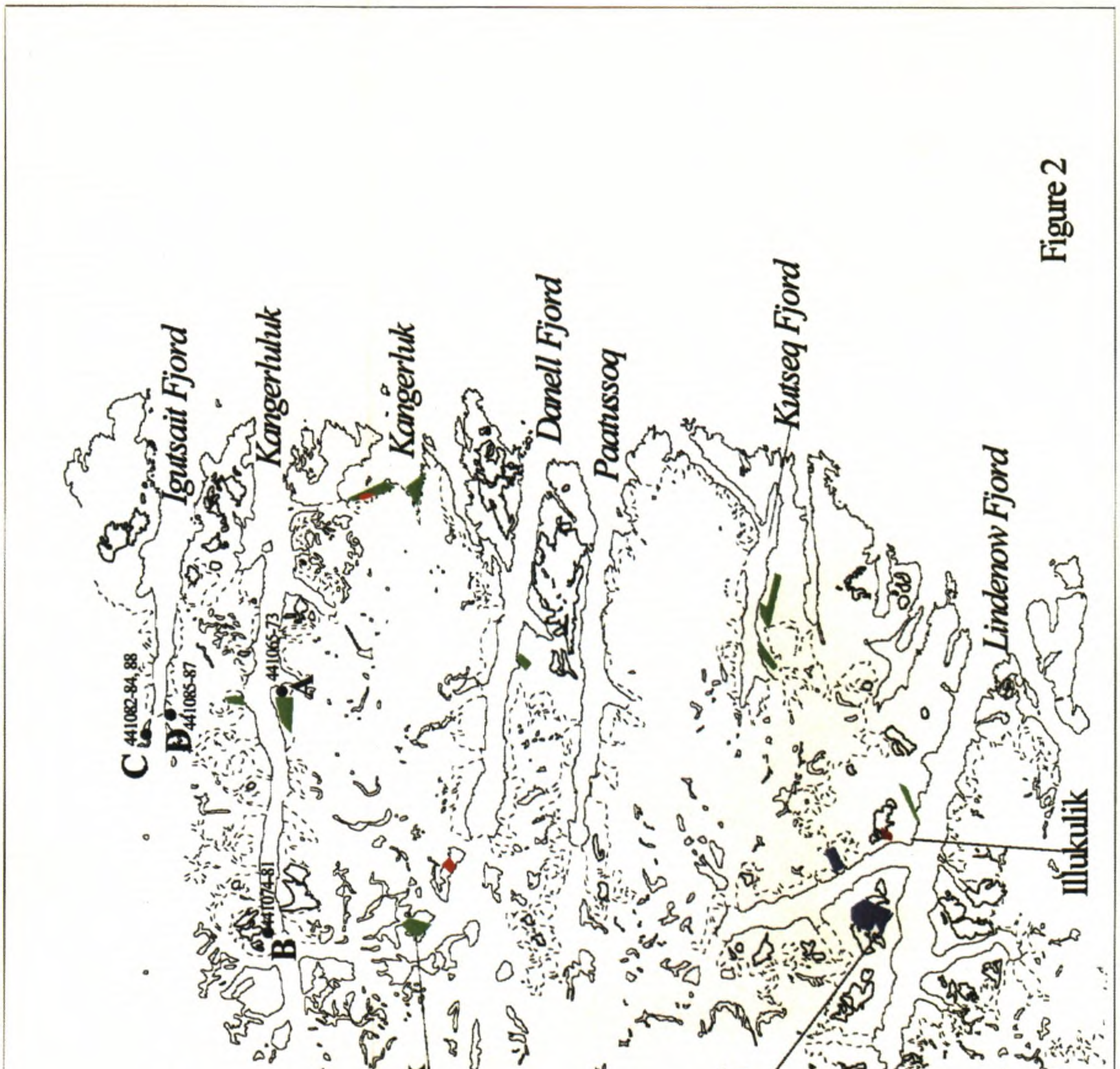

Figure 2. *Locality map and sample numbers outside the mafic complex of the Kangerluluk area.*

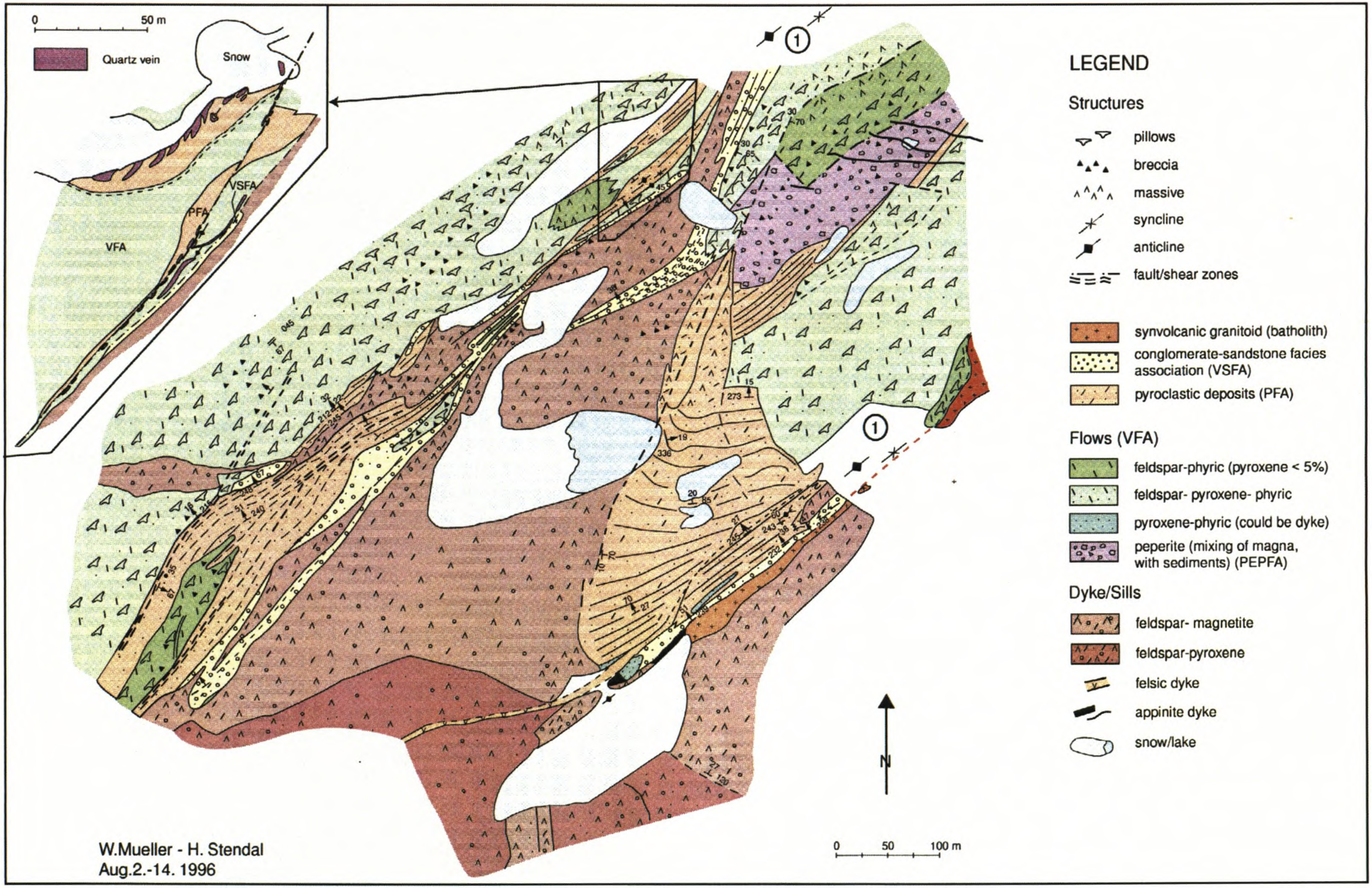
0
50 m
Quartz vein
Snow
VSFA
PFA
VFA
LEGEND
Structures
pillows
breccia
massive
syncline
anticline
fault/shear zones
synvolcanic granitoid (batholith)
conglomerate-sandstone facies association (VSFA)
pyroclastic deposits (PFA)
Flows (VFA)
feldspar-phyric (pyroxene < 5%)
feldspar- pyroxene- phyric
pyroxene-phyric (could be dyke)
peperite (mixing of magna, with sediments) (PEPFA)
Dyke/Sills
feldspar- magnetite
feldspar-pyroxene
felsic dyke
appinite dyke
snow/lake
N
0 50 100 m
W.Mueller - H. Stendal
Aug.2.-14. 1996

Figure 3 (previous page): *Geological map of part of the south side of Kangerluluk area with insert map of the most anomalous area. See also photo in Fig. 5.*

(1) The first episode comprises three different types of deformation: décollement folds, 100-120^0, and a 10^0 fault. The age relations between these three types are not known. However, they all pre-date the second episode of deformation.
The décollement folds have an amplitude of 2-10 m and they are overturned on the south-eastern limb. Generally, the fold-axes are subhorizontal with a NE-SW strike. Especially the sediments have been affected by the décollement style of folding. Shears are developed parallel to the overturned limbs particularly where the the décollement folds are squeezed up against the more competent rocks of the sill and dyke complex.
Belonging to the first episode are a set of faults striking 100-120^0 . These faults occur within the pillowed sequence. In general these faults do not exceed 50 m in length.
A very pronounced fault striking app.10^0 occurs between the pyroclastic deposit and the sill and dyke complex. This fault shows the same alteration haloes as those found around the 100-120^0 faults.

(2) The second episode is a pronounced fault direction striking 60^o. In contrast to the first and third episodes, this episode is generally not associated with any significant hydrothermal activity.

(3) The third episode consists in the mapped area of a dominant shear- and fault system which strikes approximately north-east and is steeply dipping.

Post-dating the main sinistral shear zones of the third episode are a number of 20-35^o striking breccia zones. The breccia zones are up to 2 wide and can be followed up to 100 m. The breccia zones, characterized by carbonate alteration, have been found in both supracrustal rocks and within the batholith.

Mineralization

The hydrothermal mineralization is clearly epigenetic and spatially associated with the first and the third episodes of shearing. The hydrothermal mineral association reflects to a high degree the host rock of the mineralization. Two main types of mineralization can be distinguished: (1) quartz is a dominating mineral in the sediments and 2) epidote and garnet characterise the hydrothermal deposits within the mafic volcanics. Gold is found in both types of mineral associations and copper is more abundant in the epidote-garnet type.

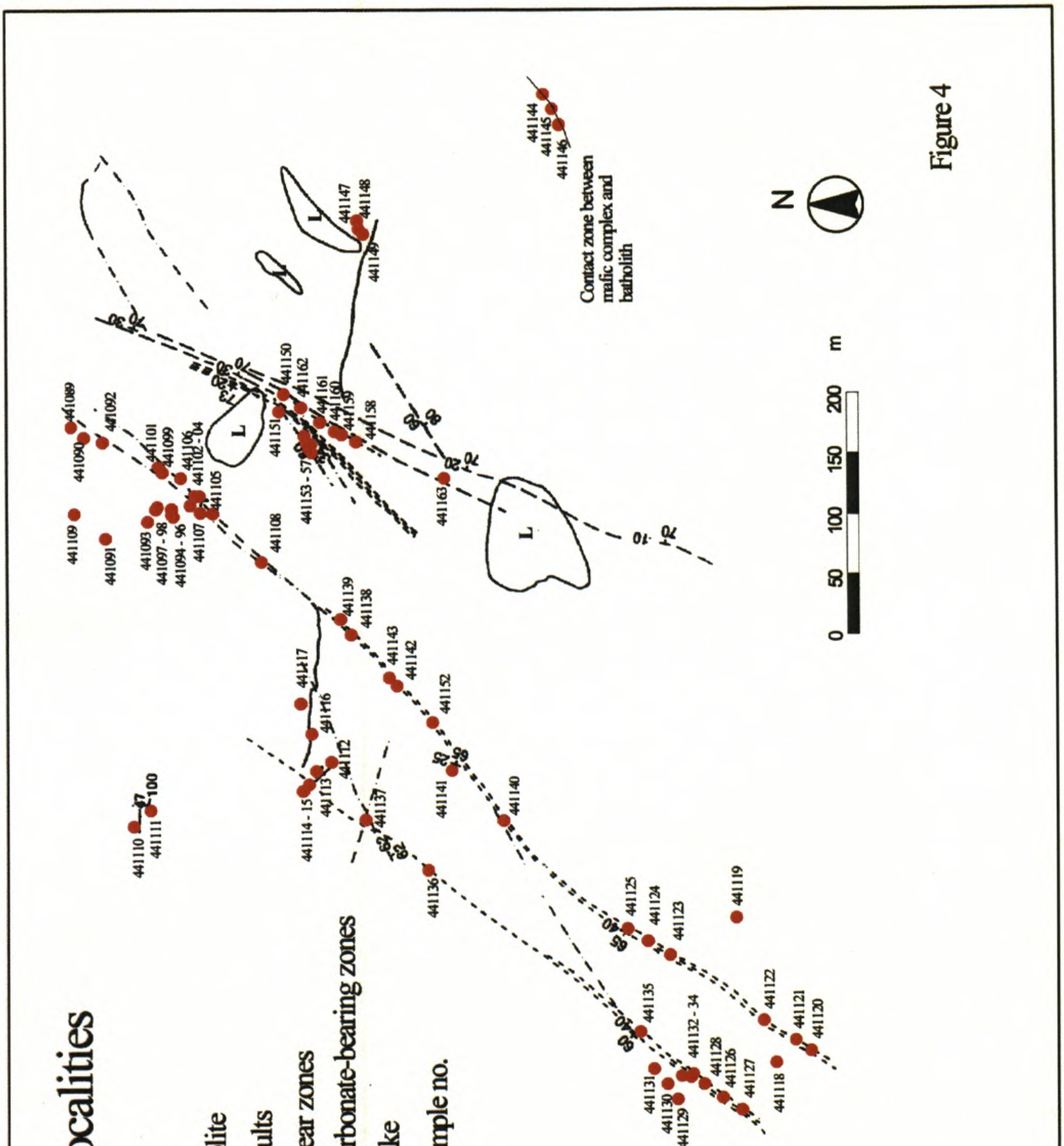

Figure 4. *Sample localities of the mafic complex Kangerluluk.*

Quartz association

Within the décollement folds (first episode), the quartz paragenesis occurs as saddle reefs up to 2 m wide containing pyrrhotite and pyrite (up to a few vol%). Locally massive pyrrhotite can be found (5 cm thick) at the contacts between the sediments and the quartz. The saddle reefs are surrounded by silicified alteration halos. The known maximum width of this silicified halo is 40 cm and a grab sample from the halo yielded 118 ppm Au.

The quartz association is also found in the third episode of shearing as an en echelon set of quartz veins within the north-east striking shear zones. This type of quartz veins are found in the sediments and are generally not associated with silicification of the host rock. The quartz veins are 1-2 m wide and 3-10 m long and have normally 1 vol.% of iron-sulphides. They have gold values up to 1.15 ppm over 2 m and are interpreted as tension gashes due to sinistral shear movement. Gold is also found in the highly strained part of the shear zone. A 5 m chip sample of a silicified part returned 7.5 ppm Au.

The late brecciated and carbonate altered zone in the sedimentary-volcanic sequence contains hematite veinlets but no gold.

Epidote-garnet association

The epidote-garnet mineral association is in the first structural episode related to the set of faults striking 100 -120^0 and to the pronounced c.10^0 fault in the central part of the mapped area. The faults striking 100 -120^0 are associated with an up-to-half a metre wide epidote-garnet alteration zone. In this alteration halo gold and copper contents vary. The highest gold value found is up to 1.1 ppm over half a metre and copper up to 1.6% also over half a metre.

The pronounced fault striking app.10^0 occurs along the boundary of the pyroclastic deposit and the sill and dyke complex. The alteration zone within the sill and dyke complex is up to one metre wide and characterized by epidote and garnet. A chip sample of this alteration halo yielded up to 3.3 ppm Au and 1.6% Cu over half a metre. The alteration within the pyroclastic deposit seems to be insignificant.

In the south-western corner of the mapped area the pillowed sequence is cut by faults (NE striking) of the third episode. This fault zone is up to 20 m wide and comprises of a set of highly epidotized vertical zones varying in width from half a metre and up to two metres. Assays of grab samples from these highly epidotized zones show in general low gold contents except for one sample, which yielded 5 ppm Au and 1.4% Cu. In addition, these epidotized zones are enhanced in zinc, one grap sample returned 0.2%.

A type of mineralization not spatially related to any shear or fault movements occurs in the sediments between the pillows of the lava flows. This alteration is dominated by the pistace coloured epidote with subordinate garnet and minor constituents of pyrite/pyrrhotite and Cu-minerals such as chalcopyrite, bornite and chalcocite. The copper-bearing samples have generally between 0.1 to 1 ppm Au. One exception, however, yielded 6.2 ppm Au and 1.8% Cu.

Julianehåb batholith

Four localities in the neighbourhood of the supracrustal sequence at Kangerluluk were also visited during the field work in 1996. The four localities, which all occur inside the Julianehåb batholith, were chosen either because they had a rusty appearence or showed sign of hydrothermal alteration. The localities are: (A) immediately east of the supracrustal sequence, (B) northside of the head of Kangerluluk Fjord, (C) northside of the head of Igutsait Fjord and (D) southside of the head of the Igutsait Fjord . Sample numbers indicate the localities on Fig. 2 and the Tables 3 & 4 give the sample description and analytical values.

(A) A NNE-NE striking shear zone occurs in the batholith. This shear zone is subparallel to the shear zones in the supracrustal sequence.
The batholith is composed of aplite-veined granodiorite. Several generations of aplite veins occur. Some of the veins have sharp contacts whereas others show irregular contacts indicating that they were intruded into a hot environment.
The shear zone is up to 50 m wide and is characterized by quartz veining. Some of the quartz veins post-date the shear movement; however, most of the quartz veins are sheared. These normally have a greenish colour due to a small amount of epidote and/or chlorite. Only a few of the veins have accessory amounts of iron-sulphides. Zones of epidote up to 0.5 m wide also occur inside the shear zone. Analyses of chip and grab samples of quartz veins and aplites only yielded up to 11 ppb Au.

(B) During field work in 1994 a copper-gold-bearing sample (0.6 ppm Au and 0.4% Cu) was collected at this locality. The area is composed of batholith-type granodiorite veined by quartz. The quartz veins are 5-10 cm wide and can be followed for up to 20 m along the NNE-NE strike. The quartz veins predates part of the NNE-NE striking sinistral movement. The quartz veins contain up to a few vol% sulphides, mainly pyrite and chalcopyrite. Analyses of grab and chip samples from the quartz vein returned enhanced W, Mo and Cu associated with gold (up to 228 ppb Au and 1.2% Cu).

Carbonatized breccia zones have disseminated galena and sphalerite and minors of gold (2.2% Pb, 4% Zn and 223 ppb Au).

(C) Several E-W striking rust-zones occur as part of a folded and sheared gneiss which is intruded by the batholith. The rust-zones are up to 2 m wide and can be followed for several hundred metres. The rust is due to a few vol% of iron sulphides which occur disseminated and in hairline fractures. These rusty zones are enhanced in gold (max. 63 ppb Au).

(D) The psammite gneisses which strike approximately 60^0 and dip moderately towards the SE are intruded by a subhorizontal E-W striking felsic (aplite) dyke. The dyke is 5-8 m wide and has a rusty appearence due to a few vol% pyrite which occur both as disseminated grains and as veinlets. The felsic dyke postdates the mafic dykes in the area. The felsic dyke is gold-bearing; a 5 m chip sample returned 1390 ppb Au.

Figure 5. *Gold anomalous shear zone. Please note that SW is in the upper left corner and NE in lower right corner. For location see Fig. 7. Photo by W. Mueller.*

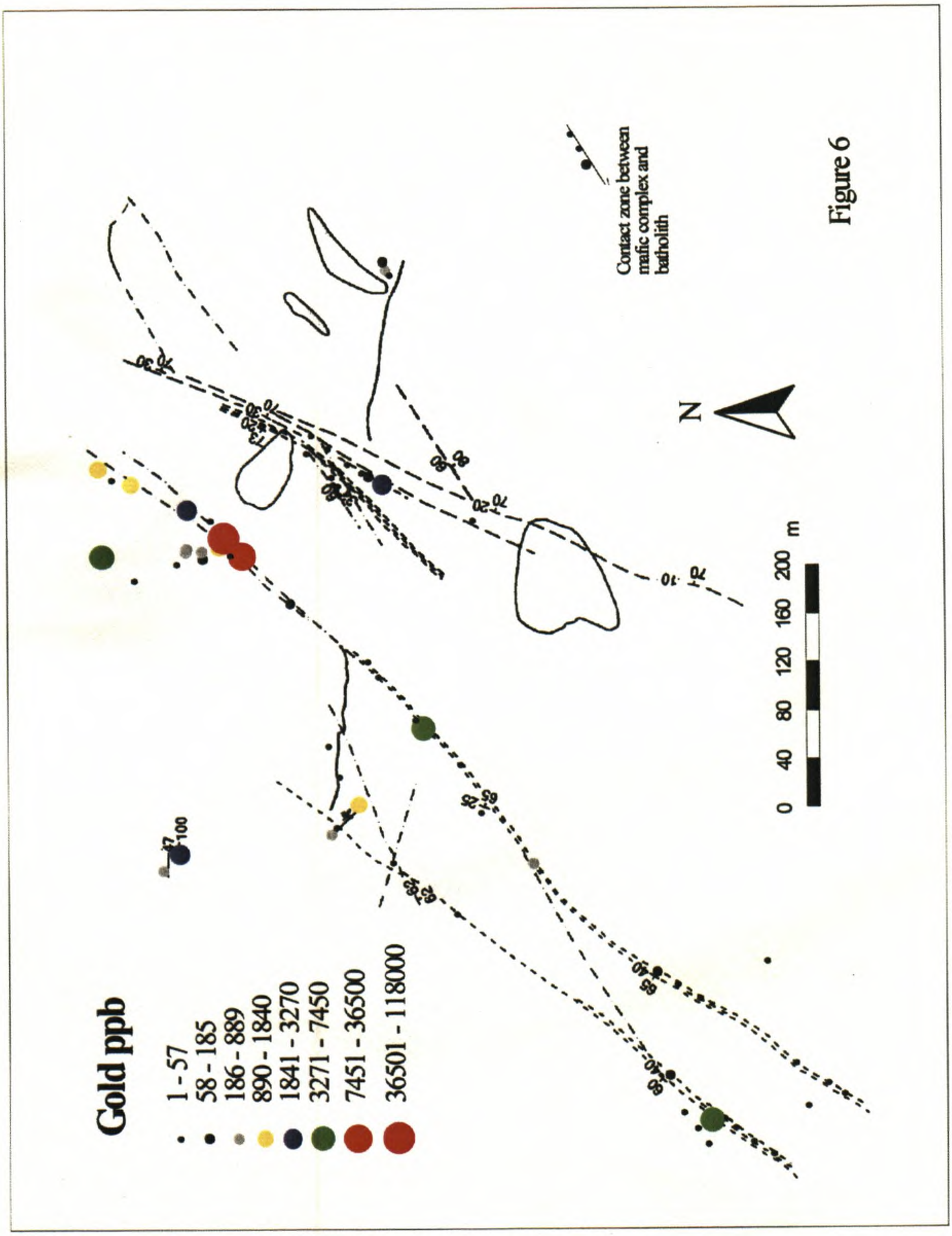

Figure 6. *Gold distribution in the Kangerluluk area. See also legend in Fig. 4.*

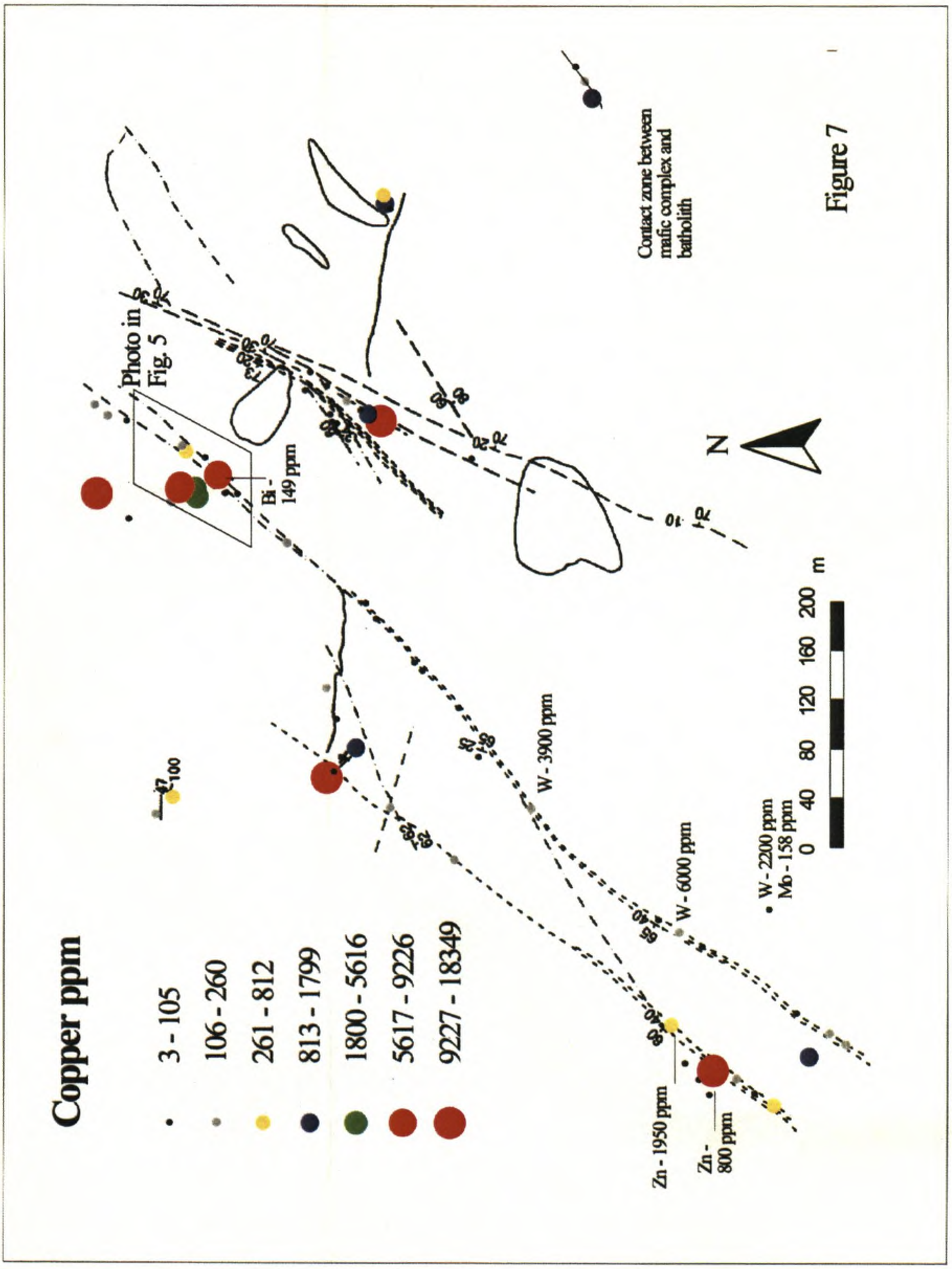

Figure 7. *Copper distribution and anomalous Zn, W, Mo, and Bi. See also legend in Fig. 4.*

Summary

The gold mineralisation is epigenetic and enveloped by an alteration halo characterised by silicification and epidotisation. More than 1 ppm Au was found in 12 out of 74 samples with a maximum value of 118 ppm; in addition, eleven samples obtained values between 0.1 and 1 ppm. Eight of the 12 samples with more than 1 ppm Au and 3 samples with values between 0.1 - 1 ppm Au are related to the quartz association. Of gold-bearing samples outside the shear zone system, 4 samples have more than 1 ppm Au and 8 samples lie within 0.1 - 1 ppm Au.

The majority of the gold mineralised samples are closely related to the north-easterly striking, steeply dipping quartz-bearing shear zones in the supracrustal sequence. The most prominent shear zone in the mapped area is more than 1 km long. This shear zone is up to 20 m wide, however, gold within this shear zone seems only to occur in a quartz and hydrothermal altered 2-5 m wide zone.

The volcano-sedimentary sequence in Kangerluluk is a unusual transition from subarial to subaqueous sediments, effusive volcanism and related pyroclastics. Collectively this rock association is a common feature of modern (Sigurdsson *et al.*, 1980) and ancient arc systems (Cole & DeCelles, 1991). The inferred fluvial to shallow water setting in an arc environment coincides with the large-scale interpretation of a convergent arc setting by Chadwick & Garde (1996). The zone bordering the Julianehåb batholith with local calc-alkaline volcanism as is the case in the Kangerluluk area may well be part of an unroofed magmatic arc (Stendal *et al.*, in press).

The interpreted unroofed magmatic arc coincides with a line of gold mineralizations in a NE-striking zone along the southern rim of the Julianehåb batholith from the Niaqornaarsuk peninsula in the south-western part of South Greenland through the Sorte Nunatak to the Kangerluluk on the east coast. This zone seems to be a promising corridor for gold in South Greenland.

Acknowledgements

In the present field work Wulf Mueller did the lithological mapping and suggested the division into the present facies associations given in Figure 3. The author thanks him for an enjoyable and instructive field period. Hans K. Schønwandt is acknowledged for many improvements, comments and lively discussions; and P. Dawes for improving the English language.

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GEUS sample no.	Au ppb	Ag ppm	As ppm	Cu ppm	Pb ppm	Zn ppm	W ppm	Mo ppm	Mn ppm	Sr ppm	Ca %	Fe %	K %	Mg %	Na %	P %
441089	1150	0.2	0.3	208	3	4	5	1	54	38	0.5	1.57	0.07	0.11	0.27	0.014
441090	4	0.2	0.3	141	3	2	3	1	66	14	0.19	0.72	0.02		0.12	0.002
441091	57	0.2	0.9	41	3	4	5	1	212	24	1.38	1.43	0.39	0.29	0.25	0.024
441092	1150	0.2	1.1	21	3	2	3	3	10	8	0.06	0.45	0.04	0.07	0.09	0.007
441093	18	0.2	0.3	205	3	260	1	1	4416	118	5.63	12.9	2.06	2.94	0.83	0.253
441094	84	4.5	4.4	3555	5	104	1	5	1438	680	7.98	6.88	1.57	1.31	2.12	0.214
441095	1	0.5	2.4	35	3	131	1	1	1566	637	6.96	7.27	1.76	1.79	2.45	0.251
441096	384	17.8	11	5616	5	6	7	1	918	1353	15.32	10.8	0.01	0.05	0.06	0.126
441097	451	11.5	4.4	9226	9	130	1	3	3662	304	12.9	6.74	0.2	3.28	0.14	0.092
441098	550	5.5	3.9	6667	3	142	1	5	4377	72	12.71	9.33	0.01	3.96	0.16	0.048
441099	32	0.2	4.7	487	3	95	5	1	2109	345	7.85	10.7	2.09	1.6	1.27	0.195
441101	2510	0.6	5.1	245	3	2	16	1	51	5	0.17	7.4	0.01	0.03	0.03	0.009
441102	77	0.2	0.3	477	3	4	1	1	10	3	0.04	39	0.01	0.02	0.02	0.002
441103	1840	0.2	0.9	155	3	7	4	5	485	44	2.24	2.87	0.1	0.31	0.03	0.031
441104	118000	9.3	4.9	6608	3	68	16	10	1936	308	6.88	11	2.45	1.9	1.03	0.22
441105	36500	0.2	3	94	3	32	12	4	656	59	1.1	6.68	1.69	0.74	0.87	0.162
441106	34	0.5	10	68	3	65	11	1	1825	583	14.5	14.3	0.37	1.06	0.1	0.12
441107	23	0.2	1.3	61	3	2	5	1	17	4	0.11	0.53	0.03	0.02	0.03	0.003
441108	73	0.4	2.8	122	3	29	7	1	850	128	3.47	5.61	0.71	1.07	0.81	0.131
441109	6200	11.4	110	18349	82	345	1	1	1532	1235	12.72	13.4	0.02	0.86	0.05	0.098
441110	345	0.2	1.1	156	3	5	16	1	19	6	0.12	0.2	0.01	0.02	0.02	0.002
441111	2500	3.5	2	812	3	12	4	1	25	2	0.1	4.29	0.01	0.01	0.02	0.002
441112	1100	6.9	14	1640	3	113	16	1	7146	75	16.7	15.8	0.01	0.52	0.05	0.005
441113	9	0.5	9.3	21	12	250	1	5	4010	620	13.08	8.81	0.12	2.24	0.45	0.125
441114	19	0.5	10	63	6	122	1	3	3630	612	16.92	9.66	0.01	1.1	0.08	0.114
441115	663	4.9	17	15954	3	476	4	3	5307	341	14.76	13.4	0.01	0.41	0.02	0.003
441116	15	0.2	1.5	105	7	16	6	8	389	244	1.93	1.26	0.12	0.17	3.71	0.003
441117	1	1.0	19	230	21	111	1	1	2520	1497	12.65	9.18	0.34	2.26	0.86	0.189
441118	17	1.4	4.7	1306	3	190	1	1	2067	769	8.28	7.48	0.93	2.91	2.14	0.252
441119	7	0.2	9	61	3	33	2200	239	5893	73	17.59	19.4	0.06	0.33	0.08	0.021
441120	22	0.2	20	246	3	20	16	1	951	32	3.86	4.23	0.07	0.47	0.24	0.006
441121	50	0.2	1.5	123	3	9	5	1	187	40	0.55	2.01	0.13	0.26	0.28	0.003
441122	24	0.2	3.2	87	3	48	6	3	1082	289	4.66	3.7	0.54	1.11	1.59	0.04
441123	29	0.2	4.5	65	6	73	10	11	2002	354	8.63	6.73	0.98	1.44	1.58	0.039
441124	38	0.2	2	137	3	68	37	28	1987	239	7.3	5.68	1.11	1	1.09	0.032
441125	94	0.2	2.4	50	3	95	6000	1	2475	201	8.75	6.93	0.44	1.84	0.12	0.146
441126	1	0.4	11	17	13	465	16	1	3655	433	10.43	13.3	0.81	2.75	1.07	0.169

Mafic complex, Kangeluluk - Table 1

GEUS sample no.	Au ppb	Ag ppm	As ppm	Cu ppm	Pb ppm	Zn ppm	W ppm	Mo ppm	Mn ppm	Sr ppm	Ca %	Fe %	K %	Mg %	Na %	P %
441127	31	0.6	11	463	11	211	17	1	3100	729	14.93	7.97	0.54	0.9	1.73	0.129
441128	19	0.9	14	120	13	572	7	1	7366	311	18.86	9.14	0.01	2.6	0.07	0.052
441129	20	0.2	14	35	15	210	1	1	3055	1081	15.08	6.56	0.64	2.02	0.29	0.14
441130	31	0.6	23	79	16	289	1	1	3913	894	15.95	6.89	0.43	2.01	0.45	0.16
441131	7	0.2	16	33	33	478	1	1	7807	427	.20.26	10.7	0.01	1.21	0.06	0.115
441132	30	0.2	17	180	3	64	5	1	7190	212	20.16	12.2	0.02	0.27	0.02	0.029
441133	1	0.5	5	26	17	192	1	3	2450	757	9.45	6.06	2.36	1.3	1.74	0.235
441134	5080	19.1	17	13860	41	800	1	1	5354	470	12.83	11.8	0.22	2.5	0.27	0.178
441135	120	0.9	17	607	225	1950	6	3	5277	767	15.97	9.21	0.1	1.5	0.29	0.096
441136	8	0.7	12	134	22	145	1	1	3045	756	16.52	7.82	0.28	1.31	0.16	0.131
441137	22	0.5	24	260	18	63	5	1	3759	482	15.31	13	0.02	0.38	0.05	0.082
441138	7	0.2	5	7	3	32	5	1	1741	253	8.38	4.91	0.26	0.49	0.23	0.055
441139	1	0.7	3.8	71	18	79	6	1	744	582	2.25	3.87	3.04	1.85	3.44	0.097
441140	889	0.4	0.3	246	3	64	3900	30	1910	172	7.19	6.55	0.63	1.35	0.42	0.095
441141	12	0.2	0.3	22	3	3	1	1	30	4	0.08	0.31	0.03	0.02	0.02	0.002
441142	7450	0.4	4.6	99	3	40	37	1	1005	164	5.86	6.09	1.6	0.86	0.35	0.092
441143	16	0.6	26	51	18	194	16	1	2488	673	13.71	7.05	0.01	0.41	0.07	0.13
441144	1	0.2	0.6	5	3	6	5	1	80	8	0.31	0.28	0.05	0.06	0.03	0.004
441145	1	1.0	6	122	3	36	1	1	1996	1081	13.42	9.57	0.01	0.64	0.04	0.15
441146	78	2.5	6.4	1120	5	165	1	4	3380	542	12.6	11.5	0.17	2.13	0.2	0.072
441147	680	1.5	5.1	1799	3	174	1	1	2795	532	12.31	11.7	0.23	3.12	1.03	0.047
441148	112	0.6	8.3	517	3	172	1	3	3503	563	11.96	9.79	0.45	3.1	0.76	0.098
441149	1	0.6	3.4	68	7	165	1	5	1699	594	6.14	7.86	2.5	2.75	2.34	0.176
441150	1	0.4	3.3	16	5	19	1	1	882	602	10.94	6.02	0.89	0.46	1.66	0.118
441151	10	0.2	2.8	24	5	16	19	8	441	59	1.14	8.68	2.64	0.23	3.79	0.063
441152	3	0.2	3.1	38	5	53	3	1	1788	272	10.32	5.94	0.17	1.5	0.07	0.085
441153	1	0.2	2.7	9	11	84	1	1	484	434	2.57	6.16	3.77	1.36	2.67	0.184
441154	1	0.2	12	8	3	120	1	3	2662	567	13.37	9.89	0.07	3.15	0.18	0.1
441155	1	0.2	0.3	3	3	66	8	1	342	42	0.42	2.3	2	1.45	2.11	0.015
441156	1	0.2	14	11	14	203	1	1	3289	461	13.09	7.93	0.12	3.06	1.22	0.06
441157	12	0.5	2.7	18	3	68	1	1	1897	348	11.47	7.09	1.37	1.95	0.26	0.101
441158	3270	24.3	11	15957	93	231	3	1	3194	182	11.33	14.5	0.3	3.66	0.34	0.071
441159	185	1.2	16	1124	12	145	6	1	2907	486	13.06	10.9	0.33	3.23	0.33	0.101
441160	11	0.4	13	12	3	170	1	1	2899	324	12.8	8.52	0.41	4.66	0.54	0.101
441161	39	0.5	26	146	12	199	1	1	2504	719	11.62	13.8	0.36	3.38	0.62	0.112
441162	1	0.2	0.3	11	8	20	1	1	217	143	0.84	1.09	0.67	0.31	3.79	0.004
441163	13	0.4	0.3	18	3	21	14	1	753	133	2.86	6.42	2.45	0.52	4.07	0.104

GEUS sample no.	Au-INNA ppb	Au-FA ppb	Au-FA ppb	Sample description - chip/grab samples
441089	1150	1416		Quartz vein - 10% rusty - 2 m chip
441090	4			Quartz vein - 50% rusty - 2 m chip
441091	57		38	Quartz vein - 100% rusty - 1 m chip
441092	1150	34	24	Sheared quartz vein in fault zone - 1 m chip
441093	18			Amfibole schist directly deposited on pillow lava - grab
441094	84		57	Cu mineralised joints in pillow lava - grab
441095	1			Pillow lava - host to 441094 - grab
441096	384	378		Cu mineralised epidote fels - matrix between pillow lava - grab
441097	451	667		Cu mineralised epidote fels - matrix between pillow lava - grab
441098	550	654		Cu mineralised epidote fels - matrix between pillow lava - grab
441099	32			Rusty, sheared pillow lava with disseminated pyrrhotite and chalcopyrite - 1 m chip
441101	2510	584	596	Quartz vein with disseminated pyrite - core of fold - 1 m chip
441102	77			Massive pyrrhotite 5 cm thick - outer shell of quartz vein cf. 441101
441103	1840	752	467	White and rusty quartz vein - part of fold cf. 441101 - 1 m chip
441104	118000	>99999		Altered and silicified pillow lava 10 cm aureole around fold cf. 441101 - grab
441105	36500	11943	13090	Quartz vein (50%) and host pillow lava (50%) - 1 m chip
441106	34			Epidote fels in contact to conglomerate - grab
441107	23			Quartz vein - 50% rusty - 2 m chip
441108	73		58	Rusty quartz vein and small amount of host pillow lava - 1.5 m chip
441109	6200	4945		Epidote fels with chalcopyrite and bornite - matrix in pillow lava - (40x20 cm) - chip
441110	345	54	37	White quartz vein - 40 cm chip
441111	2500	2686		Rusty quartz vein - 40 cm chip
441112	1100	1491		Epidote-garnet fels in pillow breccia - 1/2 m wide vein - chip
441113	9			Epidote fels with amphibole in pillow breccia - 1/2 m chip
441114	19			Epidote-garnet fels with amphibole in pillow breccia - 1/2 m chip
441115	663	929		Garnet fels with chalcopyrite in pillow breccia - 1/2 m chip
441116	15			Aplite vein - 1 m thick - chip
441117	1			Pillow lava with epidote fels - grab
441118	17			Feldspar-pyroxene phyric dark flow with garnet-chalcopyrite-bearing veinlets - grab
441119	7			Epidote-garnet fels - core of 10 cm fold - grab
441120	22			Rusty quartz vein from shear zone - 1 m chip

Mafic complex, Kangerluluk - Table 2

GEUS sample no.	Au-INNA ppb	Au-FA ppb	Au-FA ppb	Sample description - chip/grab samples
441121	50		98	Rusty quartz vein from shear zone - 1 m chip
441122	24			Shear zone - 50% quartz vein + 50% metasediment - 5 m chip
441123	29			Shear zone - quartz vein + metasediment + epidote fels + carbonate - 5 m chip
441124	38			Shear zone - quartz vein + metasediment + epidote/garnet fels + pyrrhotite - 3 m chip
441125	94	482	149	Shear zone NW contact - quartz dominated - 1 m chip
441126	1			Altered feldspar-pyroxene phyric flow - grab
441127	31			Epidote fels in altered zone cf. 441126 - grab
441128	19			Epidote/garnet fels in pillow lava - grab
441129	20			Epidote/garnet fels - matirix in pillow lava - grab
441130	31			Epidote fels - matrix in pillow lava - grab
441131	7			Epidote fels - 1.5 m vein in pillow lava - grab
441132	30			Epidote fels - 1 m chip
441133	1			Brecciated epidote/garnet/amphibole fels + quartz + calcite - 1 m chip
441134	5080		4048	Chalcopyrite epidote-bearing fels - grab
441135	120	110		Epidote fels - matrix in pillow lava - minor chalcopyrite - grab
441136	8			Epidote fels from faultzone - 3 m chip
441137	22			Epidote/garnet fels in pillow lava - grab
441138	7			Epidote/garnet fels + quartz vein - 2 m chip
441139	1			Feldspar phyric intrusion with disseminated magnetite - grab
441140	889	777		Shear zone - 50% quartz veins + epiote fels + metasediment - 10 m chip
441141	12			Rusty quartz vein - 10 cm thick - grab
441142	7450	12719		Shear zone - 50% quartz veins + epidote fels + metasediment - 5 m chip
441143	16			Epidote/garnet fels from shear zone - 10 m chip -continuation of 411142
441144	1			Sheared quartz vein in contact zone between pillow lava and feldspar phyric intrusion - 30 cm chip
441145	1			Rusty epidote fels in sheared contact cf. 441145 - grab
441146	78			1/2 m rusty epidote vein with 1-2 cm thick quartz veins - 1/2 m chip
441147	680	599		Epidote fels in peperite - grab
441148	112		85	Peperite with epidote fels - grab
441149	1			Peperite - grab
441150	1			Epidote fels from fault zone - grab
441151	10			Breccia - silicified, carbonatized + hematite veinlets - 1 m chip

GEUS sample no.	Au-INNA ppb	Au-FA ppb	Au-FA ppb	Sample description - chip/grab samples
441152	3			Sheared epidote vein in metasediments - 10 cm chip
441153	1			Feldspar phyric lightgrey intrusion with disseminated magnetite - grab
441154	1			Epidote fels in metasediments - 60 cm chip
441155	1			Altered feldspar phyric intrusion - grab
441156	1			Epidote fels - grab
441157	12			Silicified metasediment - grab
441158	3270	1584	3250	Epidote-amphibole dyke (1/2 m wide) with pyrite and chalcopyrite - 1/2 m chip
441159	185	553	251	Epidote dyke (1/2 m wide) with pyrite and chalcopyrite - 1/2 m chip
441160	11			Epidote-amphibole fels - 1/2 m chip
441161	39			Epidote-amphibole fels - grab
441162	1			Aplite 1-2 m wide - 1 m chip
441163	13			Breccia - carbonatized with hematite veinlets

GEUS sample no.	Au ppb	Ag ppm	As ppm	Cu ppm	Pb ppm	Zn ppm	W ppm	Mo ppm	Mn ppm	Sr ppm	Ca %	Fe %	K %	Mg %	Na %	P %
441065	1	4.5	2	962	6	69	140	1	64	25	0.24	1.27	0.43	0.11	0.27	0.007
441066	1	3.0	0.3	648	13	68	120	1	308	212	1.19	2.58	3.02	0.36	1.45	0.04
441067	223	4.2	2.5	114	22094	39782	1	73	334	27	3.24	2.03	0.61	0.09	0.97	0.022
441068	1	0.5	0.3	16	615	1739	13	1	517	132	2.18	3.19	1.98	0.26	3.79	0.079
441069	1	0.5	3.9	13	46	133	4	15	381	92	1.96	1.51	1.87	0.19	2.23	0.056
441070	228	19.1	27	12006	10	132	350	11	215	246	1.56	4.63	1.45	0.5	1.43	0.029
441071	71	4.3	6.2	984	18	128	450	1	678	276	1.78	5.4	1.85	0.79	1.45	0.058
441072	1	0.7	0.3	11	11	114	18	16	844	120	2.16	6.84	3.04	0.19	5.48	0.077
441073	1	0.2	0.9	18	7	27	1	5	267	13	0.08	2.16	0.07	0.03	0.03	0.011
441074	1	0.4	0.3	8	7	37	1	1	303	27	1.44	0.68	0.08	0.36	0.15	0.004
441075	1	0.5	0.3	5	3	6	6	1	5	2	0.04	0.09	0.03	0.03	0.06	0.002
441076	1	0.7	0.3	8	3	12	4	1	20	6	0.06	0.09	0.07	0.05	0.08	0.002
441077	1	0.2	0.3	13	9	21	6	2	199	127	2.1	0.46	1.41	0.26	1.69	0.004
441078	11	0.7	16	243	3	6	4	32	9	4	0.06	1.76	0.07	0.01	0.03	0.002
441079	1	0.2	0.3	5	3	10	3	1	201	68	2.52	0.98	0.12	0.2	0.18	0.007
441080	1	0.2	0.3	30	23	23	6	1	50	211	1.14	0.28	2.84	0.06	1.78	0.003
441081	10	0.4	0.3	5	7	16	19	1	83	139	0.7	0.9	4.23	0.16	3.15	0.008
441082	1	1.6	2.3	62	18	44	15	14	361	163	1.44	2.48	2.49	0.05	4.23	0.014
441083	63	0.4	0.3	170	30	27	6	1	151	102	0.38	0.96	4.84	0.14	1.65	0.011
441084	9	0.2	0.3	32	22	51	1	1	266	128	0.71	1.22	4.01	0.16	1.46	0.012
441085	27	0.8	6.7	112	6	8	13	6	69	115	0.36	1.32	3.05	0.02	4.51	0.003
441086	248	0.7	10	185	34	19	1	7	45	69	0.27	0.98	2.29	0.03	3.69	0.002
441087	1390	0.2	10	210	16	10	1	4	44	43	0.15	0.91	3.13	0.02	3.48	0.002
441088	1	0.6	3.8	43	47	137	1	6	1289	363	3.24	4.2	1.55	0.94	3.77	0.178
441164	6	0.4	2.7	10	33	45	1	3	917	1007	9.14	4.43	0.26	0.25	0.56	0.052
441165	1	0.4	1.9	9	33	64	1	6	1563	1155	11.95	5.45	0.41	0.51	0.91	0.049

GEUS sample no.	Locality	Au-INAA ppb	Au-FA ppb	Sample description - chip/grab samples
441065	B	1		10 cm thick quartz vein with pyrite and chalcopyrite - chip
441066	B	1		10 cm thick quartz vein with pyrite and chalcopyrite - chip
441067	B	223	531	Quartz-calcite/dolomite vein with galena and sphalerite - 40 cm chip
441068	B	1		Quartz-calcite/dolomite vein - 40 cm chip
441069	B	1		Quartz-calcite/dolomite vein - 20 cm chip
441070	B	228	350	3 cm quartz vein in granodiorite with pyrite - loose block
441071	B	71	28	3 cm quartz vein in granodiorite with malachite staining - grab
441072	B	1		Carbonate altered granodiorite - 1/2 m chip
441073	B	1		Altered granodiorite with 1.5 cm quartz vein with pyrite - grab
441074	A	1		Sheared 10 cm quartz vein - chip
441075	A	1		White quartz vein - 20 cm chip
441076	A	1		White quartz vein - 45 cm chip
441077	A	1		1/2 m aplite vein - chip
441078	A	11		Rusty quartz vein with pyrite - 1 m chip
441079	A	1		White quartz vein 1/2 m - brittle deformed - chip
441080	A	1		1/2 m aplite vein - chip
441081	A	10		Lightgrey aplite - grab
441082	C	1		Silicified rusty granodiorite with disseminated pyrite - 1 m chip
441083	C	63	76	Altered granodiorite sulphide-bearing veinlets - 2 m chip
441084	C	9		Rusty grey gneiss with disseminated Fe-sulphides - 2 m chip
441085	D	27	17	Rusty sulphide-bearing (1-2 vol.%) aplite - 5 m chip
441086	D	248	233	Rusty sulphide-bearing (1-2 vol.%) aplite - grab
441087	D	1390	648	Rusty sulphide-bearing (1-2 vol.%) aplite - 5 m chip
441088	C	1		Rusty grey gneiss with disseminated Fe-sulphides - grab
441164	A	6		Epidote vein - 1 m thick in granodiorite - grab
441165	A	1		Epidote vein - 10 cm thick in granodiorite - grab