Chapter 3 Ibologero Area

3-1 Method and Procedure

The geological mapping was done with using the 1 to 25,000 scale map enlarged from the 1 to 50,000 scale map. The survey routes were same as those used for geochemical sampling which were set east and west in the north, and north and south in the south of the area, with an interval of 500 meters. For the interpretation of air photographs, monochromatic photographs of 1 to 40,000 scale , taken in May to August 1974 were used.

The geological data obtained by the field works were incorporated with the results of various laboratory tests for a comprehensive interpretation (Table 2-3-1). The results of the laboratory tests: microscopic observation under thin section, polished section , X-ray test, chemical analysis and measurement of physical properties are presented in Apx.5, Apx.7 and Apx.10, Apx.12, and Apx.11 respectively.

Method of sampling and treatment of samples are the same as those in Igengi area. 1046 pieces of soil samples were collected in Iborogero area (Table 2-3-1). Analytical methods of soil sample are shown in Table 2-1-2.

Table 2-3-1 Outline of the field survey and laboratory tests in the Ibologero Area

Item		Number	Remarks
Geological survey & geochemical exploration		257km²	
Laboratory test	Assay of soil samples	1,046	Au,Ag,Cu,Pb,Zn,As,Sb,Hg,Mo,W,Bi
	Assay of ore/rock samples	39	Au,Ag,Cu,Pb,Zn,Pt
	Whole rock assay	14	Al_2O_3,CaO,Cr_2O_3,Fe_2O_3,MgO,MnO, P_2O_5,K_2O,SiO_2,Na_2O,TiO_2,LOI
	X-ray diffractive tests	15	Bulk
	Observation of thin sections	14	
	Observation of polished sections	16	
	Measurement of resistivity and chargeability of rock samples	11	

3-2 Geology

3-2-1 General Geology

The generalized geological columnar section are shown in Fig. 1-4-1 and 2-1-1, and geological plan and profiles are shown in Fig. 2-3-1.

The Iborogero Area is geologically situated in the "Nzega Greenstone Belt" by UNDP (1984), where the Nyanzian rocks are distributed being about 150km long in E-W direction, and 30km wide in N-S direction. The surrounding area is occupied by synorogenic granite terrain. The relation between the Nyanzian and granite terrains are not necessarily clear, because the northern and eastern contacts are covered by lake deposits of Plio-Pleistocene and superficial sediments of Holocene.

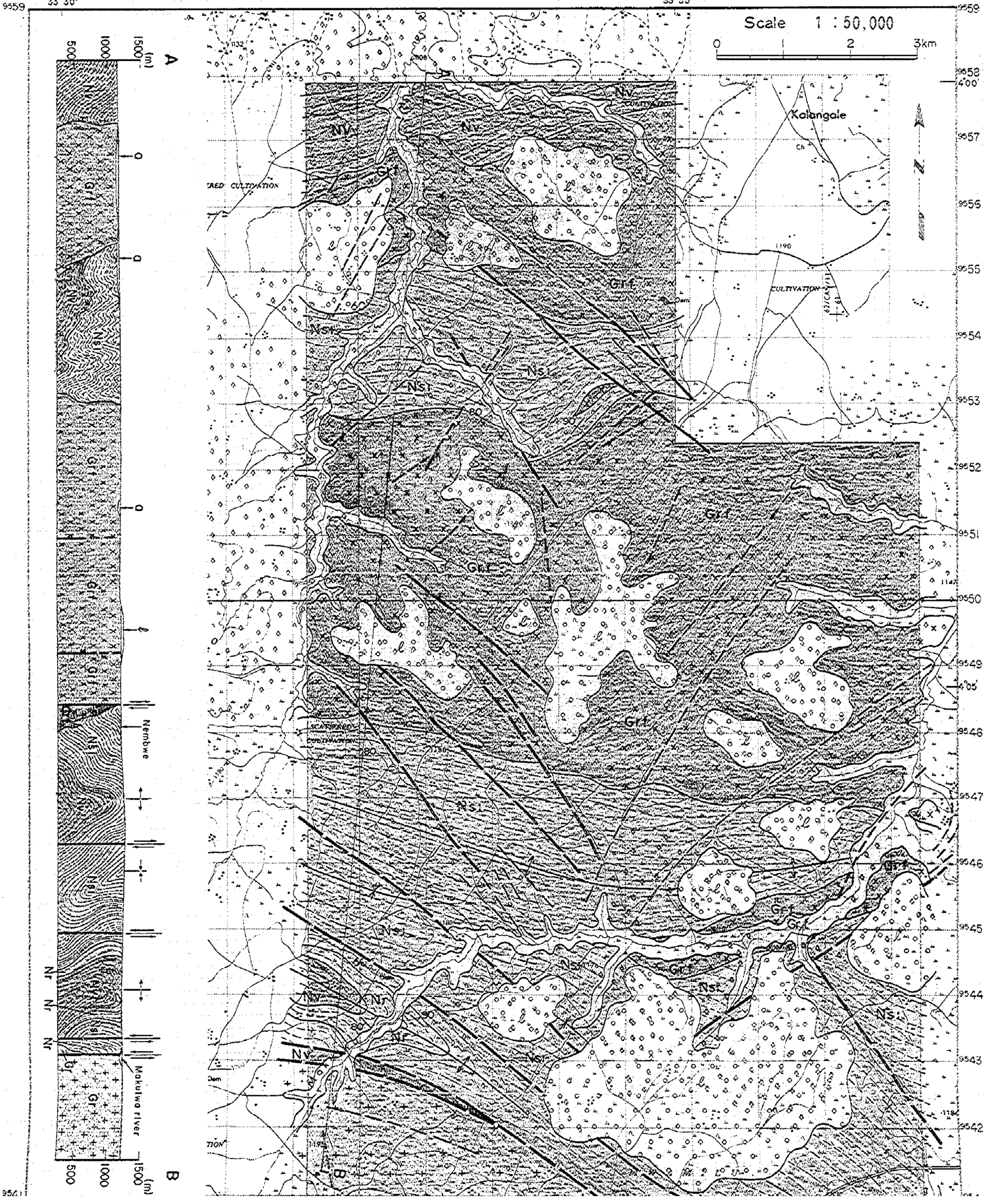
It is believed that the gold mineralization in the Nyanzian Greenstone Belt have been generated in close relation with the contineous orogeny including folding and metamorphism of Nyanzian rocks, intrusive activities of granites and faulting of Nyanzian rocks. The age of the orogeny is being judged to be 27 to 25 Ma from the results of radiometric dating of the granites.

The geology of this area comprises the Nyanzian metavolcanics and metasediments, Granitic Rocks and surperficial deposits.

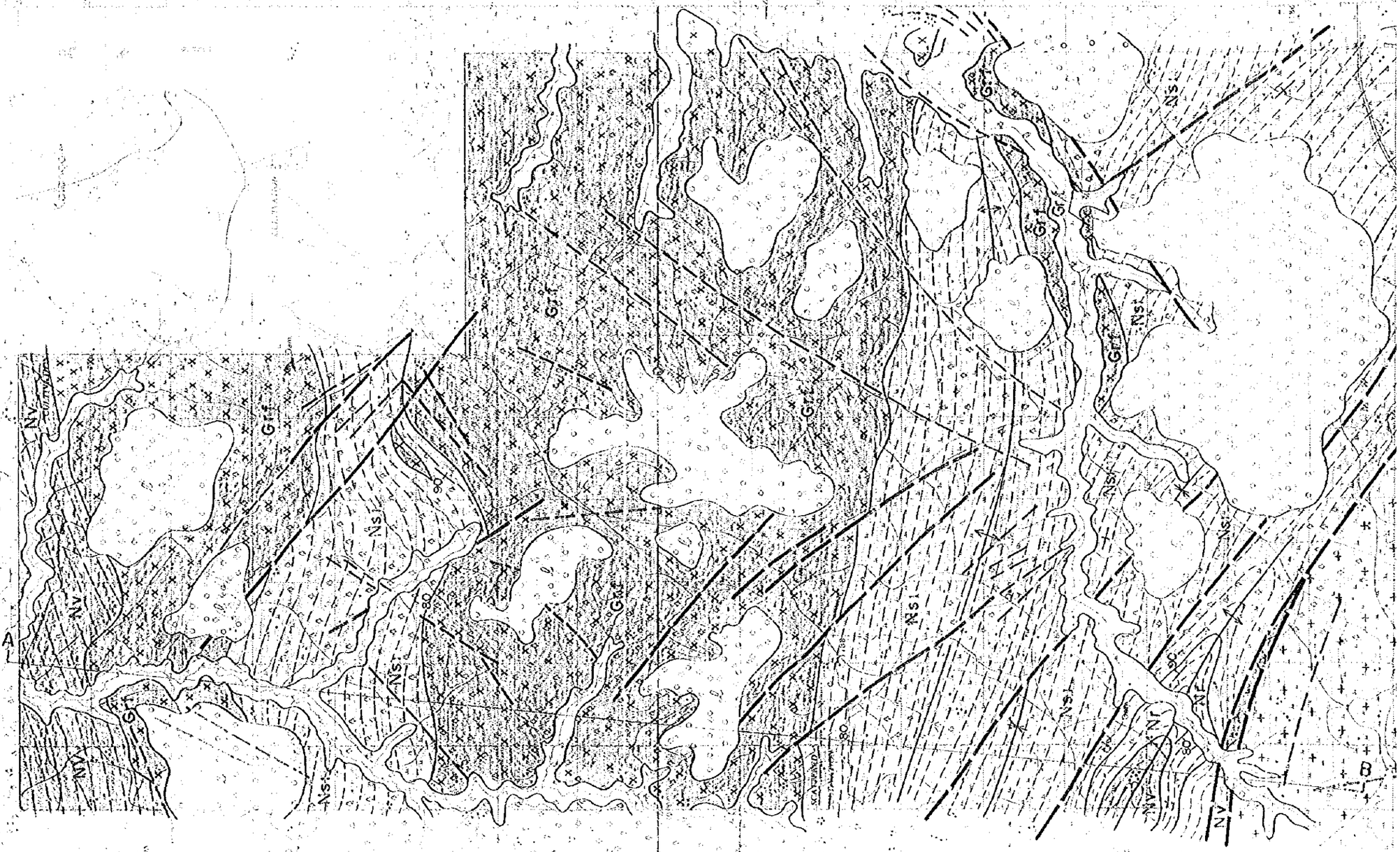
The Nyanzian System comprisese units of Metabasalt, Metaryolite, Pelitic Metasediments and Quartzite, and Banded Ironstone Formation in ascending order.

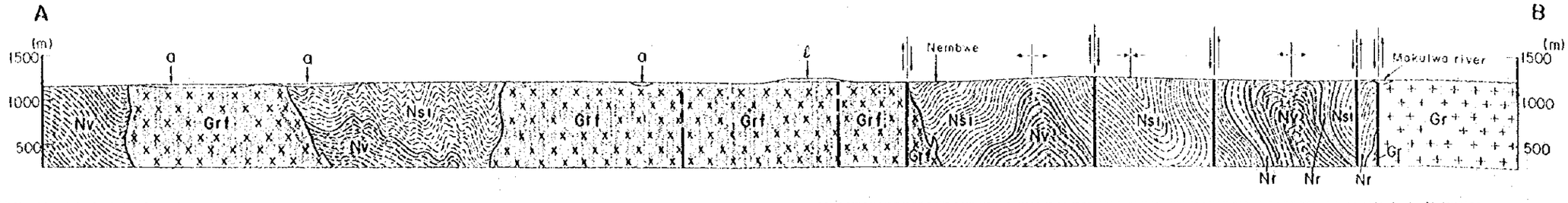
The Granitic Rocks comprises corse-grained granite and fine-grained one, and the former is distributed in the southern and the later in the northern part of the area. The area occupied by granitic rocks is about 40% of the whole area of Ibologero.

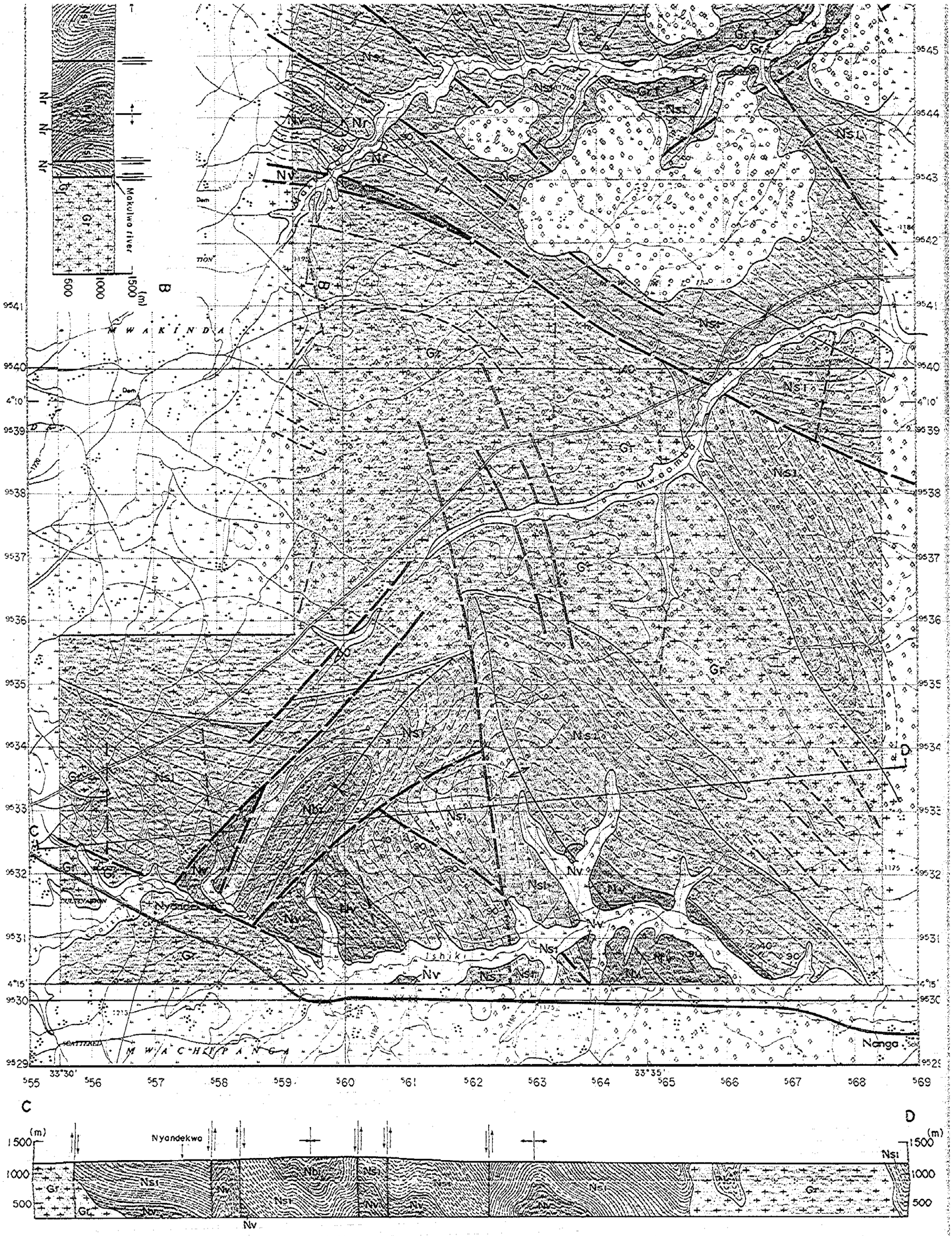
As the surperficial deposits, sporadical relict of laterite, and soil in higher areas, and black clay (Mbuga) and river sediments in lower areas are listed, but they are not shown in the geological map as independent units taking into account of the purpose of the present work.


Scale 1 : 50,000
0 1 2 3km
Kalangale
CULTIVATION
Nembwe
Makulwa river
A
B
33°30'
33°35'

Scale 1:50 000

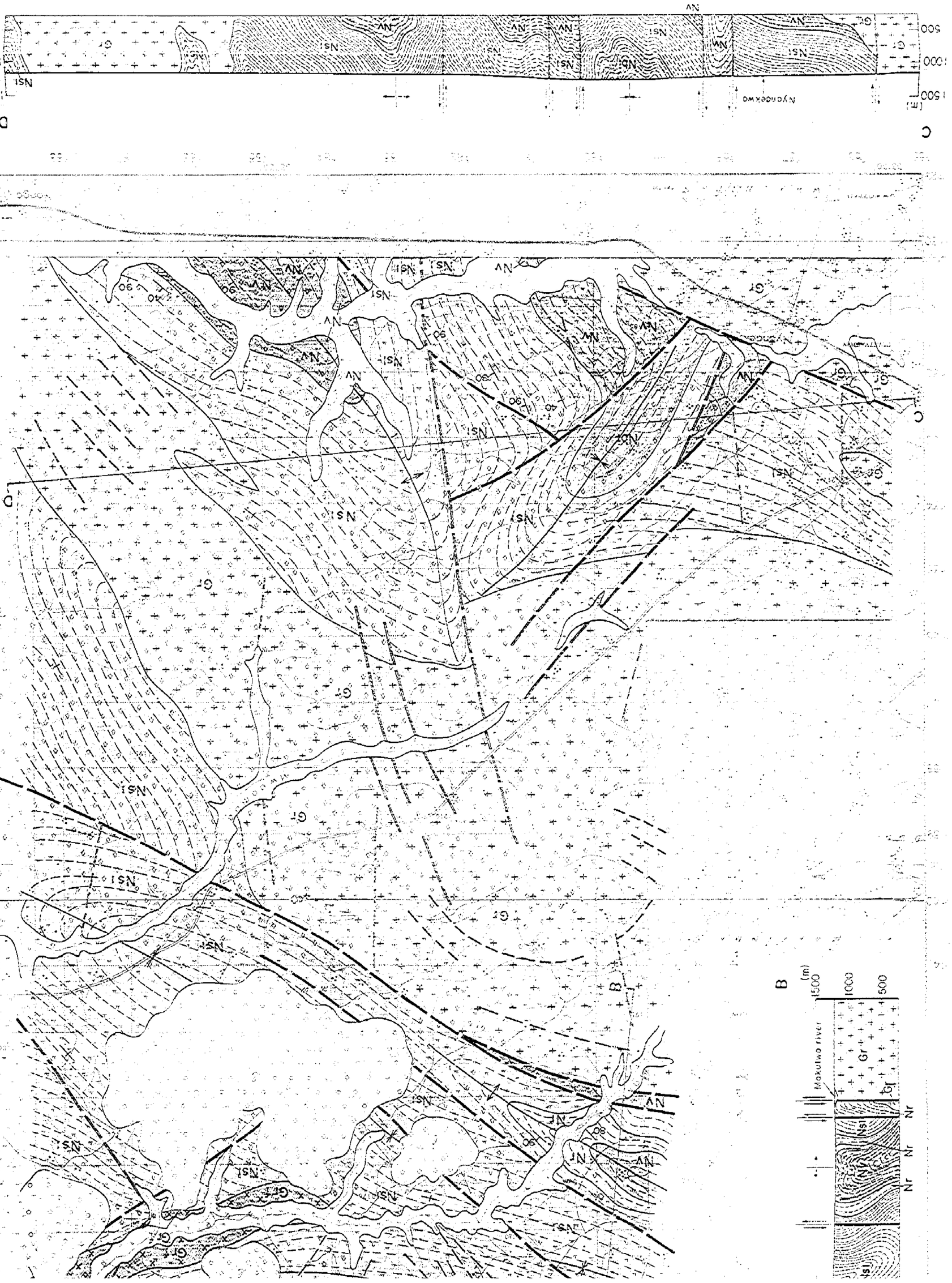


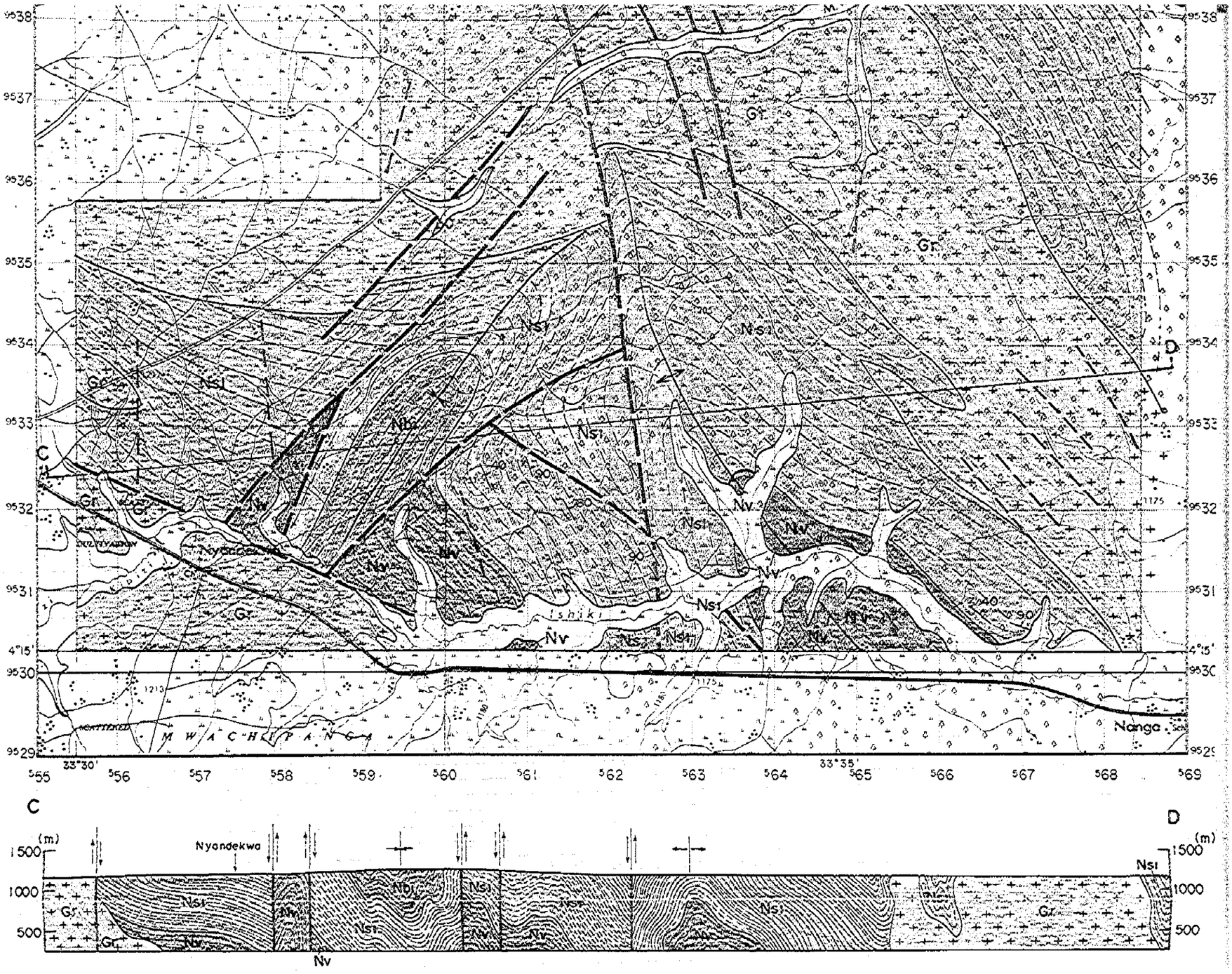



B
Nv
Nsi
Gr
Mokulwa river
500
1000
1500 (m)
MWAKINDA
MWACHILIPANGA
Nyandekwa
Ishiki
Nanga
Dam
33°30'
33°35'
4°10'
4°15'
9541
9540
9539
9538
9537
9536
9535
9534
9533
9532
9531
9530
9529
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
C
D
(m)
1500
1000
500
Nsi
Nbi
Nv
Gr

LEGEND

LEGEND

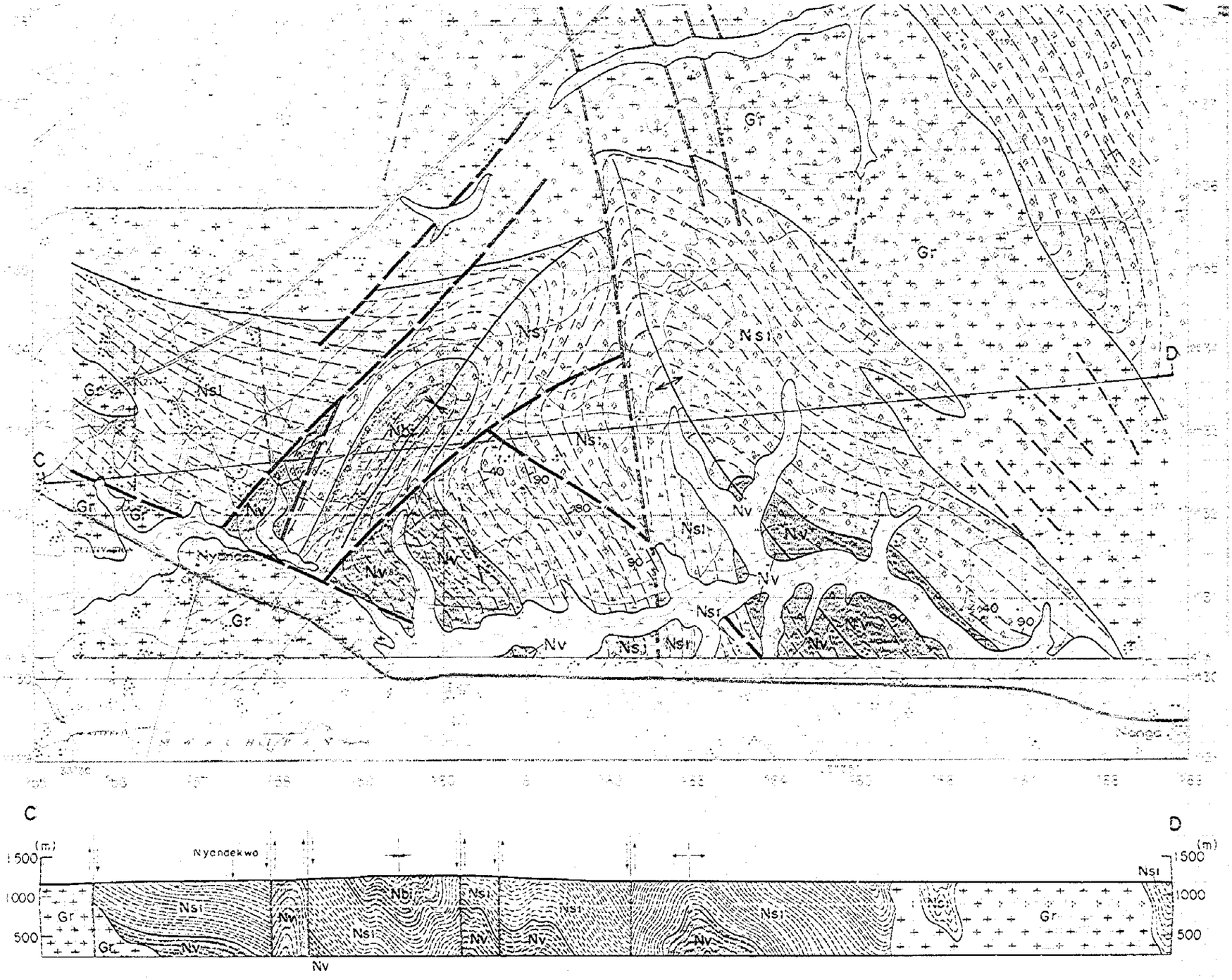




LEGEND

Recent	a — Alluvial sand and mbuga clay		Strike and dip of bedding or schistosity planes
Recent ~ Pleistocene	l — Laterite		Strike, dip indicated 90°
Intrusive Rocks	Gr — Granite, fine-grained		Estimated fault
	Gr — Granite, medium to coarse-grained		Concealed fault
Nyanzian System	Nbi — Banded Ironstone Formation		Photolineament
	Nsl — Pelitic meta-sediments (Shale and quartzite)		Geological boundary
	Nr — Meta-rhyolite		Bedding or foliation structure
	Nv — Meta-basalt and meta-dolerite		Anticline
			Syncline
		A — B	Line of section

Fig.2-3-1 Geological map of the Ibologero Area



LEGEND

Recent	Alluvial sand and mbuga clay	Strike and dip of bedding or schistosity planes	
Recent ~ Pleistocene	Laterite	Strike, dip indicated 90°	
Intrusive Rocks	Granite, fine-grained	Estimated fault	
	Granite, medium to coarse-grained	Concealed fault	
Nyanzian System	Banded Ironstone Formation	Photolineament	
	Pelitic meta-sediments (Shale and quartzite)	Geological boundary	
	Meta-rhyolite	Bedding or foliation structure	
	Meta-basalt and meta-dolerite	Anticline	
		Syncline	
		Line of section	

Fig.2-3-1 Geological map of the Ibologero Area

3-2-2 Detail of Geology

(1) Nyanzian System

Metabasalt (Nv) :

The unit is distributed along the Ishiki River near the Nyandekwa Village in the southern end of the survey area, near the Nembwe VIllage in the westernw end of the area and near the Kalangale Village in the northern part of the area. The rocks of the unit comprise dark grey to dark greenish grey, fine-grained shistose basalt (metabasalt) and dolerite. The later is composed of mainly pyroxenes and plagioclases about 1mm in size, and chloritization and pyritization are common throughout the rocks and serpentinization in a rare case. Two types of the rocks were not divided in the geological map because the exact boundary was not obtained in the present works. The dolerites are supposed to be dike facies of the basalts.

The results of whole rock analysis of these three samples are presented in Apx.9. From the plot of the results on the SiO_2 - Na + K diagram (Fig.2-1-3), the rocks correspond to basalt. The normative composition of the rocks are Olivine, Diopside, Hyperthine, Ilumenite, Anorthite, Albite and Orthclase. In the plots on the Fe (total) - Al - Mg cation triangular diagram (Fig.2-3-2) , the fine-grained basalt is in the srea of High Fe tholeite basalt, the coarse-grained basalts are in the area of High Mg tholeite basalt.

Metarhyolite (Nr) :

The unit is distributed in the western end of the area, about 4km to the southeast of the Nembwe village. The unit is estimated to overlie the metabasalt unit, and to be about 200m thick or less than it judging from the geological structure of the surrounding area.

The rocks of the unit are light brownish grey and vitreous, and contain phynocrysts of flattend quartz about 1 to 5mm in size.

The results of whole rock analysis of the two samples are presented in Apx.9. From the plot of the results on the SiO_2 - Na + K diagram (Fig.2-1-3) the rock correspond to ryolite. The normative composition of the rocks are Quartz, Albite, Orthoclase, Anorthite, Diopside and Hyperthine.

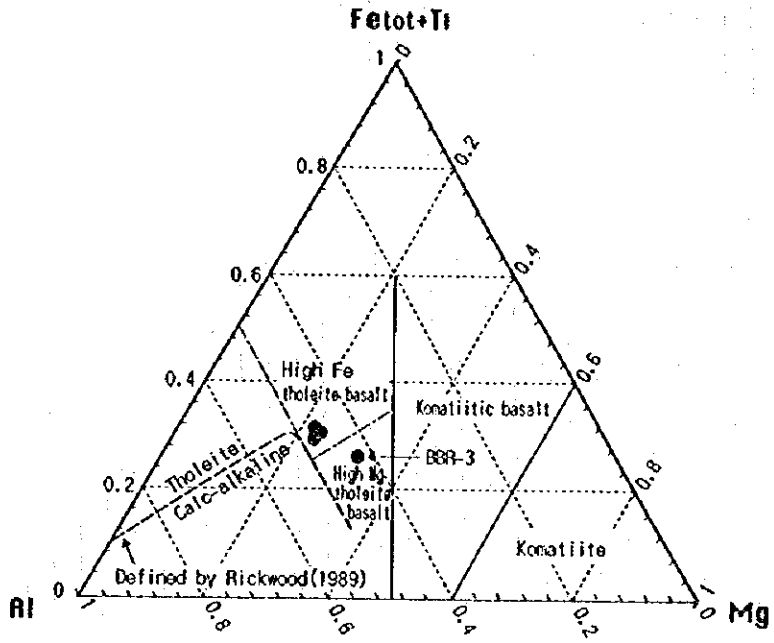


Fig.2-3-2 Classification of meta-basalts in the Ibologero Area according to the cation diagram of Jensen(1976)

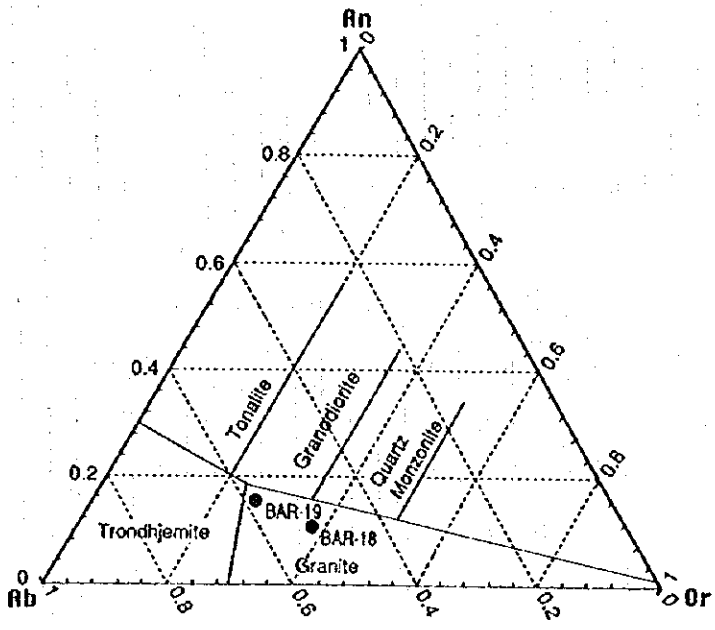


Fig.2-3-3 Classification of granitic rocks in the Ibologero Area according to their molecular normative An-Ab-Or composition after Barker(1979)

Pelitic to Psammitic Metasediments and Quartzite (Ns1) :

All rocks which overlie Metabasalt and Metaryolite units, and are underlain by Banded Ironstone Formation are drawn as a single unit in the geological map. The unit is distributed in three blocks separated by faults and granite bodies: the north block situated to the southeast of Kalangale Village , the central block to the east of Nembwe Village and the south block to the northeast of Nyandekwa Village. The thicness of the unit is estimated to be more than 1,000m, though the calcuration is very difficult because of the intense folding of the strata.

The rocks comprise mainly dark grey shale and light grey quartzite , sometimes being accompanied by shistose sandstone.

The shales, widely distributed in three blocks, contain segregated quartz veins and show shistose structure in common. At some localities in the north and central blocks, they look like phyllite and micaschist.

The quartzites, also widely distributed in three blocks like the shales, the comprise compact and brrecciated types. The compact type are light grey, and show banded structure with weak shistose structure. The brecciated type are dark grey, and have many varities of lithfacies, some of which show a pyroclastic texture. The rocks which have a texture like pyroclastics may closely related to the metaryolite unit (Nr) .

The shistose sandstone are mainly distributed in the south block, and are light grey and arkosic.

Banded Ironstone Formation (Nbi) :

The unit is distributed to the northeast of the Nyandekwa Village in the south end of the area, forming small hills. It overlies the Metasediment unit (Ns1) mentiond above , and forms a syncline with fold axies of NE trend.

The rocks are dark reddish brown in general , and consist of rhythmical thin alternating beds of quartz layers, and hematite-magnetite layers. The ratio of quartz and iron-oxide varys. Thin intercalating beds of quartzite are common throughout the unit.

(3) Granitic Rocks

The Granitic Rocks occupy an area of 40% of the Igengi area, and comprise two units: medium to coarse-grained granite in the south and fine-grained granite in the north of the area.

Radiometric dating by Rb/Sr method of granitic rocks distributed in and around Nzega Greenstone Belt, which is thought to belong to the same batholith as the granite bodies of the area shows 2520±60 Ma to 2530±25 Ma (Bell & Dodson, 1981).

Granite, medium to coarse-grained (Gr) :

The exposure of this rocks is very poor, so the area of the unit was mostly estimated from the distribution of granitic sands.

The rocks outcropping to the east of the Nyandekwa Village, mostly medium to coarse-grained (3 to 6mm in size), are composed of euhedral to subhedral plagioclase, potash-feldspar, quartz and biotite, and sometimes contain megacrysts of potash-feldspar and plagioclase (larger than 8mm in size). Chlorites are often observed in rims of biotites as secondary minerals.

Granite, fine-grained (Grf) :

The unit is widely distributed in the central to north of the area but outcrops of the fresh rocks are very rare, so the description below are mainly based on floats.

The unit varies in rock facies and mainly comprises hornblende-biotite granite and granite porphyry. Fine-grained diorites and gabbros also exist in the northwest of the area, but they are grouped into the unit because of their small exposures and fine-grained pulutonic facies.

Fine-grained biotite granites, the main facies of the unit, are composed of euhedral to subhedral plagioclase, potash-feldspar, quartz, biotite and secondary chlorite after hornblende about 1 to 3 millimeters in each size. Granite porphyry, the second major facies, is composed of phynocryst of potash-feldspar, quartz, biotite and plagioclase 2 to 3mm in size and dark grey fine-grained holocrystalline groundmass which are accompanied with chloritized biotites and hornblendes, and minor pyrites.

The results of whole rock analysis of a fine-grained granite (BBR19) and a granite porphyry (BBR18) are presented in Apx.9. The main normative minerals of both rocks are Albite, Quartz, Orthoclase, Anorthite, Diopside and Hyperthine, and the plots on normative An-Ab-Or triangular diagram (Fig.2-3-3) classify the rocks into " Granite".

(4) Quaternary

The Quaternary are composed of river sediments and Mbuga clay distributed in the lowland along Ishiki River and Mwaomba River etc. The lowland with Mbuga clay is occupying wide area along Ishiki River in the southern part of the survey area and cultivated as ricefield.

3-2-3 Geological Structure

The geological structure of the Iborogero area is mainly based on the interpretation of air photographs, distribution of granite bodies and strikes/shistsities of the Nyanzian rocks. The area is structurally divided into two sections, the north and the south, of which boundary is the fault of NW trend passing by 5km southeast of the Nembwe Village.

The South Section: In the west block of this section which is bounded on the east by a large NS fault, various faults of trnding NE, E-S and WNW-SES intersect complicatedly and the Nyanzian rocks are contacted with the coarse-grained granite in E-W and WNW-SES trends. The Nyanzian rocks, which have been strongly folded, are distributed in several separated blocks by these faults and granite bodies. In the east block, on the other hand, there are no distinct faults except small NS faults. Nyanzian rocks usually strike NW and the granites have been intruded into the Nyanzian rocks in a same way.

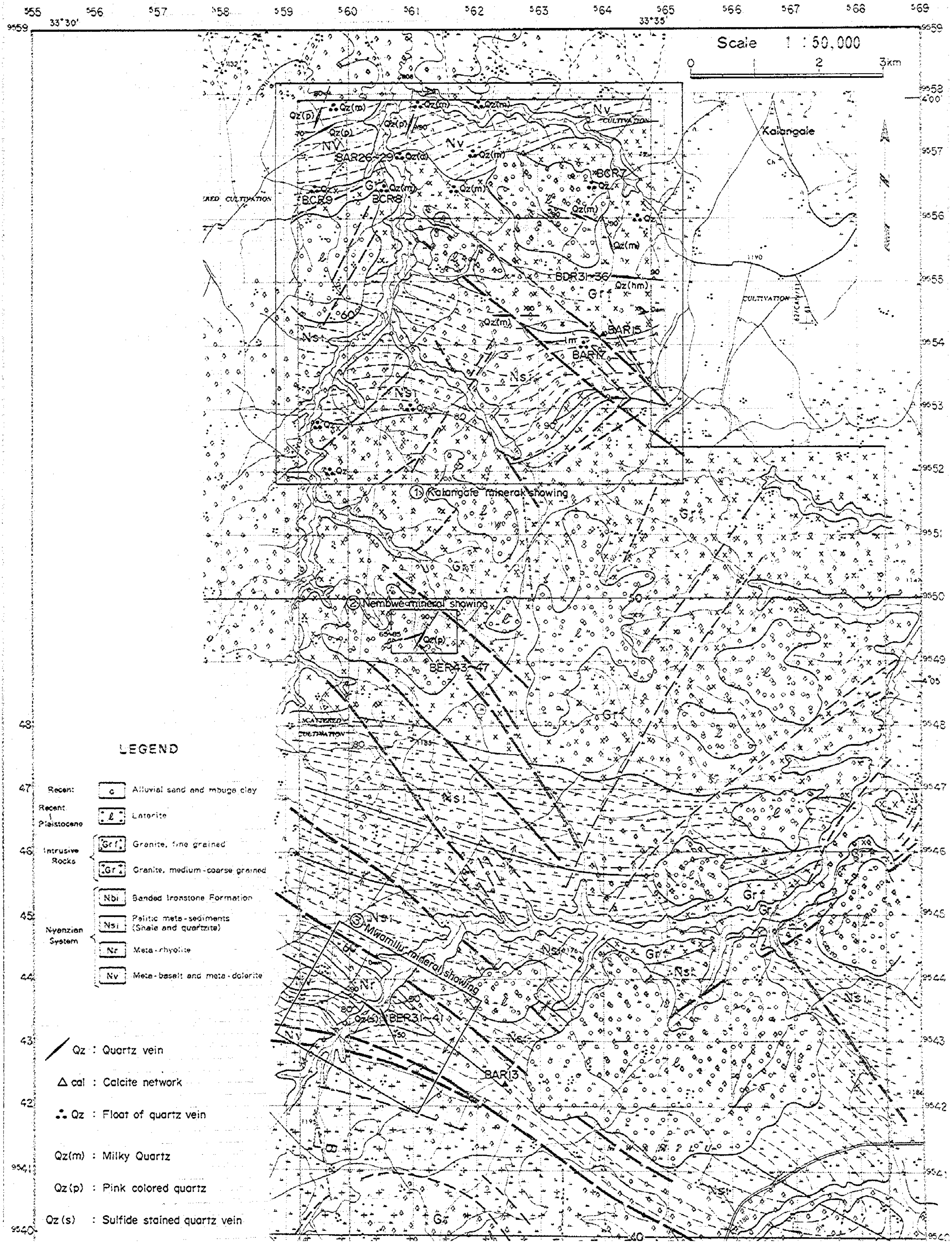
The North Section: There are many faults trending NW in the Nyanzian rocks. The biggest one among these faults divides structurally the Igengi Area into the North and South Sections as mentioned above. This is more than 10km long and divides the area roughly into the Nyanzian block and the granite block. Sheared ryolites and quartz veins parallel to the fault exist to the 500m north of the fault. Nyanzian rocks usually strike E-W, parallel to the contact between the Nyanzian rocks and granites, but strike NW in the area near the biggest fault mentioned above.

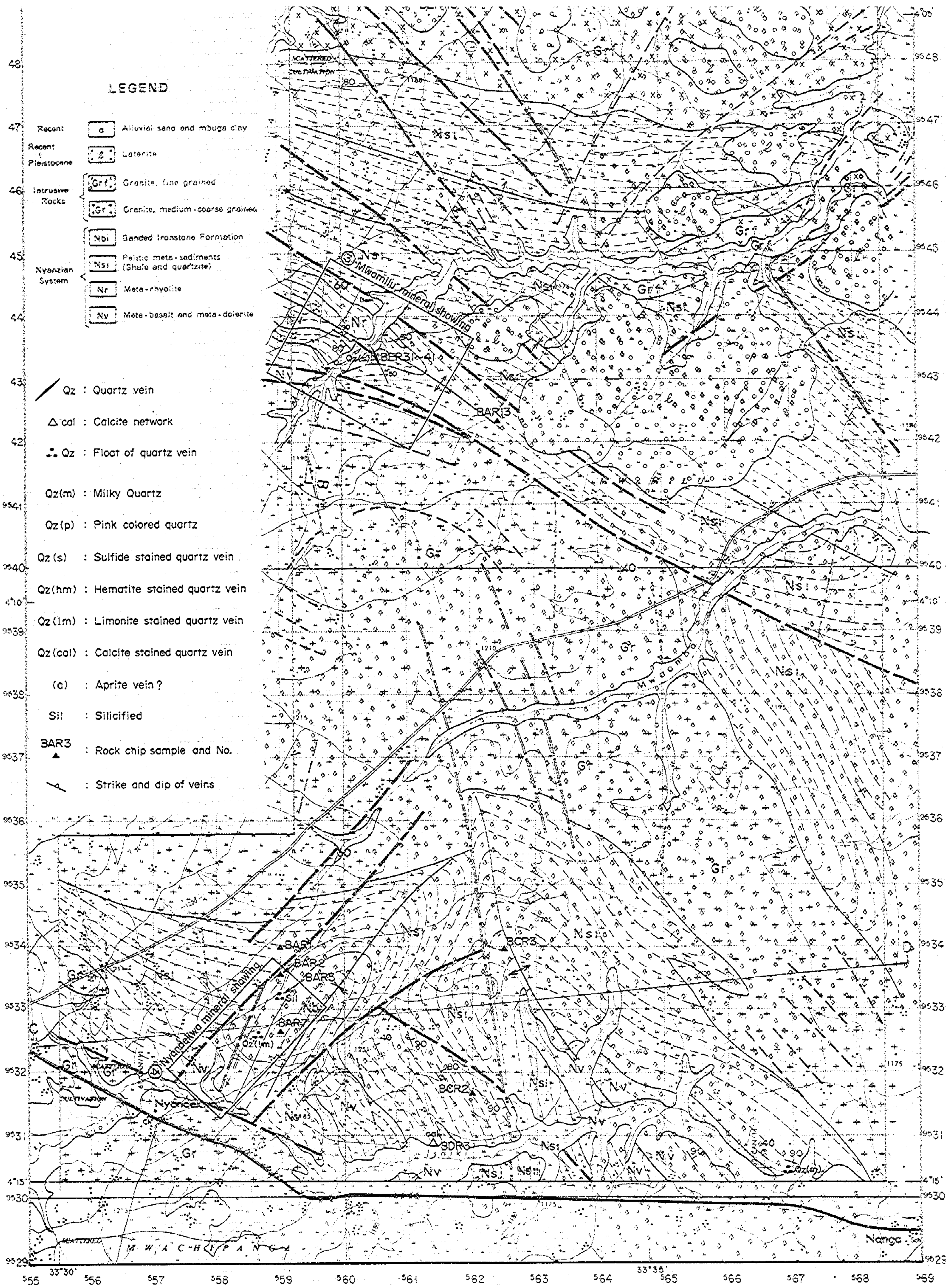
3-2-4 Mineral Showing

There is no record which indicate that any metaliferous deposits have been exploited in the Iborogero area, though the area is involved in the "Nzega Greenstone Belt (UNDP, 1991) " and is adjacent to the Hembwe and the Kinunga Prospects located 3km west and 3km north of the area respectively (Fig.1-3-3) .

Four mineral showings: 1) Kalangale, 2) Nembwe, 3) Mwamilu, 4) Nyandekwa were newly located by this year's exploration (Fig.2-3-4) .

Kalangale Showing: This showing is located in the north of the area. There is many outcrops and float zones of quartz vein in the area. They exist in the Nyanzian metabasalts and


Scale 1 : 50,000
0 1 2 3km
Kalangale
CULTIVATION
① Kalangale mineral showing
② Nembwe mineral showing
③ Mwamilu mineral showing
BAR26~29
BCR7
BCR8
BCR9
BDR31~36
BAR15
BAR17
BER43~47
BER31~41
BAR13
SCATTERED CULTIVATION
LEGEND
Recent: Alluvial sand and mbuga clay
Recent ~ Pleistocene: Laterite
Intrusive Rocks: Granite, fine grained
Granite, medium-coarse grained
Nyanzian System: Banded Ironstone Formation
Pelitic meta-sediments (Shale and quartzite)
Meta-rhyolite
Meta-basalt and meta-dolerite
Qz : Quartz vein
△ cal : Calcite network
Qz : Float of quartz vein
Qz(m) : Milky Quartz
Qz(p) : Pink colored quartz
Qz(s) : Sulfide stained quartz vein


LEGEND
Recent
Alluvial sand and mbuga clay
Recent ~ Pleistocene
Laterite
Intrusive Rocks
Grf : Granite, fine grained
Gr : Granite, medium-coarse grained
Nyanzian System
Nbi : Banded Ironstone Formation
Nsi : Pelitic meta-sediments (Shale and quartzite)
Nr : Meta-rhyolite
Nv : Meta-basalt and meta-dolerite
Qz : Quartz vein
△ cal : Calcite network
Qz : Float of quartz vein
Qz(m) : Milky Quartz
Qz(p) : Pink colored quartz
Qz(s) : Sulfide stained quartz vein
Qz(hm) : Hematite stained quartz vein
Qz(lm) : Limonite stained quartz vein
Qz(cal) : Calcite stained quartz vein
(a) : Aprite vein?
Sil : Silicified
BAR3 ▲ : Rock chip sample and No.
: Strike and dip of veins
③ Mwamilu mineral showing
④ Nyandeitwa mineral showing
BER31-41
BAR13
BAR1
BAR2
BAR3
BAR7
BCR3
BCR2
BDR3
Mwadomba
Nyanca
Nanga
M W A C H I P A N G A
33°30'
33°35'
4°10'
4°15'

Qz(m) : Milky Quartz

Qz(p) : Pink colored quartz

Qz(s) : Sulfide stained quartz vein

Qz(hm) : Hematite stained quartz vein

Qz(lm) : Limonite stained quartz vein

Qz(cal) : Calcite stained quartz vein

(a) : Aprite vein?

Sil : Silicified

BAR3 ▲ : Rock chip sample and No.

: Strike and dip of veins

Nyandekwa mineral showing

Nyundeki

Mwaombe

Nanga

MWACHIPANGA

CULTIVATION

SCATTERED

District	Sample No.	Occurrence	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Pt (g/t)
① Kalangale	BAR 15	Banded quartzite	0.002	0.34	0.01	<0.01	<0.01	<0.005
	BAR 17	Limonite stained quartzite	0.014	3.09	0.01	<0.01	<0.01	<0.005
	BAR 26	Quartz vein float (aprite?)	0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BAR 27	Quartz vein float (aprite?)	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BAR 28	Quartz vein float (aprite?)	<0.002	<0.34	<0.01	0.01	<0.01	<0.005
	BAR 29	Quartz vein float (aprite?)	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BCR 07	Quartz vein float	0.016	13.37	0.04	<0.01	<0.01	<0.005
	BCR 08	Quartz vein float	<0.002	<0.34	<0.01	<0.01	0.01	<0.005
	BCR 09	Quartz vein float	<0.002	<0.34	0.01	<0.01	0.01	<0.005
	BDR 31	Hematite stained quartz vein	<0.002	0.69	<0.01	<0.01	<0.01	<0.005
	BDR 32	Hematite stained quartz vein	0.004	1.03	<0.01	<0.01	<0.01	<0.005
	BDR 33	Hematite stained quartz vein	<0.002	<0.34	<0.01	0.01	<0.01	<0.005
	BDR 34	Hematite stained quartz vein	<0.002	<0.34	<0.01	0.01	<0.01	<0.005
	BDR 35	Hematite stained quartz vein	<0.002	1.03	<0.01	0.01	<0.01	<0.005
	BDR 36	Hematite stained quartz vein	<0.002	1.03	<0.01	0.01	<0.01	<0.005
② Nembwe	BER 43	Quartz vein, pink colored	<0.002	5.83	<0.01	<0.01	<0.01	<0.005
	BER 44	Hematite stained quartz vein	<0.002	1.71	<0.01	<0.01	<0.01	<0.005
	BER 45	Quartz vein, pink colored	<0.002	0.34	<0.01	<0.01	<0.01	<0.005
	BER 46	Quartz vein with limonite	<0.002	0.69	<0.01	<0.01	<0.01	<0.005
	BER 47	Quartz vein float	0.010	0.34	<0.01	<0.01	<0.01	<0.005
③ Mwamitu	BER 31	Quartz vein, milky white	0.006	4.46	<0.01	<0.01	<0.01	<0.005
	BER 32	Quartz vein, milky white	0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BER 33	Weathered meta-rhyolite	0.030	<0.34	<0.01	<0.01	<0.01	<0.005
	BER 34	Meta-rhyolite (shear zone)	0.048	2.40	0.01	0.01	0.01	<0.005
	BER 35	Brecciated quartz vein	0.040	6.86	0.01	<0.01	<0.01	<0.005
	BER 36	Quartz vein, milky white	0.066	5.83	<0.01	<0.01	<0.01	<0.005
	BER 37	Weathered meta-rhyolite	0.034	<0.34	<0.01	<0.01	<0.01	<0.005
	BER 38	Meta-rhyolite (shear zone)	0.014	0.34	<0.01	<0.01	<0.01	<0.005
	BER 39	Quartz vein (shear zone)	0.148	0.34	<0.01	<0.01	<0.01	<0.005
	BER 40	Quartz vein	15.900	20.57	0.04	0.02	0.02	<0.005
	BER 41	Weathered meta-rhyolite	0.106	0.34	<0.01	<0.01	<0.01	<0.005
④ Nyandekwa	BAR 02	Brecciated quartzite	<0.002	0.34	<0.01	<0.01	<0.01	<0.005
	BAR 03	Strongly silicified rock	<0.002	0.69	<0.01	<0.01	<0.01	<0.005
	BAR 07	Quartzite	0.002	0.69	0.01	<0.01	<0.01	<0.005
⑤ others	BAR 01	Brecciated quartzite	0.004	0.69	<0.01	<0.01	<0.01	<0.005
	BAR 13	Laterite	<0.002	<0.34	0.05	0.01	0.02	<0.005
	BCR 02	Meta-rhyolite	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BCR 03	Quartzite?	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BDR 03	Calcite network	<0.002	<0.34	<0.01	0.01	<0.01	<0.005

Qz Quartz, Py Pyrite, Lm Limonite, Hm Hematite

Fig. 2-3-4 Distribution map of the minaral showings in the Ibologero Area

metasediments, and granites. The quartz veins strike variously; E-W, NNE-SSW and NNW-SSE, and dip vertically in common. They are white to grey with pinkish tint and rarely contain sulfide or oxide minerals though some veins contain very small amounts of hematite. No distinct alteration and shearing of wall rocks were observed around the veins.

Assay results of 15 samples show weak mineralization of Au and Ag in two samples (BAR-17;Au:0.014g/t, Ag:3.09g/t, BCR-07;Au:0.016g/t, Ag:13.37g/t).

Nembwe Showing: This showing is located about 4km northeast of the Nembwe Village. A milky white to pinkish grey quartz vein, about 50 meters long, ranging from 40 to 60cm in width occurs in strongly weathered wallrocks which is estimated to be granitic rocks. The vein strikes NE and dips vertically. It rarely contains sulphide or oxide minerals though some films of hematite are observed at the boundary between the vein and the walls.

Assay results of 5 samples show weak mineralization of Ag in one sample (BER-43;Ag:5.83g/t), but other elements are all under detection limits or near the limits.

Mwamilu Showing: This showing is located about 5km southeast of the Nembwe Village. Five small outcrops of quartz vein are distributed in the showing (Fig.2-3-5). These quartz veins ranging from 40 to 90cm in width strikes N20° - 50°W and dips 50° - 80°E or vertically. These veins are estimated to comprise several veins which have short strike length judging from the arrangement and strikes of the veins.

The occurrences of quartz veins observed in two pre-existing pits are as followings.

Pit A: A milky white massive quartz vein (BER-36), 80cm in width and dipping about 70° NE, occurs in reddish brown strongly weathered brrecchiated to earthy metarhyolites (BER-37;hanging wall). Footwalls of the vein comprise sheared and breceiated grey quartz vein (BER-35) 15cm in width, and sheared schistose rhyorites (BER-34) 25cm in width beneath the former.

Pit B: A quartz vein (BER-40) 40cm in width, weakly disseminated by pyrites and rich in thin hematite layers, occurs in the Nyanzian metarhyolites dipping 70° - 80° NE. The footwall of the vein comprises strongly sheared metarhyolite (BER-39) 20cm in width and unweathered metarhyolites (BER-38). The hanging wall is reddish brown strongly weathered brrechiated or earthy metarhyolite (BER-41).

Assay results of 9 samples taken from Pit-A and B are shown in Table 2-3-2 and Fig.2-3-5. The results indicate distinct gold-silver mineralization associated with these veins. The highest values are Au:15.9g/t and Ag:20.6g/t in the Sample BER-40.

Nyandekwa Showing: This showing is located about 2km northeast of the Nyandekwa Village in the south of the area. The geology of the area comprises Nyanzian metashale, quartzite and banded iron rocks. Silicifide rocks and brecchiated quartzites with hematite steins and in rare case dissemination of very minor sulphides are distributed in an area about 1.5km^2. Assay results of three samples are shown in Table.2-3-2. The results do not indicate any gold nor silver mineralization.

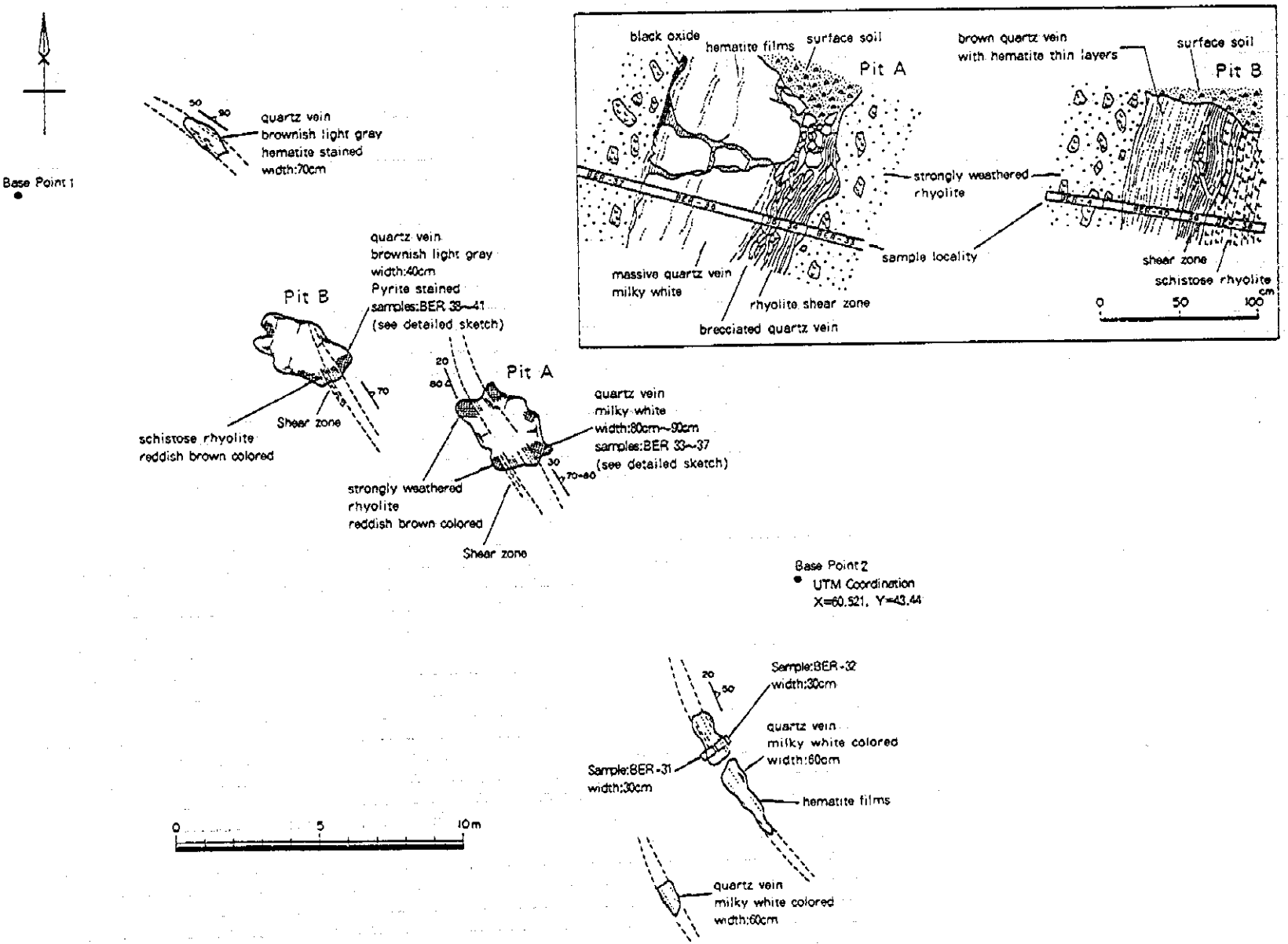


Fig. 2-3-5 Geological sketch of the Mwamilu Mineral Showing

Table 2-3-2 Results of chemical analysis for the rock samples from the Ibologero Area

District	Sample No.	Occurrence	Strike and dip	Width (m)	Minerals	Country rock	Au (g/t)	Ag (g/t)	Cu (%)	Pb (%)	Zn (%)	Pt (g/t)
① Kalangale	BAR 15	Banded quartzite	-	-	-	Quartzite	0.002	0.34	0.01	<0.01	<0.01	<0.005
	BAR 17	Limonite stained quartzite	-	-	-	Quartzite	0.014	3.09	0.01	<0.01	<0.01	<0.005
	BAR 26	Quartz vein float (aplite?)	-	-	-	Granite	0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BAR 27	Quartz vein float (aplite?)	-	-	-	Granite	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BAR 28	Quartz vein float (aplite?)	-	-	-	Granite	<0.002	<0.34	<0.01	0.01	<0.01	<0.005
	BAR 29	Quartz vein float (aplite?)	-	-	-	Granite	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BCR 07	Quartz vein float	-	-	-	Granite	0.016	13.37	0.01	<0.01	<0.01	<0.005
	BCR 08	Quartz vein float	-	-	-	Granite	<0.002	<0.34	<0.01	<0.01	0.01	<0.005
	BCR 09	Quartz vein float	-	-	-	meta-dolerite	<0.002	<0.34	0.01	<0.01	0.01	<0.005
	BDR 31	Hematite stained quartz vein	N20W 70W	0.50	Qz,(Hm)	Granite	<0.002	0.69	<0.01	<0.01	<0.01	<0.005
	BDR 32	Hematite stained quartz vein	N20W 70W	0.45	Qz,(Hm)	Granite	0.004	1.03	<0.01	<0.01	<0.01	<0.005
	BDR 33	Hematite stained quartz vein	N20W 70W	0.45	Qz,(Hm)	Granite	<0.002	<0.34	<0.01	0.01	<0.01	<0.005
	BDR 34	Hematite stained quartz vein	N20W 70W	0.50	Qz,(Hm)	Granite	<0.002	<0.34	<0.01	0.01	<0.01	<0.005
	BDR 35	Hematite stained quartz vein	N20W 70W	0.40	Qz,(Hm)	Granite	<0.002	1.03	<0.01	0.01	<0.01	<0.005
	BDR 36	Hematite stained quartz vein	N20W 70W	0.50	Qz,(Hm)	Granite	<0.002	1.03	<0.01	0.01	<0.01	<0.005
② Nembwe	BER 43	Quartz vein, pink colored	N10E 90	0.25	Qz	Granite	<0.002	5.83	<0.01	<0.01	<0.01	<0.005
	BER 44	Hematite stained quartz vein	N70E 65N	0.20	Qz,(Hm)	Granite	<0.002	1.71	<0.01	<0.01	<0.01	<0.005
	BER 45	Quartz vein, pink colored	N70E 65N	0.20	Qz	Granite	<0.002	0.34	<0.01	<0.01	<0.01	<0.005
	BER 46	Quartz vein with limonite	N80E 85N	0.30	Qz,(Lm)	Granite	<0.002	0.69	<0.01	<0.01	<0.01	<0.005
	BER 47	Quartz vein float	-	-	Qz	Granite	0.010	0.34	<0.01	<0.01	<0.01	<0.005
③ Mwamilu	BER 31	Quartz vein, milky white	N20W 50E	0.30	Qz,(Hm)	Meta-rhyolite	0.006	4.46	<0.01	<0.01	<0.01	<0.005
	BER 32	Quartz vein, milky white	N20W 50E	0.30	Qz,(Hm)	Meta-rhyolite	0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BER 33	Weathered meta-rhyolite	N30W 80W	0.50	(Hm)	Meta-rhyolite	0.030	<0.34	<0.01	<0.01	<0.01	<0.005
	BER 34	Meta-rhyolite (shear zone)	N30W 80W	0.25		Meta-rhyolite	0.048	2.40	0.01	0.01	0.01	<0.005
	BER 35	Brecciated quartz vein	N30W 80W	0.20	Qz,(Hm)	Meta-rhyolite	0.040	6.86	0.01	<0.01	<0.01	<0.005
	BER 36	Quartz vein, milky white	N30W 80W	0.80	Qz	Meta-rhyolite	0.066	5.83	<0.01	<0.01	<0.01	<0.005
	BER 37	Weathered meta-rhyolite	N30W 80W	0.50	(Hm)	Meta-rhyolite	0.034	<0.34	<0.01	<0.01	<0.01	<0.005
	BER 38	Meta-rhyolite	N20W 80W	0.40	(Hm)	Meta-rhyolite	0.014	0.34	<0.01	<0.01	<0.01	<0.005
	BER 39	Ryolite (shear zone)	N20W 80W	0.20	Qz,(Hm)	Meta-rhyolite	0.148	0.34	<0.01	<0.01	<0.01	<0.005
	BER 40	Quartz vein	N20W 80W	0.40	Qz,(Hm,Py)	Meta-rhyolite	15.900	20.57	0.04	0.02	0.02	<0.005
	BER 41	Weathered meta-rhyolite	N20W 80W	0.50	(Hm)	Meta-rhyolite	0.106	0.34	<0.01	<0.01	<0.01	<0.005
④ Nyandekwa	BAR 02	Brecciated quartzite	-	-	Qz,(Hm)	Quartzite	<0.002	0.34	<0.01	<0.01	<0.01	<0.005
	BAR 03	Strongly silicified rock	-	-	Qz,(Hm)	?	<0.002	0.69	<0.01	<0.01	<0.01	<0.005
	BAR 07	Quartzite	-	-	Qz,(Hm)	Quartzite	0.002	0.69	0.01	<0.01	<0.01	<0.005
⑤ others	BAR 01	Brecciated quartzite	-	-	Qz,(Hm)	Quartzite	0.004	0.69	<0.01	<0.01	<0.01	<0.005
	BAR 13	Laterite	-	-	-	Pelitic schist	<0.002	<0.34	0.05	0.01	0.02	<0.005
	BCR 02	Meta-rhyolite	-	-	-	Meta-rhyolite	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BCR 03	Quartzite?	-	-	-	Quartzite?	<0.002	<0.34	<0.01	<0.01	<0.01	<0.005
	BDR 03	Calcite network	-	-	Cal	Meta-basalt	<0.002	<0.34	<0.01	0.01	<0.01	<0.005

Qz:Quartz, Py:Pyrite, Lm:Limonite, Hm:Hematite

3-3. Geochemical Exploration

Analysis result of the soil sample (Apx. 14) input it into a computer for statistics handling of data. Using this input data, a quantity of basic statistics was calculated, and single variate analysis and multi-variate analysis were done. Replaced it in a half value of detection limit value and, about the case, data less than detection limit value, handled it in convenience entirely.

(1) Single variate analysis : Each elemental analysis value was expressed by a diameter of black circle, and a plot was done to collection spot on a topographical map, and the other element place chemistry distribution map was made.

(2) Multi-variate analysis : As multi-variate analysis, correlation analysis, cluster analysis and factor analysis were done.

3-3-1 Results of Single variate Analysis

Analytical result of the soil samples, basic statistics of each element and their histograms are shown in Apx. 14, Table 2-3-3 and Apx. 12 respectively.

Table 2-3-3 Basic statistics, Ibologero Area

	Au	Ag	As	Cu	Mo	Pb	Sb	Zn	Hg	W	Bi
Detection limit	1	0.2	1	1	1	1	0.2	1	10	2	0.1
Minimum value	<1	<0.2	1.00	7.00	<1	<1	<0.2	7.00	<10	<2	0.10
Maximum value	24	0.3	240	136	8	29	9	340	230	15	7.5
Standard deviation	1.43	1.10	2.30	1.84	1.49	1.68	1.81	1.60	2.03	1.55	2.56
Mean	0.54	0.10	2.58	18.26	0.60	5.96	0.17	22.93	10.20	2.99	0.14
Mean+sd.	0.78	0.11	5.92	33.66	0.90	9.99	0.32	36.66	20.66	4.63	0.35
Mean+2 x sd.	1.12	0.12	13.61	62.06	1.34	16.75	0.57	58.63	41.87	7.15	0.91

Each elemental geochemical distribution map is shown with APX. 13. A characteristic of each elemental distribution is shown below;

Au: The values more than detection limit value of 1 ppb, including the maximum value of 24 ppb, do not exceed 7.4 % of the total. The values more than the detection limit are scattered all over the area. The maximum value exists in northern area apart from the other.

Ag: The values more than detection limit value of 0.2 ppm do not exceed 1.8 % of the total. Most

of the values are concentrated in the northeastern area which includes one of the 2 maximum values of 0.3 ppm

As: The mean value of 2.6ppm in the Ibologero area is quite low comparing to the other areas having more than 10 ppm. The maximum value of 240 ppm stands alone in southern area.

Cu: Supposing the values more than 60 ppm are anomalous values, they are equivalents to 2.5 % of the total. They are comparatively gathered up in northern and southern areas. The maximum value of 136 ppm locates in one of anomalous zones of northern area.

Mo: The values more than 1 ppm of the detection limit value are equivalents to approximately 20 % of the total. The ratio is quite high comparing to the ones in the other areas. All of the highest 21 values are concentrated in northern area and form a remarkable anomalous zone.

Pb: The mean value of 6 ppm in the Ibologero area is quite low comparing to the other areas having more than 10 ppm. Generally, the values in southern area are higher than the ones in northern area. The maximum value of 29 ppm and the 9 high values more than 10 ppm are all located in southern area.

Sb: The values less than the detection limit value of 0.2 ppm occupy 56 % of the total. Generally the values in the area are quite low except for the maximum value of 9 ppm exists in southern area apart from the other high values. There is no characteristic of distribution to be mentioned more.

Zn: Generally, the values in central and northern area are higher than the ones in southern area. The maximum value of 340 ppm exist in southeast edge, but the values around the point are rather low.

Hg: There are 12 high values more than 100 ppb including the maximum value of 230 ppb. They are broadly scattered in the central and northern area and form no anomalous zone.

W: There are 4 high values more than 10 ppm. Three of them including the maximum value of 15 ppm exists concentrated in southern margin of the area.

Bi: Bi of the Ibologero area shows a characteristic distribution. There are 17 high values more than 2 ppm. All of them are concentrated in northern area with a remarkable NE-SW trend.

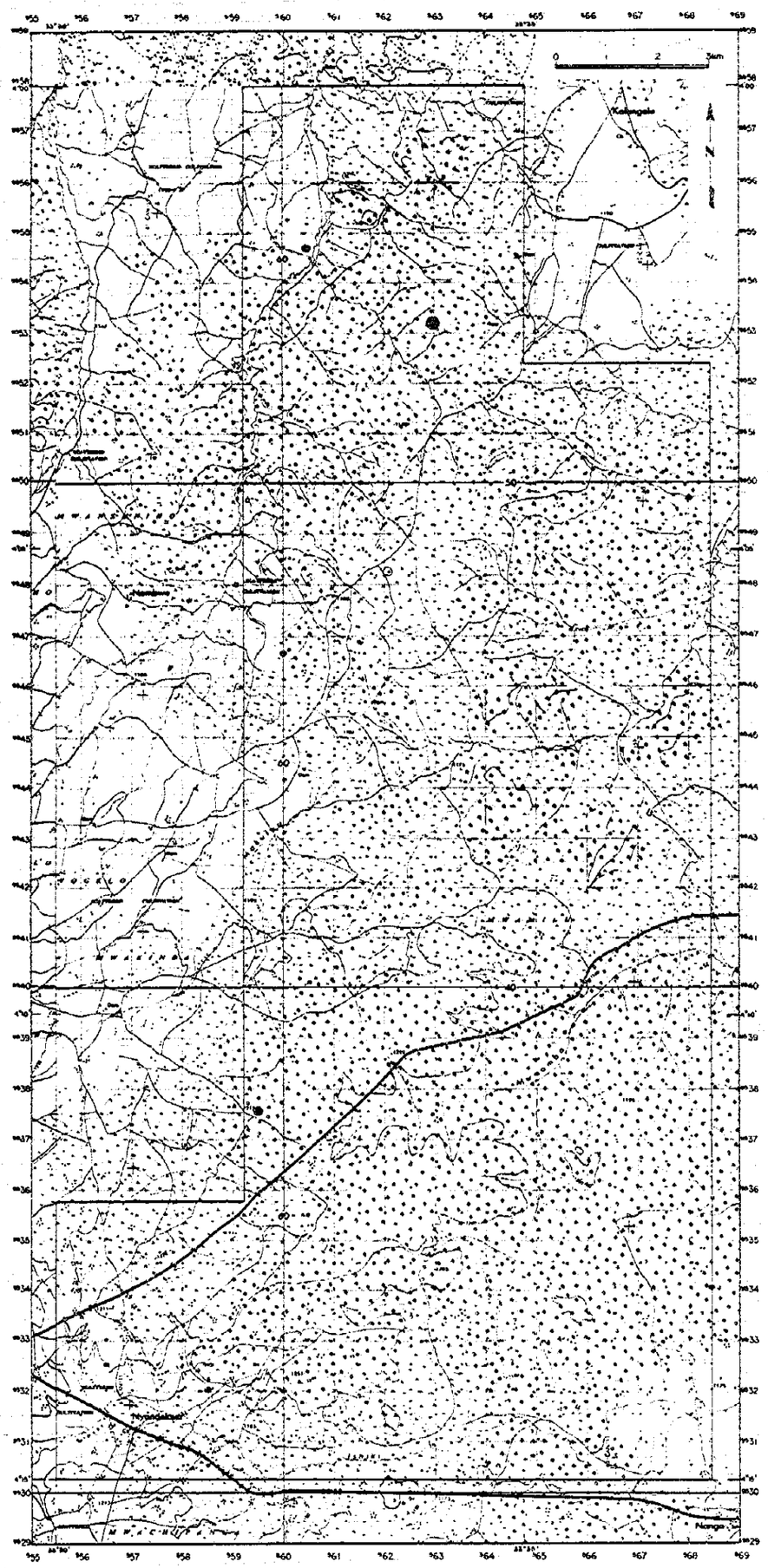


Fig. 2-3-6-(1) Distribution of Au in the Ibologero Area

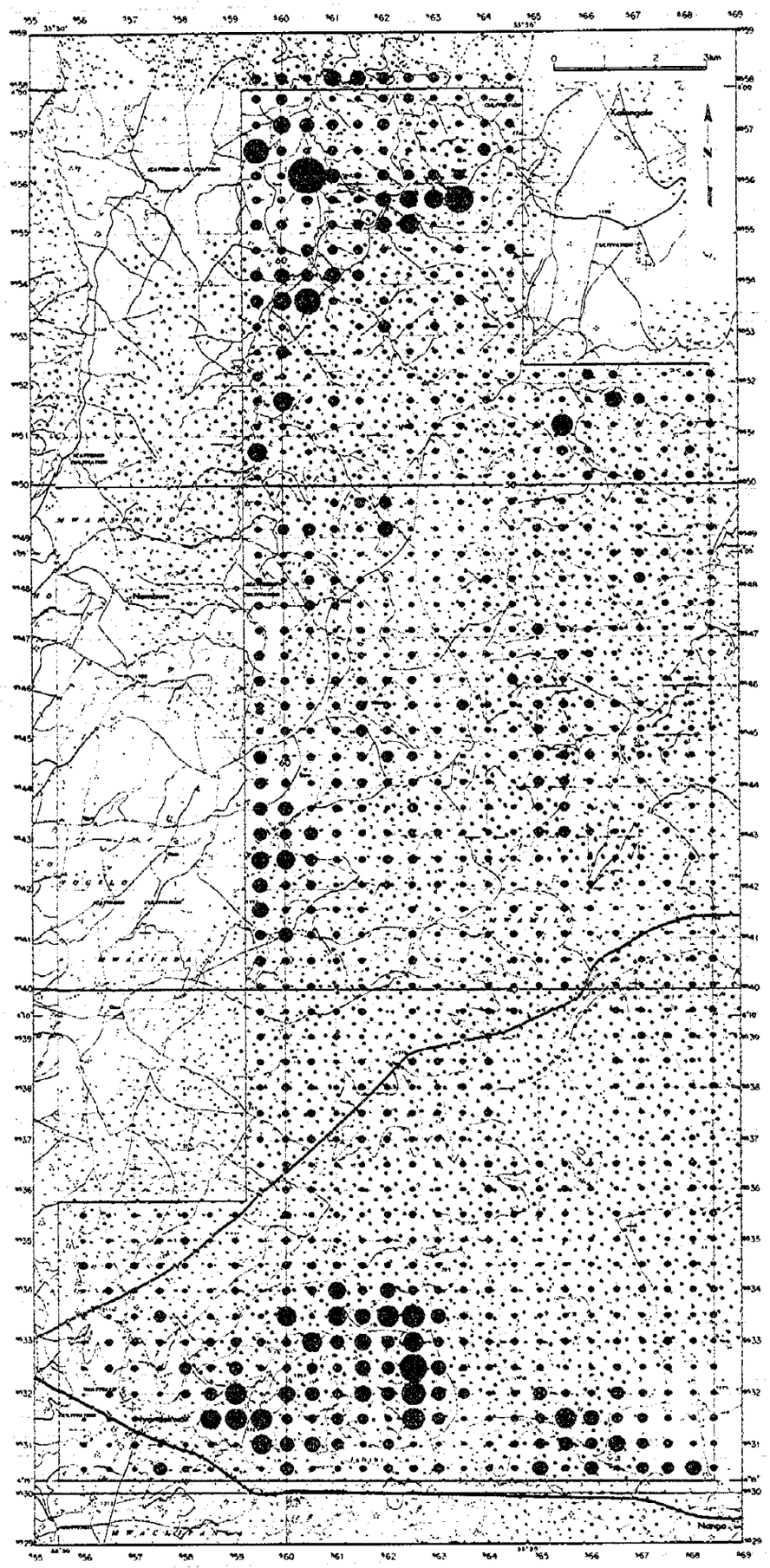


Fig. 2-3-6-(2) Distribution of Cu in the Ibologero Area

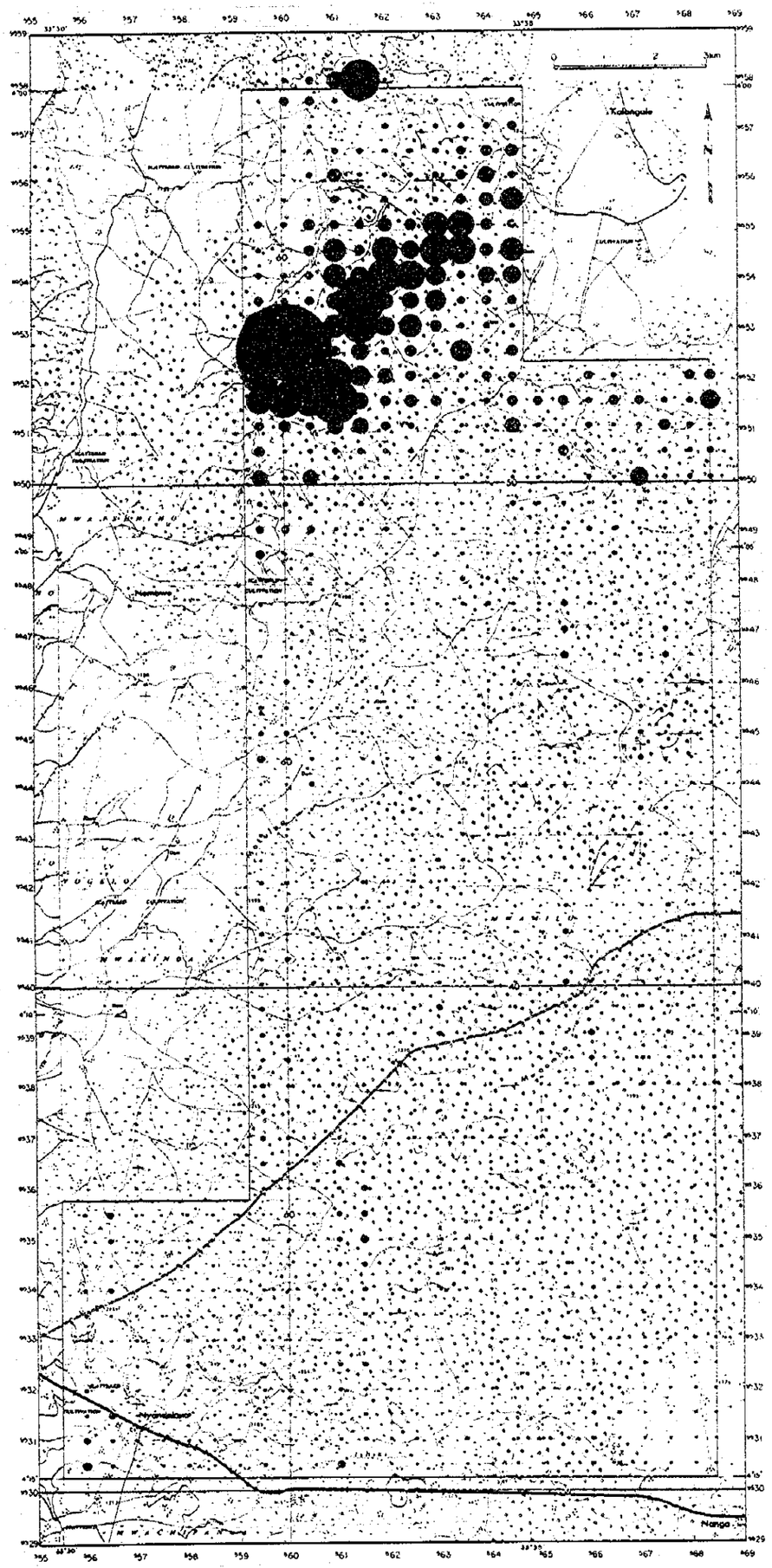


Fig. 2-3-6-(3) Distribution of Bi in the Ibologero Area