The correlation coefficients between indicators on a logarithmic base were calculated for each geological units. In the geological units, correlation coefficients between respective indicators were small, suggesting that the origins of individual indicators are different from each other. TABLE 2-3-2 show the correlation coefficients on corresponding rock codes. Results of interpretation are summarized below:

Rock code 3 : The medium correlation coefficient was obtained in this rock code. That is, Bi-Zn, Cu-Cr, Zn-Ni, Cr-Ni, and Cr-Fe show correlations of medium degree. On the other hand, Cu-Fe, Zn-Fe, and Ni-Fe have strong correlation.

Rock code 4 : Indicators of Cu-Ni, Cu-Fe, and Zn-Fe show correlation of medium degree.

Rock code 5 : Indicators of Cu-Zn, Zn-Fe, and Ni-Fe, show medium correlations. Cu-Ni an Cu-Fe have strong correlation

2-1-3 Interpretation

Principal Component Analysis

After determining the correlation coefficients between indicators, which cannot be extracted by single variable analyses, from multi-dimensional distribution characteristics, these were applied to the determination of character and the evaluation of geochemical anomalies. Results of analysis are shown in TABLE 2-3-3. General characteristics of each geological unit are summarized below:

Rock code 3 : As shown in TABLE 2-2-3(1), the contribution ratio for the first principal component to all the principal components is about 35 %, occupying one third of all. The total to the ratio of the fifth principal component amounts to 80 % approximately, so that a greater part of the fluctuation of all the components can be explained by them. However, the contribution ratio of each principal is general small and not decisive. Each component drops gradually and does not change markedly.

For the first principal component, Bi, Zn, and Cr show a medium correlation values of 0.45～0.67. On the other hand, Cu, Ni, and Fe have strong correlation values of 0.85～0.95. Therefore, the first principal component is characterized by high concentration of these indicators.

The second principal component is characterized by medium correlation of Ag and Cr, and negative medium correlation(-0.48～-0.52) with Au and F.

The third principal component has medium correlations(0.69) with Bi, and F. It means anomalous concentrations of these indicators are shown as high core val-

ues.

The fourth principal component shows a strong correlation(0.76) with As and a negative medium correlation(-0.53) with Au.

The fifth principal component is characterized by medium correlations(0.58 ~0.61) with Au and As. Therefore, the principal component is worth notice for the survey of gold, although the contribution ratio is as small as 9 %.

Rock code 4 : As shown in TABLE 2-2-2(2), the contribution ratio for the first principal component to all the principal components is about 21 %, occupying one fifth of all. The total to the ratio of the fifth principal component amounts to 70 % approximately, so that a greater part of the fluctuation of all the components can be explained by them. However, the contribution ratio of each principal is generally small and not decisive. Each component, except for the first principal component, drops gradually and does not change markedly.

For the first principal component, Cu, Cr, and Fe show medium to strong correlation value(0.67~0.80). Therefore, the first principal component correlates to the indicators and reflects as high scores to the concentration of the indicators.

The second principal component is characterized by a strong correlation(0.71) with Ag. On the other hand, negative medium correlations(-0.41 ~-0.71) with As and F are detected. High scores and low negative scores are expected in the concentration of these indicators.

The third principal component has a negative medium correlation(-0.54) with F, and a strong correlation(0.77) with Ni. Therefore, high and low negative scores are expected for the concentration of these indicators.

The fourth principal component is characterized by a strong correlation (0.80) with Au. The component is worth notice for the gold exploration, although the contribution ratio is as low as 10 %.

The fifth principal component show only a strong correlation(0.88) with Bi. No any significant geochemical characteristics were detected.

Rock code 5 : As shown in TABLE 2-2-2(3), the contribution ratio for the first principal component to all the principal components is about 26 %, occupying one fourth of all. The total to the ratio of the fifth principal component amounts to 74 % approximately, so that a greater part of the fluctuation of all the components can be explained by them. However, the contribution ratio of each component is generally small and not decisive. Each component, except for the first

and second principal components, drops gradually and does not change markedly.

For the first principal component, Cu, Ni, and Fe show a strong correlation values (0.84～0.92). Therefore, the first principal component correlates to the indicators and reflects as high scores to the concentration of the indicators.

The second principal component is characterized by strong correlations (0.87～0.89) with Ag, and Bi.

The third principal component has a medium and a strong correlations(0.52～0.60) with F, and Zn. On the other hand, negative medium correlations(-0.41～-0.46) with As and Cr are detected.

The fourth principal component is characterized by strong correlation (0.94) with Au. The component is worth notice for the gold exploration, although the contribution ratio is as low as 10 %.

The fifth principal component show a strong correlation(0.82) with As and a negative medium correlation(-0.45) with Cr.

Au Concentration and Principal Component Scores

The concentration distribution of Au in this surveyed zone indicates that there is no anomalous zone with remarkable continuity (see FIG. 2-3-3). Since Juwere mineralized zones (I and II) have been found in this zone, as mentioned above, it was expected that an association between the zones and geochemical anomalies would be found. However, no noteworthy anomaly was found by geochemical soil survey around these mineralized zones.

No special relationship was found between geochemical anomalies and geology for mafic granulite, felsic granulite and gneissose granulite distributed in this zone.

The distribution of Au does not seem to be controlled by a specific geology or geography, since Au is distributed in a scattered manner.

Contrasts can generally be evaluated as low, except that Cr in the soil of code 5 rock has a slightly higher contrast.

Principal component highly related to Au were the fifth component for code 3 and the fourth component for codes 4 and 5. The score distributions of such components are shown in FIG. 2-2-4. The figure shows a scattered distribution of high scores, and no promising zone could be specified. This may suggest that contribution ratios of these principal components are relatively small and the relationship with Au may be diluted by the effects of other indicators.

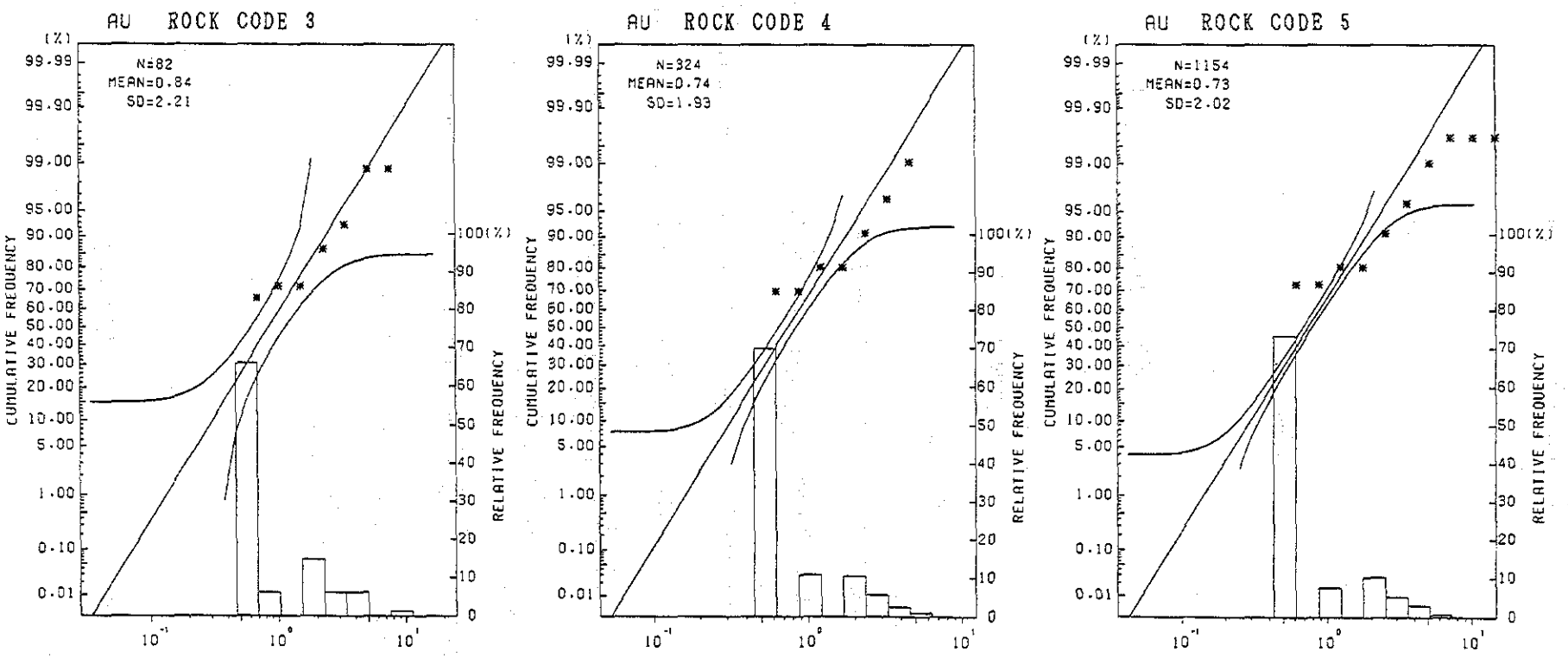

FIG. 2-2-2 Frequency Distribution and Cumulative Frequency Curve(Au;Juwere Zone)

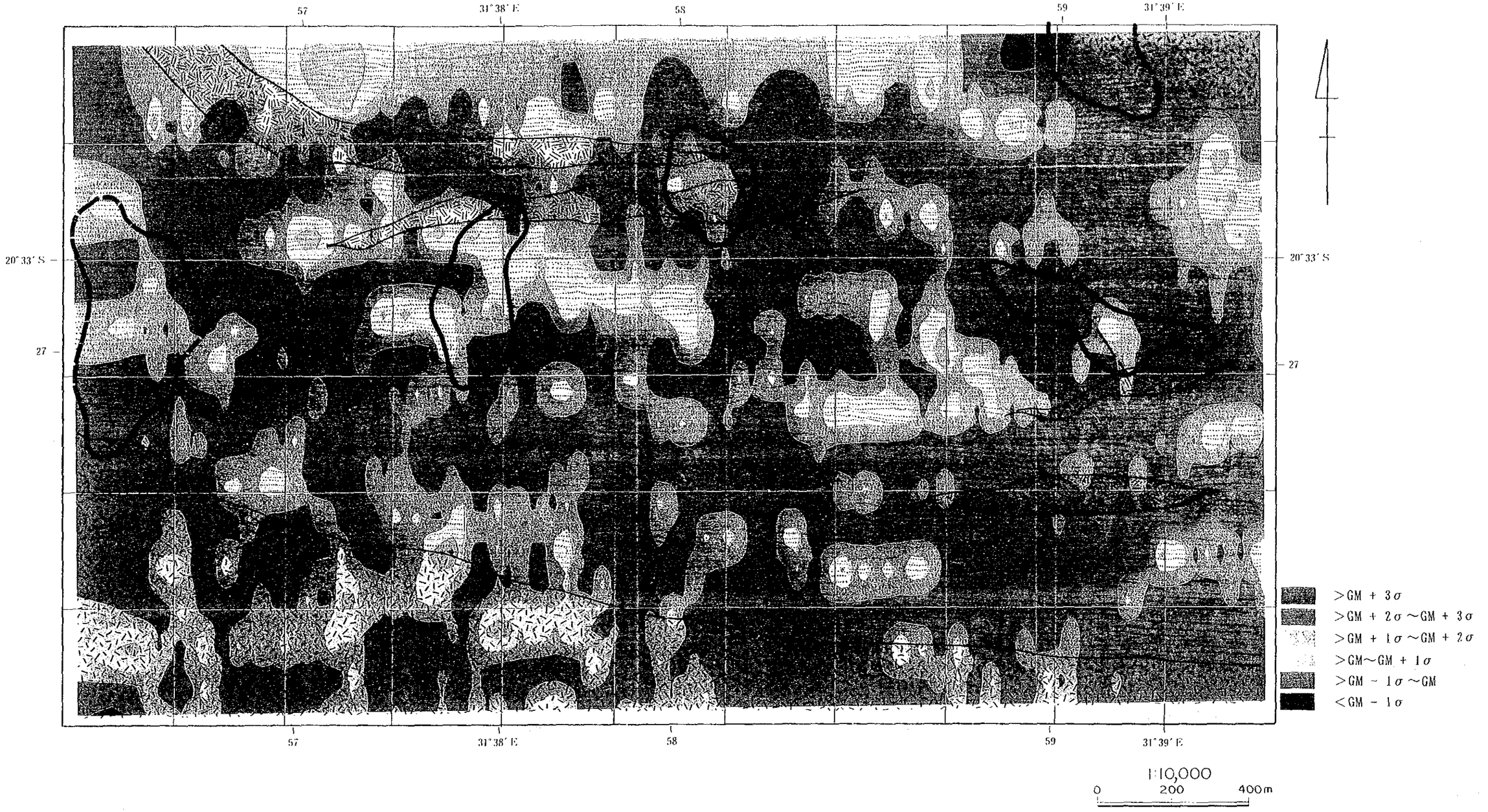

FIG. 2-2-3 Gold Distribution(Juwere Zone)

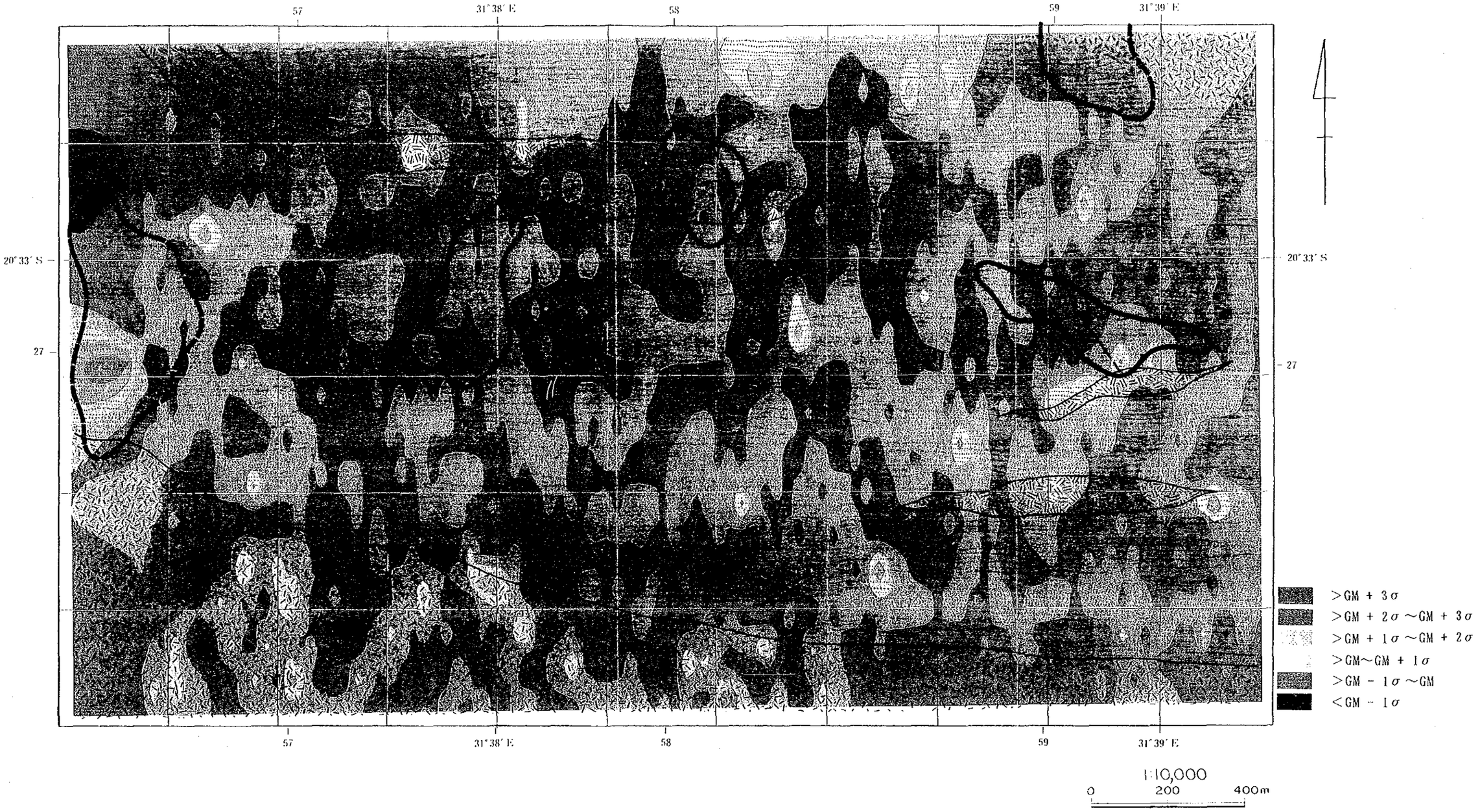

FIG. 2-2-4 Distribution of Principal Component Scores (Juwere Zone)

TABLE 2-2-1 Statistical Parameter of Indicators (Juwere Zone)

SOIL <ROCK CODE>	NO. OF SAMPLE	GEOMETRIC MEAN (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)		THRESHOLD (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)	
													1.86	0.81	1.65	0.05	112	64	117	251	113	10.71	←g.m.+ s.d
MAFIC GRANULITE	82	0.84	0.47	0.73	0.05	47.05	31.58	75.28	111.66	54.49	5.83	←g.m.	4.12	1.40	3.73	0.06	269	129	182	565	234	19.69	←g.m.+2 s.d.
<3>		2.22	1.72	2.26	1.08	2.39	2.02	1.55	2.25	2.07	1.84	←s.d.	9.14	2.40	8.44	0.06	642	261	283	1,270	484	35.19	←g.m.+3 s.d.
													1.44	0.53	0.84	0.05	8	153	75	57	18	2.24	←g.m.+ s.d
FELSIC GRANULITE	324	0.74	0.34	0.58	0.05	4.30	71.25	40.92	31.95	4.41	1.70	←g.m.	2.78	0.82	1.22	0.06	16	329	136	103	73	2.95	←g.m.+2 s.d.
<4>		1.94	1.55	1.46	1.06	1.92	2.15	1.82	1.80	4.07	1.32	←s.d.	5.39	1.27	1.77	0.06	30	707	247	185	297	3.89	←g.m.+3 s.d.
													1.48	0.50	1.39	0.06	36	139	103	166	57	5.14	←g.m.+ s.d
GNEISSOSE GRANULITE	1,154	0.73	0.32	0.66	0.05	12.20	54.70	48.08	62.36	13.28	2.48	←g.m.	3.01	0.79	2.95	0.07	109	355	222	443	246	10.65	←g.m.+2 s.d.
<5>		2.03	1.58	2.12	1.16	2.99	2.55	2.15	2.66	4.30	2.07	←s.d.	6.11	1.25	6.24	0.08	325	903	476	1,179	1,056	22.06	←g.m.+3 s.d.

	NO. OF SAMPLE	MINIMUM VALUE (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)	MAXIMUM VALUE (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)
MAFIC GRANULITE <3>	82	0.50	0.25	0.50	0.05	10.00	10.00	18.00	18.00	10.00	1.19	8.00	1.30	46.00	0.10	287	160	198	660	206	18.88
FELSIC GRANULITE <4>	324	0.50	0.25	0.50	0.05	0.50	10.00	13.00	1.00	0.50	0.86	6.00	1.80	11.00	0.10	23	450	2,350	226	621	4.64
GNEISSOSE GRANULITE <5>	1,154	0.50	0.25	0.50	0.05	0.50	10.00	9.00	1.00	5.00	0.56	115.00	11.00	240.00	1.10	432	650	5,050	5,400	294	22.09

g.m. : geometric mean s.d. : standard deviation

ROCK CODE	Au (PPB)	Ag (PPM)	As (PPM)	Bi (PPM)	Cu (PPM)	P (PPM)	Zn (PPM)	Cr (PPM)	Ni (PPM)	Fe (%)
ALL ZONES										
R.C.3	1.73	0.63	2.25	0.06	61.57	26.42	90.47	215.97	153.32	6.89
R.C.4	0.98	0.48	0.58	0.05	8.82	23.02	40.41	30.92	11.77	1.96
R.C.5	0.93	0.53	0.66	0.05	12.86	30.30	37.45	44.07	19.23	1.90
JUWERE ZONE (SOIL)										
R.C.3	0.84	0.47	0.73	0.05	47.05	31.58	75.28	111.66	54.49	5.83
R.C.4	0.74	0.37	0.58	0.05	4.30	71.25	40.92	31.95	4.41	1.70
R.C.5	0.73	0.32	0.66	0.05	12.20	54.70	48.08	62.36	13.28	2.48

ROCK TYPE	Au (PPB)	Ag (PPM)	As (PPM)	Bi (PPM)	Cu (PPM)	F (PPM)	Zn (PPM)	Cr (PPM)	Ni (PPM)	Fe (%)
MAFIC ROCK	4.00	0.10	2.00	0.01	100	370	130	200	160	8.56
INT. ROCK	----	0.07	2.40	0.01	35	500	72	50	55	5.85
FELSIC ROCK	4.50	0.05	1.00	0.01	20	800	28	25	8	2.70
GRANITE	1.00	0.05	0.25	0.43	12	1,250	85	7	5	1.85
MICA SCHIST	----	0.30	----	----	30	----	70	50	45	4.90

<After Flanagan(1976) & Vinogradov(1962)>

JUWERE ZONE (ROCK)										
R.C.3	0.50	0.25	1.00	0.05	37	95	102	158	98	9.16
R.C.4	0.50	0.25	1.00	0.05	3	35	126	1	84	0.87
R.C.5	1.48	0.25	0.79	0.05	13	128	83	17	32	2.62

INT. ROCK : INTERMEDIATE ROCK
---- : NO DATA

TABLE 2-2-2(1) Matrix of Correlation Coefficients (Juwere Zone)

	Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
Au	1.00									
Ag	-0.21	1.00								
As	-0.30	0.07	1.00							
Bi	0.12	0.08	0.19	1.00						
Cu	0.15	-0.24	0.12	0.23	1.00					
F	0.14	-0.08	0.05	0.10	-0.13	1.00				
Zn	0.05	-0.10	0.13	0.63	0.36	0.15	1.00			
Cr	-0.05	0.05	0.08	0.20	0.62	-41.00	0.15	1.00		
Ni	0.10	-0.15	0.10	0.20	0.83	-0.11	0.52	0.63	1.00	
Fe	0.08	-0.17	0.11	0.17	0.94	-0.04	0.73	0.49	0.77	1.00

TABLE 2-2-2(2) Matrix of Correlation Coefficients (Juwere Zone)

	Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
Au	1.00									
Ag	-0.07	1.00								
As	0.03	-0.14	1.00							
Bi	-0.50	-0.06	-0.03	1.00						
Cu	0.03	-0.09	0.24	0.05	1.00					
F	0.14	-0.09	0.11	0.01	0.04	1.00				
Zn	0.01	0.36	-0.06	-0.03	0.20	-0.13	1.00			
Cr	-0.20	0.20	0.09	0.02	0.24	0.01	0.10	1.00		
Ni	0.15	-0.22	0.31	0.09	0.55	0.13	0.14	0.01	1.00	
Fe	0.02	0.35	0.04	0.04	0.46	0.05	0.44	0.30	0.35	1.00

TABLE 2-2-2(3) Matrix of Correlation Coefficients (Juwere Zone)

	Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
Au	1.00									
Ag	0.01	1.00								
As	0.00	0.16	1.00							
Bi	-0.02	0.11	0.02	1.00						
Cu	0.01	0.11	0.03	0.12	1.00					
F	-0.04	-0.20	-0.21	-0.03	-0.18	1.00				
Zn	0.01	0.05	-0.06	0.07	0.62	0.00	1.00			
Cr	0.04	0.05	0.02	0.07	0.39	-0.33	0.23	1.00		
Ni	0.04	0.16	0.07	0.11	0.78	-0.16	0.38	0.39	1.00	
Fe	0.00	0.13	-0.04	0.13	0.85	-0.06	0.63	0.33	0.69	1.00

TABLE 2-2-3(1) Results of Principal Component Analysis (Juwere Zone)

PRINCIPAL COMPONENT	EIGEN-VALUE	CONTRIBUTION RATIO	FACTOR LOADING										SCORE	
			Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe	MAXIMUM	MINIMUM
Z1	3.5100	0.3510 (0.3510)	0.09	-0.24	0.14	0.45	0.95	-0.15	0.67	0.59	0.85	0.87	2.666	-1.650
Z2	1.4890	0.1489 (0.4999)	-0.48	0.64	-0.19	0.18	-0.06	-0.52	-0.33	0.59	0.13	-0.15	7.789	-1.149
Z3	1.0410	0.1041 (0.6040)	-0.04	0.21	-0.12	0.69	0.03	0.69	-0.11	0.00	0.03	-0.15	3.660	-2.146
Z4	1.0170	0.1017 (0.7057)	-0.53	0.21	0.76	-0.10	-0.04	0.19	0.23	-0.07	-0.06	0.05	4.564	-1.207
Z5	0.9310	0.0931 (0.7988)	0.61	0.11	0.58	0.28	-0.05	-0.25	-0.20	0.10	-0.01	-0.17	7.831	-0.629

TABLE 2-2-3(2) Results of Principal Component Analysis (Juwere Zone)

PRINCIPAL COMPONENT	EIGEN-VALUE	CONTRIBUTION RATIO	FACTOR LOADING										SCORE	
			Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe	MAXIMUM	MINIMUM
Z1	2.0640	0.2064 (0.2064)	-0.04	0.29	0.38	0.03	0.77	0.19	0.17	0.67	0.29	0.80	7.155	-2.416
Z2	1.4040	0.1404 (0.3468)	-0.27	0.71	-0.44	-0.05	-0.34	-0.41	0.45	0.03	-0.21	0.32	8.379	-3.409
Z3	1.2050	0.1205 (0.4673)	0.04	-0.11	-0.13	0.13	0.29	-0.54	0.25	-0.36	0.77	-0.08	10.572	-1.700
Z4	1.1050	0.1105 (0.5778)	0.80	0.12	-0.08	-0.41	-0.07	0.30	0.33	-0.23	0.07	0.13	4.238	-1.404
Z5	0.9890	0.0989 (0.6767)	0.28	-0.02	-0.23	0.88	-0.06	0.21	0.11	-0.02	-0.07	0.13	12.476	-2.210

TABLE 2-2-3(3) Results of Principal Component Analysis (Juwere Zone)

PRINCIPAL COMPONENT	EIGEN-VALUE	CONTRIBUTION RATIO	FACTOR LOADING										SCORE	
			Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe	MAXIMUM	MINIMUM
Z1	2.5930	0.2593 (0.2593)	0.00	0.09	-0.06	0.11	0.90	-0.11	0.34	0.26	0.84	0.92	5.765	-0.850
Z2	1.6230	0.1623 (0.4216)	0.06	0.89	0.15	0.87	-0.07	-0.17	-0.10	0.00	-0.04	-0.06	30.246	-0.593
Z3	1.1810	0.1181 (0.5397)	-0.18	0.09	-0.41	0.18	0.02	0.73	0.43	-0.46	-0.09	0.06	8.793	-11.628
Z4	1.0060	0.1006 (0.6403)	0.94	0.01	-0.05	-0.06	0.05	-0.05	0.11	-0.30	-0.04	0.03	22.313	-3.598
Z5	0.9930	0.0993 (0.7396)	-0.14	0.01	0.82	-0.10	0.07	-0.01	0.28	-0.45	-0.05	0.06	23.361	-2.941

TABLE 2-2-4 Contrast (Juwere Zone)

SOIL & ROCK R. C. <3, 4, 5>	NO. OF SAMPLE	CONTRAST									
		Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
SOIL<3> TH2		8.25	5.58	3.73	1.17	7.26	1.36	1.78	3.57	2.38	2.15
SOIL<3> TH1	82	3.72	3.25	1.65	1.08	3.04	0.67	1.15	1.59	1.15	1.17
SOIL<3>GM		1.68	1.89	0.73	1.00	1.27	0.33	0.74	0.71	0.56	0.64
ROCK <3>(GM.PPM)	2	0.50	0.25	1.00	0.05	37.00	95.00	102.00	158.00	98.00	9.16
SOIL<4> TH2		5.56	3.27	1.22	1.11	3.16	4.39	2.89	0.47	1.16	2.02
SOIL<4> TH1	324	2.87	2.11	0.84	1.06	1.65	2.04	1.59	0.26	0.28	1.54
SOIL<4>GM		1.48	1.36	0.58	1.00	0.86	0.95	0.87	0.14	0.07	1.17
ROCK <4>(GM.PPM)	1	0.50	0.25	1.00	0.05	5.00	75.00	47.00	221.00	63.00	1.46
SOIL<5> TH2		2.03	3.16	3.73	1.37	8.38	2.57	2.67	26.03	7.68	4.06
SOIL<5> TH1	1,154	1.00	2.00	1.76	1.18	2.80	1.01	1.24	9.77	1.78	1.96
SOIL<5>GM		0.49	1.27	0.83	1.02	0.94	0.40	0.58	3.67	0.42	0.95
ROCK <5>(GM.PPM)	3	1.48	0.25	0.79	0.05	13.00	138.00	83.00	17.00	32.00	2.62

TH2:THRESHOLD (GM+2 STANDARD DEVIATION)

TH1:THRESHOLD (GM+1 STANDARD DEVIATION)

GM:GEOMETRIC MEAN

2-2 JEGEDE ZONE

2-2-1 Sampling

Soil sampling lines were set on north-south direction due to east-west occurrence of Jegede mineralized zone and B-horizon soil was taken. Soil colour in the zone reflects the basement geology. In general, red soils are predominant in the central to southern portions of the zone and gray soils in the northern portion. Soils taken over the mafic granulite, felsic granulite, and gneissose granulite are 478, 139, and 658, respectively.

2-2-2 Geochemical Indicators

A mineralized zone was found within the zone. Analytical results of the soils also poorly agreed with the observations which confirmed the sulphide mineralization in the field but continuous and promising Au anomalous zone was detected in the central portion of the zone.

The contents on geochemical indicators compared with all zones studied and Jegede zone are shown as follows.

ROCK CODE	Au (PPB)	Ag (PPM)	As (PPM)	Bi (PPM)	Cu (PPM)	F (PPM)	Zn (PPM)	Cr (PPM)	Ni (PPM)	Fe (%)
ALL ZONES										
R.C.3	1.73	0.63	2.25	0.06	61.57	26.42	90.47	215.97	153.32	6.89
R.C.4	0.98	0.48	0.58	0.05	8.82	23.02	40.41	30.92	11.77	1.96
R.C.5	0.93	0.53	0.66	0.05	12.86	30.30	37.45	44.07	19.23	1.90
JEGEDE ZONE (SOIL)										
R.C.3	1.65	0.89	3.73	0.08	102.73	19.37	122.92	169.06	203.74	9.93
R.C.4	0.97	2.58	0.83	0.05	17.93	18.00	45.51	58.70	47.27	2.38
R.C.5	0.92	0.77	1.15	0.06	15.38	22.40	53.97	54.45	37.75	2.81

Background Geology and Indicator Content

Accordingly, geochemical characteristics for respective geological units are shown in TABLE 2-2-5. According to this table, geochemical characteristics on each indicator are summarized as follows:

Au : Geometric means(GMs) of rock code 3, rock code 4, and rock code 5 of all zones are 1.73, 0.89, and 0.93 ppb, respectively but rock code 3 in the zone has the largest value of 1.65 ppb. On the other hand, the smallest GM is 0.92 ppb of rock code 5. A comparison on the contents of indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Au contents in the zone can be pointed out to be rather low. The maximum value in the

zone is 1,490 ppb.

Ag : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 0.63, 0.48, and 0.53 ppm, respectively but rock code 4 in the zone has the largest value of 2.58 ppm. On the other hand, the smallest GM is 0.77 ppm of rock code 5. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Ag contents in the zone is rather high, with a maximum value of 10.20 ppm.

As : Since approximately 50 % of data indicated contents below its detection limit(1.00 ppm), it is difficult to clarify its geochemical character in the zone. GMs of rock code 3, rock code 4, and rock code 5 of all zones are 2.25, 0.58 and 0.66 ppm, respectively but rock code 3 in the zone has the largest value of 3.73 ppm. On the other hand, the smallest GM is 0.83 ppm of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. As contents of the zone is nearly same, with maximum value of 238 ppm.

Bi : Since approximately 95 % of data indicated content below its detection limit(0.10 ppm), it is difficult to clarify its geochemical character in the zone. GMs of all zones are 0.06, 0.05, and 0.05 ppm, respectively. There is no difference among the GMs of indicators. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Bi contents in the zone is nearly the same. Maximum value in the zone is 1.10 ppm.

Cu : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 61.57, 8.82, and 12.86 ppm, respectively but rock code 3 in the zone has the largest value of 102.73 ppm. On the other hand, the smallest GM is 15.38 ppm of rock code 5. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Copper contents of the zone is nearly same as that of the areas compared. The maximum value in the zone is 401 ppm.

F : GMs of rock code 3, rock code 4 and rock code 5 of the zone are 26.42, 23.02, and 30.30 ppm, respectively but rock code 5 in the zone has the largest value of 22.40 ppm. On the other hand, the smallest GM is 18.00 ppm of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. F contents in the zone is fairly low, with maximum value of 570 ppm.

Zn : GMs of rock code 3, rock code 4, and rock code 5 of the zone are 90.47, 40.41, and 37.45 ppm, respectively but rock code 3 in the zone has the largest value of 122.92 ppm. On the other hand, the smallest GM is 45.51 ppm of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Zn contents in the zone is normal. The maximum value in the zone is 1,240 ppm.

Cr : GMs of rock code 3, rock code 4, and rock code 5 of the zone are 215.97, 30.92, and 44.07 ppm, respectively but rock code 5 in the zone has larger value of 169.06 ppm. On the other hand, the smallest GM is 54.45 ppm of rock code 5. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Cr contents of the zone is almost same. However, the indicator's values fluctuate greatly for rock types according to Flanagan's data. The maximum value in the zone is 2,240 ppm.

Ni : GMs of rock code 3, rock code 4, and rock code 5 of the zone are 153.32, 11.77, and 19.23 ppm but rock code 3 in the zone has the largest value of 203.74 ppm. On the other hand, the smallest GM is 37.75 ppm of rock code 5. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Ni contents of rock code 5 of the zone is almost the same for the area compared. However, values of Flanagan's data fluctuate greatly for various rock types. The maximum value in the zone is 1,140 ppm.

Fe : GMs of rock code 3, rock code 4, and rock code 5 of the zone are 6.89, 1.96, and 1.90 %, respectively but rock code 3 in the zone has the largest value of 9.93 %. On the other hand, the smallest GM is 2.38 % of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Fe contents in the zone is normal. The maximum value in the zone is 17.03 %.

Determination of Threshold Values

An interpretation was conducted on the cumulative frequency curve of Au in each geological unit. The results are summarized as follows:

Rock code 3 : Au shows a kind of dual distribution as shown in FIG.2-3-5. Geochemical values principally consist of two populations, that is, cumulative frequency of each population is about 40 %, and 60 %. The threshold value(GM + 2 δ)determined statistically corresponds to the upper 5 % level of the second pop-

ulation.

Rock code 4 : Au shows a kind of dual distribution as shown in FIG.2-3-5. Geochemical values principally consist of two populations, that is, cumulative frequency of each population is about 65 %, and 35 %. The threshold value(GM + 2 δ)determined corresponds to the upper 5 % level of the second population.

Rock code 5 : The cumulative frequency curve shows almost same characteristics to that of rock code 4 as shown in FIG.2-2-5.

However, it can be observed that the cumulative frequency curves of the second populations of 3 rock codes tend to show negative skewness.

Correlation Coefficient between Indicators

The correlation coefficients between indicators on a logarithmic base were calculated for each geological units. In the geological units, correlation coefficients between respective indicators were small, suggesting that the origins of individual indicators are different from each other.

TABLE 2-2-6 shows the correlation coefficients on corresponding rock codes. Results of interpretation are summarized below:

Rock code 3 : The medium correlation coefficients were obtained in this rock code. That is, As-Zn, Cu-Zn, Cu-Cr, Cu-Ni, and Cr-Ni show correlations of medium degree.

Rock code 4 : Indicators of Au-Cu, Au-Zn, Au-Ni, Au-Fe, As-Bi, As-Cu, As-Zn, As-Cr, As-Ni, As-Fe, Bi-Zn, As-Cr, As-Ni, As-Fe, Bi-Zn, Bi-Ni, Bi-Fe, Zn-Fe, Cr-Ni, and Cr-Fe show correlations of medium degree. On the other hand, Cu-Zn, Cu-Ni, Cu-Fe, Zn-Ni, and Ni-Fe show strong correlations.

Rock code 5 : Indicators of Au-As, As-Bi, As-Zn, As-Cr, As-Ni, Cu-Cr, Zn-Ni, Cr-Ni, and Cr-Fe show medium correlations. On the other hand, As-Cu, As-Fe, Cu-Zn, Cu-Ni, Cu-Fe, Zn-Fe, and Ni-Fe show strong correlations.

Many correlation coefficients among indicators in the zone were obtained.

2-2-3 Interpretation

Principal Component Analysis

After determining the correlation coefficients between indicators, which cannot be extracted by single variable analyses, from multi-dimensional distribution characteristics, these were applied to the determination of character and the evaluation of geochemical anomalies. Results of analysis are shown in TABLE 2-2-7.

General characteristics of each geological unit are summarized below:

Rock code 3 : As shown in TABLE 2-2-7(1), the contribution ratio for the first principal component to all the principal components is about 25 %, occupying one fourth of all. The total to the ratio of the fifth principal component amounts to 74 % approximately, so that a greater part of the fluctuation of all the components can be explained by them. However, the contribution ratio of each component is general small and not decisive. Each component drops gradually and does not change markedly.

For the first principal component, As, Cu, Zn, Cr, and Ni show medium to strong correlation values of 0.57～0.80. Therefore, the first principal component is characterized by high concentration of these indicators.

The second principal component is characterized by a strong correlation (0.71) of Au and medium correlation(0.48～0.55) with F, Zn, and Fe. Therefore, the principal component is worth notice for the exploration of gold although the contribution ratio is as small as 16 %.

The third principal component has a strong correlation(0.77) with Ag, and a medium correlation(0.59) with Bi. It means anomalous concentrations of these indicators are shown as high core values. A negative medium correlation(-0.48) also are detected by Fe.

The fourth principal component shows a medium correlation(0.47) with As and a negative medium correlation(-0.56) with Au.

The fifth principal component is characterized by medium correlations(0.46 ～0.59) with F and Cr.

Rock code 4 : As shown in TABLE 2-2-7(2), the contribution ratio for the first principal component to all the principal components is about 48%, occupying nearly half of all. The total to the ratio of the fifth principal component amounts to 90 % approximately, so that a greater part of the fluctuation of all the components can be explained by them. The contribution ratio of each principal is generally high. Each component, except for the first and the second components, drops gradually.

For the first principal component, Au, As, and Bi show medium correlations (0.46～0.68) and strong correlations(0.71～0.90) with Cu, Zn, Cr, and Fe. Therefore, the first principal component correlates to the indicators and reflects as high scores to the concentration of the indicators.

The second principal component is characterized by medium correlations (0.47～0.62) with Ag, and As. On the other hand, a negative medium correlation

(-0.42) with Au. High scores and low negative scores are expected in the concentration of these indicators.

The third principal component has medium correlations(0.53～0.63) with Au, As, and Bi. Therefore, high scores are expected for the concentration of these indicators.

The fourth principal component is characterized by medium correlations (0.40～0.45) with Bi and F and a strong correlation(0.70) with Au. The component is worth notice for the gold exploration, although the contribution ratio is as low as 10 %.

The fifth principal component show only a strong correlation(0.72) with Ag.

Rock code 5 : As shown in TABLE 2-2-7(3), the contribution ratio for the first principal component to all the principal components is about 40 %. The total to the ratio of the fifth principal component amounts to 80 % approximately, to that a greater part of the fluctuation of all the components can be explained by them. However, the contribution ratio of each principal is rather high . Each component, except for the first and second components, drops gradually.

For the first principal component, As, Bi, Zn, and Cr show medium correlation values(0.53～0.66) and strong correlations(0.80～0.91) with Cu, Ni and Fe. Therefore, the first principal component correlates to the indicators and reflects as high scores to the concentration of the indicators.

The second principal component is characterized by medium correlations (0.50～0.56) with Ag, As, and Bi. On the other hand, negative medium correlation (-0.60) with Fe. High scores and low negative scores are expected in the concentration of these indicators.

The third principal component has medium correlations(0.53～0.65) with Au, and F. Therefore, high scores are expected for the concentration of these indicators.

The fourth principal component is characterized by a strong correlation (0.76) with Au, and a negative medium correlation(-0.60) with Ag. The component is worth notice for the gold exploration, although the contribution ratio is as low as 10%.

The fifth principal component show only a strong correlation(0.75) with Zn.

Au Concentration and Principal Component Scores

The concentration distribution of gold in this area, as shown in FIG. 2-2-6, indicates an anomalous zone (GM+ σ ～GM+ σ 2) with good continuity in the ENE-WSW

direction. As mentioned above, Jegede mineralized zone has been found in this zone, but no noteworthy anomalous zones were found in them. The center of the above anomalous zone was found to lie about 400m north of the mineralized zone. Since this anomalous zone is located geographically lower, it may be that it represents so-called hydromorphic anomalies in which Au has been transported from a higher portion, as suggested high mobility of Au by Krauskopf (1984), Mann (1984) and Webster and Mann (1984). In general, Au is stable as Au^{o} in natural conditions, but it becomes unstable in forms Au^{+} and Au^{++} forming complex compounds with $(CN)^{-}$, $(S_2\ O_2)^{-}$ or carbonaceous materials. Moreover, it may be transported as a form of colloid.

As for the relationship between the anomalous zone found by geochemical soil exploration and the geology, anomalies are most frequently distributed in mafic granulite, but they are also distributed in other geological units, i.e., felsic granulite and gneissose granulite, indicating that the distribution is not limited to a specific geology.

High contrasts against Au and As of soil on code 3, and against Ag and Cu of soil on code 4, are noticeable. In addition, contrasts against Cr on code 4 and code 5 show a high value of 90.

Principal components highly related to Au are the second component for code 3 and the fourth component for code 4 and 5. FIG. 2-2-7 indicates the distribution of such high scores. From the figure showing a scattered distribution of high scores, no promising zone could be specified. This may suggest that these principal components have low contribution ratios as mentioned above, and that their relationships with Au is diluted by the effects of other indicators.

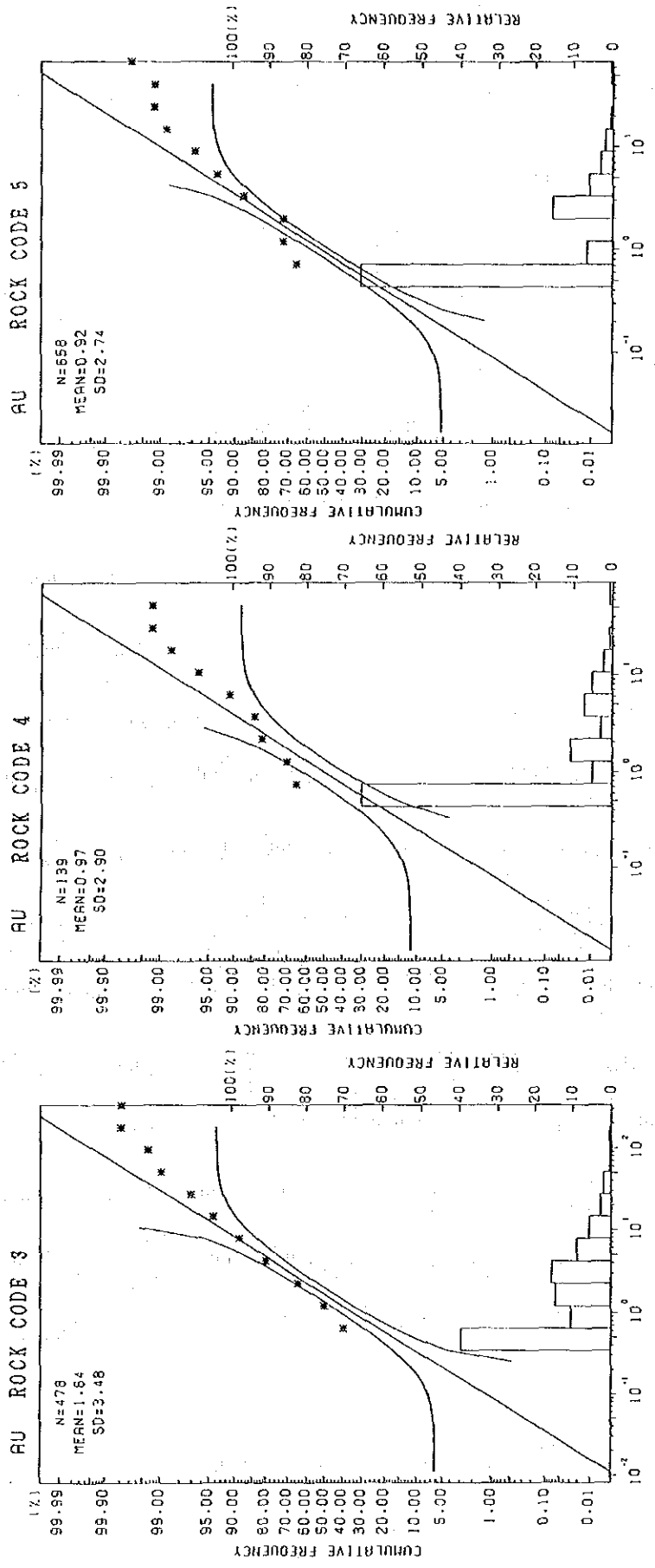

FIG. 2-2-5 Frequency Distribution and Cumulative Frequency Curve (Au;Jegede Zone)

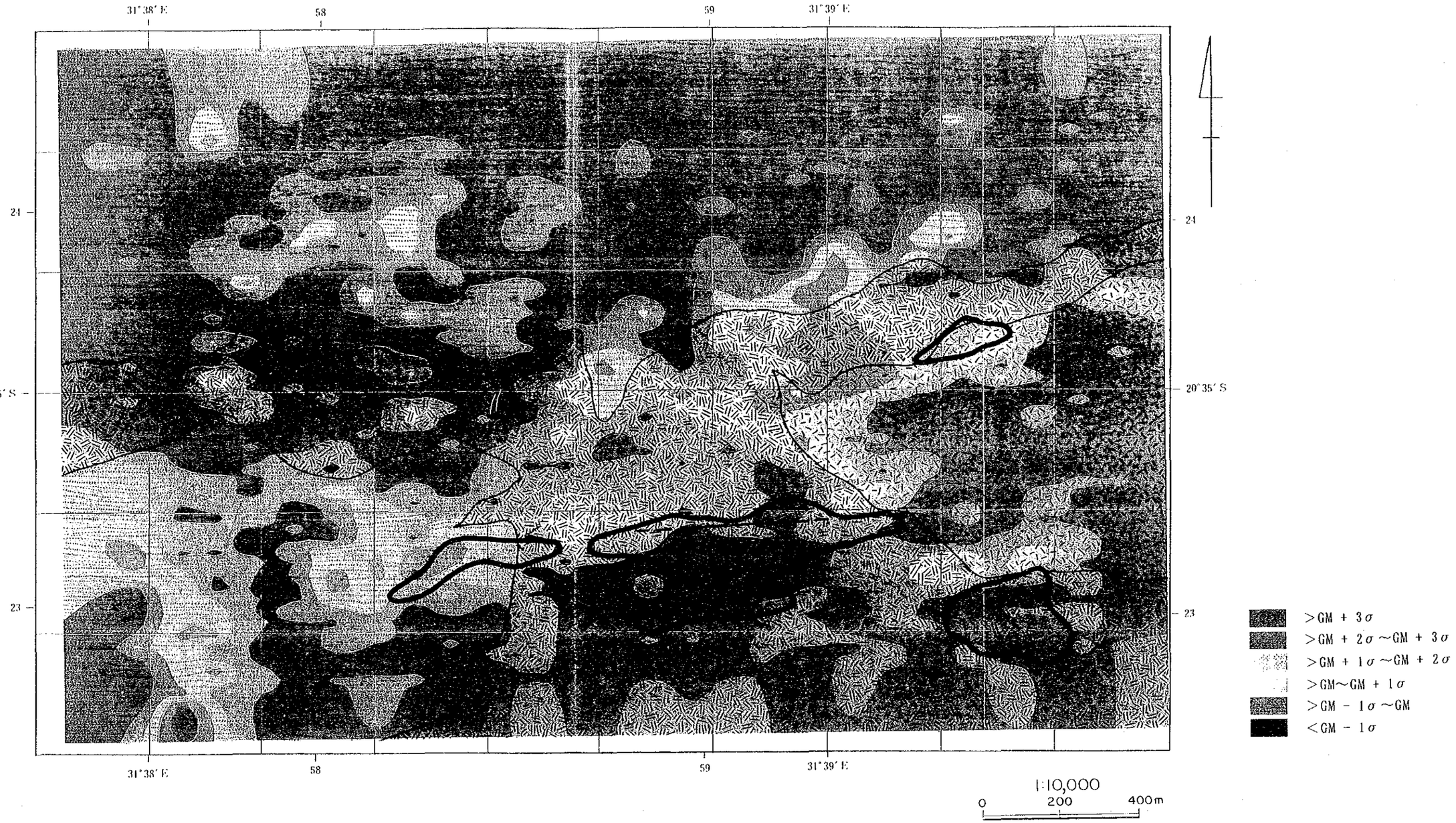

FIG. 2-2-6 Gold Distribution (Jegede Zone)

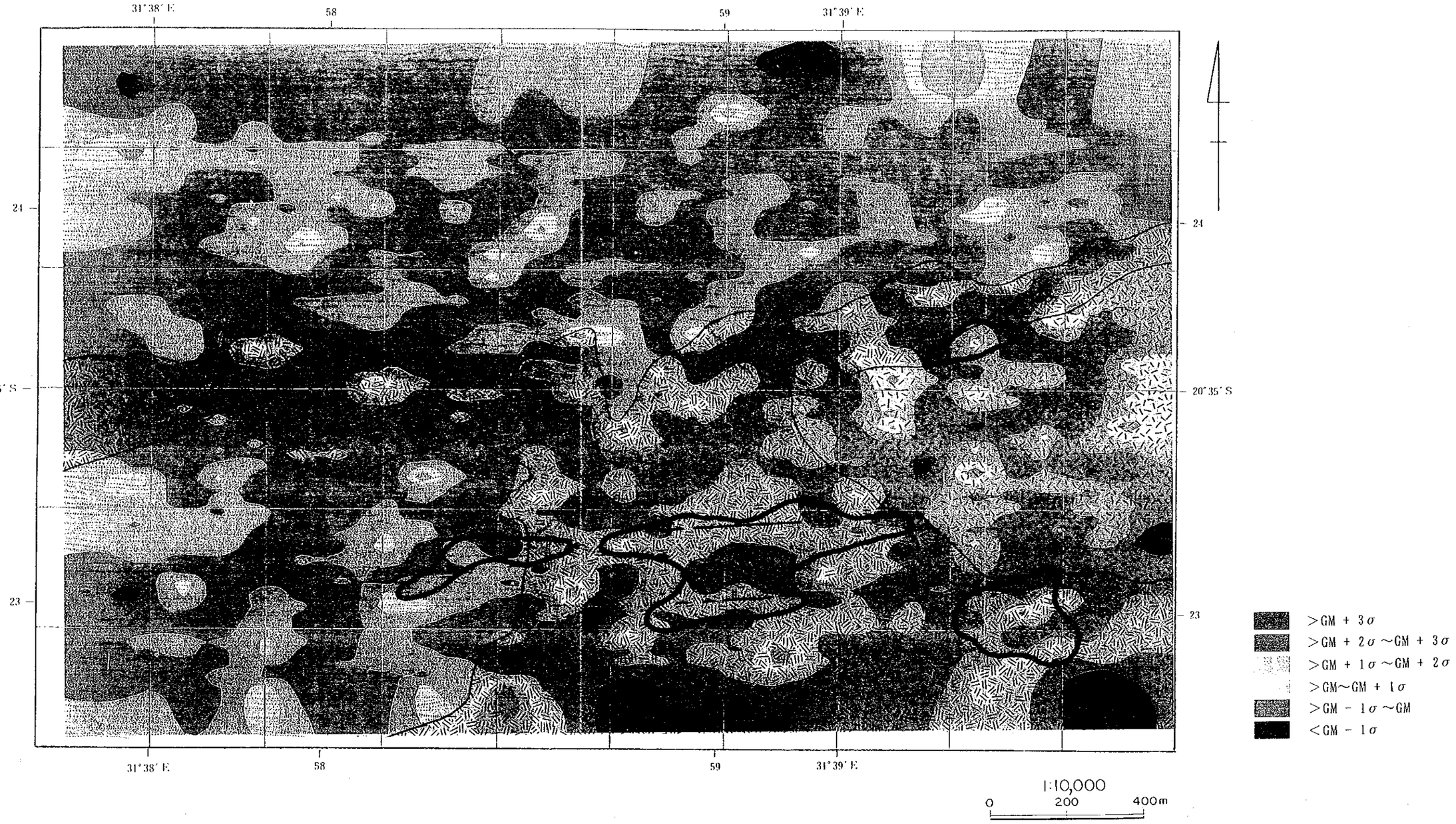

FIG. 2-2-7 Distribution of Principal Component Scores (Jegede Zone)

TABLE 2-2-5 Statistical Parameter of Indicators (Jegede Zone)

SOIL <ROCK CODE>	NO. OF SAMPLE	GEOMETRIC MEAN (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)		THRESHOLD (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)	
													5.74	1.89	16.40	0.15	157	39	185	700	420	12.23	←g.m.+ s.d
MAFIC GRANULITE	478	1.65	0.89	3.73	0.08	102.73	19.37	122.92	169.06	203.74	9.93	←g.m.	20.04	4.02	72.12	0.26	241	79	280	2,896	866	15.05	←g.m.+2 s.d.
<3>		3.49	2.13	4.40	1.79	1.53	2.01	1.51	4.14	2.06	1.23	←s.d.	68.91	8.56	317.25	0.47	369	158	422	11,987	1,786	18.53	←g.m.+3 s.d.
													2.83	4.16	1.84	0.07	54	37	105	174	101	4.62	←g.m.+ s.d
FELSIC GRANULITE	139	0.97	2.58	0.83	0.05	17.93	18.00	45.51	58.70	47.27	2.38	←g.m.	8.20	6.71	4.05	0.09	161	77	241	517	216	8.98	←g.m.+2 s.d.
<4>		2.90	1.61	2.21	1.30	3.00	2.07	2.30	2.97	2.14	1.94	←s.d.	23.80	10.81	8.93	0.12	485	160	554	1,533	461	17.45	←g.m.+3 s.d.
													2.54	2.12	4.07	0.09	73	49	125	181	160	6.96	←g.m.+ s.d
GNEISSOSE GRANULITE	658	0.92	0.77	1.15	0.06	15.38	22.40	53.97	54.45	37.75	2.81	←g.m.	6.97	5.82	14.40	0.14	346	106	291	599	681	17.23	←g.m.+2 s.d.
<5>		2.75	2.75	3.54	1.54	4.74	2.18	2.32	3.32	4.25	2.48	←s.d.	19.13	16.00	51.01	0.21	1,640	232	677	1,989	2,890	42.65	←g.m.+3 s.d.

	NO. OF SAMPLE	MINIMUM VALUE (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)	MAXIMUM VALUE (PPM) Au(PPB)	Ag(PPM)	As(PPM)	Bi(PPM)	Cu(PPM)	F(PPM)	Zn(PPM)	Cr(PPM)	Ni(PPM)	Fe(%)
MAFIC GRANULITE <3>	478	0.50	0.25	0.50	0.05	10.00	10.00	19.00	1.00	27.00	1.69	954.00	9.30	200.00	0.70	401	190	774	2,240	880	14.55
FELSIC GRANULITE <4>	139	0.50	0.70	0.50	0.05	0.50	10.00	12.00	2.00	19.00	0.85	76.00	10.20	30.00	0.20	160	570	402	742	333	11.13
GNEISSOSE GRANULITE <5>	658	0.50	0.25	0.50	0.05	0.50	10.00	2.00	1.00	0.50	0.59	1,490	9.90	238.00	1.10	225	470	1,240	1,260	1,140	17.03

g.m. : geometric mean s.d. : standard deviation

ROCK CODE	Au (PPB)	Ag (PPM)	As (PPM)	Bi (PPM)	Cu (PPM)	F (PPM)	Zn (PPM)	Cr (PPM)	Ni (PPM)	Fe (%)
ALL ZONES										
R.CC.3	1.73	0.63	2.25	0.06	61.57	26.42	90.47	215.97	153.32	6.89
R.CC.4	0.98	0.48	0.58	0.05	5.82	23.02	40.41	30.92	11.77	1.96
R.CC.5	0.93	0.53	0.66	0.05	12.86	30.30	37.45	44.07	19.23	1.90
JEGEDE ZONE (SOIL)										
R.CC.3	1.69	0.89	3.73	0.08	102.73	19.37	122.92	169.06	203.74	9.93
R.CC.4	0.97	2.58	0.83	0.05	17.93	18.00	45.51	58.70	47.27	2.38
R.CC.5	0.92	0.77	1.15	0.06	15.38	22.40	53.97	54.45	37.75	2.81

ROCK TYPE	Au (PPB)	Ag (PPM)	As (PPM)	Bi (PPM)	Cu (PPM)	F (PPM)	Zn (PPM)	Cr (PPM)	Ni (PPM)	Fe (%)
MAFIC ROCK	4.00	0.10	2.00	0.01	100	370	130	200	160	8.56
INT. ROCK	----	0.07	2.40	0.01	35	500	72	50	55	5.85
FELSIC ROCK	4.50	0.05	1.50	0.01	20	800	6	25	8	2.70
GRANITE	1.00	0.05	0.25	0.43	12	1,250	85	7	5	1.85
MICA SCHIST	----	0.30	----	----	30	----	70	70	50	4.90

<After Flanagan(1976) & Vinogradov(1962)>

JEGEDE ZONE (ROCK)										
R.CC.3	0.500	0.25	1.41	0.05	132	95	54	240	138	5.42
R.CC.4	0.500	0.25	0.50	0.05	55	69	46	2	15	1.13
R.CC.5	0.50	0.25	1.00	0.05	10	182	54	2	19	1.60

INT. ROCK : INTERMEDIATE ROCK
NO DATA

TABLE 2-2-6(1) Matrix of Correlation Coefficients (Jegede Zone)

	Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
Au	1.00									
Ag	0.00	1.00								
As	0.15	0.11	1.00							
Bi	0.14	0.36	0.16	1.00						
Cu	0.39	0.08	0.34	0.27	1.00					
F	-0.04	-0.25	0.06	-0.15	-0.28	1.00				
Zn	0.32	0.23	0.52	0.24	0.49	-0.13	1.00			
Cr	0.18	0.21	0.28	0.04	0.51	-0.23	0.22	1.00		
Ni	0.21	0.24	0.19	0.20	0.69	-0.38	0.34	0.64	1.00	
Fe	0.23	-0.30	0.20	-0.06	0.25	0.11	0.30	-0.05	0.00	1.00

TABLE 2-2-6(2) Matrix of Correlation Coefficients (Jegede Zone)

	Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
Au	1.00									
Ag	-0.37	1.00								
As	0.23	-0.24	1.00							
Bi	0.15	-0.18	0.53	1.00						
Cu	0.54	-0.39	0.59	0.41	1.00					
F	0.02	0.12	0.10	0.14	0.05	1.00				
Zn	0.42	-0.29	0.60	0.49	0.73	0.22	1.00			
Cr	0.29	-0.43	0.42	0.26	0.36	-0.07	0.28	1.00		
Ni	0.58	-0.41	0.61	0.47	0.90	0.13	0.76	0.42	1.00	
Fe	0.53	-0.52	0.61	0.42	0.88	-0.03	0.68	0.42	0.91	1.00

TABLE 2-2-6(3) Matrix of Correlation Coefficients (Jegede Zone)

	Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
Au	1.00									
Ag	-0.20	1.00								
As	0.40	-0.43	1.00							
Bi	0.33	-0.16	0.47	1.00						
Cu	0.35	-0.52	0.71	0.36	1.00					
F	0.16	-0.44	0.29	0.15	0.36	1.00				
Zn	0.29	-0.37	0.60	0.31	0.73	0.32	1.00			
Cr	0.16	-0.16	0.41	0.14	0.40	0.07	0.22	1.00		
Ni	0.30	-0.24	0.68	0.32	0.70	0.10	0.46	0.45	1.00	
Fe	0.36	-0.52	0.78	0.37	0.90	0.34	0.72	0.42	0.73	1.00

TABLE 2-2-7(1) Results of Principal Component Analysis (Jegede Zone)

PRINCIPAL COMPONENT	EIGEN-VALUE	CONTRIBUTION RATIO	FACTOR LOADING										SCORE	
			Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe	MAXIMUM	MINIMUM
Z1	2.5280	0.2528 (0.2528)	0.12	0.08	0.57	0.32	0.80	-0.36	0.59	0.62	0.72	0.25	5.511	-2.573
Z2	1.5950	0.1595 (0.4123)	0.71	-0.12	0.21	0.03	-0.03	0.55	0.54	-0.30	-0.34	0.48	5.059	-3.815
Z3	1.3900	0.1390 (0.5513)	0.02	0.77	0.16	0.59	-0.06	-0.07	0.24	-0.31	-0.20	-0.48	18.791	-0.995
Z4	1.0900	0.1090 (0.6603)	-0.56	-0.16	0.47	0.38	0.16	0.21	-0.29	-0.21	-0.20	0.38	1.975	-5.918
Z5	0.7900	0.0790 (0.7393)	-0.06	0.22	0.27	-0.17	-0.14	0.59	-0.10	0.46	0.06	-0.21	5.414	-2.181

TABLE 2-2-7(2) Results of Principal Component Analysis (Jegede Zone)

PRINCIPAL COMPONENT	EIGEN-VALUE	CONTRIBUTION RATIO	FACTOR LOADING										SCORE	
			Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe	MAXIMUM	MINIMUM
Z1	4.7740	0.4774 (0.4774)	0.46	-0.40	0.60	0.68	0.95	-0.01	0.73	0.71	0.91	0.90	4.679	-0.862
Z2	1.2210	0.1221 (0.5995)	-0.42	0.47	0.62	0.37	-0.09	0.19	0.39	-0.26	-0.14	-0.16	8.664	-1.909
Z3	1.0080	0.1008 (0.7003)	0.53	-0.17	0.60	0.63	-0.12	-0.21	0.01	-0.01	-0.04	-0.06	10.885	-1.132
Z4	0.9700	0.0970 (0.7973)	0.70	0.13	-0.10	0.40	0.00	0.45	-0.10	-0.23	-0.10	-0.16	5.428	-1.437
Z5	0.7820	0.0782 (0.8755)	0.02	0.72	-0.27	-0.24	0.12	0.09	0.02	0.09	0.26	0.20	10.868	-0.453

TABLE 2-2-7(3) Results of Principal Component Analysis (Jegede Zone)

PRINCIPAL COMPONENT	EIGEN-VALUE	CONTRIBUTION RATIO	FACTOR LOADING										SCORE	
			Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe	MAXIMUM	MINIMUM
Z1	3.9690	0.3969 (0.3969)	0.03	-0.48	0.65	0.53	0.91	0.23	0.54	0.66	0.80	0.90	4.779	-3.279
Z2	1.2930	0.1293 (0.5262)	0.13	0.50	0.53	0.56	-0.09	-0.60	-0.22	0.07	0.01	-0.13	14.615	-1.405
Z3	1.0620	0.1062 (0.6324)	0.62	-0.23	0.24	0.37	-0.11	0.47	0.07	-0.35	-0.23	-0.12	9.342	-4.121
Z4	0.9720	0.0972 (0.7296)	0.76	-0.60	-0.19	-0.36	0.07	-0.32	-0.15	0.28	0.14	0.07	14.434	-1.482
Z5	0.7970	0.0797 (0.8093)	0.13	0.36	-0.11	-0.07	0.03	-0.16	0.75	-0.22	-0.04	0.06	25.223	-1.050

TABLE 2-2-8 Contrast (Jegede Zone)

SOIL & ROCK R. C. <3, 4, 5>	NO. OF SAMPLE	CONTRAST									
		Au	Ag	As	Bi	Cu	F	Zn	Cr	Ni	Fe
SOIL<3> TH2		40.07	16.08	51.15	5.21	1.82	0.83	5.18	12.07	6.28	2.78
SOIL<3> TH1	478	11.49	7.55	11.63	2.91	1.19	0.41	3.43	2.92	3.04	2.26
SOIL<3>GM		3.29	3.54	2.64	1.62	0.78	0.20	2.28	0.70	1.48	1.83
ROCK <3>(GM.PPM)	2	0.50	0.25	1.41	0.05	132.00	95.00	54.00	240.00	138.00	5.42
SOIL<4> TH2		4.10	26.83	8.10	1.68	32.30	1.12	5.23	258.39	14.38	7.94
SOIL<4> TH1	139	1.41	16.64	3.67	1.30	10.76	0.54	2.28	87.09	6.73	4.09
SOIL<4>GM		0.49	10.32	1.67	1.00	3.59	0.26	0.99	29.35	3.15	2.10
ROCK <4>(GM.PPM)	1	2.00	0.25	0.50	0.05	5.00	69.00	46.00	2.00	15.00	1.13
SOIL<5> TH2		13.93	23.29	14.40	2.71	34.58	0.58	5.39	299.70	35.82	10.77
SOIL<5> TH1	658	5.07	8.47	4.07	1.76	7.29	0.27	2.32	90.32	8.44	4.35
SOIL<5>GM		1.85	3.08	1.15	1.14	1.54	0.12	1.00	27.22	1.99	1.76
ROCK <5>(GM.PPM)	2	0.50	0.25	1.00	0.05	10.00	182.00	54.00	2.00	19.00	1.60

TH2:THRESHOLD (GM+2 STANDARD DEVIATION)

TH1:THRESHOLD (GM+1 STANDARD DEVIATION)

GM:GEOMETRIC MEAN

2-3 MUCHACHA ZONE

2-3-1 Sampling

Soil sampling lines were set on north-south direction due to east-west occurrences of Muchacha mineralized zone and B-horizon soil was taken. Soil colour in the zone possibly reflects the basement geology. In general, red soils are predominant in the southwestern portion of the zone and gray to brown soils in the west of the zone.

Soils taken over the mafic granulite, felsic granulite, and gneissose granulite are 228, 56, and 622, respectively.

2-3-2 Geochemical Indicators

Muchacha mineralized zone was found within the zone. Analytical results of the soils also poorly agreed with the observations which confirmed the sulphide mineralization in the field.

The contents on geochemical indicators compared with all zones studied Muchacha zone are shown as follows:

ROCK CODE	Au (PPB)	Ag (PPM)	As (PPM)	Bi (PPM)	Cu (PPM)	F (PPM)	Zn (PPM)	Cr (PPM)	Ni (PPM)	Fe (%)
ALL ZONES										
R.C.3	1.73	0.63	2.25	0.06	61.57	26.42	90.47	215.97	153.32	6.89
R.C.4	0.98	0.48	0.58	0.05	8.82	23.02	40.41	30.92	11.77	1.96
R.C.5	0.93	0.53	0.66	0.05	12.86	30.30	37.45	44.07	19.23	1.90
MUCHACHA ZONE (SOIL)										
R.C.3	1.50	0.34	5.38	0.09	33.74	25.97	59.03	163.97	75.45	5.09
R.C.4	0.69	0.33	0.58	0.05	5.74	15.24	25.48	77.32	11.48	1.55
R.C.5	0.72	0.46	0.73	0.05	6.55	20.61	22.22	53.07	21.69	1.53

Background Geology and Indicator Content

Accordingly, geochemical characteristics for respective geological units are shown in TABLE 2-3-9. According to this table, geochemical characteristics on each element are summarized as follows:

Au : Geometric means(GMs) of rock code 3, rock code 4, and rock code 5 of all zones are 1.73, 0.89, and 0.93 ppb, respectively but rock code 3 in the zone has the largest value of 1.50 ppb. On the other hand, the smallest GM is 0.69 ppb of rock code 4. A comparison on the content of indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Au contents in the zone can be pointed out to be rather low. The maximum value in the zone is

27 ppb.

Ag : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 0.63, 0.48, and 0.53 ppm, respectively but rock code 5 in the zone has the largest value of 0.46 ppm. On the other hand, the smallest GM is 0.33 ppm of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Ag contents in the zone rather high, with a maximum value of 14.20 ppm.

As : Since approximately 60 % of data except rock code 3 indicated content below its detection limit(1.00 ppm), it is difficult to clarify its geochemical character in the zone.

GMs of rock code 3, rock code 4, and rock code 5 of all zones are 2.25, 0.58, and 0.66 ppm, respectively but rock code 3 in the zone has the largest value of 5.38 ppm. On the other hand, the smallest GM is 0.58 ppm of rock code 4. A comparison on content of the indicator between the zone and other area based on data by Flanagan(1976) and Vinogradov(1962) was made. As contents of rock code 3 in the zone is rather high, with maximum value of 1,120 ppm.

Bi : Since approximately 90 % of data except rock code 3 indicated content below its detection limit(0.10 ppm), it is difficult to clarify its geochemical character in the zone. GMs of all zones are 0.06, 0.05 and 0.05 ppm, respectively. There is no difference among the GMs of elements. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Bi contents in the zone is nearly the same. Maximum value in the zone is 1.00 ppm.

Cu : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 61.57, 8.82, and 12.86 ppm, respectively but rock code 3 in the zone has the largest value of 33.74 ppm. On the other hand, the smallest GM is 5.74 ppm of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. Copper content in rock code 3 and rock code 5 of the zone is nearly the same as the areas compared.

The maximum value in the zone is 302 ppm.

F : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 26.42, 23.02, and 30.30 ppm, respectively but rock code 3 in the zone has largest value of 25.79 ppm. On the other hand, the smallest GM is 15.24 ppm of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) was made. F contents in the zone is

fairly low, with maximum value of 310 ppm.

Zn : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 90.47, 40.41, and 37.45 ppm, respectively but rock code 3 in the zone has the largest value of 59.03 ppm. On the other hand, the smallest GM is 22.22 ppm of rock code 5. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Zn contents in the zone is fairly low. The maximum value in the zone is 349 ppm.

Cr : GMs of rock code 3, rock code 4 and rock code 5 of all zones are 215.97, 30.92, and 44.07 ppm, respectively but rock code 3 in the zone has the largest value of 163.97 ppm. On the other hand, the smallest GM is 53.07 ppm of rock code 5. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Cr contents of rock code 5 of the zone is almost same. However, the indicator's values fluctuate greatly for rock types according to Flanagan's data. The maximum value in the zone is 3,950 ppm.

Ni : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 153.32, 11.77, and 19.23 ppm but rock code 3 in the zone has the largest value of 75.45 ppm. On the other hand, the smallest GM is 11.48 ppm of rock code 4. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Ni contents of rock code 5 of the zone is almost the same for the area compared. However, values of Flanagan's data fluctuate greatly for various rock types. The maximum value in the zone is 1,820 ppm.

Fe : GMs of rock code 3, rock code 4, and rock code 5 of all zones are 6.89, 1.96, and 1.90 %, respectively but rock code 3 in the zone has the largest value of 5.09 %. On the other hand, the smallest GM is 1.53 % of rock code 5. A comparison on contents of the indicator between the zone and other areas based on data by Flanagan(1976) and Vinogradov(1962) made clear that Fe contents in the zone is normal. The maximum value in the zone is 17.02 %.

Determination of Threshold Values

An interpretation was conducted on the cumulative frequency curve of Au in each geological unit. The results are summarized as follows:

Rock code 3 : Au shows a kind of dual distribution as shown in FIG.2-2-8. Geochemical values principally consist of two populations, that is, cumulative frequency of each population is about 55 %, and 45 %. The threshold value(GM + 2δ)