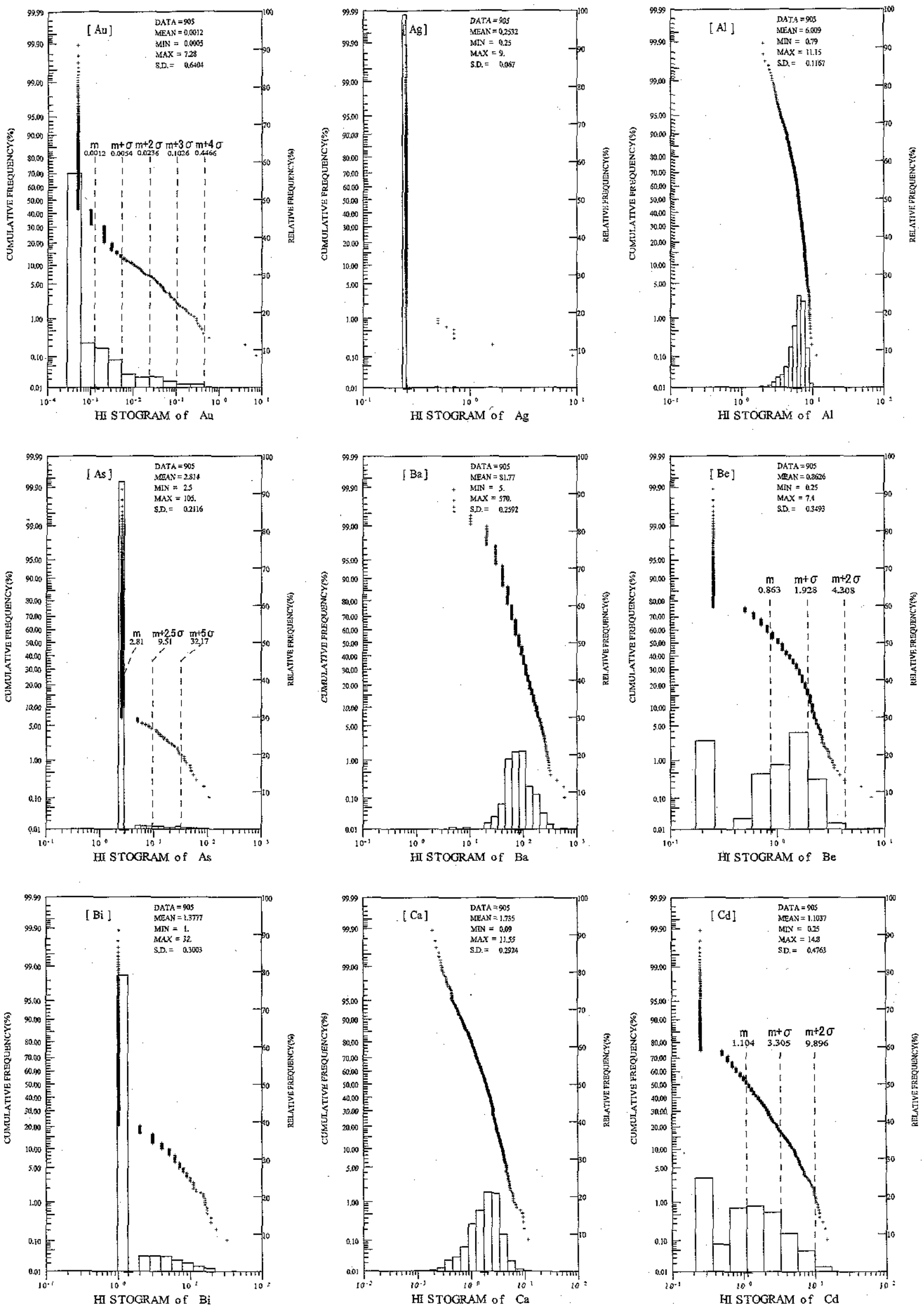

Fig.II-2-2 Probability plot of the stream sediment samples(1)

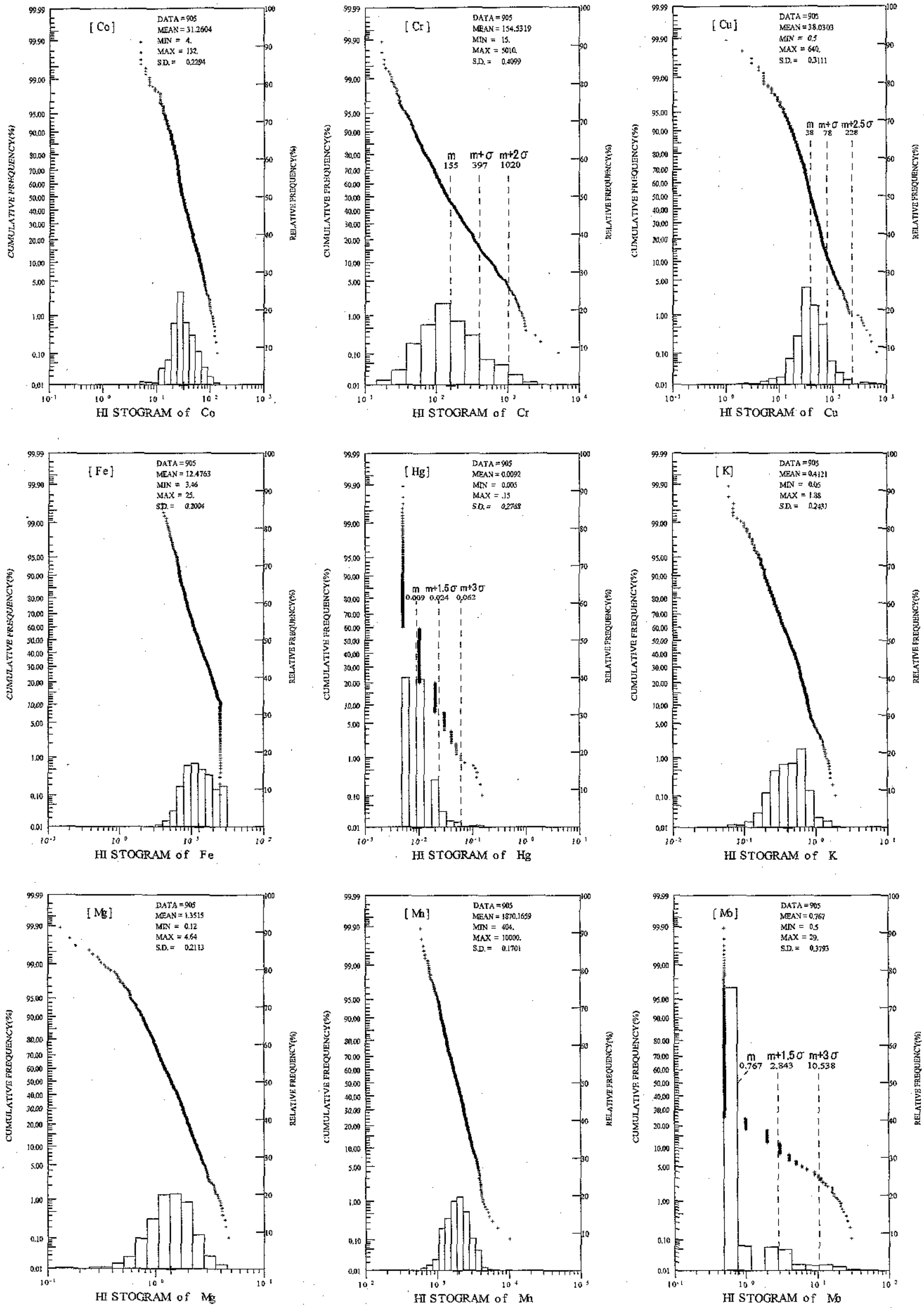

Fig.II-2-2 Probability plot of the stream sediment samples(2)

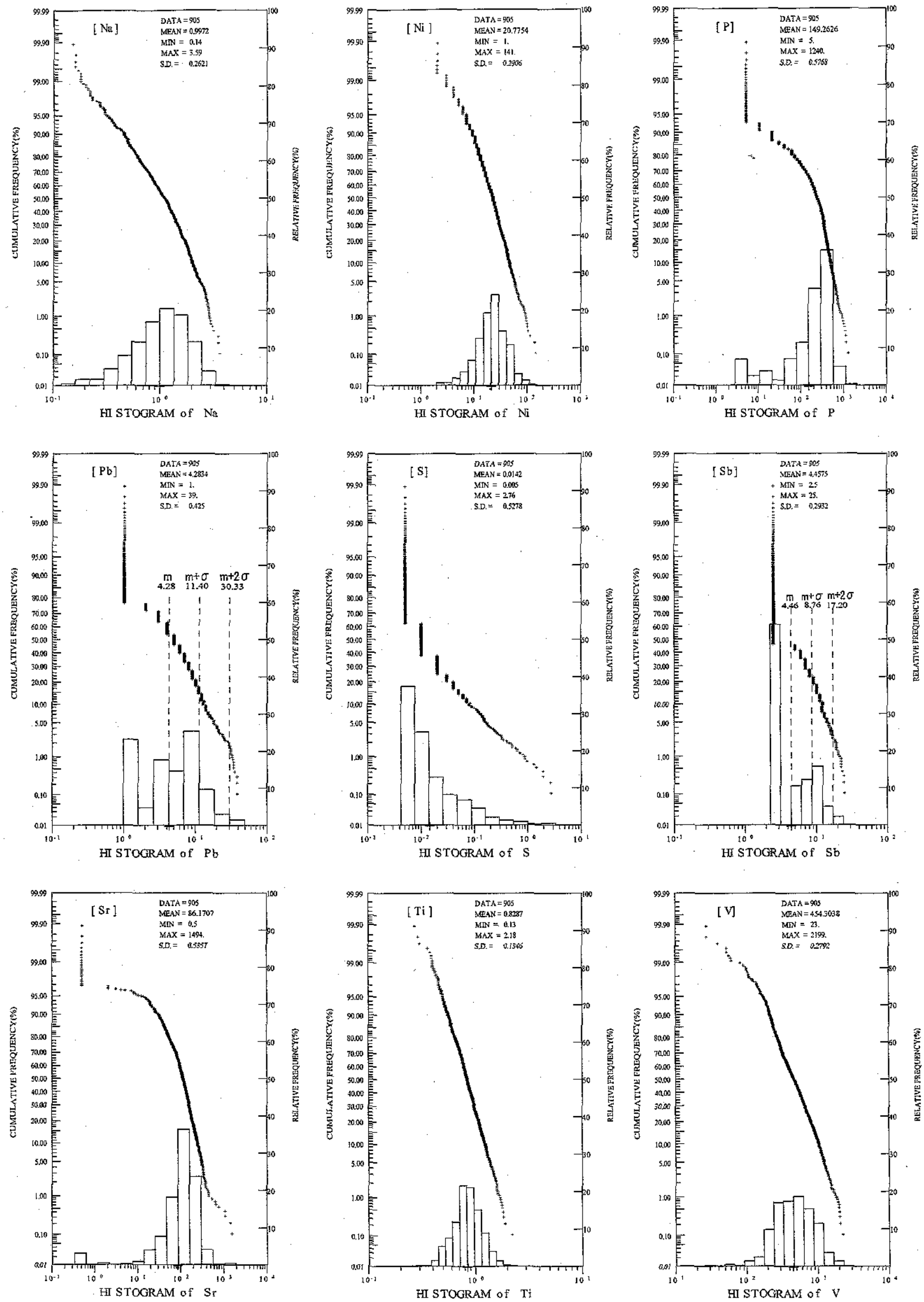

Fig.II-2-2 Probability plot of the stream sediment samples(3)

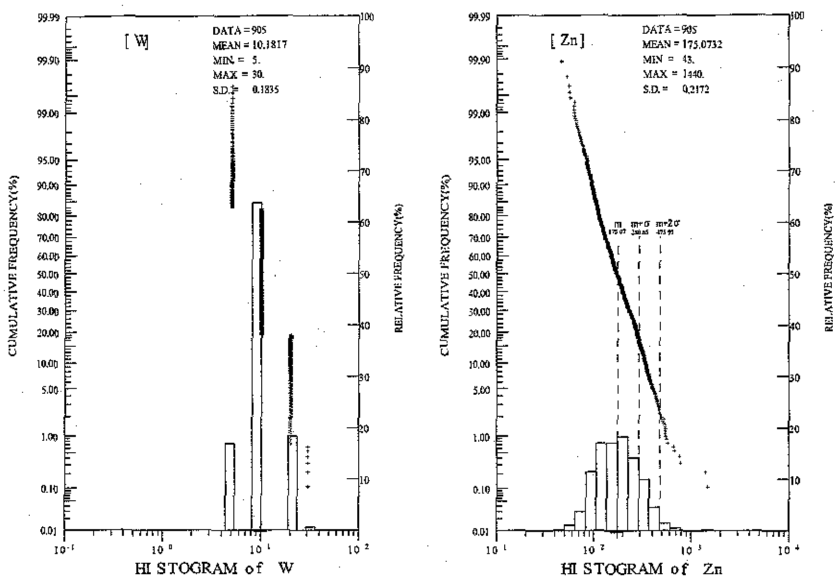

Fig.II-2-2 Probability plot of the stream sediment samples(4)

Table II-2-2 Variance-covariance matrix of the stream sediment samples

cov_mat	Au	Hg	Al	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Mg	Mn	Na	Ni	P	Pb	S	Sb	Sr	Ti	V	Zn
Au	0.407893	0.030895	-0.0012	0.035288	0.013818	0.005705	-0.03717	0.013848	0.003175	-0.01629	0.049982	0.014632	0.016945	-0.00971	-0.00436	-0.03102	-0.00342	0.00766	0.045056	0.035585	0.005728	-0.01739	0.004101	0.024696	0.02204
Hg	0.030895	0.076646	0.006448	0.017609	0.012865	-0.00227	-0.0391	-0.03581	-0.00152	-0.00563	0.029088	-0.00555	0.004195	-0.01348	-0.00335	-0.02514	-0.00624	0.001141	0.008369	0.026298	-0.00102	-0.01821	-0.00166	-0.00953	0.008909
Al	-0.0012	0.006448	0.013626	0.001864	0.013856	0.005927	0.004511	-0.02467	-0.0077	-0.00584	0.006465	-0.01354	0.01412	0.005897	-0.01091	0.010504	6.82E-05	0.040743	-0.00615	0.016146	-0.00422	0.030725	-0.00184	-0.01325	-0.00879
As	0.035288	0.017609	0.001864	0.044788	0.013757	-0.00329	-0.01505	0.002782	-0.00141	-0.01656	0.024628	0.001409	0.011162	-0.00335	-0.0037	-0.0095	-0.00422	0.019624	0.025301	0.022359	0.006139	-0.00044	-0.00037	0.00255	0.009899
Ba	0.013818	0.012865	0.013856	0.013757	0.067181	0.013209	0.004645	-0.03468	-0.01113	-0.01835	0.024087	-0.01558	0.045601	0.007315	-0.01655	0.016702	-0.00147	0.080658	0.013565	0.029341	0.006478	0.065347	0.002514	-0.01223	-0.00928
Be	0.005705	-0.00227	0.005927	-0.00329	0.013209	0.121976	0.00532	-0.01017	0.005907	0.01655	0.011018	-0.00011	0.011755	0.0071	-0.00357	0.00614	0.002107	0.024945	-0.01513	0.018824	-0.05577	0.038264	0.012304	0.005418	-0.00351
Ca	-0.03717	-0.0391	0.004511	-0.01505	0.004645	0.00532	0.085496	0.032542	0.010026	0.019036	-0.01645	-0.00115	0.00523	0.041794	-0.00234	0.04201	0.026379	0.044208	-0.00968	-0.0058	0.004839	0.085805	0.005001	0.012318	-0.01647
Cd	0.013848	-0.03581	-0.02467	0.002782	-0.03468	-0.01017	0.032542	0.226872	0.066898	0.008635	0.030381	0.065341	-0.03595	0.032596	0.03597	-0.04059	0.040493	-0.05338	-0.00283	-0.03642	0.009955	-0.02712	0.016085	0.089344	0.049428
Co	0.003175	-0.00152	-0.0077	-0.00141	-0.01113	0.005907	0.010026	0.066898	0.052609	0.030247	0.039376	0.033463	-0.01776	0.026445	0.01709	-0.03048	0.042968	-0.02964	0.006131	-0.02384	0.001903	-0.00758	0.008524	0.048467	0.029201
Cr	-0.01629	-0.00563	-0.00584	-0.01656	-0.01635	0.01655	0.019036	0.008635	0.030247	0.167994	0.007157	0.012716	-0.00578	0.021029	0.006286	-0.00476	0.079345	-0.04322	0.002002	-0.0217	-0.00823	0.005204	0.00717	0.020202	-0.00405
Cu	0.049982	0.029088	0.006465	0.024628	0.024087	0.011018	-0.01645	0.030381	0.039376	0.007157	0.096792	0.018149	0.010767	0.021947	-0.00077	-0.04056	0.037687	0.03302	0.02476	0.029936	0.002302	0.013348	0.0066	0.036387	0.031284
Fe	0.014632	-0.00555	-0.01354	0.001409	-0.01558	-0.00011	-0.00115	0.065341	0.033463	0.012716	0.018149	0.040143	-0.0194	0.007637	0.024181	-0.02677	0.012663	-0.04844	0.009113	-0.02141	0.00821	-0.03122	0.011041	0.046386	0.029236
K	0.016945	0.004195	0.01412	0.011162	0.045601	0.011755	0.00523	-0.03595	-0.01776	-0.00578	0.010767	-0.0194	0.059078	0.007375	-0.01808	0.02061	-0.00456	0.080059	0.004627	0.032126	0.001058	0.065149	0.001364	-0.01656	-0.01683
Mg	-0.00971	-0.01348	0.005897	-0.00335	0.007315	0.0071	0.041794	0.032596	0.026445	0.021023	0.021947	0.007637	0.007375	0.044663	-0.00012	0.009533	0.037267	0.037385	0.002077	0.001663	0.002403	0.048102	0.005867	0.023674	0.004834
Mn	-0.00436	-0.00335	-0.01091	-0.0037	-0.01655	-0.00357	-0.00234	0.03597	0.01709	0.006286	-0.00077	0.024181	-0.01808	-0.00012	0.028939	-0.01375	0.000574	-0.04866	0.005222	-0.02193	0.006163	-0.03569	0.005357	0.019195	0.022032
Na	-0.03102	-0.02514	0.010504	-0.0095	0.016702	0.00614	0.04201	-0.04059	-0.03048	-0.00476	-0.04056	-0.02677	0.02061	0.009533	-0.01375	0.06872	-0.01101	0.053125	-0.00386	0.012791	-3.92E-05	0.06245	-0.00238	-0.03196	-0.02933
Ni	-0.00342	-0.00624	6.82E-05	-0.00422	-0.00147	0.002107	0.026379	0.040493	0.042968	0.079345	0.037687	0.012663	-0.00456	0.037267	0.000574	-0.01101	0.084455	-0.00098	0.001796	-0.01952	-0.00224	0.024066	0.004123	0.031072	0.008339
P	0.00766	0.001141	0.040743	0.019624	0.080658	0.024945	0.044208	-0.05338	-0.02964	-0.04322	0.03302	-0.04844	0.080059	0.037385	-0.04866	0.053125	-0.00098	0.332692	-0.00197	0.117106	0.008013	0.158463	0.008305	-0.02523	-0.0421
Pb	0.045056	0.008369	-0.00615	0.025301	0.013565	-0.01513	-0.00968	-0.00283	0.006131	0.002002	0.02476	0.009113	0.004627	0.002077	0.005222	-0.00386	0.001796	-0.00197	0.180657	0.019979	0.036239	-0.03016	0.001311	0.014103	0.022504
S	0.035585	0.026298	0.016146	0.022359	0.029341	0.018824	-0.0058	-0.03642	-0.02384	-0.0217	0.029936	-0.02141	0.032126	0.001663	-0.02193	0.012791	-0.01952	0.117106	0.019979	0.278564	0.010038	0.041958	0.010903	-0.00933	-0.00353
Sb	0.005728	-0.00102	-0.00422	0.006139	0.006478	-0.05577	0.004839	0.009955	0.001903	-0.00823	0.002302	0.00821	0.001058	0.002403	0.006163	-3.92E-05	-0.00224	0.008013	0.036239	0.010038	0.085991	-0.00651	0.006018	0.011229	0.011344
Sr	-0.01739	-0.01821	0.030725	-0.00044	0.065347	0.038264	0.085805	-0.02712	-0.00758	0.005204	0.013348	-0.03122	0.065149	0.048102	-0.03569	0.06245	0.024066	0.158463	-0.03016	0.041958	-0.00651	0.286923	0.012946	-0.01655	-0.04126
Ti	0.004101	-0.00166	-0.00184	-0.00037	0.002514	0.012304	0.005001	0.016085	0.008524	0.00717	0.0066	0.011041	0.001364	0.005867	0.005357	-0.00238	0.004123	0.008305	0.001311	0.010903	0.006018	0.012946	0.018126	0.020674	0.00658
V	0.024696	-0.00953	-0.01325	0.00255	-0.01223	0.005418	0.012318	0.089344	0.048467	0.020202	0.036387	0.046386	-0.01656	0.023674	0.019195	-0.03196	0.031072	-0.02523	0.014103	-0.00933	0.011229	-0.01655	0.020674	0.077935	0.031472
Zn	0.02204	0.008909	-0.00879	0.009899	-0.00928	-0.00351	-0.01647	0.049428	0.029201	-0.00405	0.031284	0.029236	-0.01683	0.004834	0.022032	-0.02933	0.008339	-0.0421	0.022504	-0.00353	0.011344	-0.04126	0.00658	0.031472	0.047155

Table II-2-3 Correlation matrix of the stream sediment samples

cor_mat	Au	Hg	Al	As	Ba	Be	Ca	Cd	Co	Cr	Cu	Fe	K	Mg	Mn	Na	Ni	P	Pb	S	Sb	Sr	Ti	V	Zn
Au	1	0.174731	-0.01616	0.261082	0.083475	0.025575	-0.19906	0.045522	0.021676	-0.06989	0.251548	0.114347	0.10916	-0.07196	-0.0401	-0.18527	-0.01841	0.020795	0.16598	0.105568	0.030583	-0.05083	0.047697	0.138513	0.158915
Hg	0.174731	1	0.199513	0.300548	0.179291	-0.0235	-0.48297	-0.27157	-0.02389	-0.04964	0.337716	-0.09997	0.062337	-0.23047	-0.0712	-0.34638	-0.0775	0.007143	0.071118	0.179975	-0.0126	-0.12278	-0.04463	-0.12334	0.148197
Al	-0.01616	0.199513	1	0.075451	0.457967	0.145371	0.132157	-0.44379	-0.28755	-0.12208	0.178021	-0.57912	0.497654	0.239053	-0.54924	0.343252	0.002011	0.605127	-0.12392	0.262062	-0.12324	0.491378	-0.11708	-0.40646	-0.34677
As	0.261082	0.300548	0.075451	1	0.250793	-0.04446	-0.24326	0.027597	-0.02899	-0.19092	0.374053	0.03322	0.217	-0.07483	-0.10266	-0.17119	-0.06865	0.160766	0.281273	0.200179	0.098919	-0.00386	-0.01296	0.043158	0.217567
Ba	0.083475	0.179291	0.457967	0.250793	1	0.145916	0.061284	-0.28093	-0.18722	-0.17268	0.2987	-0.30007	0.723839	0.133547	-0.37541	0.245806	-0.01945	0.539515	0.123133	0.214482	0.085234	0.470669	0.072033	-0.16903	-0.16484
Be	0.025575	-0.0235	0.145371	-0.04446	0.145916	1	0.052097	-0.06113	0.073736	0.115615	0.101405	-0.00159	0.138477	0.086196	-0.06014	0.067064	0.020764	0.123831	-0.10189	0.10212	-0.54454	0.204534	0.261676	0.055568	-0.04624
Ca	-0.19906	-0.48297	0.132157	-0.24326	0.061284	0.052097	1	0.233656	0.149496	0.158838	-0.18085	-0.01963	0.073589	0.676347	-0.04706	0.548073	0.310435	0.262125	-0.07789	-0.0376	0.056438	0.547842	0.12704	0.150908	-0.25941
Cd	0.045522	-0.27157	-0.44379	0.027597	-0.28093	-0.06113	0.233656	1	0.612336	0.044229	0.20502	0.684684	-0.31055	0.323818	0.443924	-0.32505	0.292535	-0.19428	-0.01397	-0.14486	0.071279	-0.10629	0.250829	0.671901	0.477881
Co	0.021676	-0.02389	-0.28755	-0.02899	-0.18722	0.073736	0.149496	0.612336	1	0.321735	0.551804	0.728156	-0.31858	0.54556	0.437987	-0.50691	0.644616	-0.22406	0.062887	-0.19693	0.028292	-0.06172	0.276051	0.757233	0.586276
Cr	-0.06989	-0.04964	-0.12208	-0.19092	-0.17268	0.115615	0.158838	0.044229	0.321735	1	0.056127	0.154847	-0.05799	0.2427	0.090157	-0.04432	0.666133	-0.18263	0.011491	-0.10029	-0.06849	0.023705	0.129833	0.176554	-0.04551
Cu	0.251548	0.337716	0.178021	0.374053	0.2987	0.101405	-0.18085	0.20502	0.551804	0.056127	1	0.281151	0.142388	0.333793	-0.01461	-0.49733	0.416828	0.184005	0.187243	0.182309	0.025232	0.080095	0.157561	0.418945	0.46306
Fe	0.114347	-0.09997	-0.57912	0.03322	-0.30007	-0.00159	-0.01963	0.684684	0.728156	0.154847	0.291151	1	-0.39834	0.18037	0.709451	-0.50969	0.217487	-0.41918	0.107008	-0.20244	0.13973	-0.29094	0.409328	0.829315	0.671965
K	0.10916	0.062337	0.497654	0.217	0.723839	0.138477	0.073589	-0.31055	-0.31858	-0.05799	0.142388	-0.39834	1	0.143579	-0.46155	0.323465	-0.06457	0.571056	0.04479	0.250429	0.014851	0.500396	0.041685	-0.24402	-0.31877
Mg	-0.07196	-0.23047	0.239053	-0.07483	0.133547	0.096196	0.676347	0.323818	0.54556	0.2427	0.333793	0.18037	0.143579	1	-0.00324	0.172076	0.606791	0.306693	0.023121	0.015068	0.038767	0.424921	0.206216	0.401271	0.105337
Mn	-0.0401	-0.0712	-0.54924	-0.10266	-0.37541	-0.06014	-0.04706	0.443924	0.437987	0.090157	-0.01461	0.709451	-0.46155	-0.00324	1	-0.30827	0.011604	-0.49588	0.072218	-0.24424	0.123536	-0.39172	0.233897	0.404189	0.596401
Na	-0.18527	-0.34638	0.343252	-0.17119	0.245806	0.067064	0.548073	-0.32505	-0.50691	-0.04432	-0.49733	-0.50969	0.323465	0.172076	-0.30827	1	-0.14447	0.35135	-0.03557	0.092449	-0.00051	0.444745	-0.06755	-0.43669	-0.51527
Ni	-0.01841	-0.0775	0.002011	-0.06865	-0.01945	0.020764	0.310435	0.292535	0.644616	0.666133	0.416828	0.217487	-0.06457	0.606791	0.011604	-0.14447	1	-0.00582	0.014555	-0.12729	-0.02627	0.154599	0.105375	0.382994	0.132135
P	0.020795	0.007143	0.605127	0.160766	0.539515	0.123831	0.262125	-0.19428	-0.22406	-0.18263	0.184005	-0.41918	0.571056	0.306693	-0.49588	0.35135	-0.00582	1	-0.00802	0.384677	0.047375	0.512888	0.106953	-0.15667	-0.33616
Pb	0.16598	0.071118	-0.12392	0.281273	0.123133	-0.10189	-0.07789	-0.01397	0.062887	0.011491	0.187243	0.107008	0.04479	0.023121	0.072218	-0.03557	0.014555	-0.00802	1	0.089058	0.290755	-0.13248	0.022904	0.118859	0.243824
S	0.105568	0.179975	0.262062	0.200179	0.214482	0.10212	-0.0376	-0.14486	-0.19693	-0.10029	0.182309	-0.20244	0.250429	0.015068	-0.24424	0.092449	-0.12729	0.384677	0.089058	1	0.06486	0.148413	0.153442	-0.06333	-0.0308
Sb	0.030583	-0.0126	-0.12324	0.098919	0.085234	-0.54454	0.056438	0.071273	0.028292	-0.06848	0.025232	0.13973	0.014851	0.038767	0.123536	-0.00051	-0.02627	0.047375	0.290755	0.06486	1	-0.04148	0.152431	0.13717	0.178151
Sr	-0.05083	-0.12278	0.491378	-0.00386	0.470669	0.204534	0.547842	-0.10629	-0.06172	0.023705	0.080095	-0.29094	0.500396	0.424921	-0.39172	0.444745	0.154599	0.512888	-0.13248	0.148413	-0.04148	1	0.179517	-0.11068	-0.35469
Ti	0.047697	-0.04463	-0.11708	-0.01296	0.072033	0.261676	0.12704	0.250829	0.276051	0.129833	0.157561	0.409328	0.041685	0.206216	0.233897	-0.06755	0.105375	0.106953	0.022904	0.153442	0.152431	0.179517	1	0.55007	0.225058
V	0.138513	-0.12334	-0.40646	0.043158	-0.16903	0.055568	0.150908	0.671901	0.757233	0.176554	0.418945	0.829315	-0.24402	0.401271	0.404189	-0.43669	0.382994	-0.15667	0.118859	-0.06333	0.13717	-0.11068	0.55007	1	0.519149
Zn	0.158915	0.148197	-0.34677	0.217567	-0.16484	-0.04624	-0.25941	0.477881	0.586276	-0.04551	0.46306	0.671965	-0.31877	0.105337	0.596401	-0.51527	0.132135	-0.33616	0.243824	-0.0308	0.178151	-0.35469	0.225058	0.519149	1

(Au, Cd, Cu, Co, Cr, Mo, Ni, Pb, Sb and Zn) show large variance of this ratio.

2 - 3 - 2 Distribution of geochemical anomaly

In order to decide a threshold that sorts out an anomaly from a background level of geochemical data, various methods have been proposed: an natural gap of probability curve, a inflection point of probability curve, a method to use average and standard deviation, a percentile of frequency distribution and others. In this paper, the combination of an avarage and standard deviation is taken as a criterion. However, an inflection point and a natural gap are also considered for the decision. The threshold value of each element is shown in Fig.II-2-2-(1)-(4). As for 10 elements that obviously include anomalos values and that are said to be harmful to human being, the anomaly distribution maps were made in this time (Fig.II-2-3-(1)-(10)).

The characteristics of each anomaly distribution are as follows.

[Au] (Fig.II-2-3-(1))

The values of 19 samples exceed 0.1026 ppm Au. These anomaly values suggest Au mineralization. Cu-Au deposits and Au mineral occurences are known in Namosi region (Waidina River basin, Rewa River drainage system) and upper-stream of Waimanu River (Rewa River drainage system). However, several anomalous values are also distibuted in the other tributaries of Navua River drainage system except Namosi Region and the small rivers of coastal area. Therefore, Au mineral occurences are expected in these catchments.

[As] (Fig.II-2-3-(2))

93% of samples show the below the detection limit value (5 ppm As), this is partly because the detection limit value itself is high. 39 samples exceed 9.51 ppm As and 11 samples among them exceed 32.17 ppm As. These anomaly values are thought to have a relation to Au mineralization. However, background value may be is high because the geology in which the rivers flow is mainly composed of volcanic rocks. The ditribution of As anomaly values are almost concordant with that of Au and distributed in Namosi region and around.

[Cd] (Fig.II-2-3-(3))

The values of 156 samples exceed 3.305 ppm Cd and 12 samples among them exceed 9.896 ppm Cd. The values of Cd are generally high in all the area, but especially high in the upper stream of Sigatoka River. Cd anomalies are generally accompanied with Zn deposits, and there are many Zn deposits or mineral occurences are distributed in the area. In the upper-stream of Sigatoka River, Cd anomalies appear to have no relation with Zn anomalies.

[Cr] (Fig.II-2-3-(4))

The values of 33 samples exceed 1,020 ppm Cr. The anomalous values of Cr are distributed characteristically in the right bank of Rewa Rver and the middle-upper stream of Navua River. These anomalies reflect Cr minerals derived from basic igneous rocks.

[Cu] (Fig.II-2-3-(5))

The values of 9 samples exceed 228 ppm Cu. The anomalous values of Cu are distributed in Rewa River drainage system, especially in Namosi region. Another small anomalies are seen in Waimanu River (Rewa River drainage system) and Wainikovu River (Navua River water system). Cu anomalies have a relation with Cu-Au mineralization represented by Porphyry Cu deposits in Namosi region.

[Hg] (Fig.II-2-3-(6))

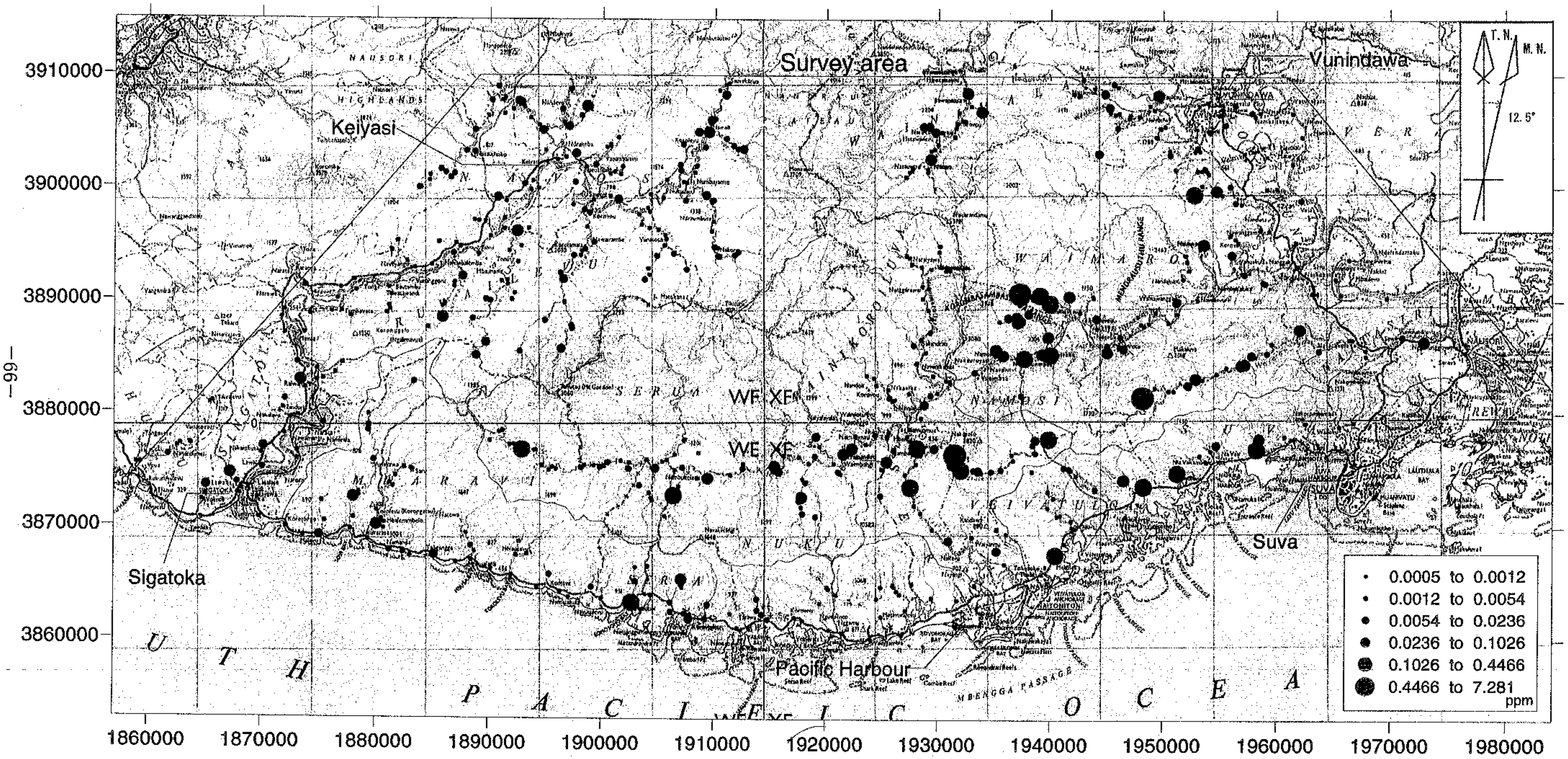

Fig.II-2-3-(1) Distribution of geochemical anomaly of the stream sediment samples (Au) (1:500,000)

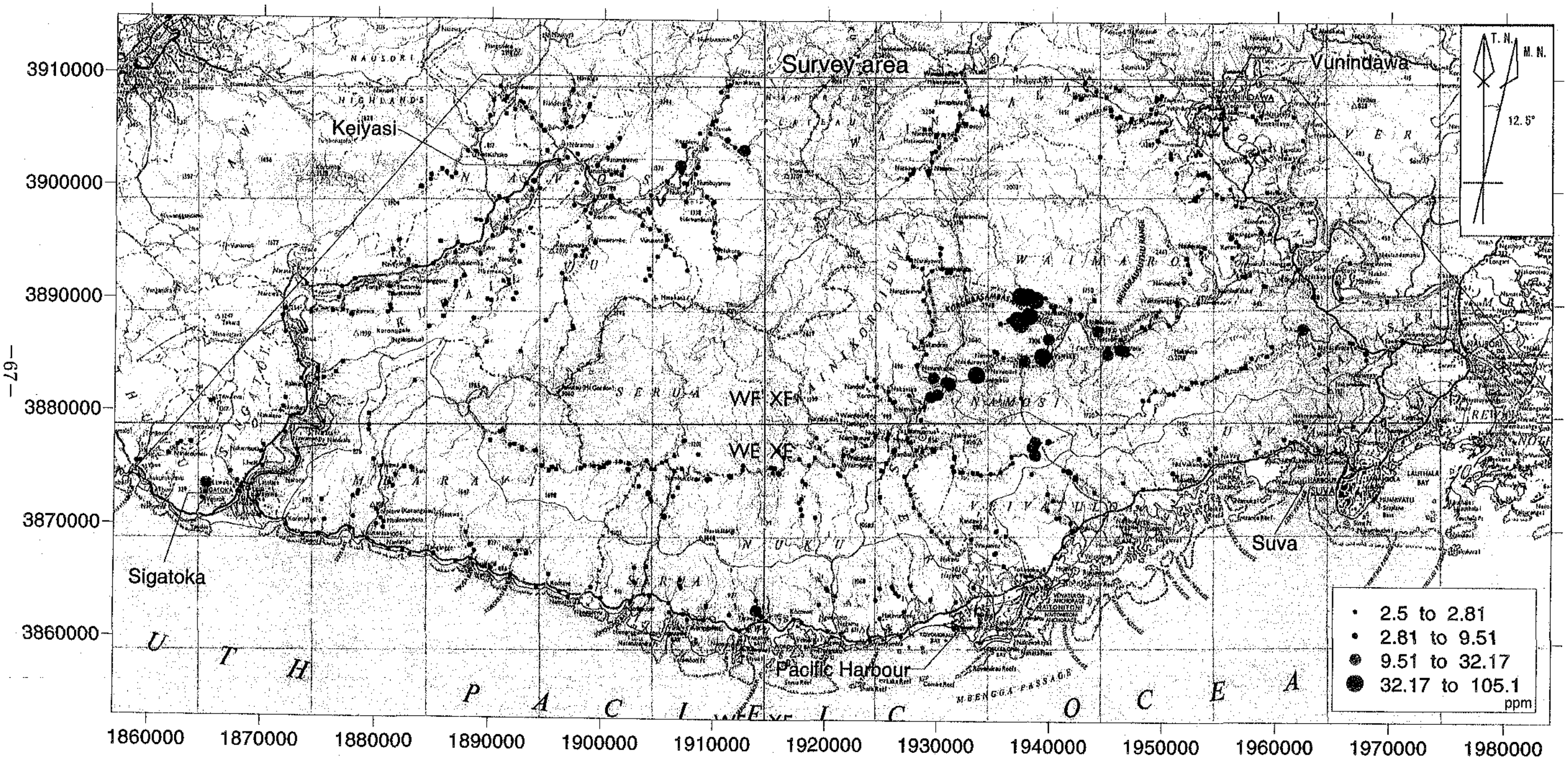

Fig.II-2-3-(2) Distribution of geochemical anomaly of the stream sediment samples (As) (1:500,000)

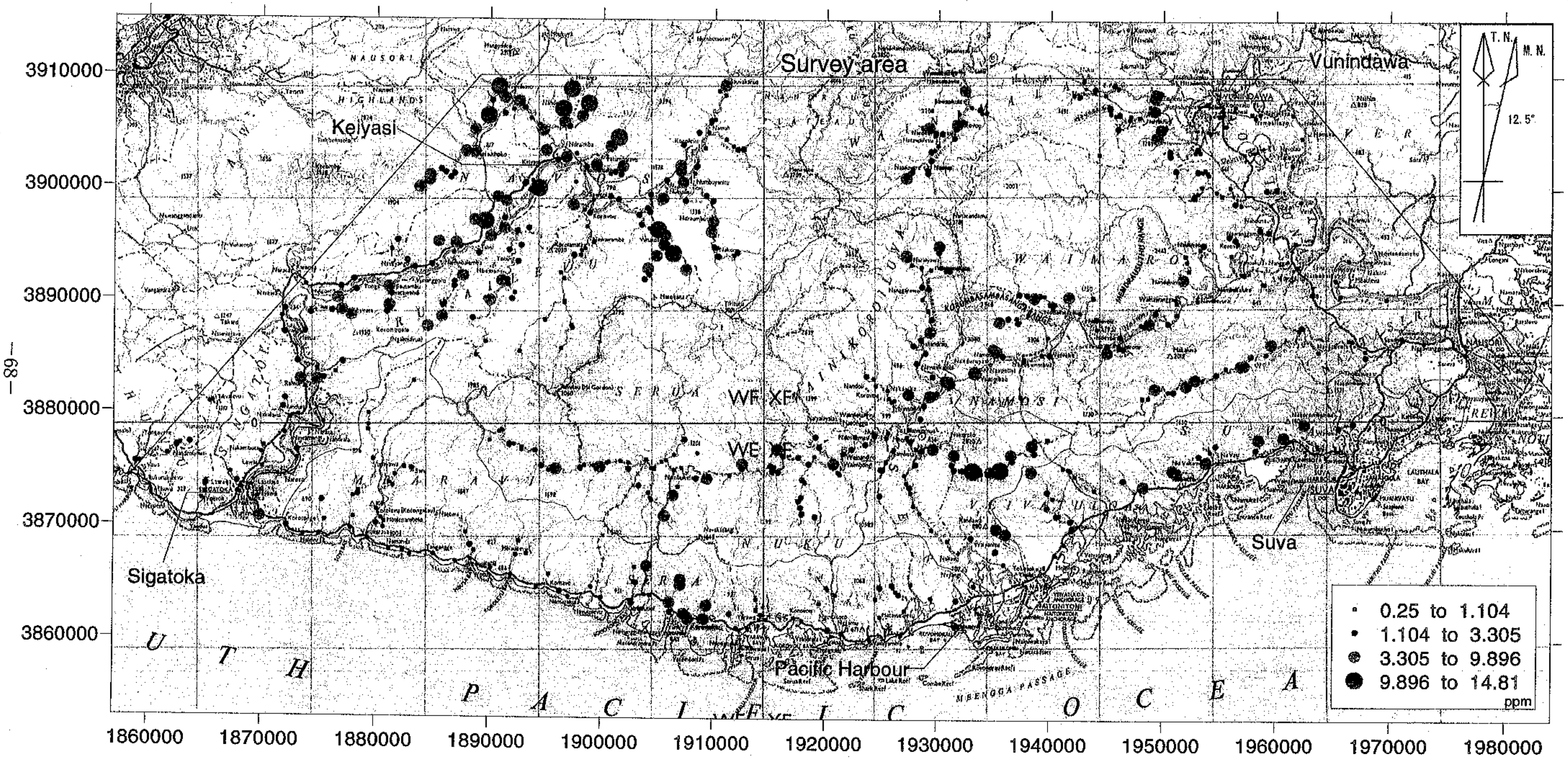

Fig.II-2-3-(3) Distribution of geochemical anomaly of the stream sediment samples (Cd) (1:500,000)

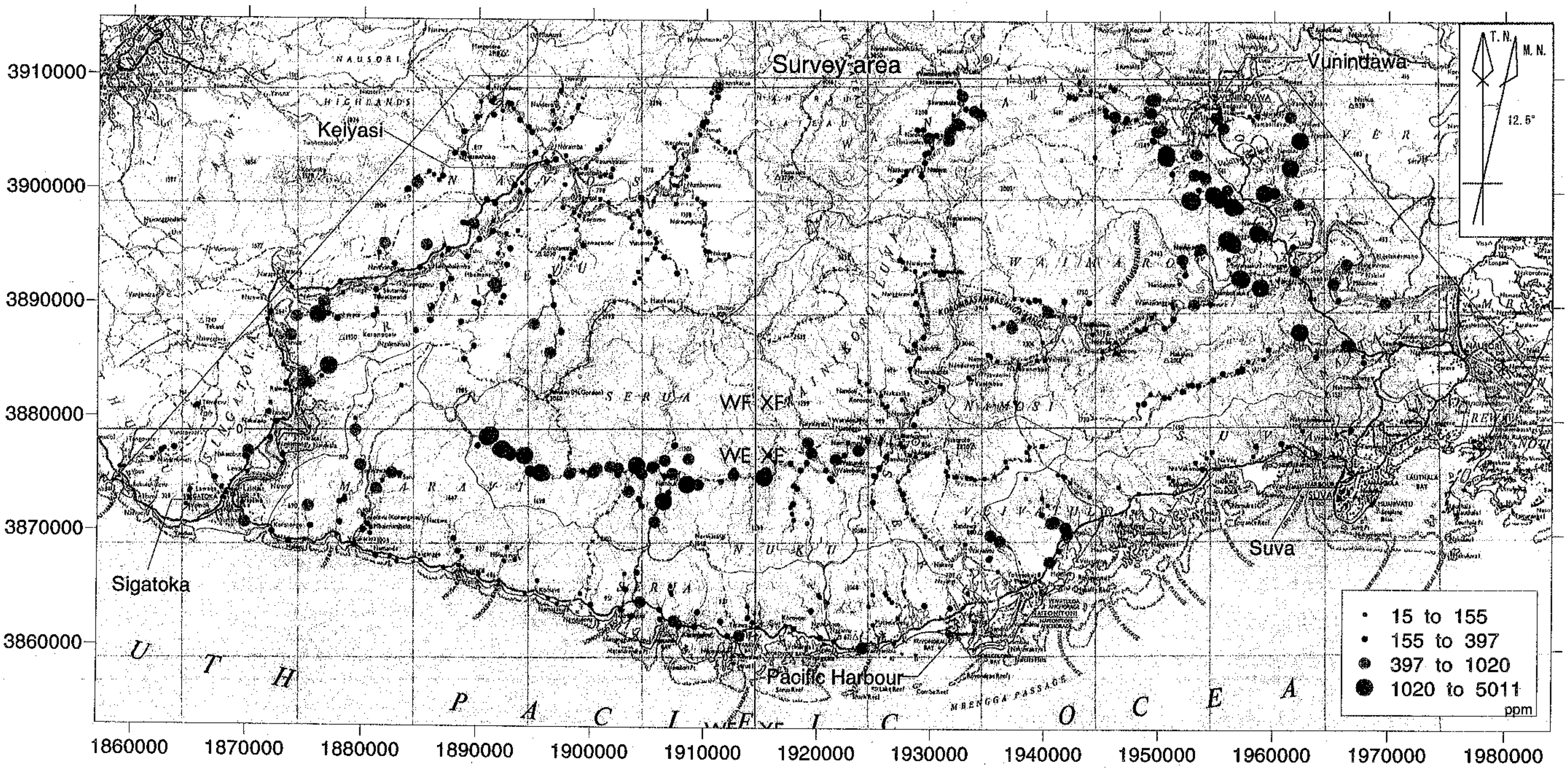

Fig.II-2-3-(4) Distribution of geochemical anomaly of the stream sediment samples (Cr) (1:500,000)

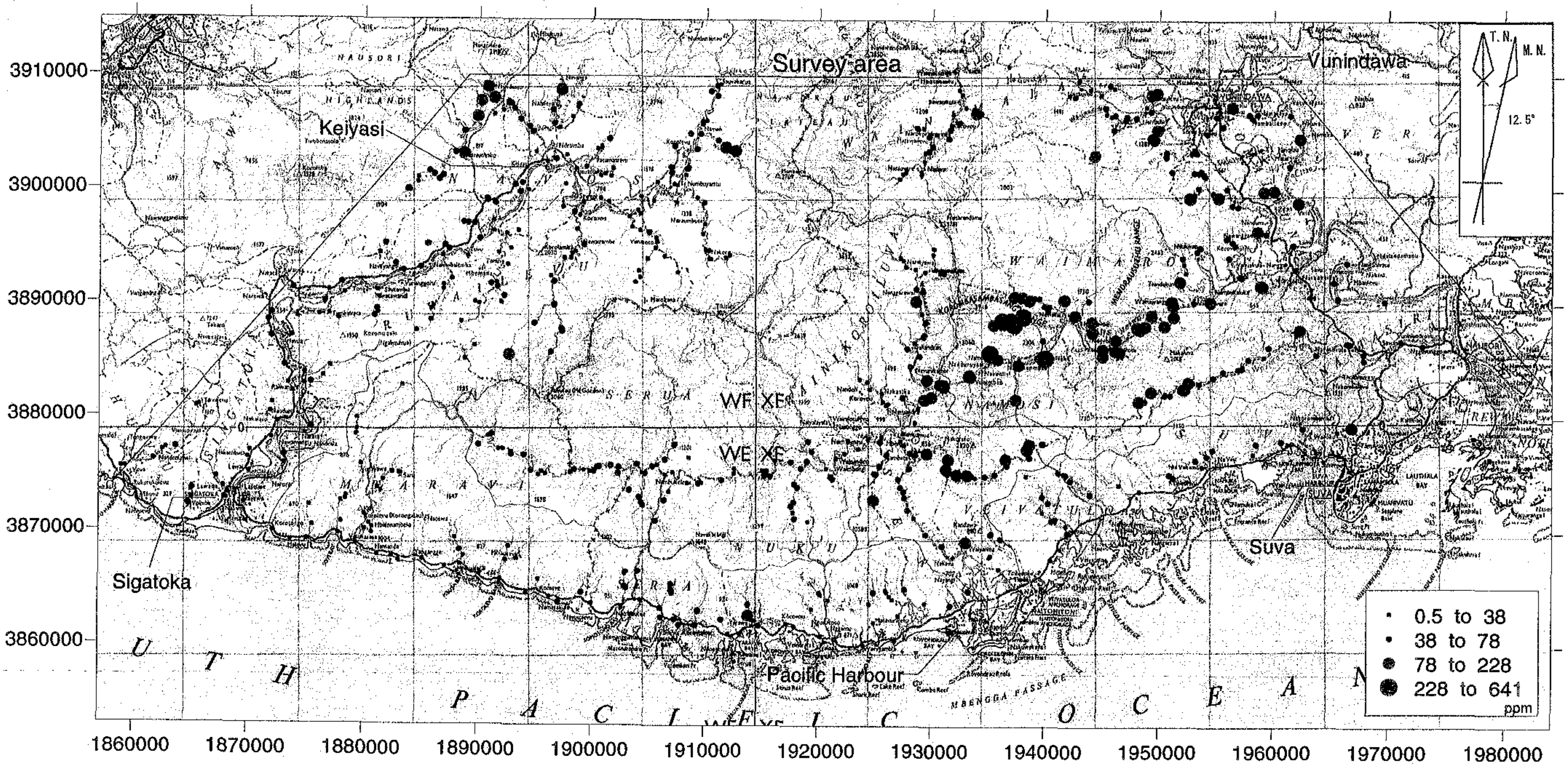

Fig.II-2-3-(5) Distribution of geochemical anomaly of the stream sediment samples (Cu) (1:500,000)

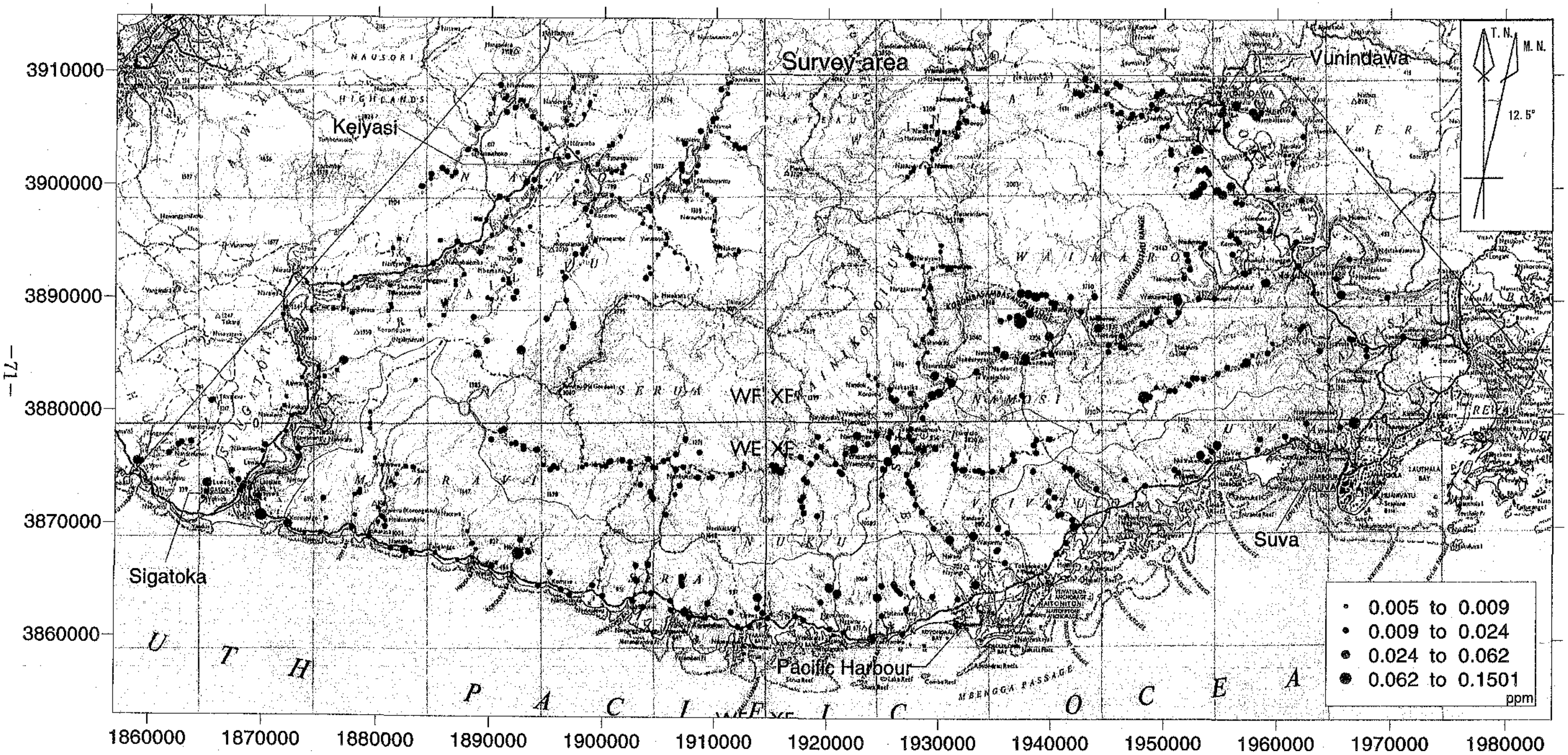

Fig.II-2-3-(6) Distribution of geochemical anomaly of the stream sediment samples (Hg) (1:500,000)

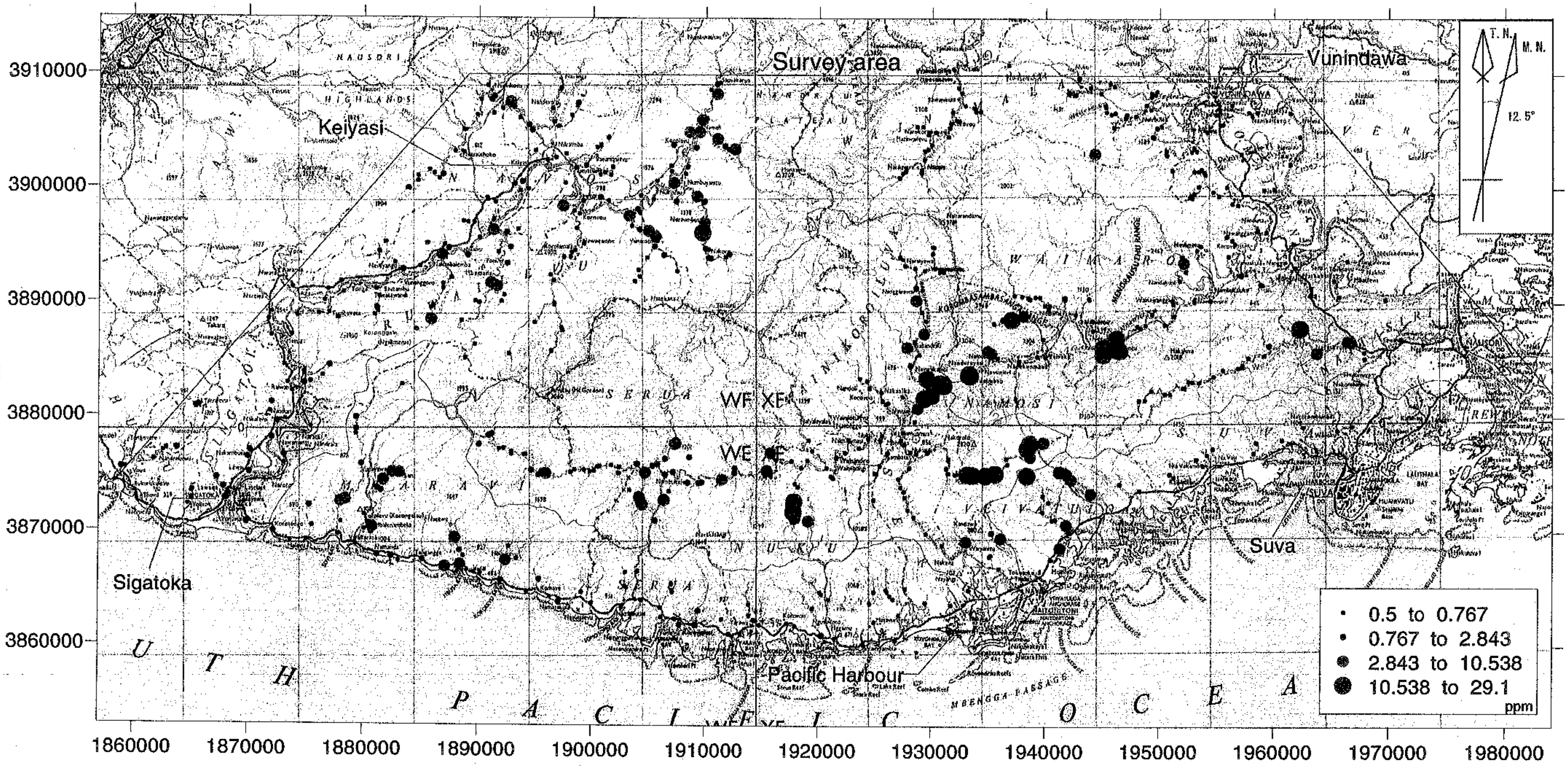

Fig.II-2-3-(7) Distribution of geochemical anomaly of the stream sediment samples (Mo) (1:500,000)

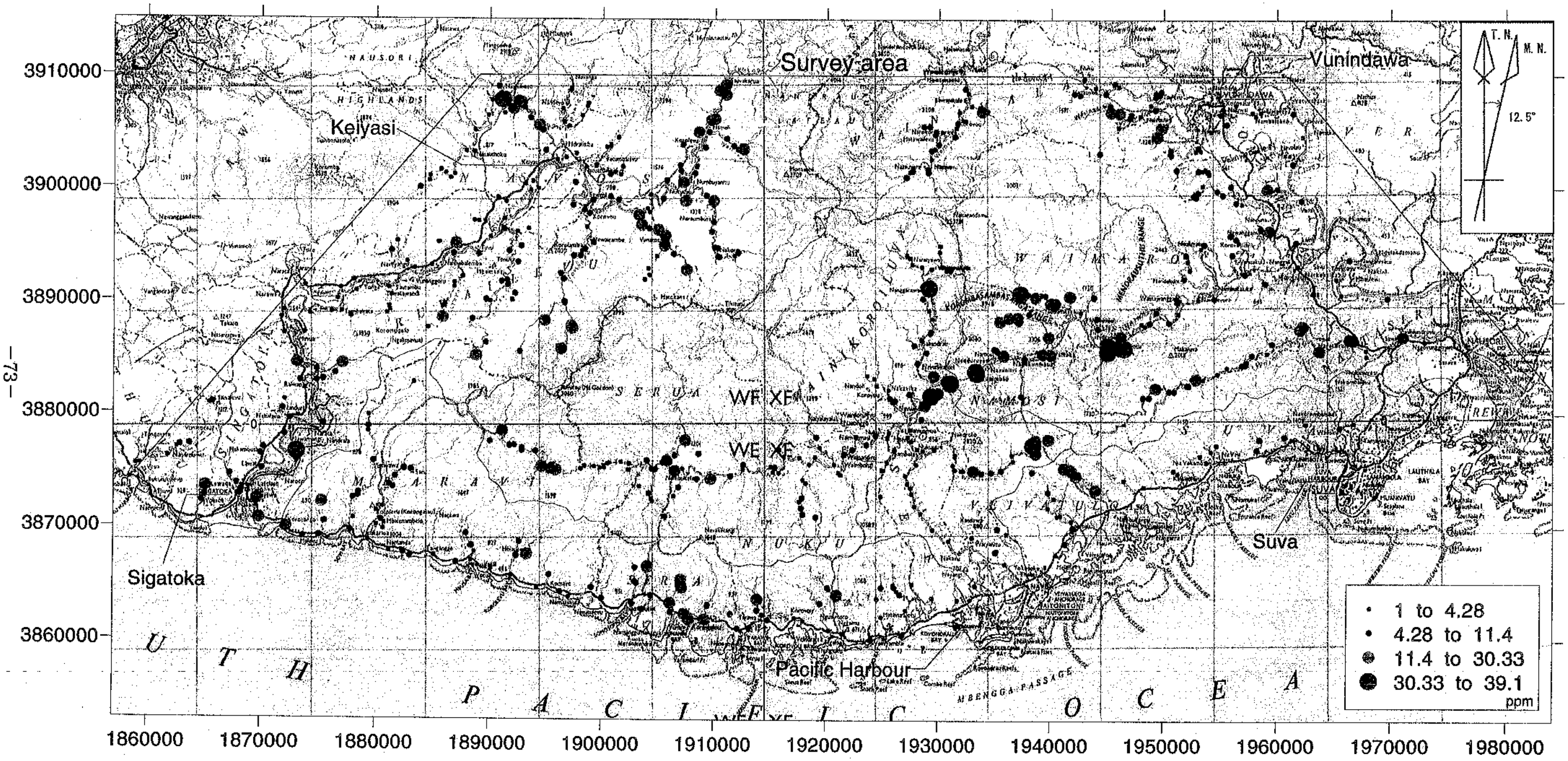

Fig.II-2-3-(8) Distribution of geochemical anomaly of the stream sediment samples (Pb) (1:500,000)

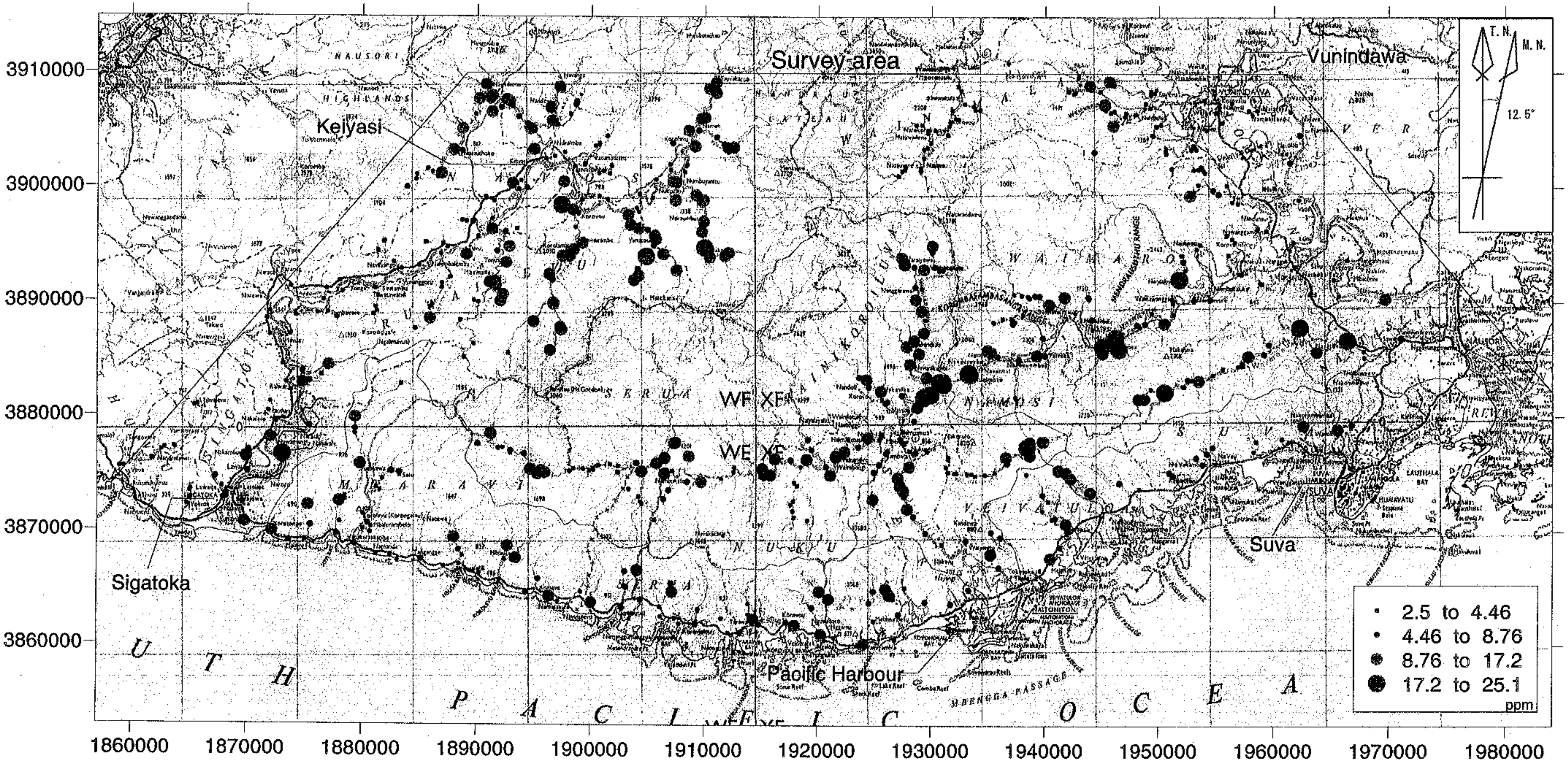

Fig.II-2-3-(9) Distribution of geochemical anomaly of the stream sediment samples (Sb) (1:500,000)

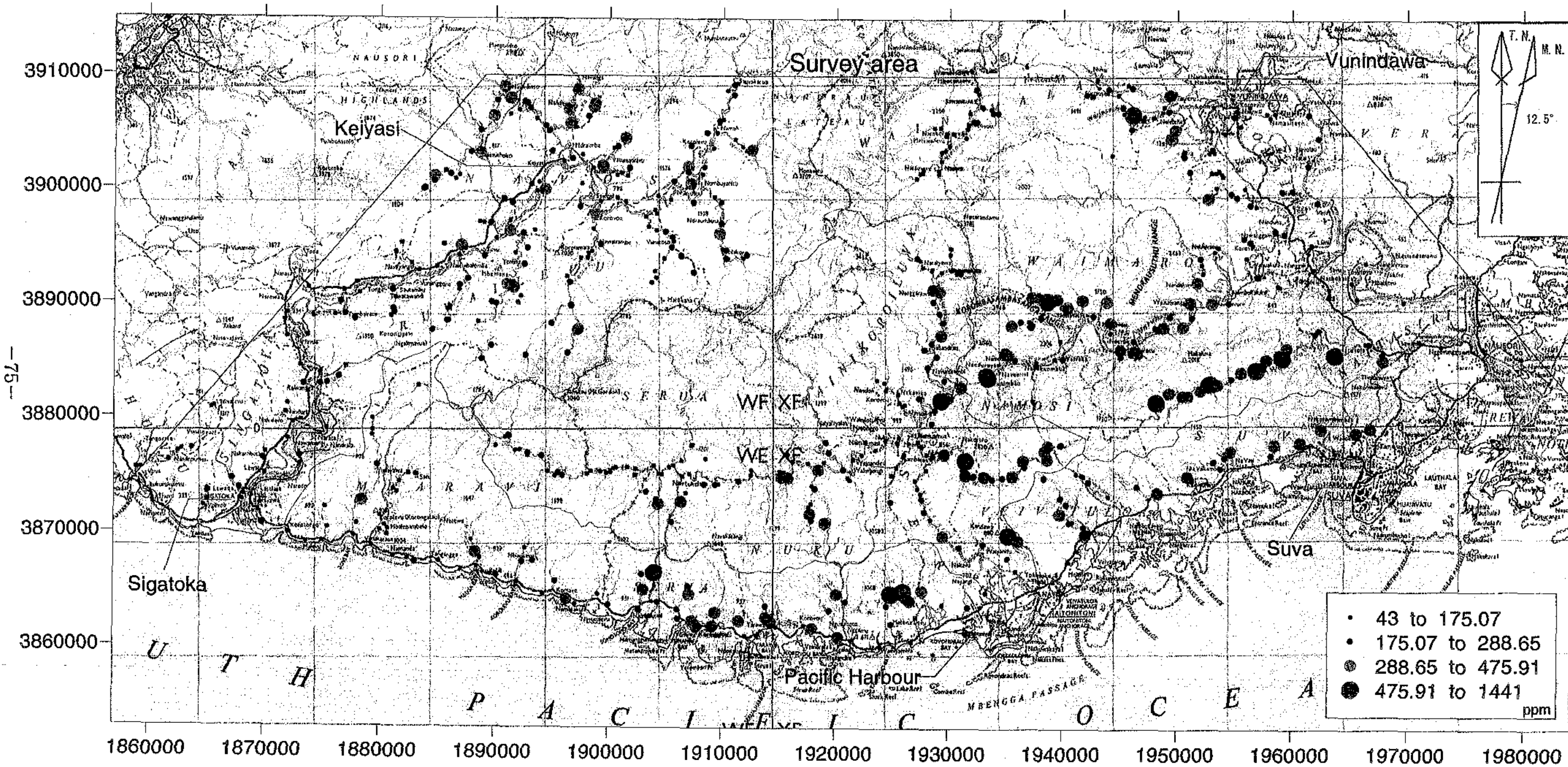

Fig.II-2-3-(10) Distribution of geochemical anomaly of the stream sediment samples (Zn) (1:500,000)

40% of the samples are below the detection limit value (0.01 ppm Hg) and 92.3% of the samples are below 0.02 ppm Hg. Even the maximum value is 0.15 ppm Hg that is a generally low. Some weak Hg anomalies are seen in Namosi region of Rewa River drainage system, South of Vunidawa and middle stream of Navua River, which are thought to have a relation with Au mineralization.

[Mo] (Fig.II-2-3-(7))

More than 75.2% of the samples are below the detection limit value (1 ppm Mo), but the values of 28 samples exceed 10.538 ppm Mo. The anomalies of Mo are distributed in Namosi Region of Rewa River drainage system and Wainikovu River and Wainikoroiluva River of Navua River drainage system. These anomalies are thought to have a relation with Cu mineralization.

[Pb] (Fig.II-2-3-(8))

The values of 14 samples exceed 30.33 ppm Pb. Pb is accompanied metallogenically with Zn and Cu. The anomalies of Pb are distributed in middle stream of Wainikoroiluva River of Navua River drainage system and aroud Nasele village in the east of Namosi village.

[Sb] (Fig.II-2-3-(9))

The values of 21 samples exceed 17.2 ppm Sb. with. Sb has a tendency to be accompanied with Au, Ag, As and Hg of vein type Au-Ag deposits. However, anomaly distribution of Sb is concordant with that of Pb rather than that of Au. The anomalous values of Sb are distributed in middle stream of Wainikoroiluva River of Navua River drainage system and aroud Nasele village in the east of Namosi village.

[Zn] (Fig.II-2-3-(10))

The values of 19 samples exceed 475.91 ppm Zn. Zn has a metallogenic relation with Pb, Cu, Cd, Ag and Au. Zn is a high mobility element and small Zn mineral occurences are scattered inside the survey area, therefore Zn anomly distribution are scattered. The background value of Zn is high similarly to Cd.

2 - 3 - 3 *Principal component analysis*

Using the correlation matrix calculeted from logarithm of analysis values of stream sediments samples, principal components values are decided and the result are shown in Table II-2-4. Eigenvalues of up to the third principal component are above 2. Cummulative contribution up to the third principal component is 52.2%. The score distribution maps are shown in Fig.II-2-4-(1)-(3).

[Z- 1] (Fig.II-2-4-(1))

The first principal component contributes approximately 24.6% of original variability. The factor loadings of Fe, Co, V, Zn, Mn and Cd are highly positive, and these elements seem to reflect ferromagnesian minerals. The factor loadings of P, K, Na, Al and Ba are negative, and these elements seem to reflect feldspars and clay minerals. The areas of positive scores are around Waimanu River and Wainimala River of Rewa River drainage system, near Vunaniu Bay and medium-upper stream of Sigatoka River. On the contrary, the areas of negative scores are Navua River basin. The contribution of Fe is especially high positive and many magnetite sands were sampled in the river of the acidic-basic intrusive rock zone. Therefore, the areas of positive score are related with acidic - basic intrusive rocks and the areas of negative score are related with sedimentary rocks and volcaniclastic rocks.