

### **1-3-2 Distribution of geochemical anomalies**

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 average and standard deviation is taken as criteria. However, an inflection point and a natural gap are also considered for the decision. The geochemical maps are made as to 20 chemical elements that obviously include anomaly and that may be harmful to human being (Fig.II-2-3-(1)-(20)). The geochemical characteristics of each element are described as follows.

In Namosi area, MMAJ and Nittetsu Mining have been executing mineral exploration, which includes stream sediment survey. The density of sampling in the mineral exploration was higher than this environmental baseline study. The methods (\*) of preparations before analysis are different between these two surveys for minerals except Au and Hg. However, the data of the mineral exploration were also included into geochemical mappings only as to Au, Ag, As, Cd, Cr, Cu, Hg, Mo, P, Pb, S, Zn and V because these elements seem not to be influenced by the difference between 2 preparations.

(\*) As for analysis of elements except Au and Hg, preparation of the environmental baseline study is to use four kinds of acids that dissolve completely almost all minerals, while preparation of the mineral exploration is to use aqua regia that dissolve ore minerals but doesn't dissolve all silicate minerals.

Geochemical characteristics of each element are as follows.

[Silver] (Ag) (Fig.II-1-3-(1))

The 86% of the samples including the mineral exploration samples indicate Ag contents under detection limit. Some small sized anomalies are distributed in Namosi area (the uppermost Waidina River and the Waivaka River).

[Aluminium] (Al) (Fig.II-1-3-(2))

The Al contents of the samples from the survey area are relatively lower than the average crustal value (8.13%). The distribution of Al content is strongly influenced by the regional geology because Al is generally included in feldspars. Relatively high Al ranges are seen in the Lobau River (Costal Rivers) and the left bank of the upper Navua River, and a relatively low Al range is seen around the Busa Bay and Korolevu Bay.

[Arsenic] (As) (Fig.II-1-3-(3))

The 78% of the samples including the mineral exploration samples indicate As contents under detection limit. The maximum As value is 105ppm. The 140 samples including the mineral exploration samples indicate As contents more than 10 ppm. The As anomaly is generally accompanied with Au mineralization. In this survey, As anomalies adjoin Au anomalies in he Namosi area, but they do not accord perfectly with each other.

[Gold] (Au) (Fig.II-1-3-(4))

The 27 samples including the mineral exploration samples indicate Au contents more than 1 ppm. The 151 samples including the mineral exploration samples indicate Au contents from 0.1 to 1 ppm. Various sizes of Cu-Au deposits and Au mineral occurrences are known in the Namosi area (around the Waidina River), the upper stream of Waimanu River (the Rewa River drainage) and the upper stream of Wainadoi River (the Coastal Rivers). These locations of deposits and mineral occurrences are in harmony with the geochemical anomalies of Au. In

addition, some Au anomalies are distributed in the Wainikovu River (the Navua River drainage), the Wainamoli River (the Navua River drainage), the middle-lower stream of Sigatoka River, the right bank of upper Rewa River.

[Barium] (Ba) (Fig.II-1-3-(5))

A laterally elongated low Ba range is seen along the south coast. While, a relatively high Ba range is detected in the Wainivau River (the uppermost tributary of Sigatoka River). The Ba has a positive correlation with K.

[Calcium] (Ca) (Fig.II-1-3-(6))

The Ca distribution is strongly influenced by the regional geology because relatively high Ca ranges are seen along the Sigatoka River where limestone dominates. An anomaly in the west of Sigatoka town is due to contamination of marine shell sands. The Ca has positive correlations with Mg, Na and Sr.

[Cadmium] (Cd) (Fig.II-1-3-(7))

The 49 samples including the mineral exploration samples indicate Cd contents more than 10 ppm. High Cd anomalies are detected in the uppermost stream of Waidina River and the upper stream of Sigatoka River. The Cd is generally accompanied with Zn deposit. In the survey area, Cd anomalies are roughly concordant with Zn anomalies with the maximum value is 21.2 ppm.

[Chromium] (Cr) (Fig.II-1-3-(8))

The 74 samples including the mineral exploration samples indicate Cr contents more than 1,000 ppm. The Cr positive anomalies are detected in the upper stream of Rewa River and the middle-upper stream of Navua River, which reflect Cr including minerals derived from basic intrusive rocks.

[Copper] (Cu) (Fig.II-1-3-(9))

The 70 samples including the mineral exploration samples indicate Cu contents more than 200 ppm. The Cu anomalies are distributed around the Namosi area and two small Cu anomalies exist in the south of junction of Rewa River and the Waimanu River and in the Wainivau River (the uppermost tributary of Sigatoka River). These Cu anomalies reflect Cu-Au mineralization represented by Porphyry Cu deposits in the Namosi area.

[Mercury] (Hg) (Fig.II-1-3-(10))

The 40% of the samples including the mineral exploration samples indicate Hg contents under detection limit (0.01 ppm). The Hg content in this area is generally low, and 94.4% of the samples indicate the values under 0.02 ppm. The maximum Hg content is 0.66 ppm. Some weak Hg anomalies are seen in the uppermost stream of Waidina River in the Namosi area and in the uppermost stream of Waimanu River, which have a relation with Au mineralization.

[Potassium] (K) (Fig.II-1-3-(11))

The K contents in the survey area indicate generally low value. A laterally elongated low K range is seen along the southern coast and relatively high K ranges are seen in inland area. Hence the K has a positive correlation with Ba.

[Magnesium] (Mg) (Fig.II-1-3-(12))

The Mg has a positive correlation with Ca. The distribution of Mg content is strongly influenced by the regional geology similarly to the Ca distribution. Two relatively high Mg ranges are distributed along the middle stream of Sigatoka River.

[Molybdenum] (Mo) (Fig.II-1-3-(13))

The 62.4% of the samples including the mineral exploration samples indicate Mo contents under detection limit (1 ppm), and 45 samples exceed 10 ppm. The Mo anomalies are distributed around the Namosi area, near the Nasele village in the east of Namosi village, along the Wainikoroiluva River and the Wainikovu River. The Mo is generally accompanied with Cu, Pb, Zn, Au, Ag, Sn and W in hydrothermal mineralization. The Mo anomalies in the area are in harmony with Pb anomalies rather than Cu anomalies.

[Sodium] (Na) (Fig.II-1-3-(14))

Relatively low Na ranges are distributed in the southeastern side of the area that has much rain and relatively high Na ranges are distributed in the northwestern side of the area that is drier than southeast side.

[Phosphorus] (P) (Fig.II-1-3-(15))

The P has a weak positive correlation with Al. A laterally elongated low P range is distributed in the south coast and relatively high P ranges are detected in the western Namosi area and the Wainivau River (the uppermost stream of Sigatoka River).

[Lead] (Pb) (Fig.II-1-3-(16))

The 39 samples including the mineral exploration samples indicate Pb contents more than 30 ppm. The Pb is generally accompanied with Zn mineralization and around Cu mineralization. The Pb anomalies are distributed around the Namosi area and are in harmony with Mo anomalies rather than Zn and Cu. In addition, a small Pb anomaly is detected in the Wainamoli River (Navua drainage).

[Sulphur] (S) (Fig.II-1-3-(17))

The 43 samples including the mineral exploration samples indicate S contents more than 0.5%. The S anomalies are distributed in the northern Namosi area, the right bank of middle stream of Wainikoroiluva River, the upper Wainimala River, around the Veivatuloa Bay, on the west of Pacific Harbour and the upper Wainivau River etc.

[Antimony] (Sb) (Fig.II-1-3-(18))

The 185 samples indicate Sb contents more than 10 ppm. The Sb is generally accompanied with Au, Ag, As and Hg in hydrothermal mineralization. However, Sb anomalies is weakly concordant with Pb anomalies rather than Au anomalies in the Namosi area.

[Vanadium] (V) (Fig.II-1-3-(19))

The V shows good positive correlations with Fe and Co. The V anomalies are distributed in the western Namosi area, the upper stream of Wainadoi River and around the Vunaniu Bay.

[Zinc] (Zn) (Fig.II-1-3-(20))

The 54 samples including the mineral exploration samples indicate Zn contents more than 500 ppm. The Zn contents in the area show generally high values. The Zn shows relatively good correlations with Fe, Co, Cu, Mn and V in this survey. The Zn anomalies are distributed around the Namosi area, between Suva and the Waimanu River and along the middle south coast.

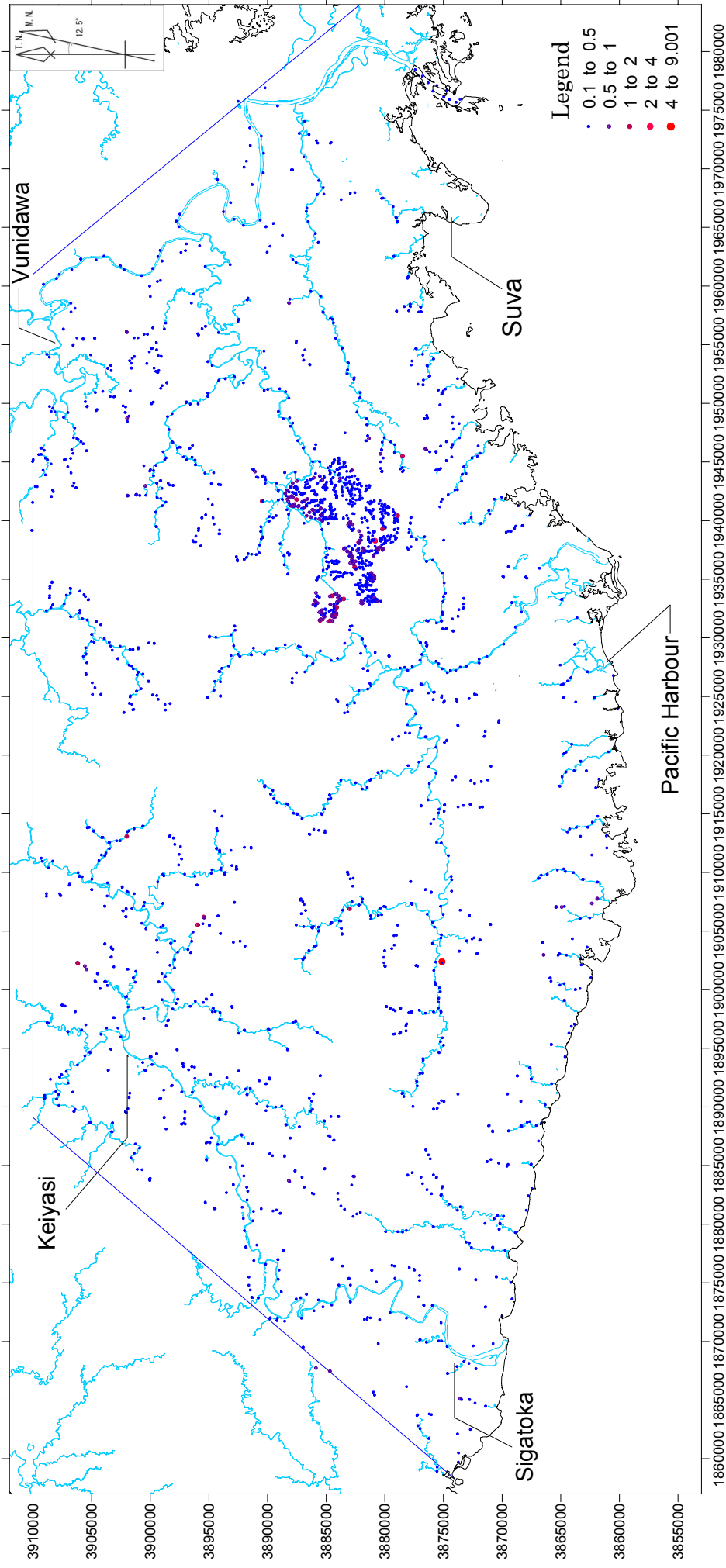


Figure II-1-3-(1) Geochemical map of Ag (ppm) in stream sediment samples (1:500,000)

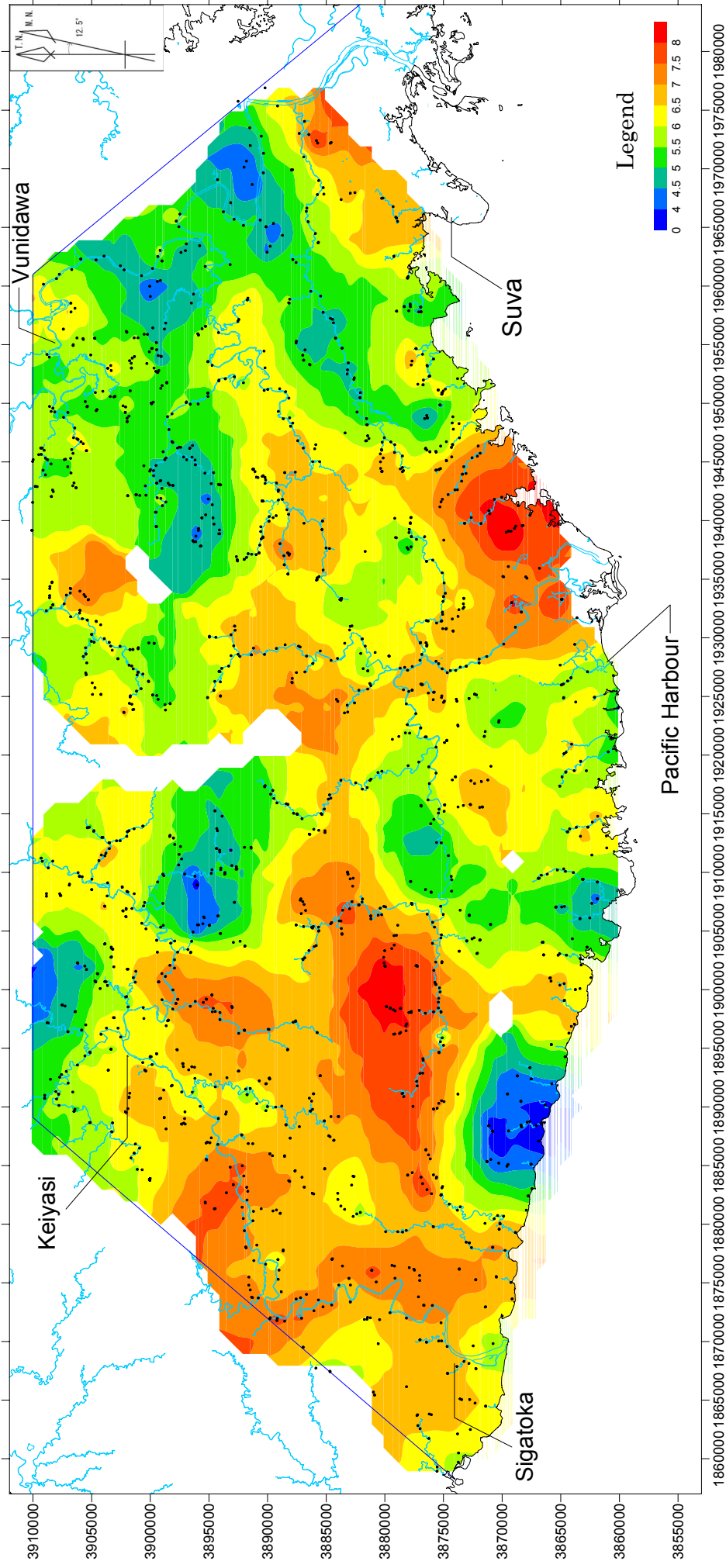


Figure II-1-3-(2) Geochemical map of Al (%) in stream sediment samples (1:500,000)

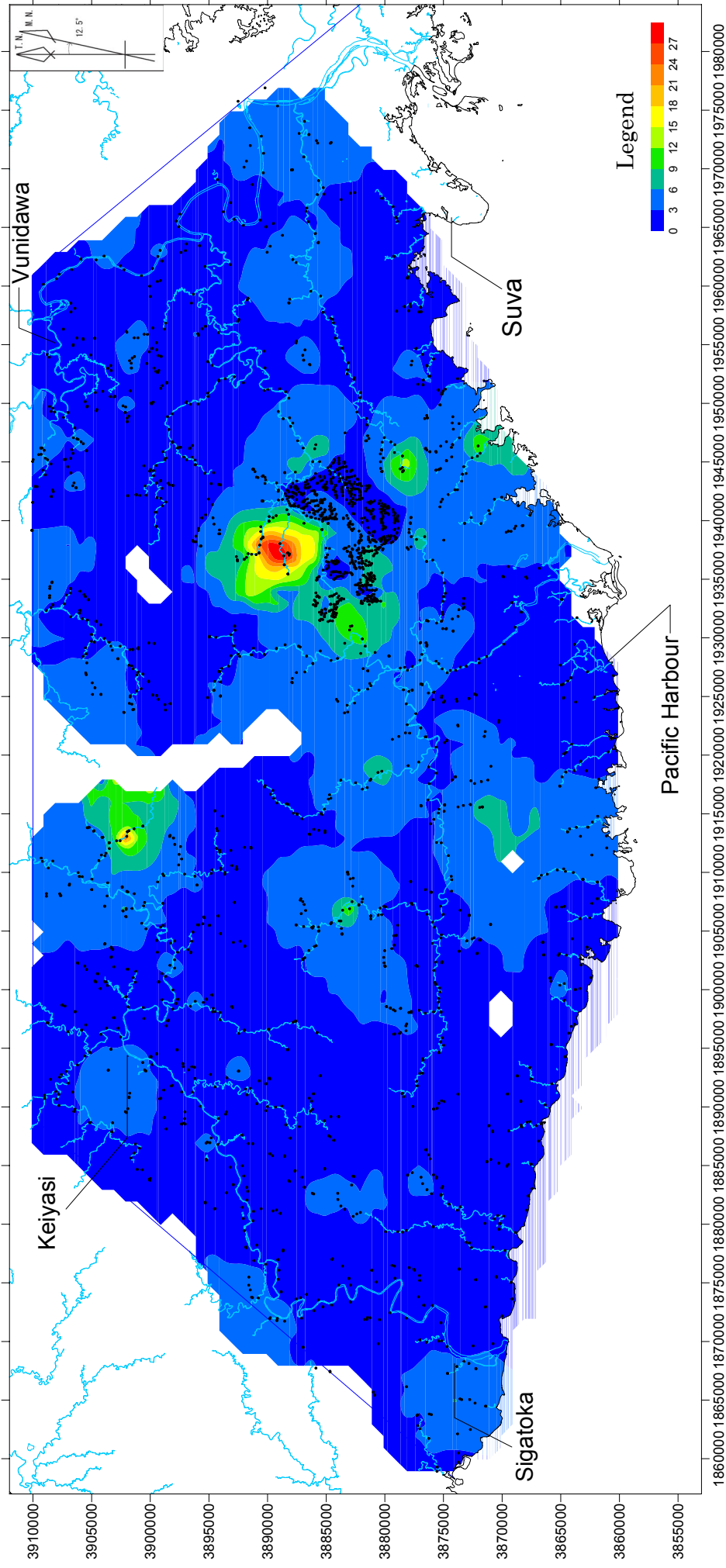


Figure II-1-3-(3) Geochemical map of As (ppm) in stream sediment samples (1:500,000)

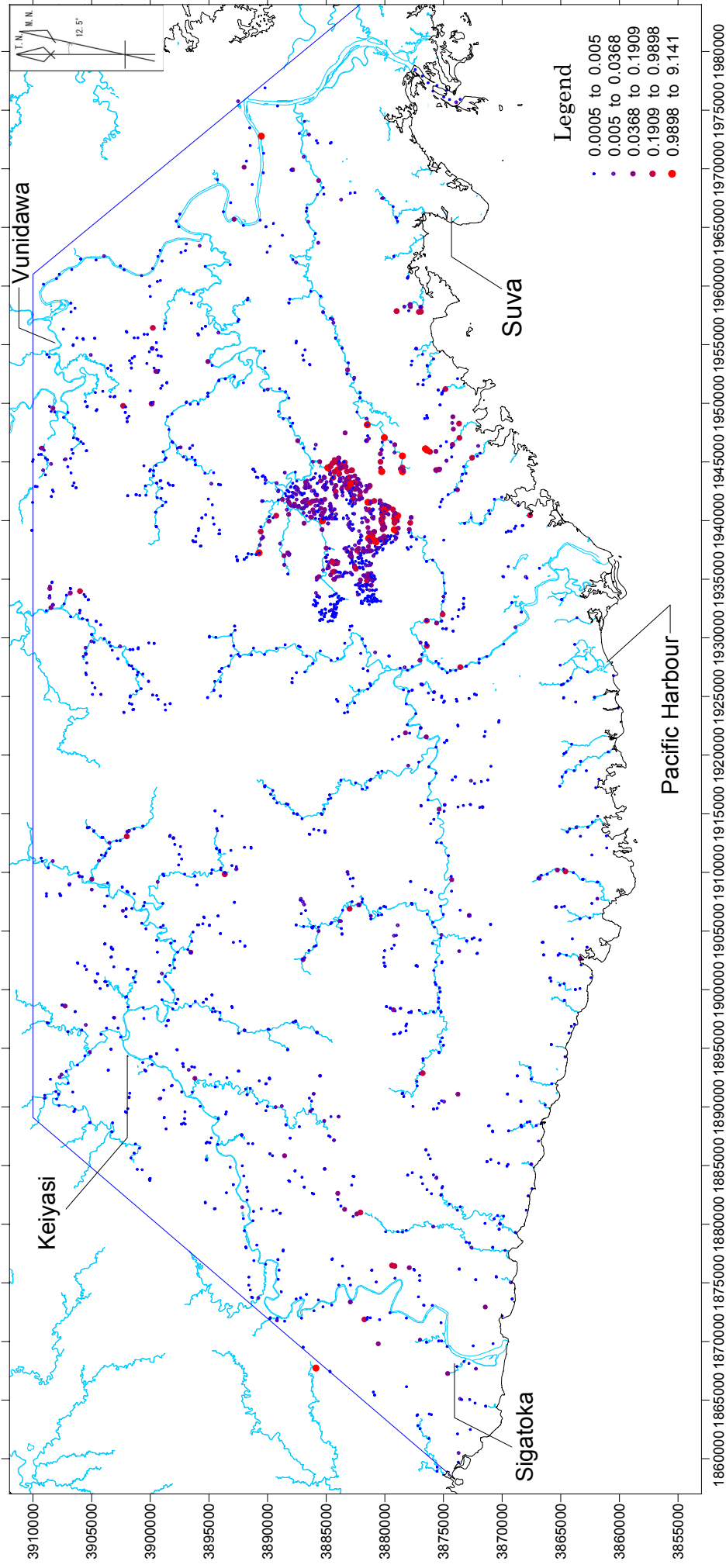


Figure II-1-3-(4) Geochemical map of Au (ppm) in stream sediment samples (1:500,000)

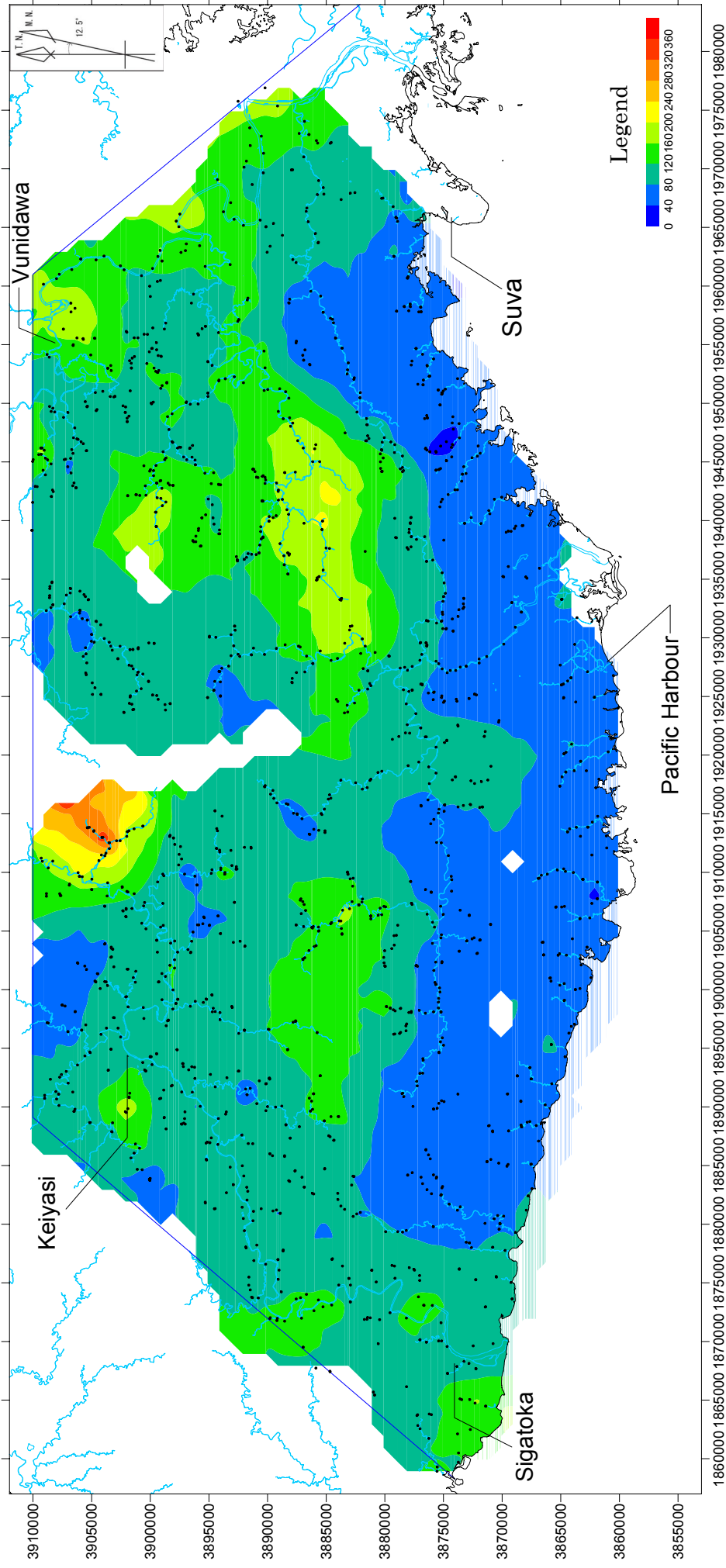


Figure II-1-3-(5) Geochemical map of Ba (ppm) in stream sediment samples (1:500,000)