



# Results of Geochemical Mapping In Kainantu, Eastern Highlands Province, Papua New Guinea

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# Outline

- Introduction
- Description of work area
- Field work
- Sample analysis and data processing
- Results

# Introduction

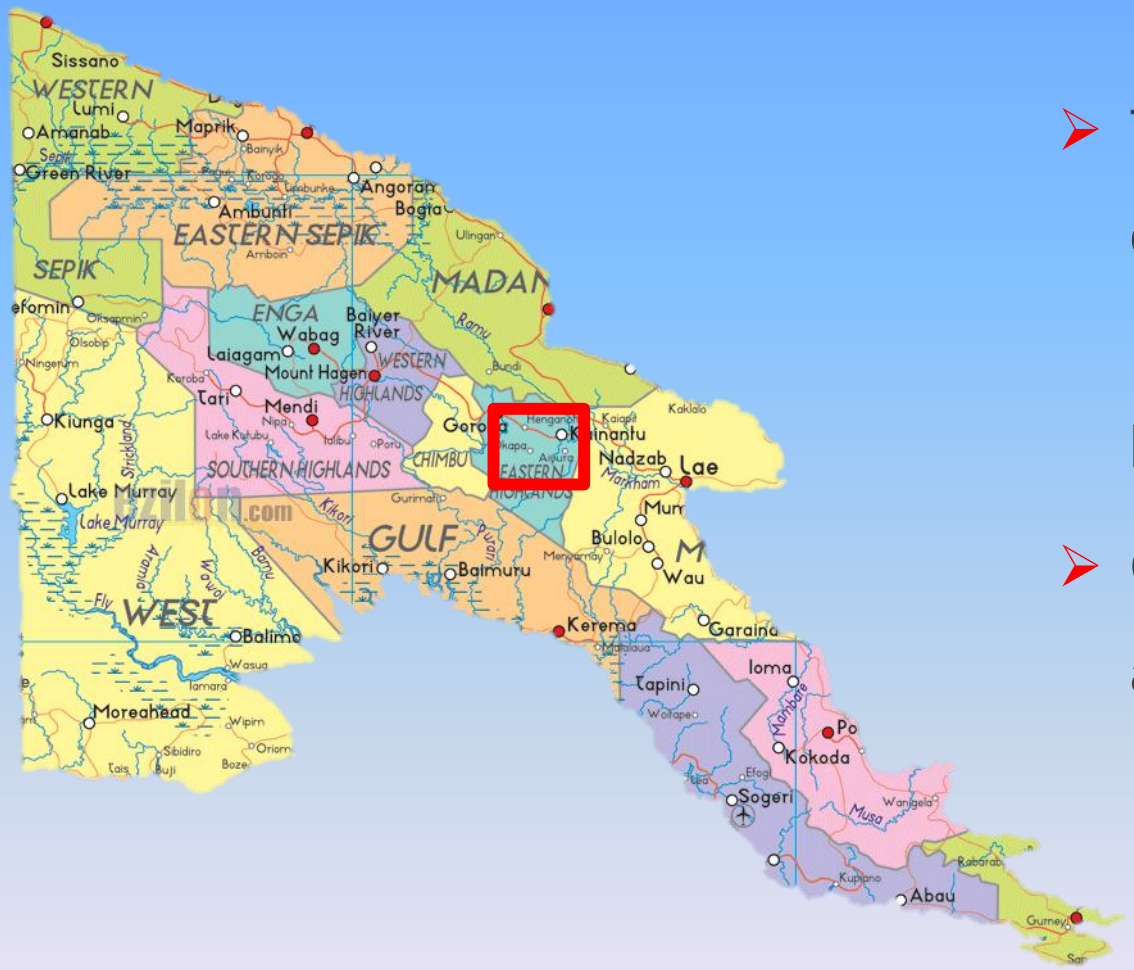
- PNG is an Island Nation in the Pacific, north of Australia and east of Indonesia.
- Area (Land) : 462, 000 km$^2$
- Population: ~8million
- Language: English, Pidgin, Motu
- GDP(per capita): $2400 US
- Economy: Export Economy (mineral exports =~ 65%)


# Project Background

- MOU of Collaborative work in Geosciences between Ministry of Lands & Resources of PRC and Department of Mining, PNG, signed in 2012, Tianjin,China
- Collaborative work agreement between CGS and MRA signed in 2013, Tianjin,China
- Collaborative work started in PNG, 2014

MOU signing ceremony in Tianjin China Mining, 2013

# Description of work area

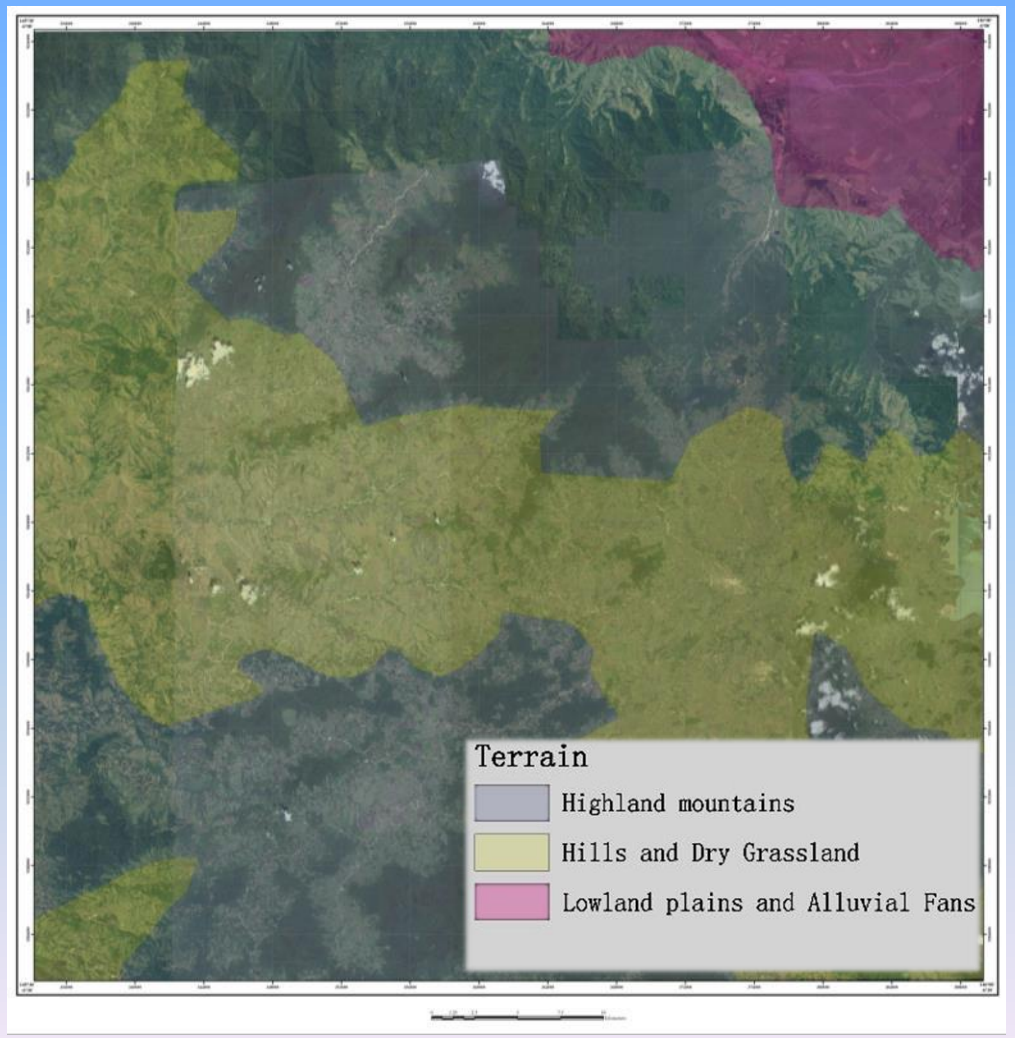



- The project area is located east of Eastern Highlands Province(EHP) (indicated by red box)
- Covers six districts in EHP, and part of Morobe Province

# Topography

The project area shows 3 main Landscapes:

- Highland mountains
- Hills and Dry Grassland
- Lowland plains and Alluvial Fans



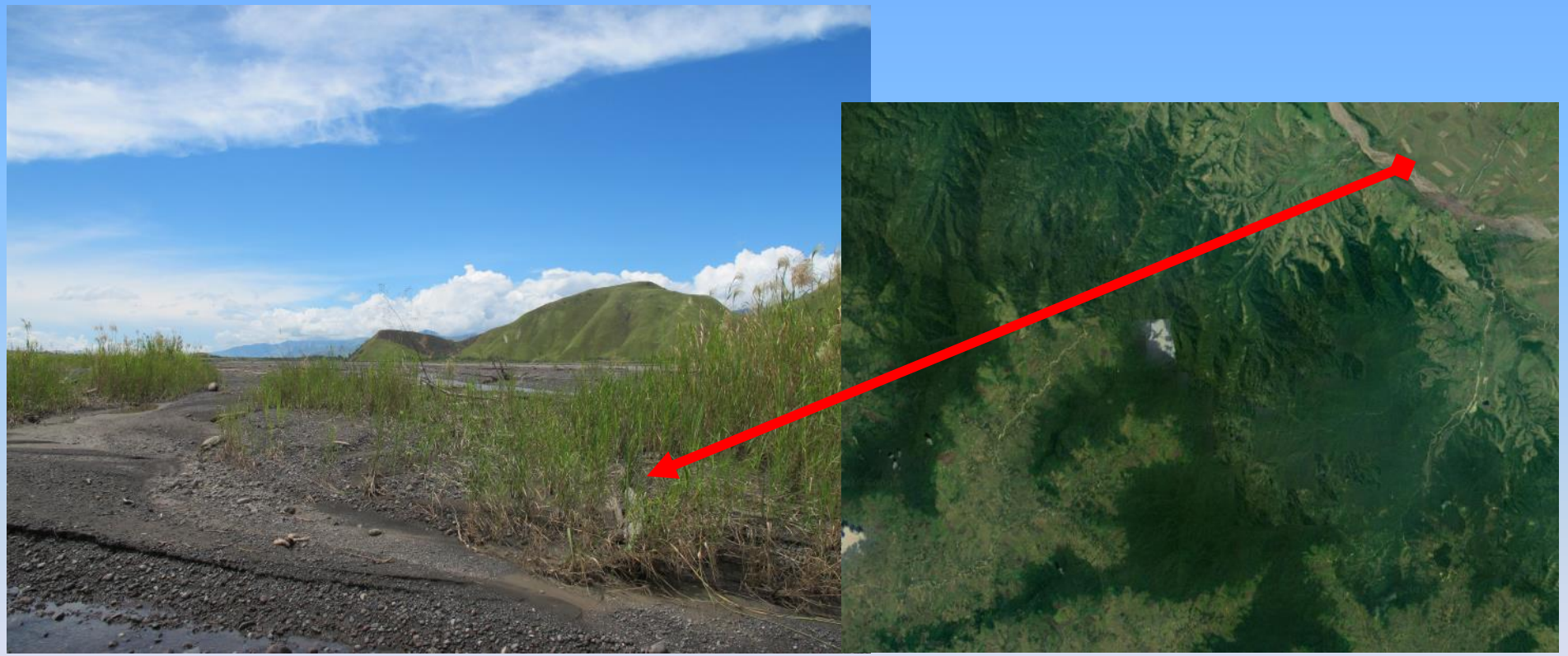
# Topography

Highlands Mountains – mostly dense uninhabited rainforest

# Topography

Hills and Dry grassland– mostly short ‘Kunai’ grass

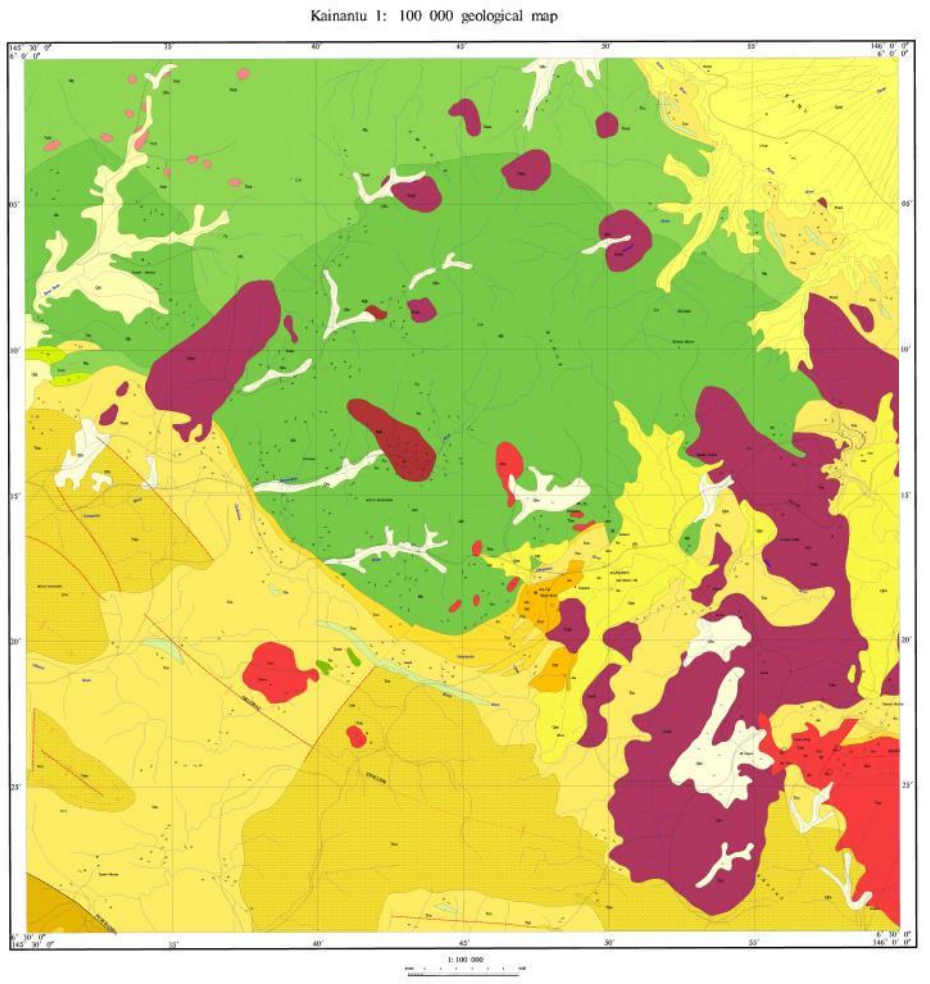
# Topography



Lowland Plains & Alluvial Fans– Ramu valley

# Geology

| | | |
|---|---|---|
| Quaternary | Holocene | Alluvium swamp and beach deposits |
| | | Lacustrine deposits |
| | Pleistocene To Holocene | Piedmont slope deposits |
| | Pleistocene | Kainantu Beds |
| Tertiary | Upper Miocene | Elendora Porphyry |
| | Middle Miocene | Bismarck Intrusive Complex |
| | | Yaveufa Formation |
| | | Aifunka Yolcanics |
| | | Akuna Intrusive Complex |
| | Lower Miocene To Middle Miocene | Movi Beds |
| | Middle Oligocene To Upper Oligocene | Omaura Greywacke |
| | Oligocene | Nasananka Conglomerate |
| | Middle Eocene To Lower Oligocene | Chimbu Limestone |
| Mesozoic | Upper-Cretaceous | Mount Victor Granodiorite |
| | Jurassic To Cretaceous | Goroka Formation |
| | Lower Jurassic | Karmantina Gneissic Granite |
| | Triassic | Bena Bena Formation |



# Mineralization

- **Gold**: mainly occurred in the eastern part of the mapsheet
- **Silver**: minor silver associated with the gold mineralization in Kainantu mine
- **Copper**: occurred in Bilimoia, Yonki Creek Prospect and Aimontina
- **Lead-Zinc**: minor lead-zinc mineralization at Efontera Prospect

# Pre-field Preparation

Indoor training

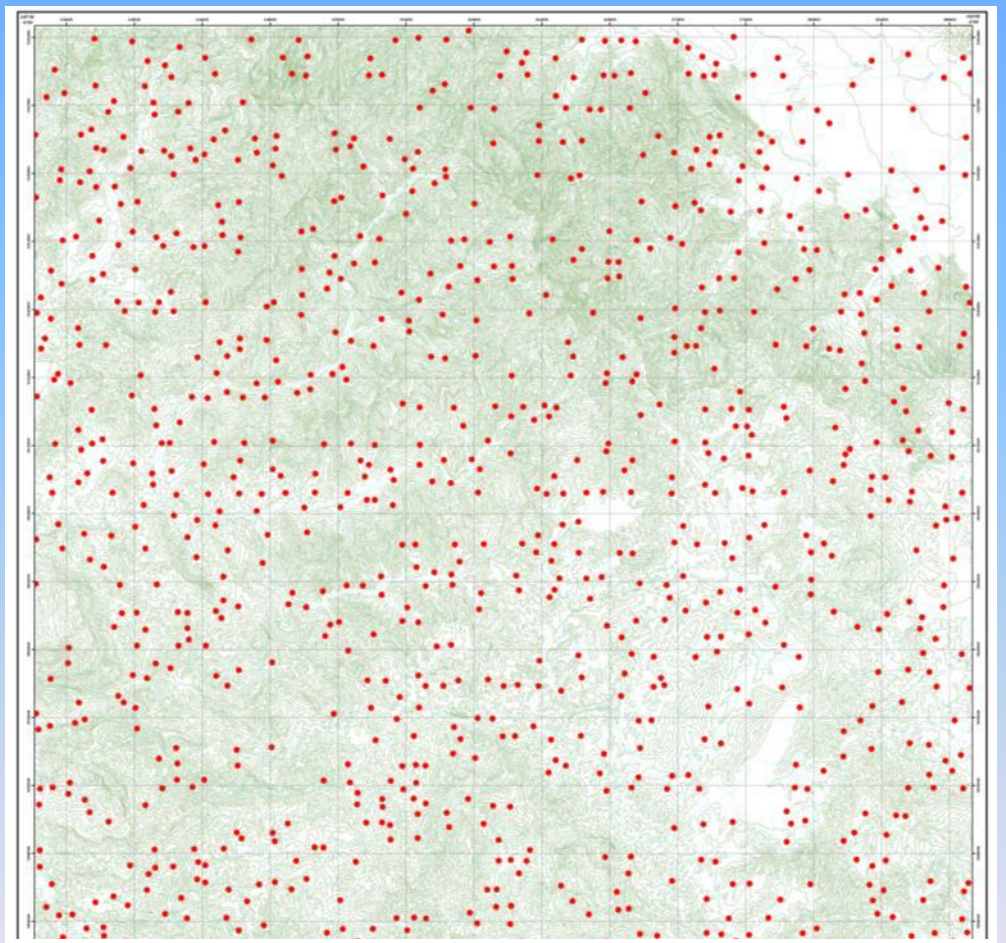
Field training

## Training in 2014

Nanjing Center, CGS conduct the indoor and field training for regional geochemical training in Port Moresby, PNG.

# Sample design

- 865 samples were designed for regional geochemical mapping at scale of 1：100 000



Geochemical sample design distribution map

# Community Awareness

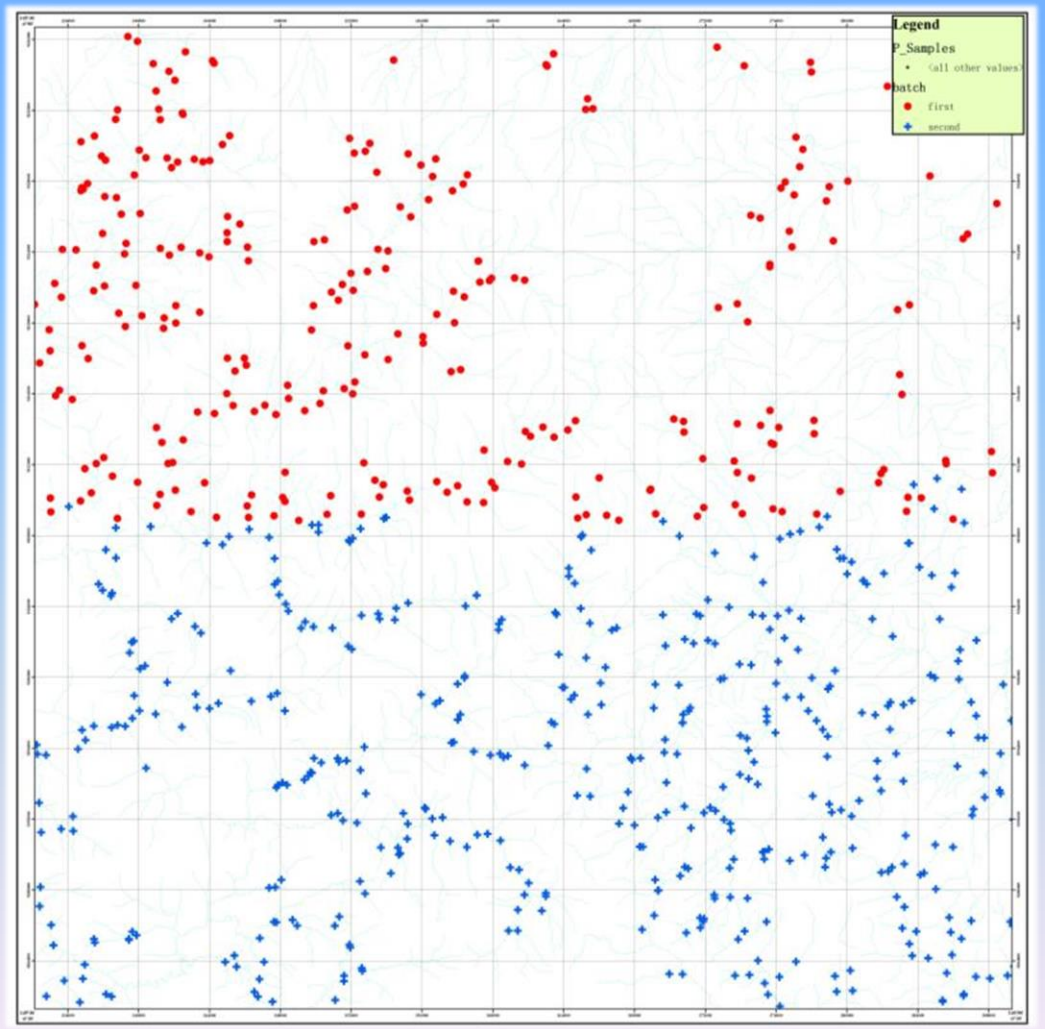
Permission to work from local community, is very important.

# Sampling

# Field Work Accomplished

Regional geochemical survey in Kainantu mapsheet conducted in two stages:

1. northern part of mapsheet: 302 samples collected
2. southern part of mapsheet: 474 samples collected



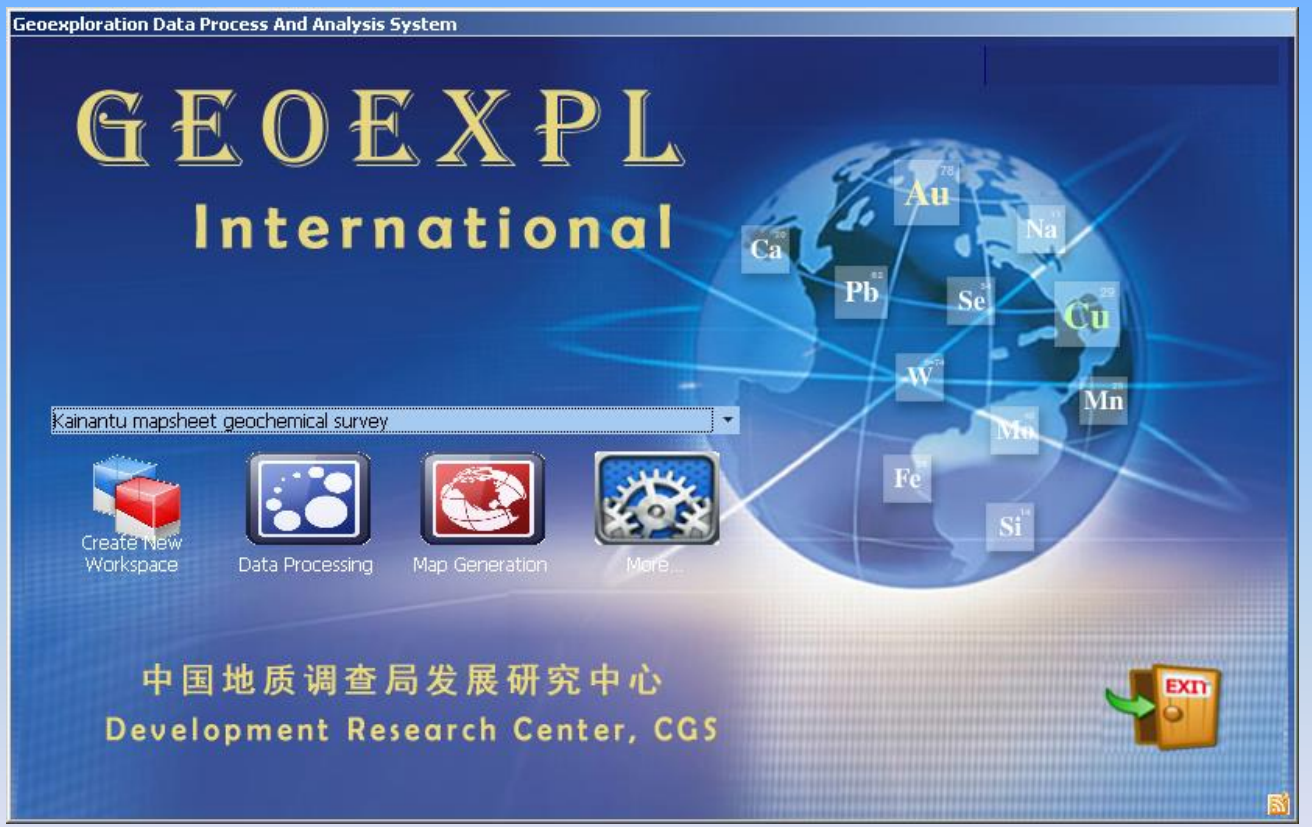
# Laboratory Analysis

39 elements analyzed in Nanjing Geological Testing Center, Ministry of Land & Resources of China.

| Analysis method | Elements / compounds |
|---|---|
| XRF | $SiO_2$、$Al_2O_3$、$Fe_2O_3$、$K_2O$、$Na_2O$、CaO、MgO、Ba、Cr、Mn、P、Ti、La、Y、Zr |
| ICP-MS | Cu、Pb、Zn、Co、Ni、Cd、V、Li、Be、U、Th、Nb、W、Mo、Sr、Sc |
| GFAAS | Au |
| AFS | As、Sb、Bi、Hg |
| ES | Ag、B、Sn |
| ISE | F |

# Data Processing

The analysis data are processed and geochemical map generated by GeoExpl (International).




**GeoExpl, developed by Development Research center, CGS**

# Results

| id | x | y | $SiO_2$ (%) | $Al_2O_3$ (%) | $TFe_2O_3$ (%) | MgO (%) | CaO (%) | $Na_2O$ (%) | $K_2O$ (%) | MnO (%) | $P_2O_5$ (%) | $TiO_2$ (% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 002B1 | 339393.75 | 9336157.1 | 60.86 | 15.97 | 7.3 | 1.57 | 0.705 | 1.018 | 2.339 | 0.079663 | 0.122796 | 0.6789 |
| 003B1 | 339936.43 | 9335878.3 | 61.87 | 15.93 | 6.73 | 1.482 | 0.682 | 0.997 | 2.343 | 0.076383 | 0.114662 | 0.684 |
| 004C1 | 340817.71 | 9334621.1 | 60.56 | 16.68 | 6.39 | 1.46 | 0.489 | 1.242 | 2.407 | 0.091147 | 0.125683 | 0.68 |
| 004D1 | 341710.22 | 9334186.4 | 69.26 | 12.34 | 4.2 | 1.177 | 0.362 | 0.767 | 2.796 | 0.058327 | 0.089617 | 0.446 |
| 005A1 | 342641.1 | 9335291.8 | 54.59 | 19.27 | 7.92 | 1.78 | 0.142 | 0.876 | 2.766 | 0.138696 | 0.137782 | 0.8078 |
| 007C1 | 344161.35 | 9334792.1 | 74.6 | 10.76 | 2.8 | 0.897 | 0.172 | 0.733 | 2.954 | 0.037539 | 0.061226 | 0.3653 |
| 011D1 | 354401.44 | 9334825.6 | 57.75 | 16.26 | 7.09 | 2.186 | 1.179 | 1.922 | 2.288 | 0.08215 | 0.210121 | 0.6898 |
| 017B11 | 363428.48 | 9335177.7 | 62.69 | 16.37 | 7.41 | 1.224 | 0.307 | 0.913 | 2.305 | 0.041611 | 0.082078 | 0.6731 |
| 017C11 | 363010.61 | 9334560.1 | 54.99 | 16.6 | 8.51 | 3.014 | 1.714 | 1.729 | 1.825 | 0.069958 | 0.117961 | 0.8649 |
| 022A1 | 372660.84 | 9335551.9 | 50.19 | 14.75 | 12.8 | 3.027 | 2.283 | 1.53 | 1.617 | 0.126931 | 0.177973 | 1.1581 |
| 024C1 | 374198.58 | 9334501.6 | 59.62 | 13.37 | 7.09 | 1.625 | 2.534 | 1.885 | 1.486 | 0.083357 | 0.137942 | 0.6689 |
| 025D1 | 377935.7 | 9334700.6 | 51.89 | 12.21 | 7.48 | 3.244 | 5.872 | 2.187 | 1.086 | 0.125334 | 0.169678 | 0.8470 |
| 028D1 | 382909.72 | 9334501.9 | 51.77 | 12.54 | 7.8 | 3.36 | 5.757 | 2.83 | 1.143 | 0.138708 | 0.173069 | 0.850 |
| 029B1 | 384703.37 | 9334557 | 51.9 | 11.7 | 7.86 | 3.548 | 6.139 | 3.677 | 1.041 | 0.173773 | 0.170091 | 0.8868 |
| 031C1 | 389822.37 | 9335041.9 | 52.43 | 11.78 | 7.96 | 3.568 | 6.088 | 3.559 | 0.98 | 0.167957 | 0.150591 | 0.8895 |
| 034C1 | 338809.83 | 9332011.6 | 59.07 | 13.88 | 5.81 | 2.118 | 2.213 | 2.486 | 2.026 | 0.093732 | 0.107971 | 0.6363 |
| 036A11 | 340980.24 | 9333084 | 57.77 | 14.47 | 6.49 | 2.625 | 2.65 | 2.357 | 2.261 | 0.12359 | 0.131641 | 0.8213 |
| 036D11 | 341137.91 | 9332046.6 | 60.76 | 15.8 | 6.05 | 1.599 | 0.672 | 1.375 | 2.597 | 0.108619 | 0.129716 | 0.7175 |
| 037A1 | 342044.96 | 9333680.7 | 60.8 | 15.4 | 5.08 | 1.581 | 0.695 | 1.627 | 2.878 | 0.101206 | 0.095276 | 0.7010 |
| 037D1 | 342463.34 | 9331836.8 | 60.56 | 15.59 | 5.27 | 1.775 | 0.924 | 1.435 | 2.963 | 0.086222 | 0.104167 | 0.6745 |
| 038A1 | 344256.28 | 9334650.2 | 76.34 | 9.76 | 2.66 | 0.732 | 0.144 | 0.689 | 2.874 | 0.036661 | 0.052656 | 0.3656 |
| 043B1 | 354399.44 | 9334826.6 | 58.62 | 15.8 | 7.45 | 2.016 | 0.848 | 2.193 | 2.256 | 0.123237 | 0.21113 | 0.6892 |
| 048B1 | 363062.59 | 9334488.1 | 56.65 | 15.02 | 7.97 | 2.112 | 2.157 | 2.315 | 1.806 | 0.142 | 0.167937 | 1.1814 |
| 049C1 | 365347.97 | 9332636.2 | 58.29 | 17.2 | 9.47 | 1.023 | 0.3 | 0.95 | 2.151 | 0.089489 | 0.098966 | 0.8774 |
| 056A1 | 377985.78 | 9334158.9 | 51.52 | 11.92 | 7.82 | 3.409 | 6.1 | 3.506 | 1.007 | 0.169713 | 0.163927 | 0.855 |
| 059A1 | 382278.1 | 9333339.5 | 52.98 | 11.73 | 7.92 | 3.352 | 5.851 | 3.679 | 1.009 | 0.164373 | 0.151416 | 0.8829 |
| 062B1 | 389751.44 | 9331677.5 | 48.38 | 12.01 | 8.98 | 5.052 | 7.94 | 1.615 | 1.06 | 0.122932 | 0.172428 | 0.9336 |
| 064C1 | 336745.13 | 9330222.5 | 53.6 | 14.14 | 9.99 | 3.102 | 3.375 | 1.874 | 2.016 | 0.148206 | 0.173642 | 1.284 |

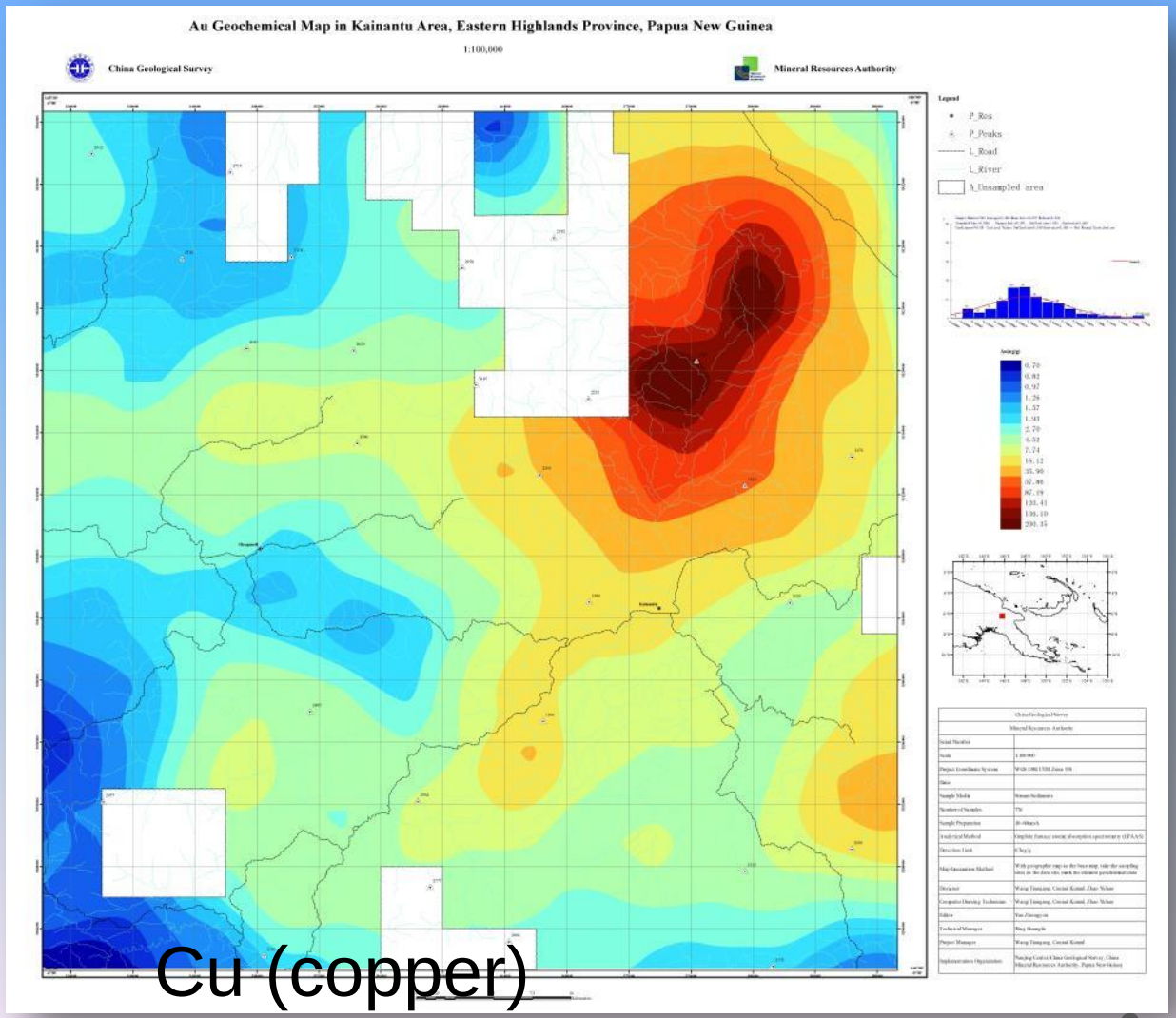
Part of the analysis result

# Results

**Information on Mineral potential**:

Au (gold)、Cu (copper)、Pb (lead)、Zn (zinc)、Ag (silver)、Co、Ni、V、Li、U、Nb、W、Mo、Sn、Sb、Bi

# Au (gold)


Au Geochemical Map in Kainantu Area, Eastern Highlands Province, Papua New Guinea
1:100,000
China Geological Survey
Mineral Resources Authority
Legend
P_Res
P_Peaks
L_Road
L_River
A_Unsampled area

Cu (copper)

# Pb (lead)

# Zn (zinc)

# Ag (silver)

# Results

**Information on Geology**:

$SiO_2$ (silicon dioxide)、$Fe_2O_3$ (iron oxide)、$K_2O$(potassium oxide)、$Na_2O$ (sodium oxide)、MgO (magnesium oxide)、CaO、$Al_2O_3$、MnO、$P_2O_5$、$TiO_2$、La、Y

$SiO_2$ (Silicon dioxide)

$Fe_2O_3$ (iron oxide)

$K_2O$(potassium oxide)

$Na_2O$ (sodium oxide)

MgO (magnesium oxide)

# Results

**Information on Environment** :

As (arsenic)、Hg (mercury)、Cd (cadmium)、F、Cr、Pb、U、Th

As (arsenic)

# Hg (mercury)

Cd (cadmium)

# Thank you!

http://www.mra.gov.pg/