Mainoru Project
Gravity

GDA94 MGA Zone 54

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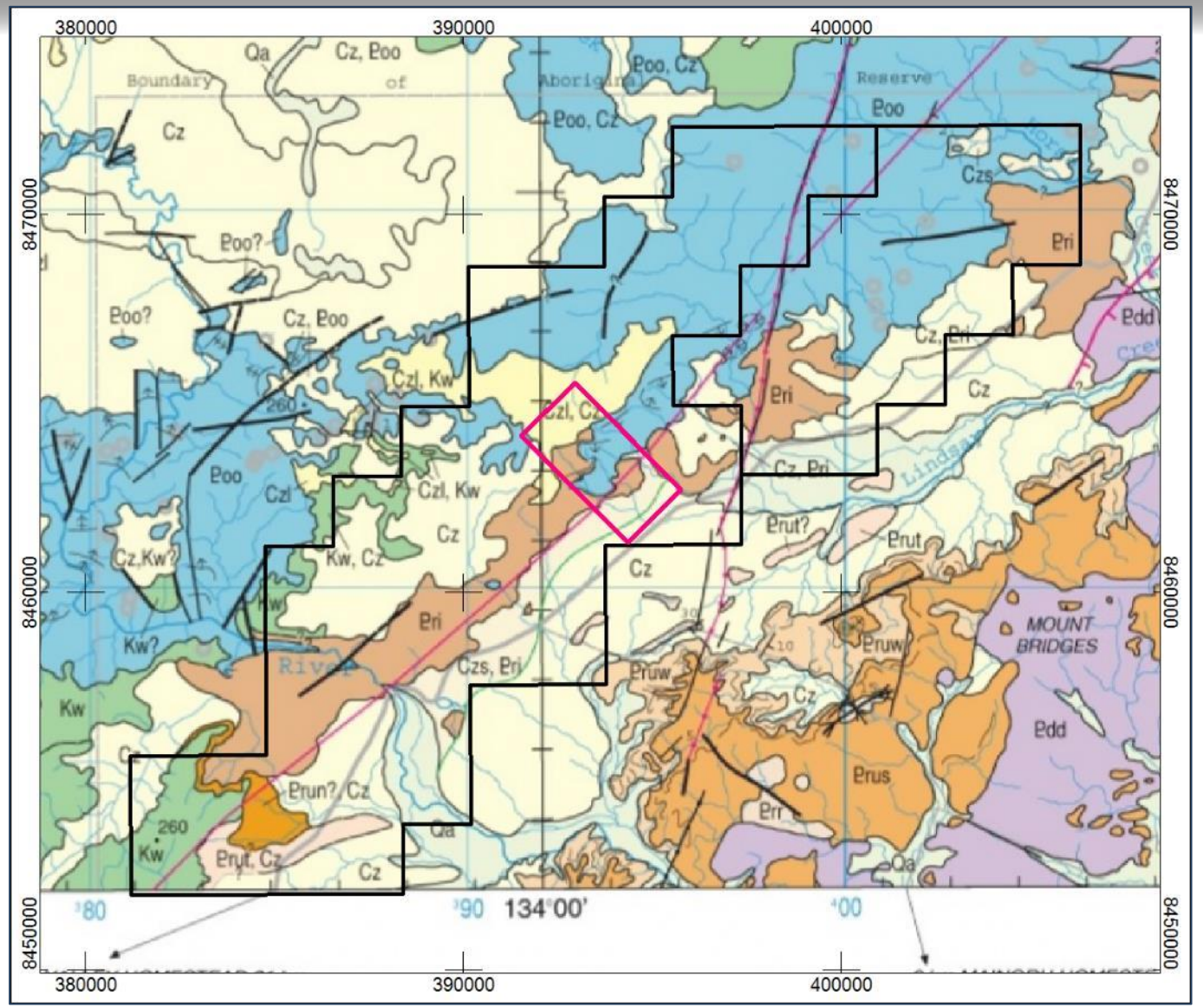
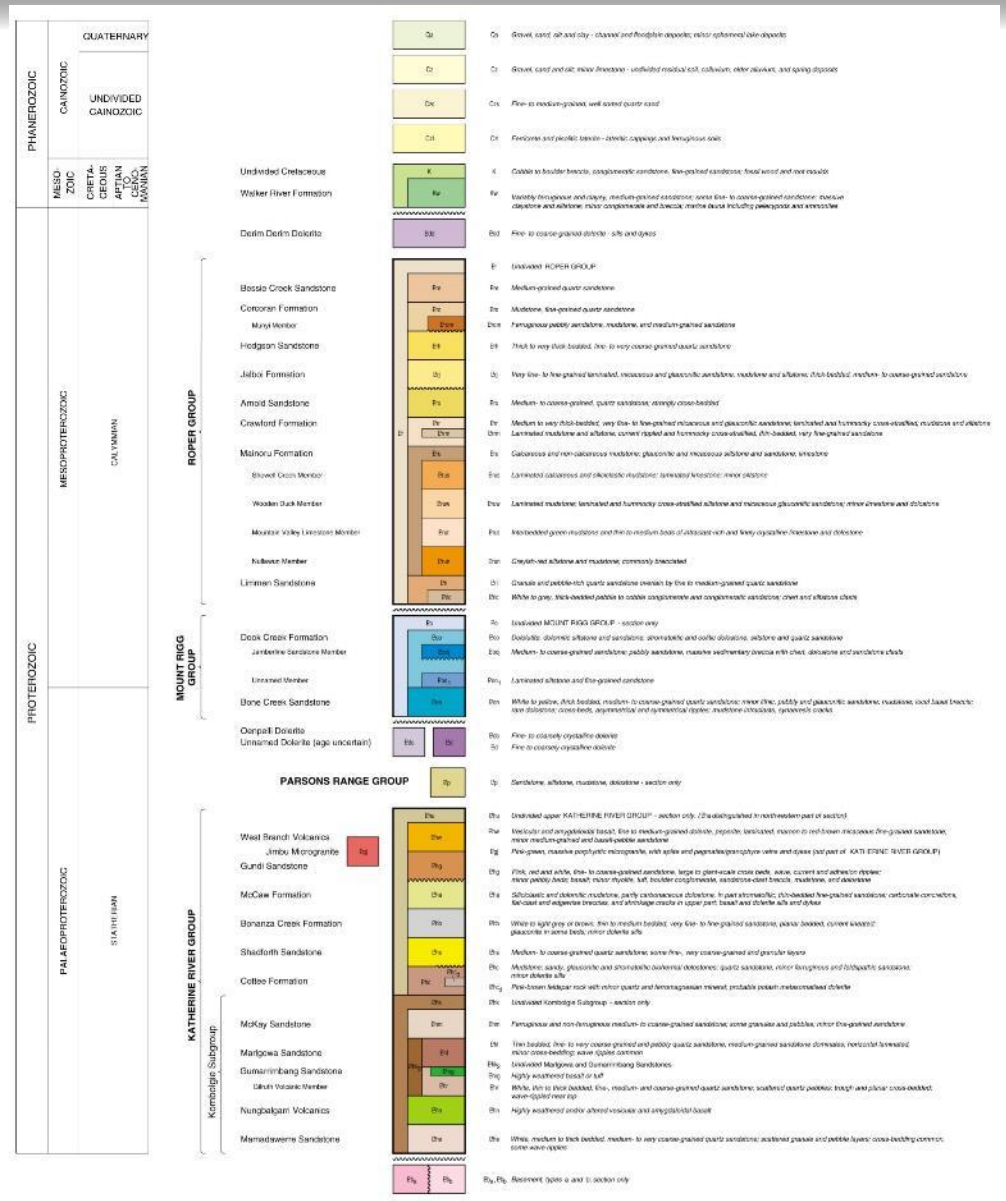
Mainoru – Geology

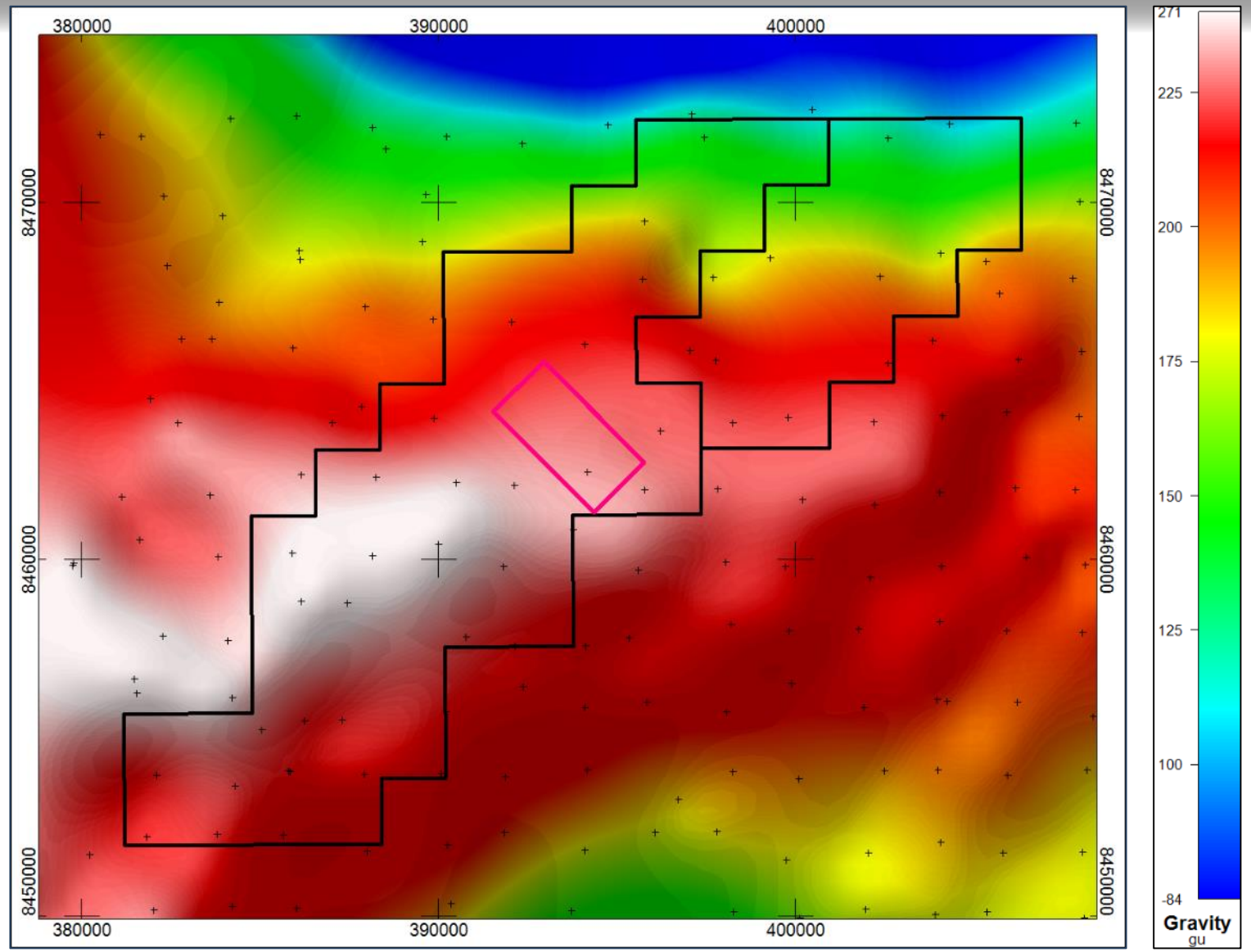


250k geology (Mt Marumba) with detailed gravity area (pink).



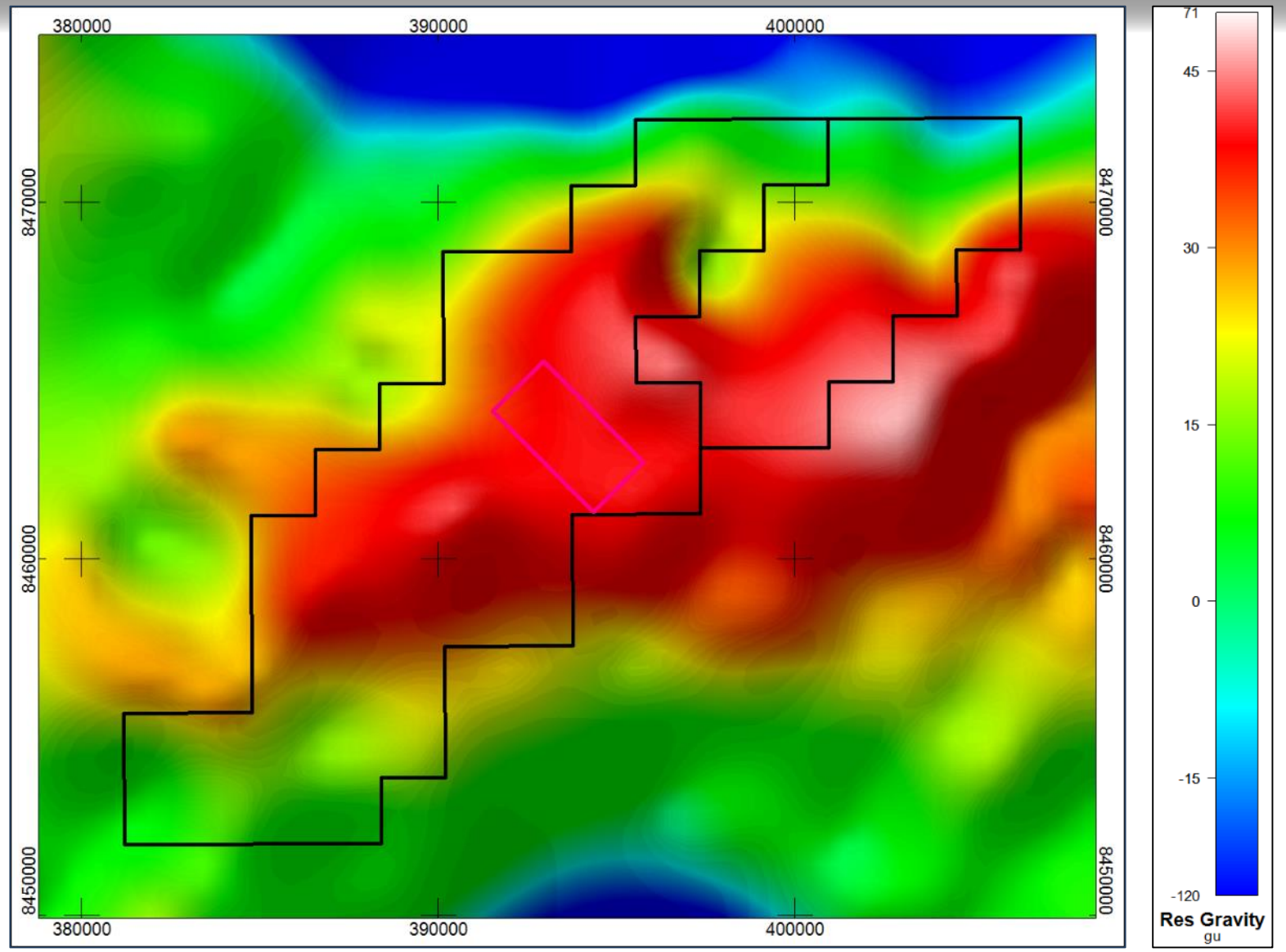
Mainoru – Regional Gravity

~2x2km station spacing.



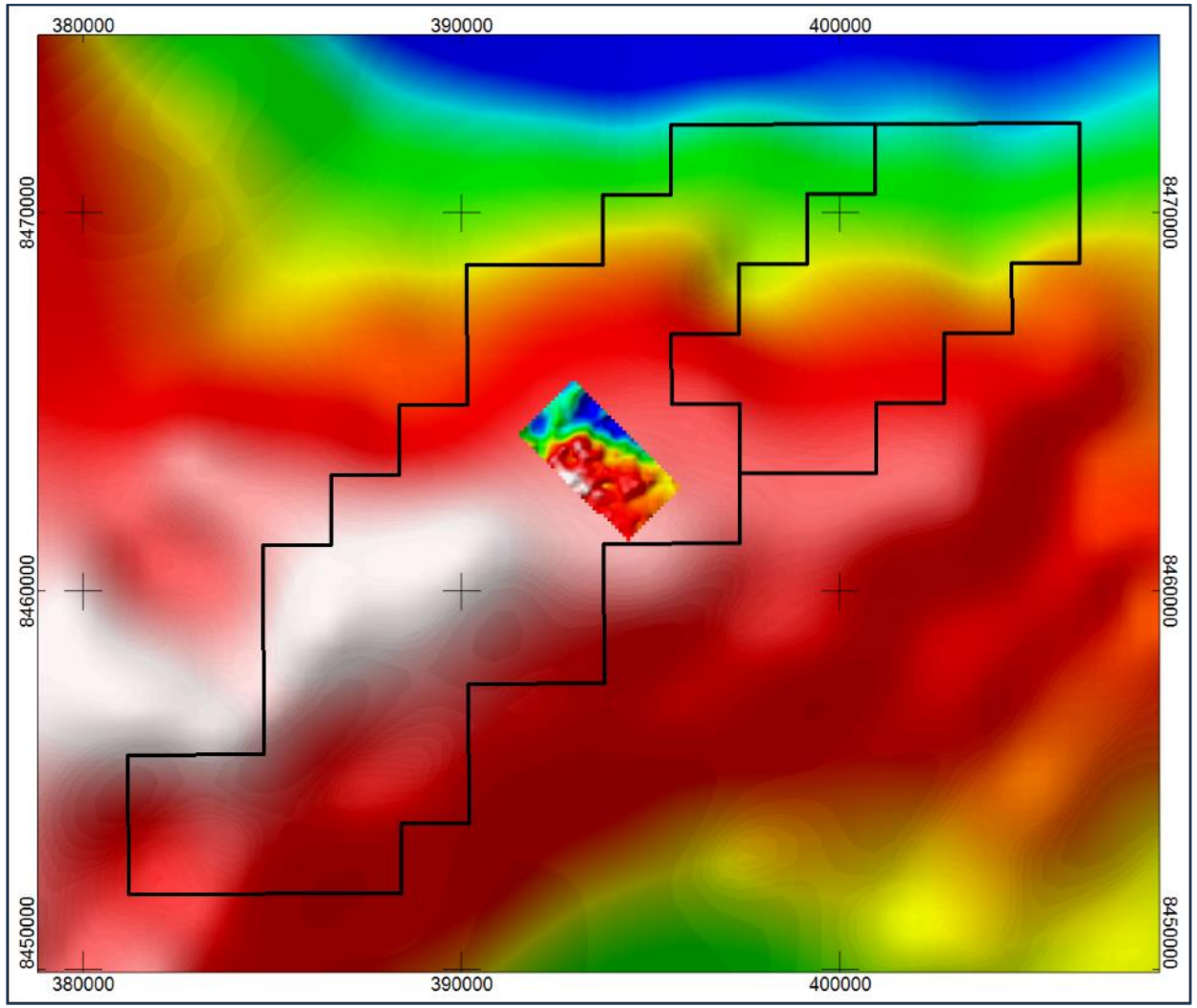
Regional gravity with stations (crosses) and detailed gravity area (pink).

Mainoru – Regional Gravity

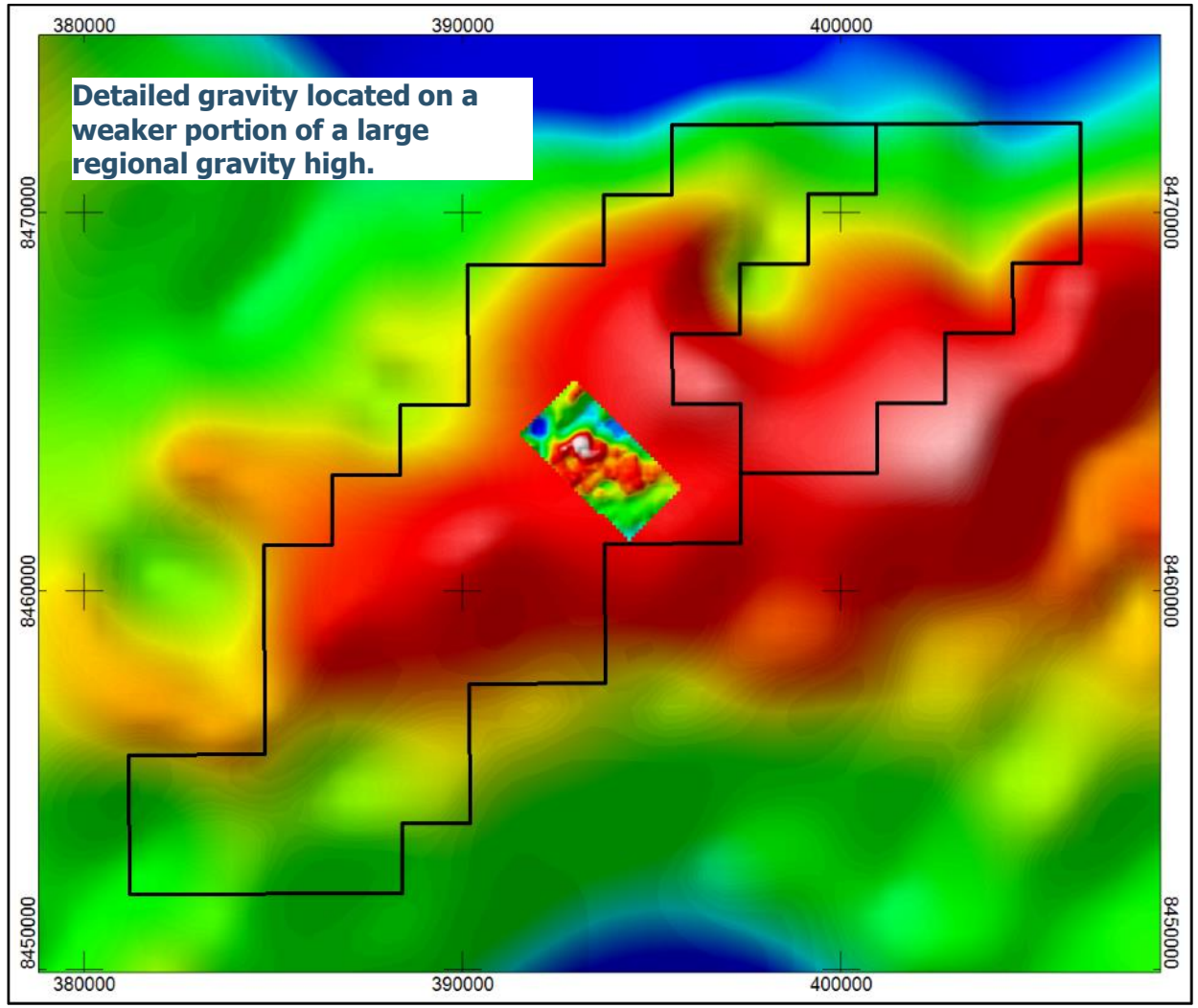


Residual regional gravity with detailed gravity area (pink).

Mainoru – Regional and Detailed Gravity



Regional gravity with detailed gravity overlain (note different scales).



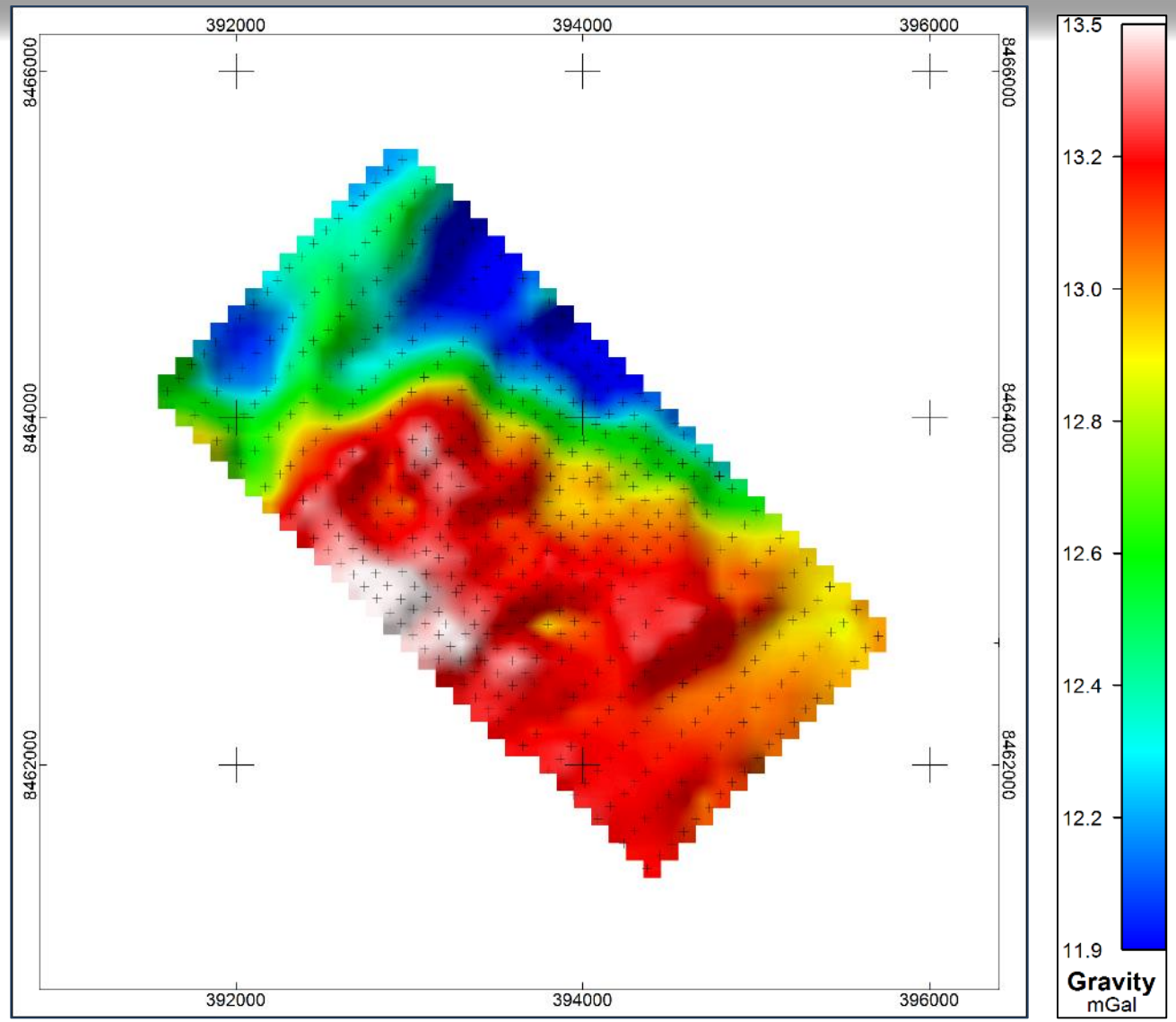
Residual regional gravity with residual detailed gravity overlain (note different scales).

Mainoru – Detailed Gravity

Line orientation: NE-SW

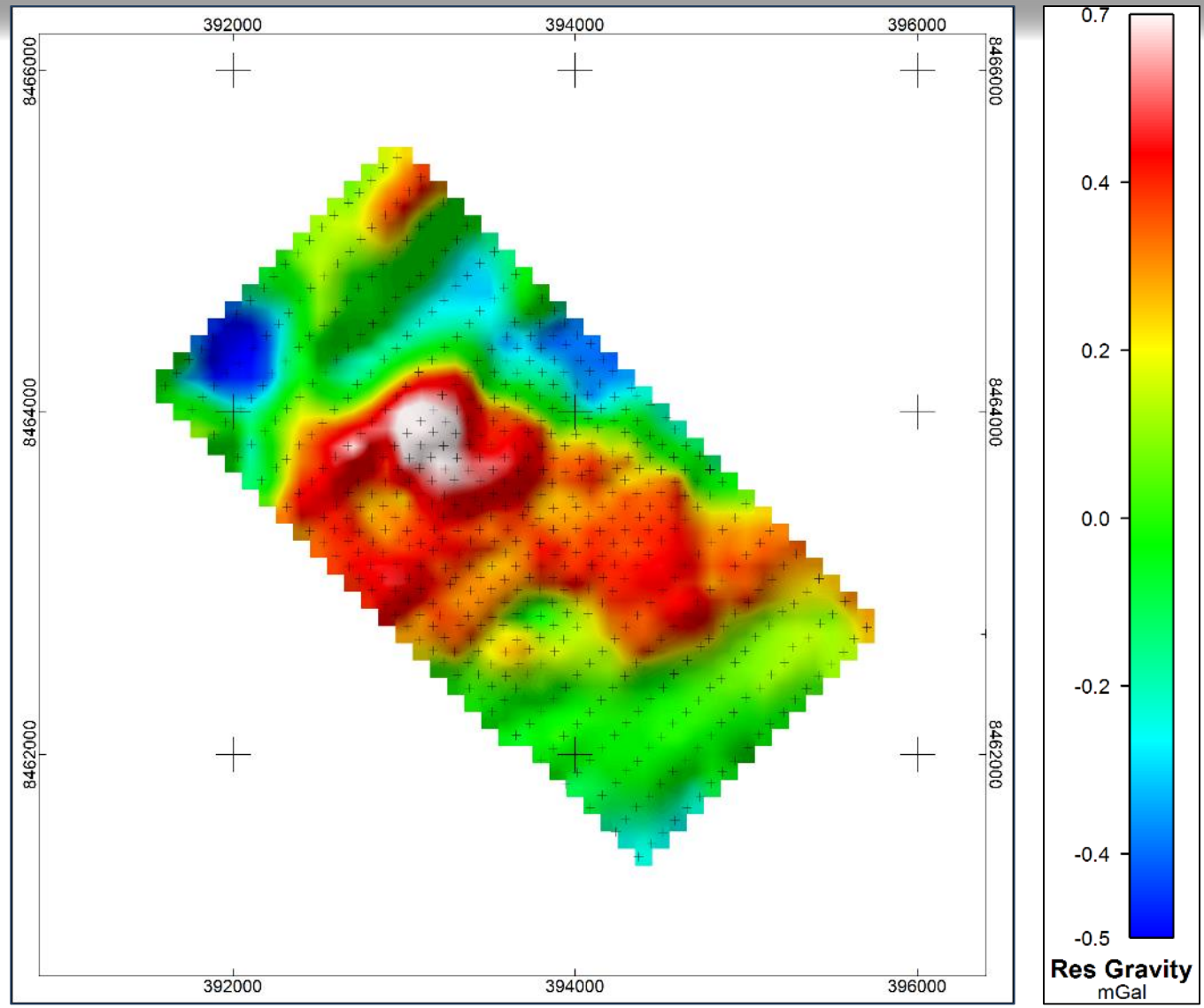
Line spacing: 100 and 200m

Station spacing: 100m



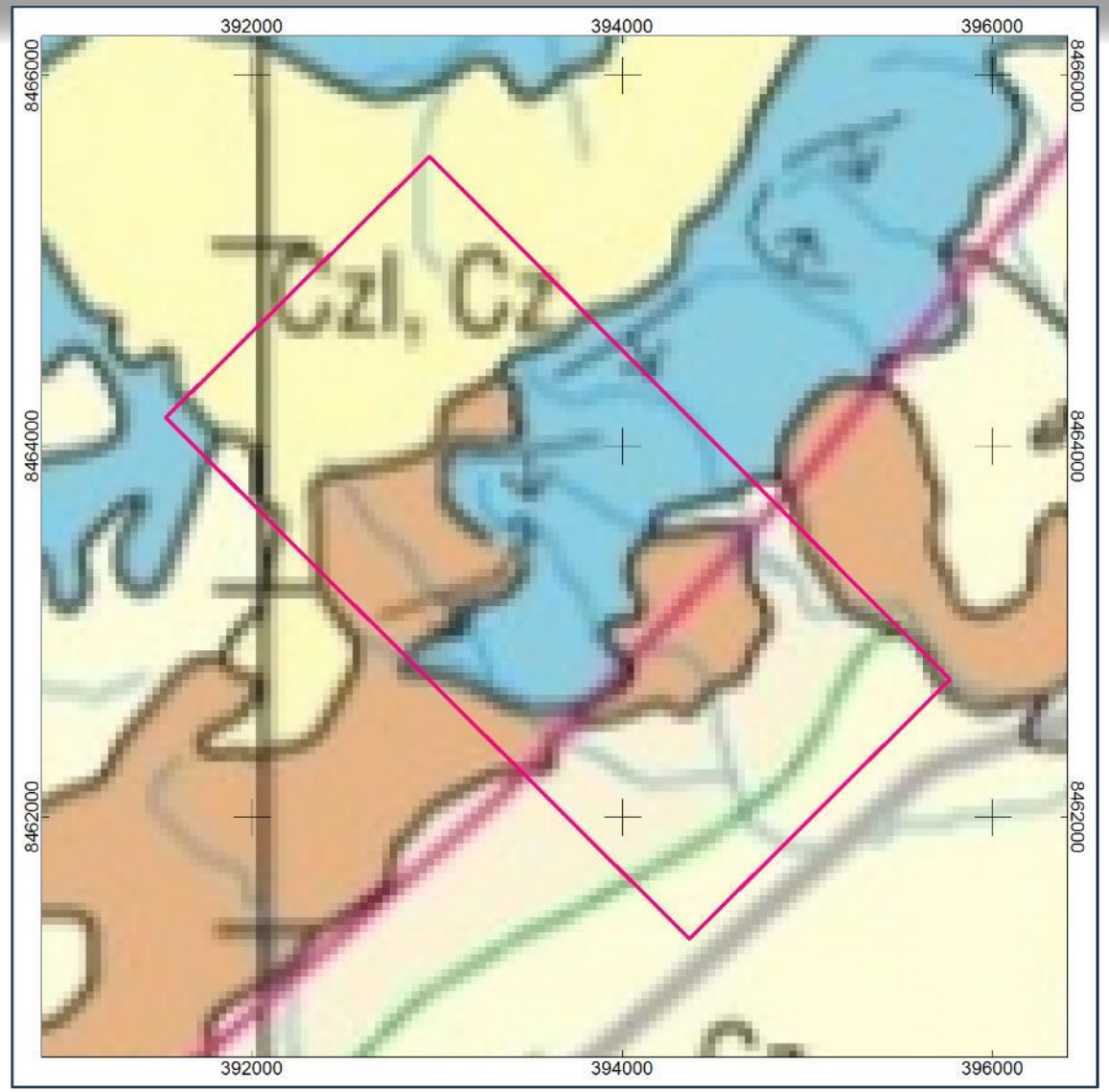
Detailed gravity with stations.

Mainoru – Detailed Gravity



Residual detailed gravity with stations.

Mainoru – Detailed Gravity

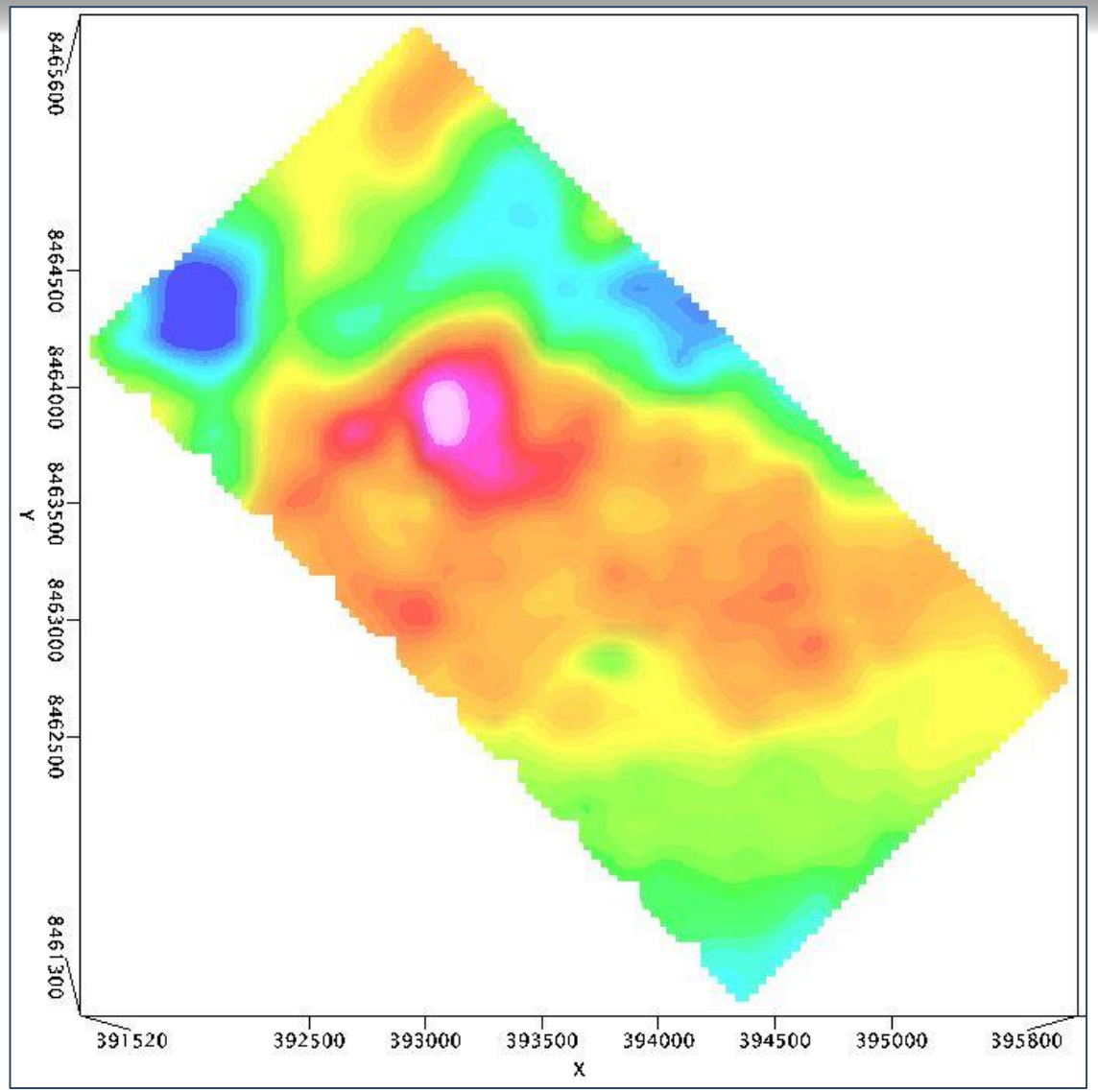


250k geology (Mt Marumba) with detailed gravity area (pink).

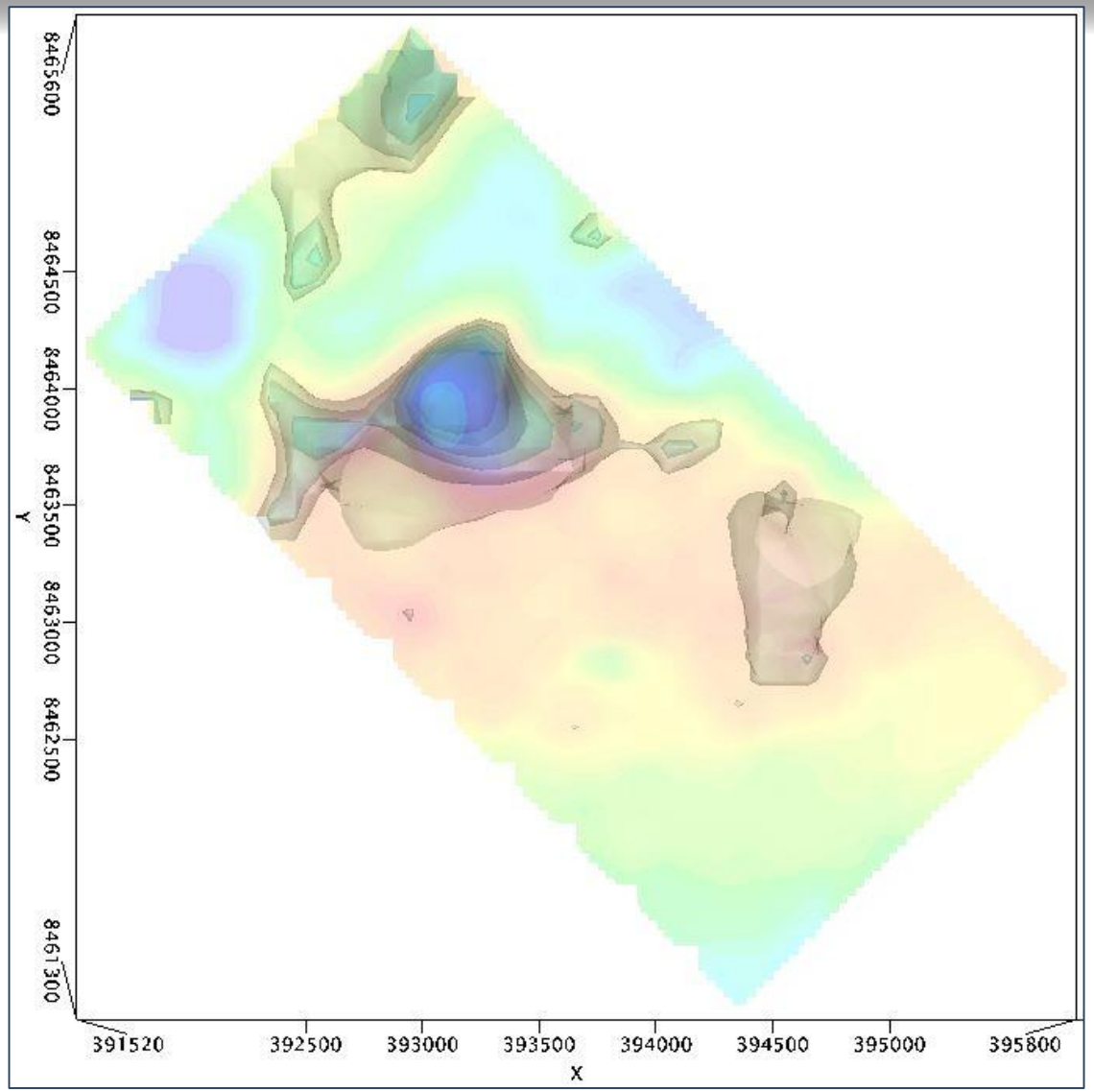
Mainoru – Gravity Inversion

- 3D inversion undertaken with Geosoft's VOXI Earth Modelling software.
- Inversion inputs were gridded residual BA gravity data and DEM from gravity survey. 100x100x50m mesh used in inversion.

Mainoru – Gravity Inversion

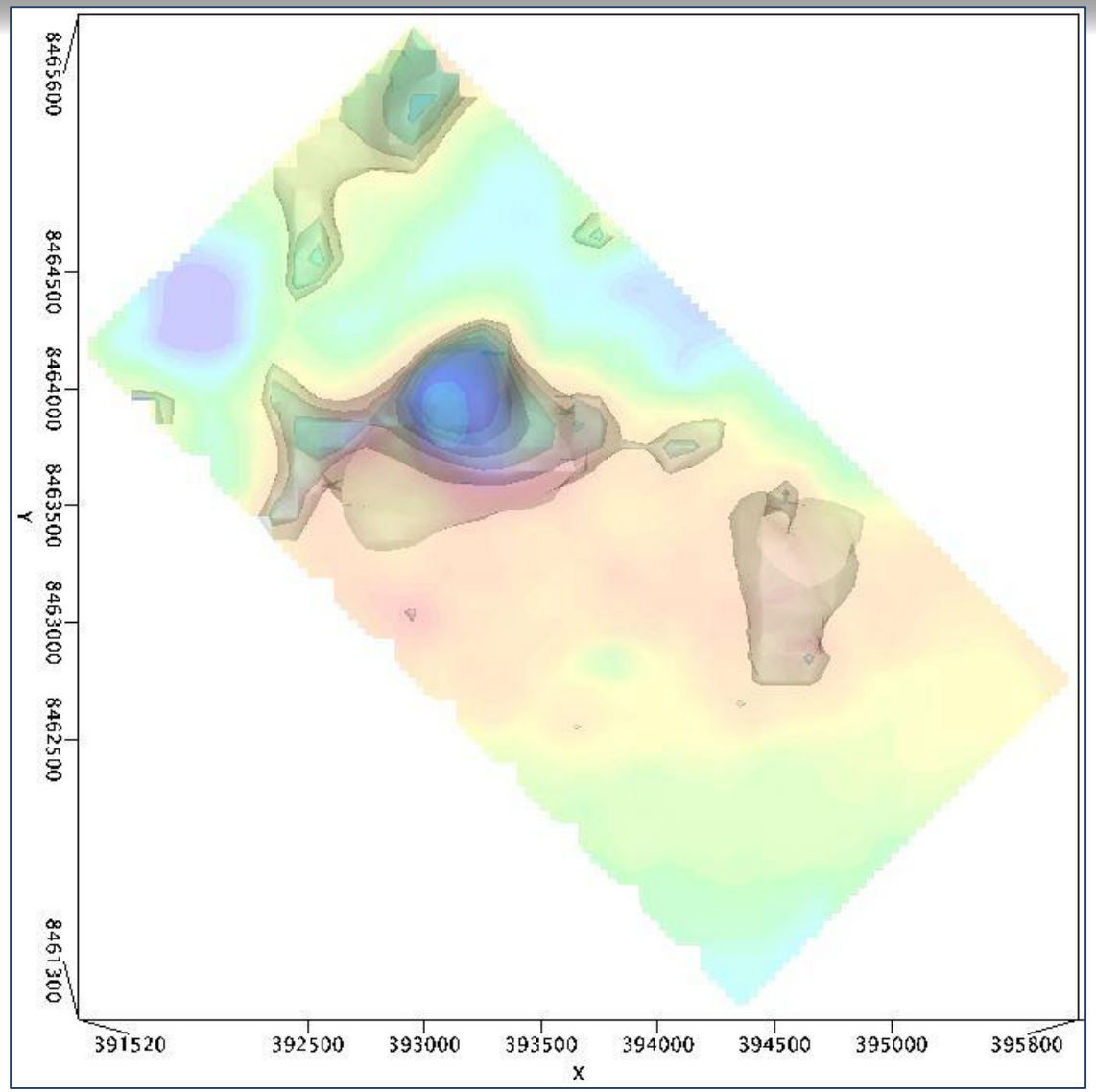


Residual BA gravity.

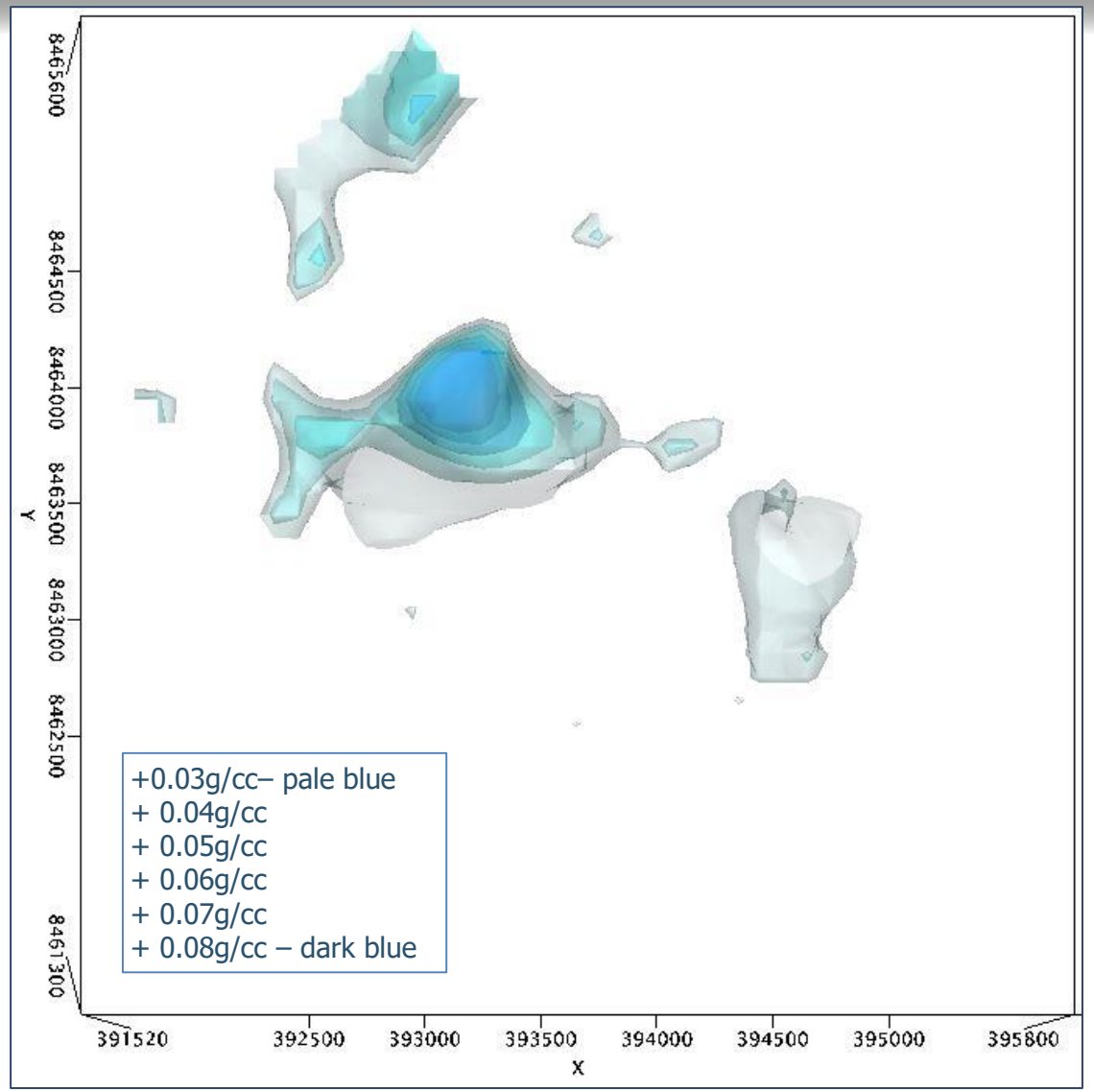


Residual BA gravity with density isosurfaces underneath.

Mainoru – Gravity Inversion

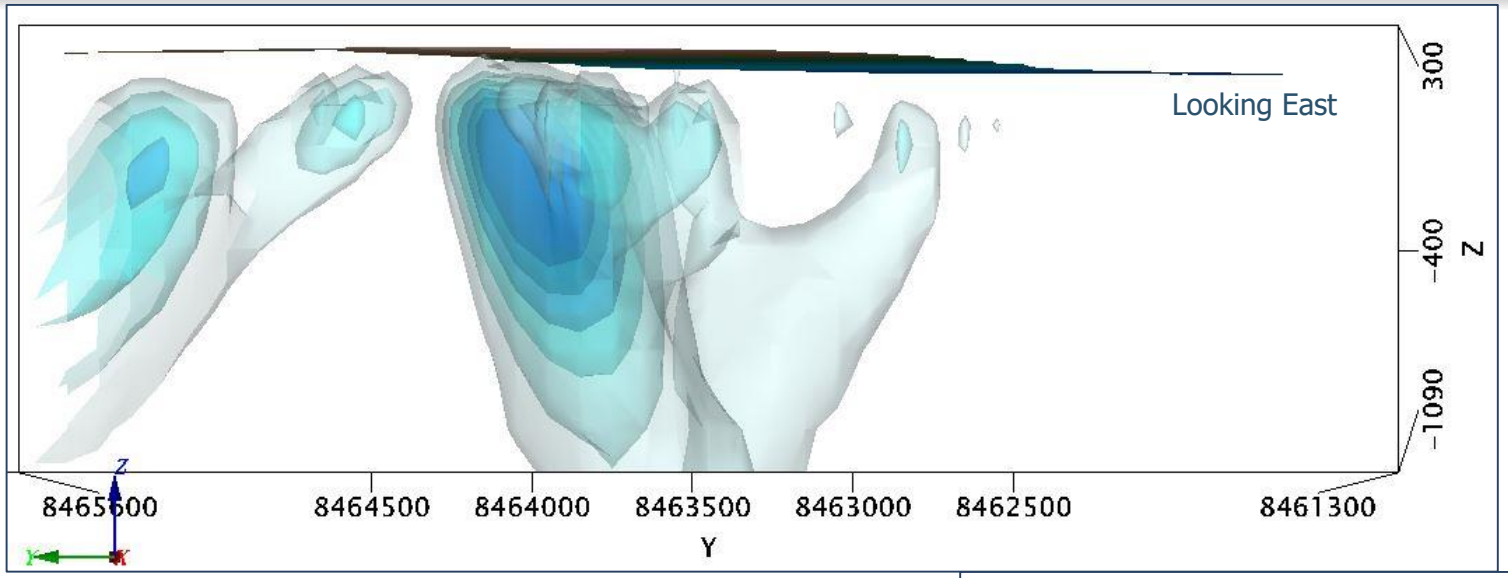


Residual BA gravity with density isosurfaces underneath.



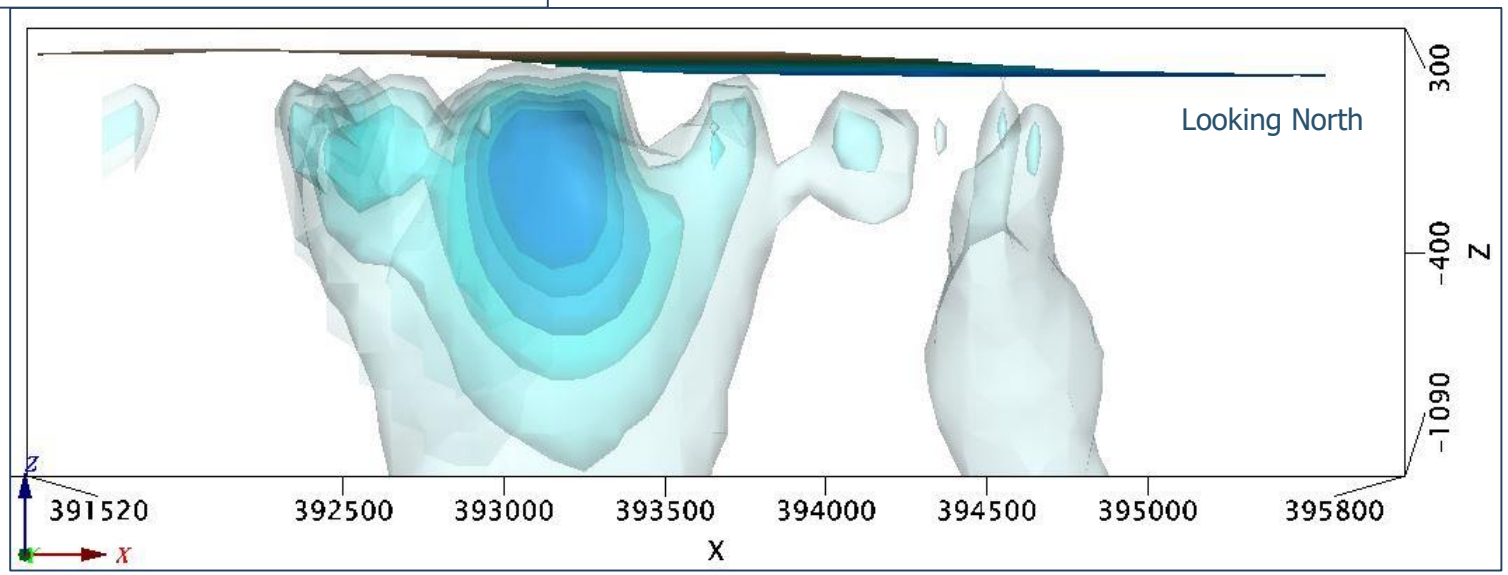
Density isosurfaces.

Mainoru – Gravity Inversion



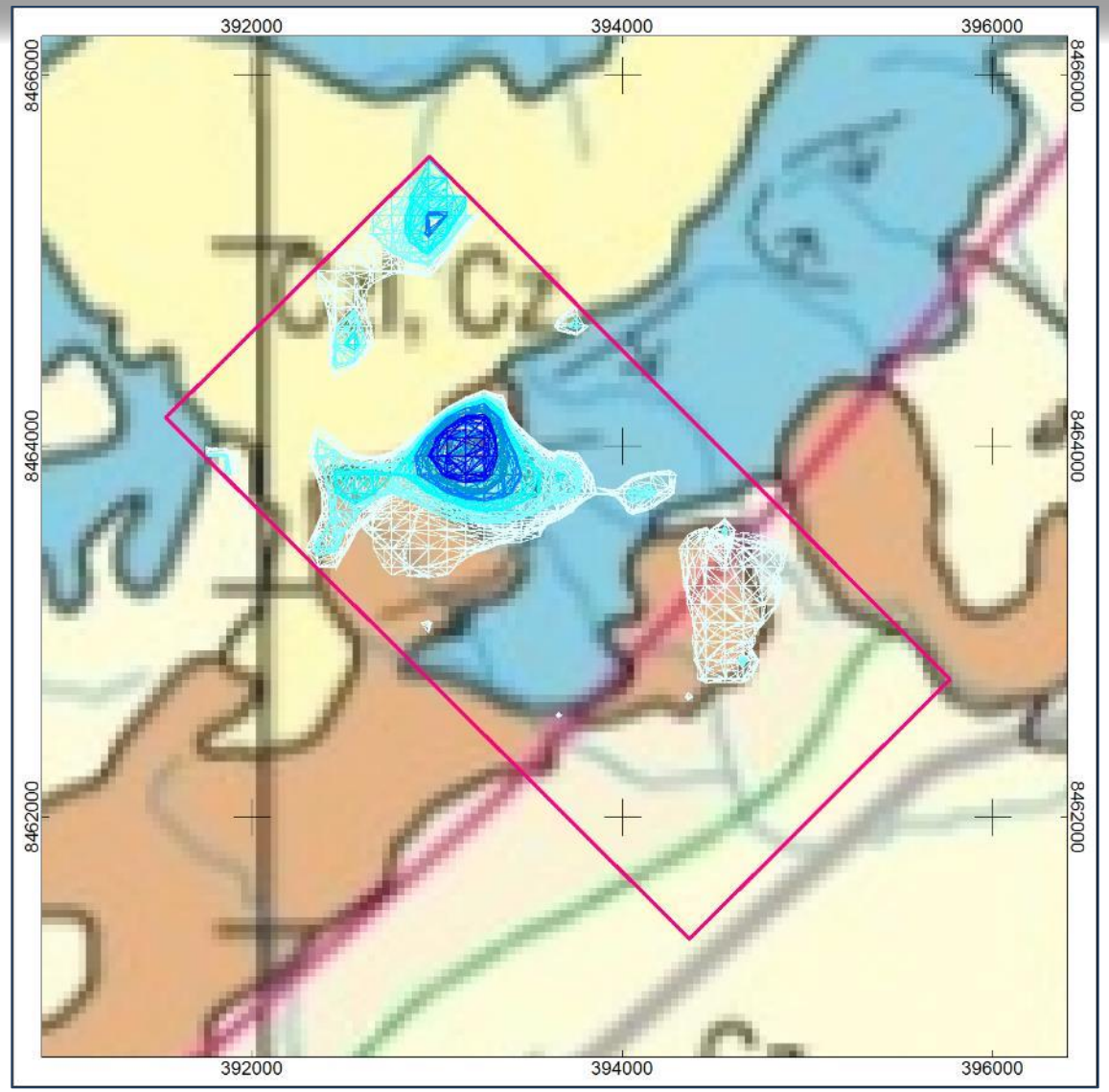
+0.03g/cc– pale blue
+ 0.04g/cc
+ 0.05g/cc
+ 0.06g/cc
+ 0.07g/cc
+ 0.08g/cc – dark blue

Density feature has flat top with relatively steeply dipping body.



Density isosurfaces.

Mainoru – Detailed Gravity

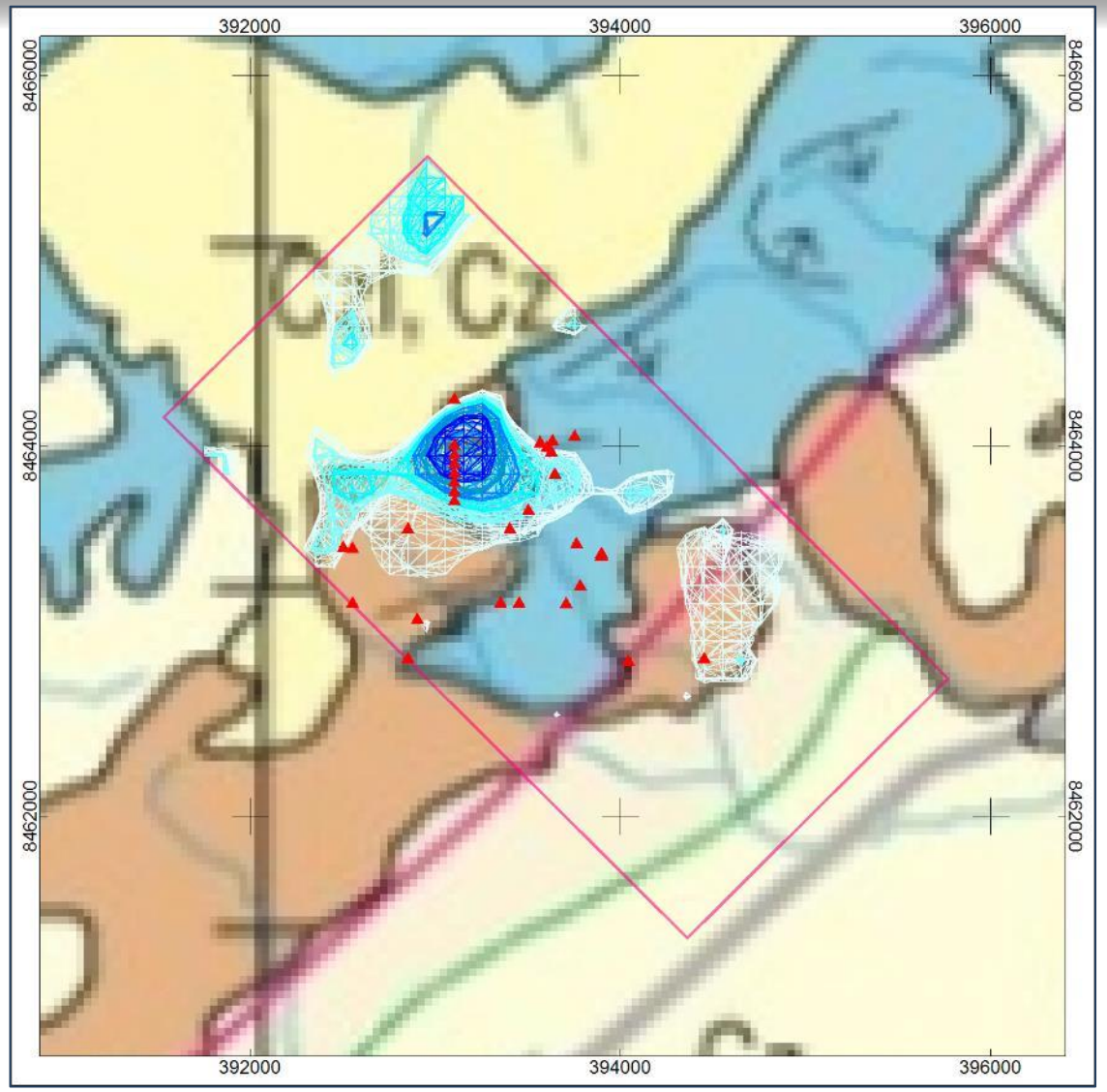


+0.03g/cc– pale blue
+ 0.04g/cc
+ 0.05g/cc
+ 0.06g/cc
+ 0.07g/cc
+ 0.08g/cc – dark blue

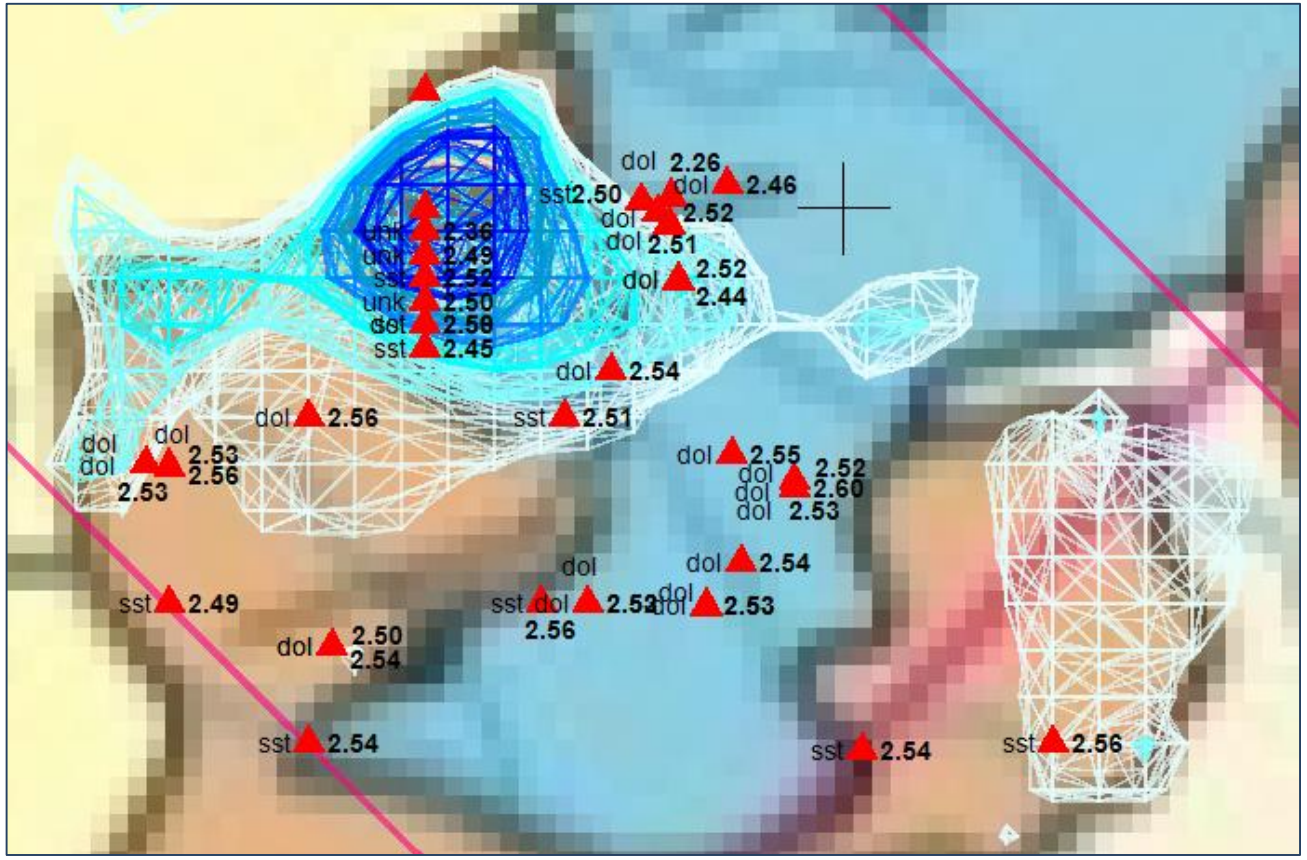
Blue (Ꝑoo) – dolomite
Brown (Ꝑri) - sandstone

Detailed gravity inversion density isosurfaces overlain on geology.

Mainoru – Surface Densities



Location of surface samples with detailed gravity inversion density isosurfaces and geology.

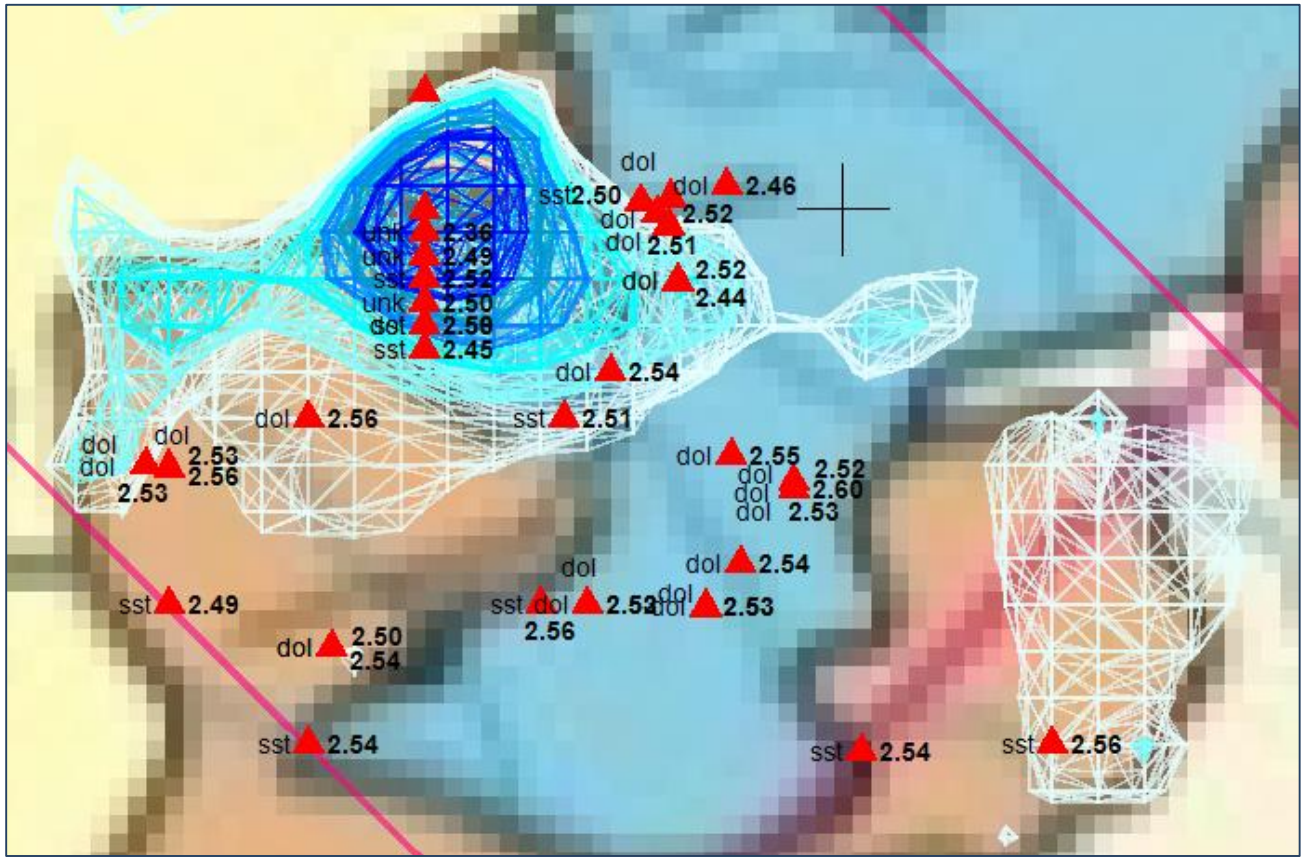


Surface samples with density and simplified rock type (sst – silicified sandstone, dol – silicified dolomite, unk – unknown, Cretaceous data not displayed).

Mainoru – Surface Densities

Rock type	Average Density
All	2.53 g/cc
Silicified sandstone	2.52 g/cc
Silicified dolomite, all	2.53 g/cc
Silicified dolomite, no sulphides	2.52 g/cc
Silicified dolomite, sulphides	2.53 g/cc

- There is a minor difference of +0.01g/cc between sandstone and dolomite.
- There is a +0.01g/cc, increase in density due to the presence of sulphides in silicified dolomite at surface.



Surface samples with density and simplified rock type (sst – silicified sandstone, dol – silicified dolomite, unk – unknown, Cretaceous data not displayed).

Century – Densities

- Century ore has density of 2.8 to 3.0 g/cc, a contrast of +0.1 to +0.3g/cc with host rocks.

Table 1: ***Summary of qualitative log responses.***

	Cambrian limestone	Prot. sandstone (h/wall)	Prot. shale and siltstone (h/wall)	Ore zone	Prot. shale and siltstone (footwall)
Natural Gamma (API cps)	very low 25	high 160	moderate 125	low–mod 70–150	high 200
Magnetic Susceptibility ($SI \times 10^{-5}$)	very low <10	low 0–50	low-moderate 0 –100	v. low (ore)– mod (waste) 0–150	low–mod 50–150
Resistivity (ohm-m)	high >1000	low 60	low 75	variable 50–200	low 80
Density (g/cc)	moderate 2.7	low 2.6	moderate 2.7	mod–high 2.8–3.0	moderate 2.6–2.7
Neutron (API cps)	high 1500	high 1600	moderate 1200	low 700–variable	moderate 1200
Sonic Velocity (m/s)	very high 5000–6000	moderate 4500	moderate 4000	mod–high 4000–5000	moderate 4000

From Mutton 1997, The Application of Geophysics During Evaluation of the Century Zinc Deposit, Mine Site Exploration and Ore Delineation.

HYC – Densities

HYC ore has a density contrast of +0.3 to +0.6g/cc with host dolomitic units, however gravity anomalies due to mineralisation are difficult to distinguish from lithological causes.

HYC densities:

- Ore – 3.2 to 3.3g/cc
- Dolomitic units – 2.7 to 2.9g/cc
- Clastics – 2.4 to 2.7g/cc

From Shalley and Harvey 1992, Geophysical Responses of the HYC Deposit, Exploration Geophysics.

Mainoru – Summary and Conclusions

Detailed gravity at Mainoru is located in a weaker portion of a large regional gravity high.

Inversion of detailed gravity data shows that there is a density anomaly of ~0.04 to 0.05g/cc.

The density anomaly is not due to topographic effects.

The density anomaly is not readily explained by surface lithological variation as it would be expected that the density anomaly would coincide with dolomite, not sandstone. It is possible that the density anomaly is due to thicker and/or shallower dolomite beneath the sandstone.

It is possible that the density anomaly is caused by sulphide mineralisation, however, the estimated absolute density of ~2.58g/cc (2.53 + 0.05) is low for sulphide mineralisation and the density contrast with host rocks is an order of magnitude lower than that seen at HYC and Century.

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