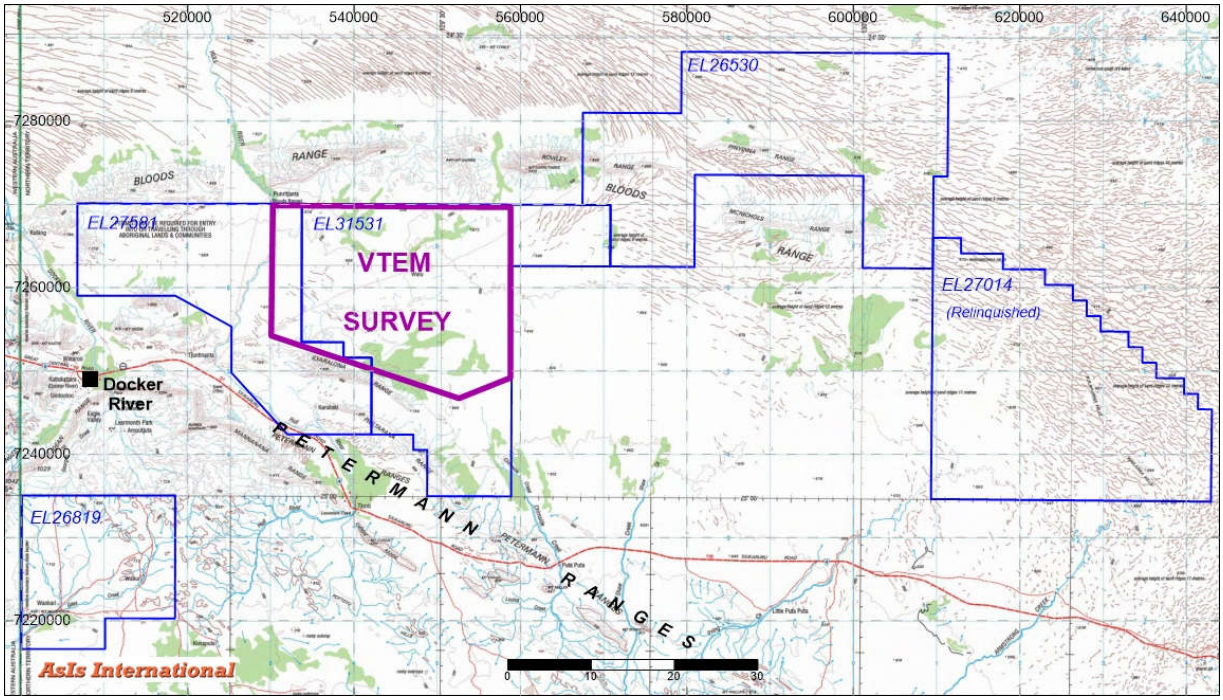
GEMPART (NT) PTY LTD

GR472 2nd ATR

APPENDIX 4

MERGE OF AEROMAGNETIC DATA



MERGE OF AEROMAGNETIC DATA FROM VTEM & NTGS SURVEYS

GEMPART (NT) PTY LTD - PETERMANN RANGES PROJECT EL 31531

This note describes the process and outcome of merging data from two airborne surveys.

DATA

Survey 1 ("NTGS PETERMANN")

Contractor	Austirex International
Client	NTGS
Survey date	1985
Flight line spacing	500 metres
Line orientation	North-south
Sensor height	100 metres (magnetometer in aircraft)
Reading interval	0.25 seconds (approx 60 metres)
Navigation	Aerial photography
Levelling	Tie-line levelling

Survey 2 ("VTEM DOCKER RIVER")

Contractor	GeoTech
Client	Gempart (NT) Pty Ltd
Survey date	2017
Flight line spacing	500 metres (lines flown in between NTGS flight lines)
Line orientation	North-south
Sensor height	70 metres (magnetometer below helicopter)
Reading interval	0.1 seconds (approx 3 metres)
Navigation	GPS
Levelling	Base station correction but no tie-line levelling

PROCESS

The TMI data were acquired on surveys with disparate parameters – vastly different vintage of equipment, and different sampling interval, sensor height, navigation method and levelling. Some pre-existing levelling errors are evident in the NTGS data when gridded at a cell size of less than 125 metres. So it is expected that the merging process will not produce a perfect fit.

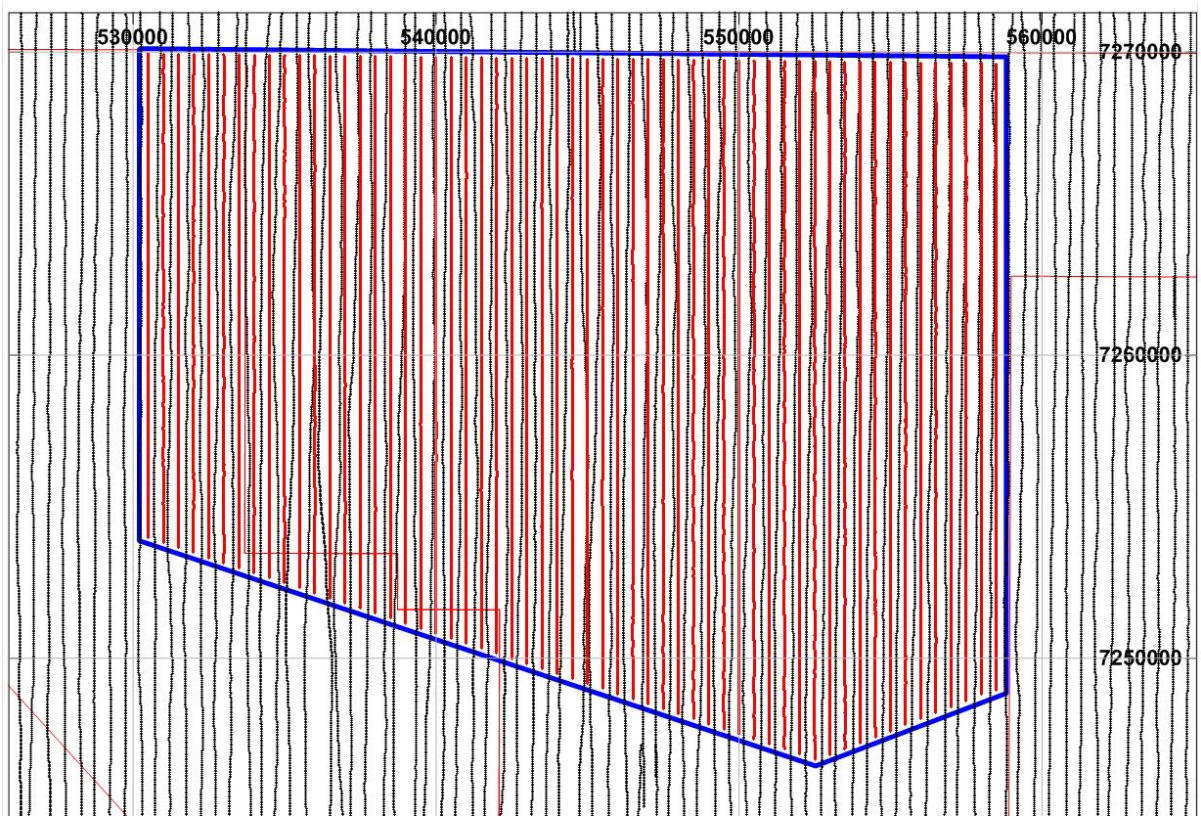


Figure 1. Flight path diagram for NTGS survey (black) and VTEM survey (red). The VTEM data were acquired using GPS navigation, and the flight lines are quite straight. The NTGS data were acquired using visual navigation from black and white photos. The flight path wanders; in places there are big gaps, and in other places lines cross.

Line profile data were extracted from the NTGS LDT file "Final Magnetic Intensity" field, and from the 273 channel VTEM data file "Mag3" field.

The NTGS data were downward continued to the VTEM sensor height of 70 metres using a Fourier filter on the line profile data. Grids were created in ModelVision at 100 metre cell size using the line profile data from each survey and compared for differences.

Further data manipulation was completed using an Excel spreadsheet. The following arithmetic was applied to the VTEM data to get a best visual fit with the NTGS data.

1) *Subtract 51,146 nT*
2) *Add regional gradient of +110 nT across the north-south extent of the survey area.*
3) *An east-west regional gradient of 12 nT was applied but did not improve the overall fit. It was omitted.*

The final merged profile data was then gridded in ModelVision at grid mesh sizes of 50, 75, 100 and 125 metres.

RESULTS

Grid images of TMI from the Petermann survey and from the merged data are shown in Figures 2 and 3.

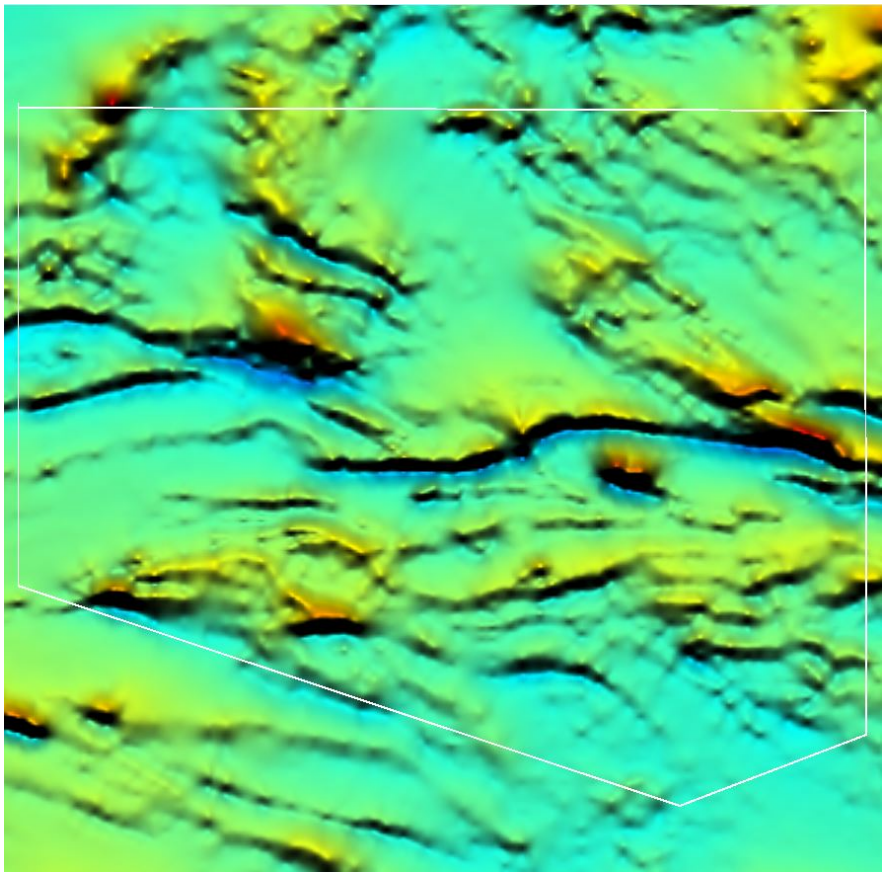


Figure 2. Image of Petermann TMI data.

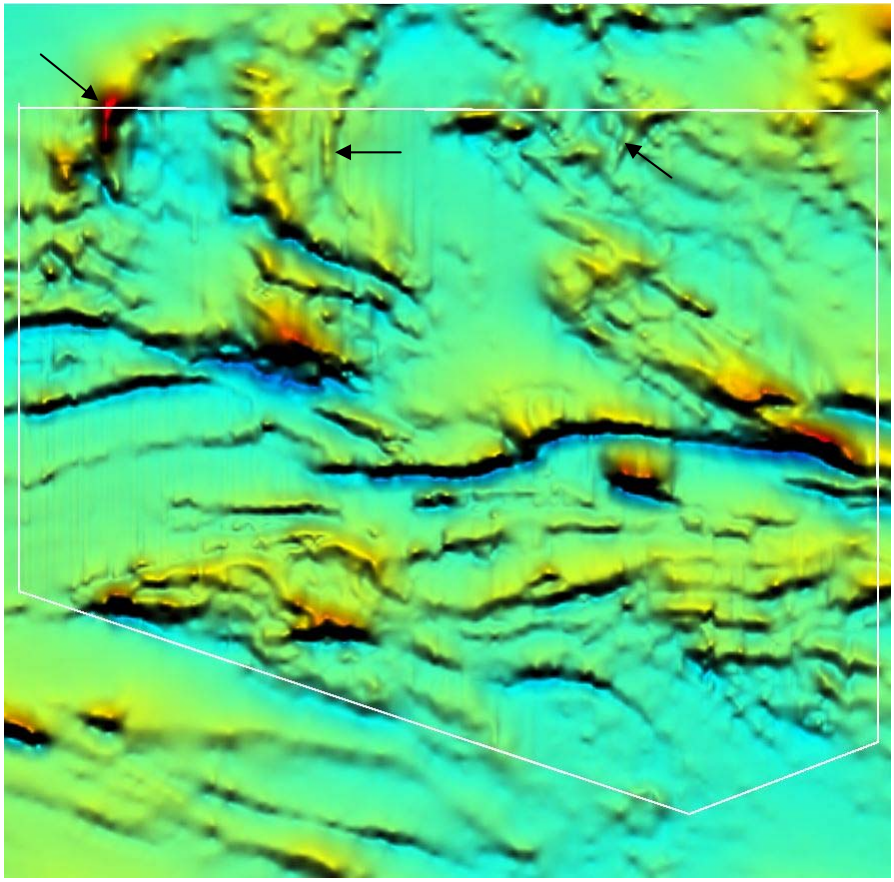


Figure 3. Image of merged NTGS and VTEM TMI data

The merged data shows some noise along the flight line direction (“pulls”) but this is inevitable given the disparate forms of acquisition and processing. The amplitude of the “pulls” is typically less than ten nT.

Filters could be applied to reduce the noise, but these same filters will also cut out some of the real (geological) signal and remove fine detail. It is best to leave the image as is.

The merged data image, when examined in high resolution on a computer screen, clearly is sharper than the NTGS data image. The east-west trending features do not show much change in character, however there is more continuity.

Of significance is clarity of a few north-south oriented linear anomalies, particularly in the northern part of the survey area. Three such anomalies are arrowed.

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3rd September 2018

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