RIO TINTO

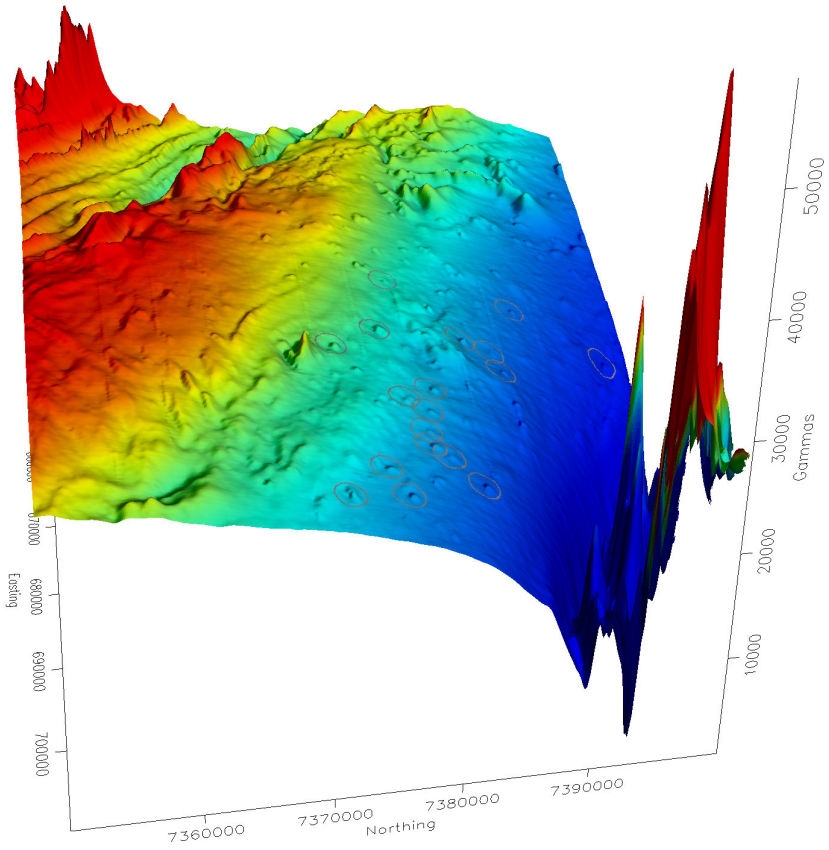
Memorandum

To: **Gerard Rheinberger**

From: Mike Enright

Date: 3 August 2005 File:32A.03.05 Doc. No.1363

Plenty River Diamond Project Aeromagnetic Target Selection Report



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Introduction

A total of 15 discrete aeromagnetic targets have been selected as potential kimberlitic sources from within the Plenty River diamond exploration tenements. The aeromagnetic targets have been selected from within the government Eromanga magnetic and radiometric airborne survey (400m line spaced, 80m flying height data). The tenements (Plenty River 1 & 2) are located 250km east of Alice Springs in the Northern Territory, which along with the extent of the Eromanga airborne survey is outlined in **Figure 1**.

The targets are focussed in the north-east of the Plenty River 1 tenement and the northern half of Plenty River 2 tenement where the magnetics is quieter and access is not restricted. The distribution of the targets and the surrounding north-north-east orientated longitudinal dune topography is displayed in **Figure 2**. Dune ridges are commonly 7m in height and can clearly be seen in the LANDSAT image in **Figure 3**.

Figure 1: Location map displaying Plenty River Tenements, Alice Springs and extent of the Eromanga aeromagnetic survey (TMI aeromagnetic image). Coordinates in GDA94 UTM Zone 53S

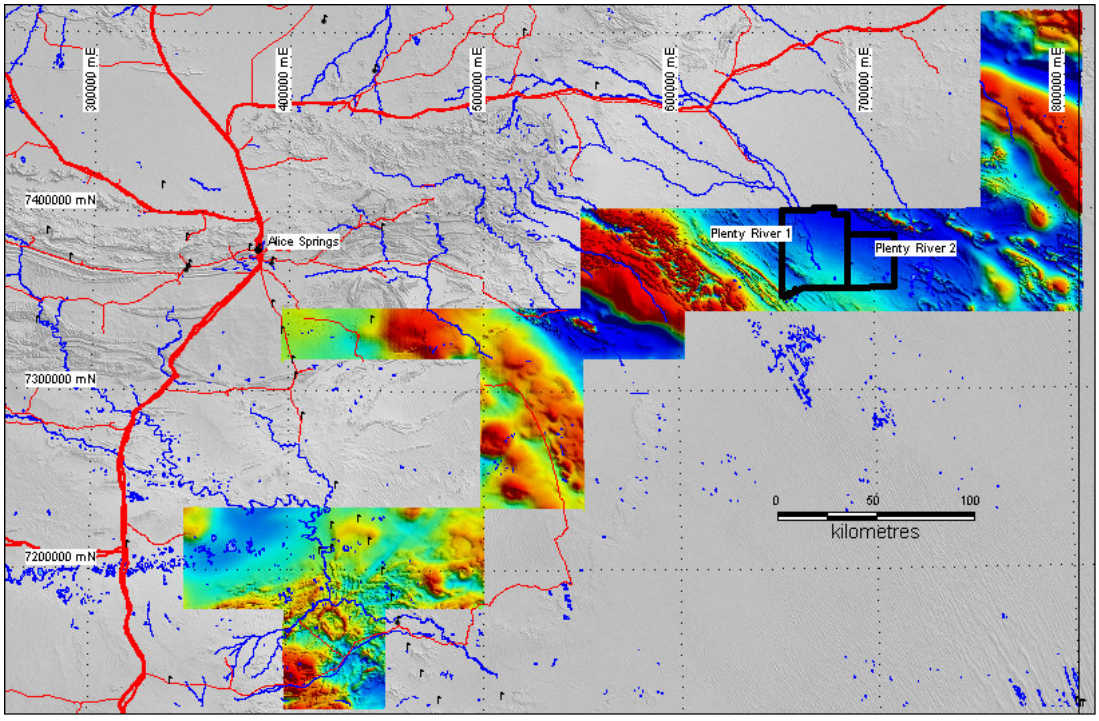
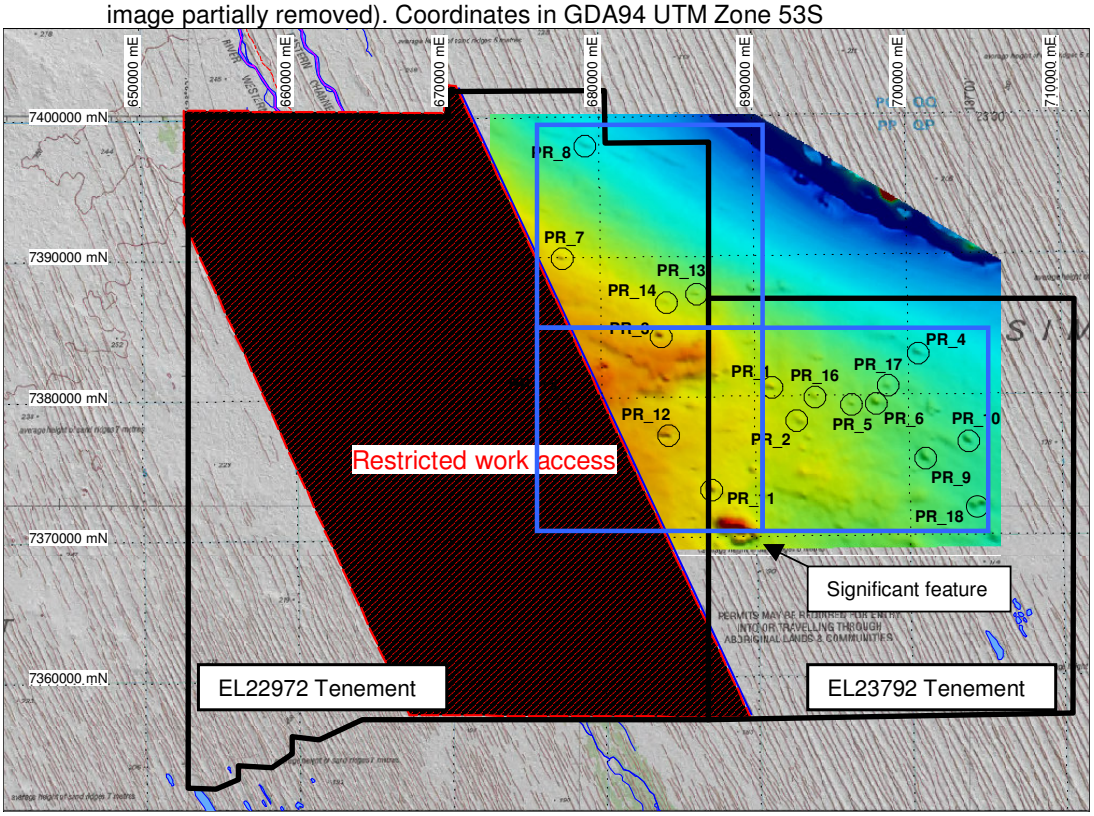


Figure 2: Distribution of the aeromagnetic targets, restricted access area, **tenement boundaries** and 3 regions (15km^2) examined in **Figures 4, 5 and 6** overlaid on a colour TMI aeromagnetic image and sand dune topography. (Regional trend within aeromagnetic image partially removed). Coordinates in GDA94 UTM Zone 53S

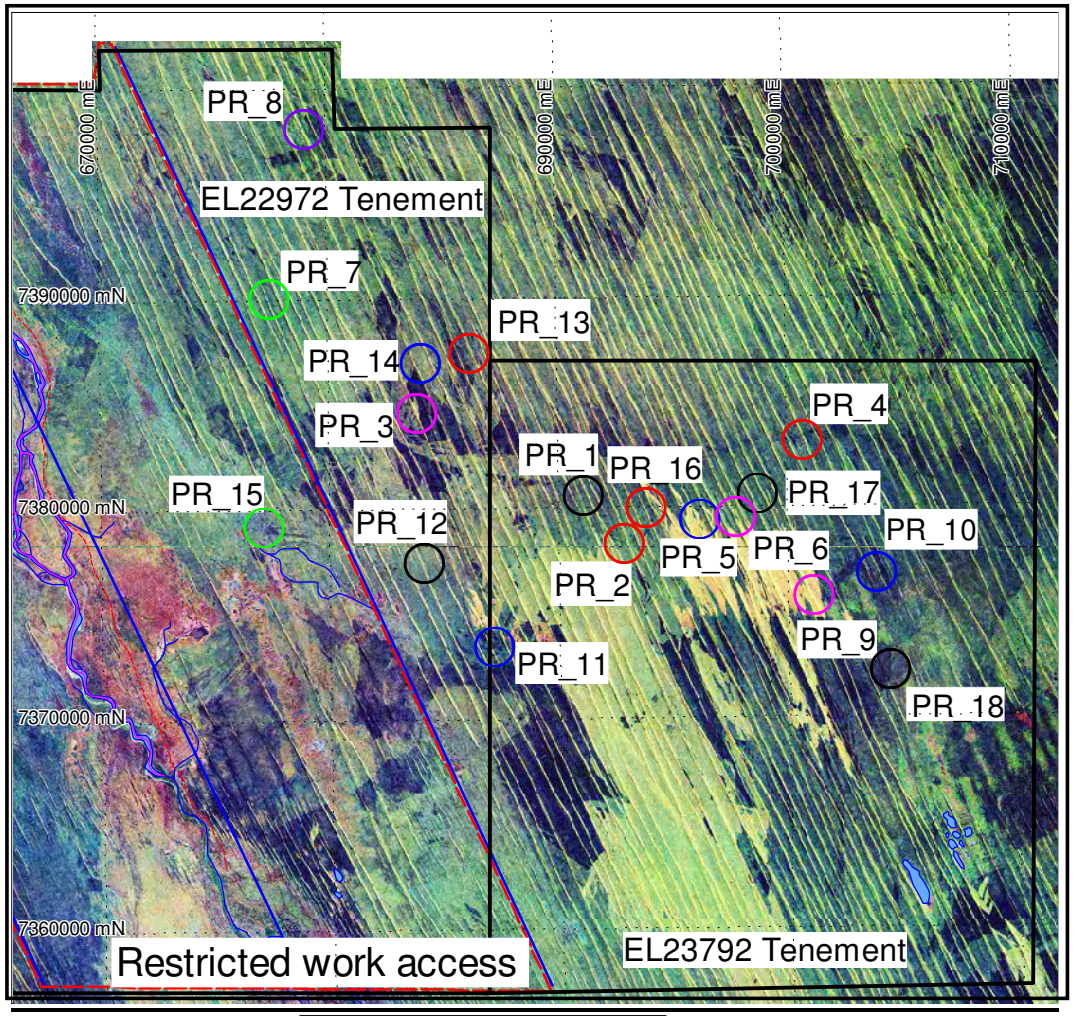


Results

The aeromagnetic targets have been modelled using line profiles within MAGMOD and/or ModelVision. The modelling results, target parameters and general comments have been tabulated in **Table 1**. The coordinates in the table and all subsequent maps is GDA-94 UTM Zone 53S. It should be noted that with a 400m. line-spaced survey the survey flight lines potentially don't traverse exactly over target locations resulting in modelled depth estimates deeper than true depth. Similarly it can be interpolated that targets modelling near surface are located "in line" with the survey flight line.

The topography column in **Table 1** is a guide to whether the target is sitting between dunes or aligned spatially with the peaks of dunes outlining whether all targets are inter-dune and correspond with outcropping material or inter-dune accumulation. The exact location of the targets may shift between traverses on completion of ground magnetic surveys though the preliminary comparison of topography with target location suggests there is no correlation.

Figure 3: Distribution of the aeromagnetic targets overlaid on LANDSAT 741 image.
Coordinates in GDA94 UTM Zone 53S



Legend for Aeomagnetic targets

- Depth < 10m, Dimenions 200+ x 200+
- Depth < 10m, Dimenions elongated
- Depth > 30m
- Depth < 10m, Dimenions < 60m x < 60m
- Potential blow along dyke
- No effective modelling

Table 1: Aeromagnetic target parameters. (Ampl = target point to point amplitude, topogr = topography seen in profile. The target coordinates are from the steepest gradient on the target responses profile. When a target is observed across more than one profile the profile response with the largest amplitude has been chosen. Therefore exact target location may shift laterally at the completion of the ground magnetic surveys

Target	Easting	Northing	Ampl	Topogr	MAGMOD				Modelvision				Comments
	GDA94 UTM Z35S		nT		depth	size - (m)	degree fit	mag sus. SI	depth	size (m)	degree fit	mag sus. S.I.	
PR1	691090	7380577	9	side dune	10 - 20m	310 x 200	good	0.0012556	< 10m	200 x 200	good	0.00087892	depth 40m if no restrictions on depth extent
PR2	693098	7378114	3.5	low	< 10m	280 x 400	Ok	0.0005022			bad	0.000389236	good fit if dip north 70 degrees
PR3	683888	7384315	16	high			bad	0.0015067	60m	38 x 300	good	0.003465456	if any dip it would be slightly to the north
PR4	700692	7382900	6	side dune	60m	320 x 350	very good	0.0016323	30m	330 x 180	good	0.00100448	GEOSOFT dip to the north, single line target ,
													GEOSOFT model deeper than target
PR5	696294	7379335	5	side dune	60	240 x 80	OK	0.003139	20	300 x 65	Ok	0.0009417	mag sus variable
													GEOSOFT model deeper than target
PR6	697892	7379378	9	low	110	240 x 400	good	0.0026368	120	225 x 380	good	0.001833176	mag sus variable
													secondary shallow source present
PR7	677492	7389953	8.5	low	-	-	-		< 10m	80 x 80	good	0.00163228	GEOSOFT poor fit - regional gradient variable
PR8	679087	7397889	3	high	-	-	-		20	400 x 200	Ok	0.000678024	GEOSOFT poor fit - regional gradient variable
PR9	701087	7375449	8	high					200	190 x 80	good	0.0081614	
PR10	703886	7376644	11.5	side dune					20	50 x 250	good	0.003214336	profile distinctly different shape
PR11	687093	7373341	15	low					10	40 x 260	good	0.00477128	lower priority when seen in 15 km mag image
PR12	684291	7377267	14	low									double bump in profile (small, shallow source to north)
PR13	686293	7387287	5	high	< 10m	300 x 250	good	0.0008789					target is between traverse lines
PR14	684292	7386729	2.5	high					20m	160 x 85	good	0.0087892	
PR15	677101	7379169	7	low	< 10m	35 x 70	good	0.0026368					
PR16	693892	7379867	3.5	low					< 10m	200 x 170	OK	0.0006278	
PR17	698688	7380632	2	low									profile shape may be unigue - regional difficult estimate
PR18	704683	7372216	18	low	50	300 x 220	good	0.00025					

For a more detailed examination of the various target's magnetic responses the aeromagnetic image has been sectioned into three 15km^2 regions (North-west, South-west and South-east as outlined in **Figure 2**). The North-west section (**Figure 4**), displays target PR8 which is potentially a blow along a dyke and three isolated normally magnetized dipole targets.

Figure 4A: The North-west region's magnetic image overlaid with targets. Linear feature modelling results are located in **Appendix D**.
(Magnetic image is TMI with sun shading and partial regional magnetic trend removed.)

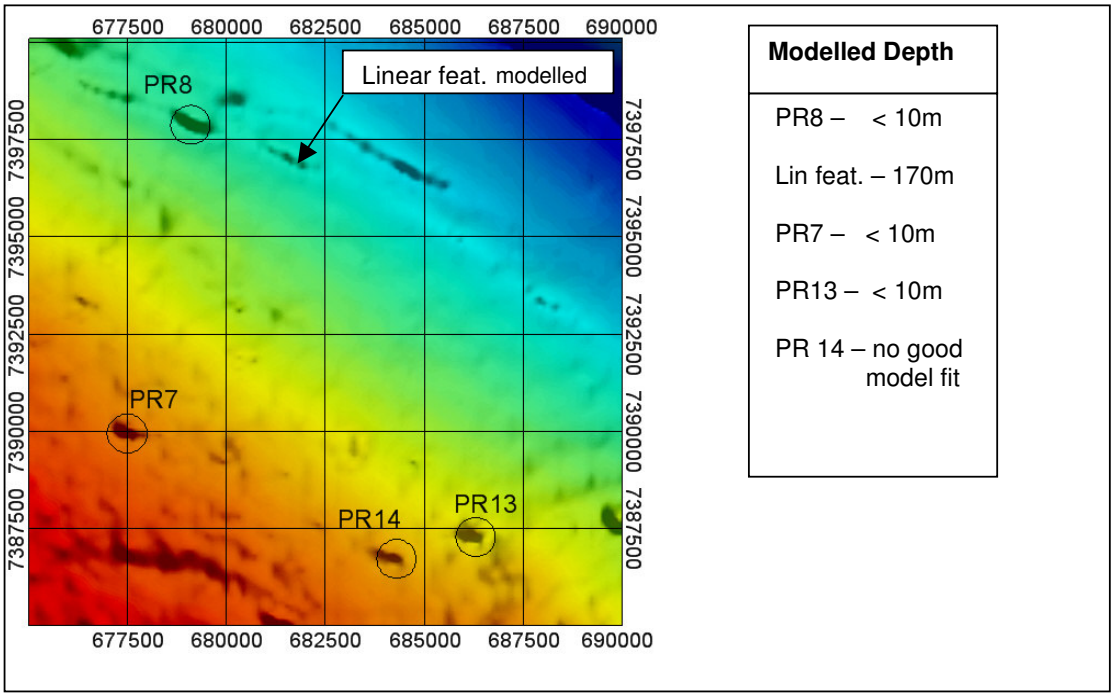
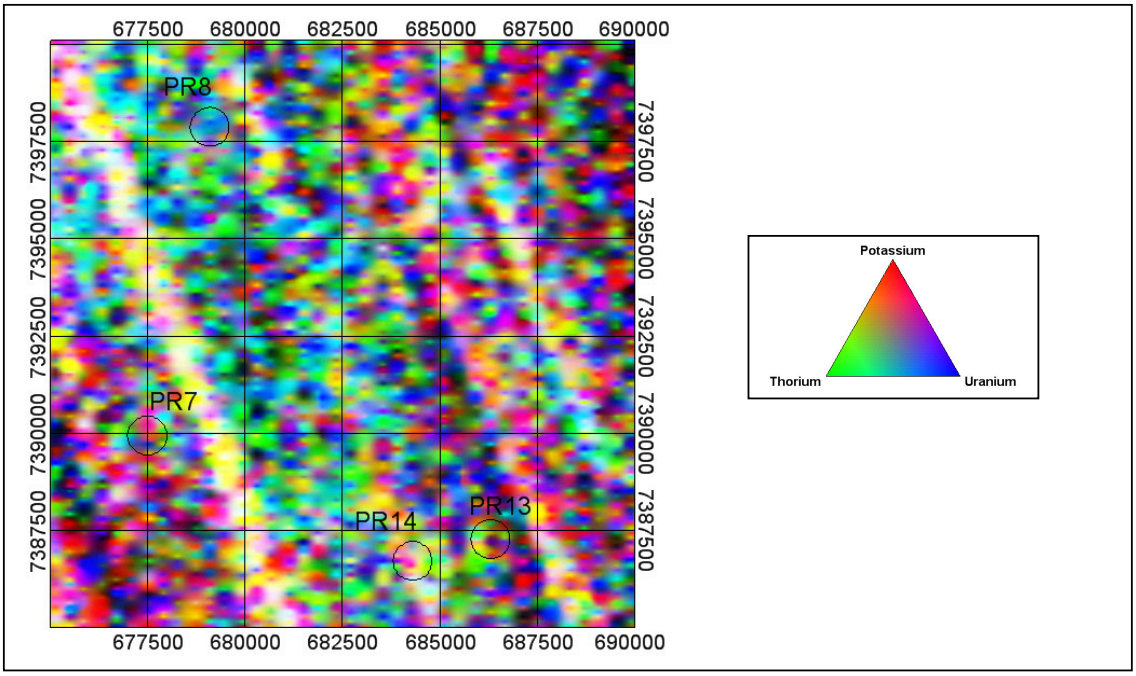


Figure 4B: North-west region's RGB radiometrics image



The South-west section (**Figure 5**), is more magnetically active. Four isolated dipole targets have been selected. It should be noted that PR15 is within the restricted access region.

Figure 5A: South-west region's magnetic image overlaid with targets.
(Magnetic image is TMI with sun shading and partial regional magnetic trend removed.)

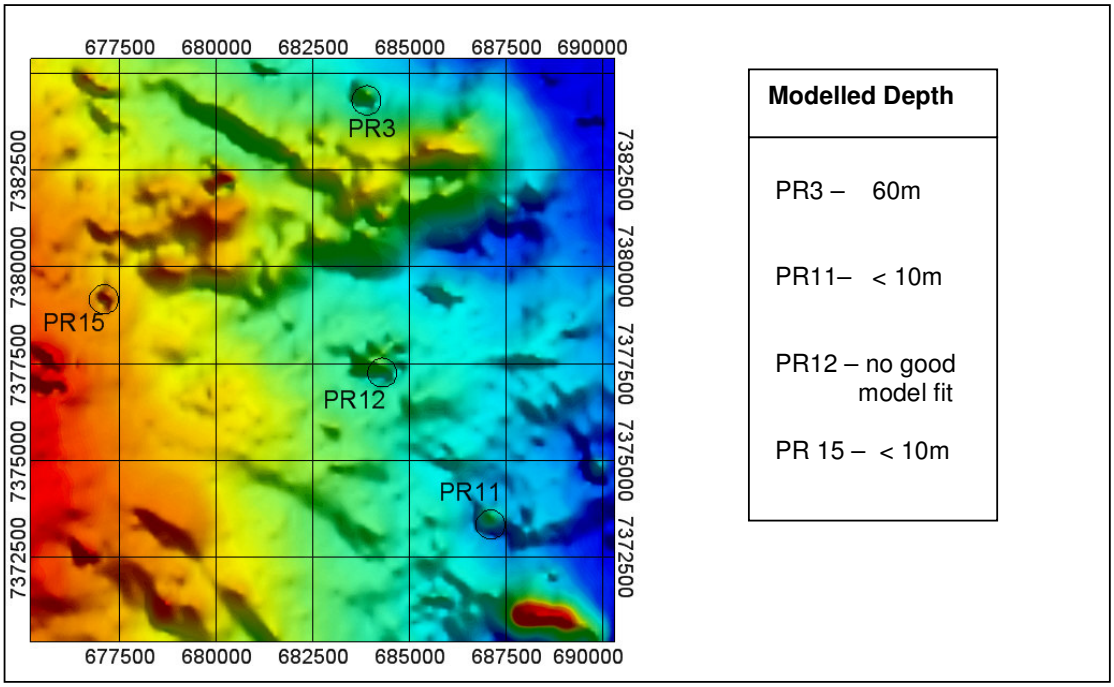
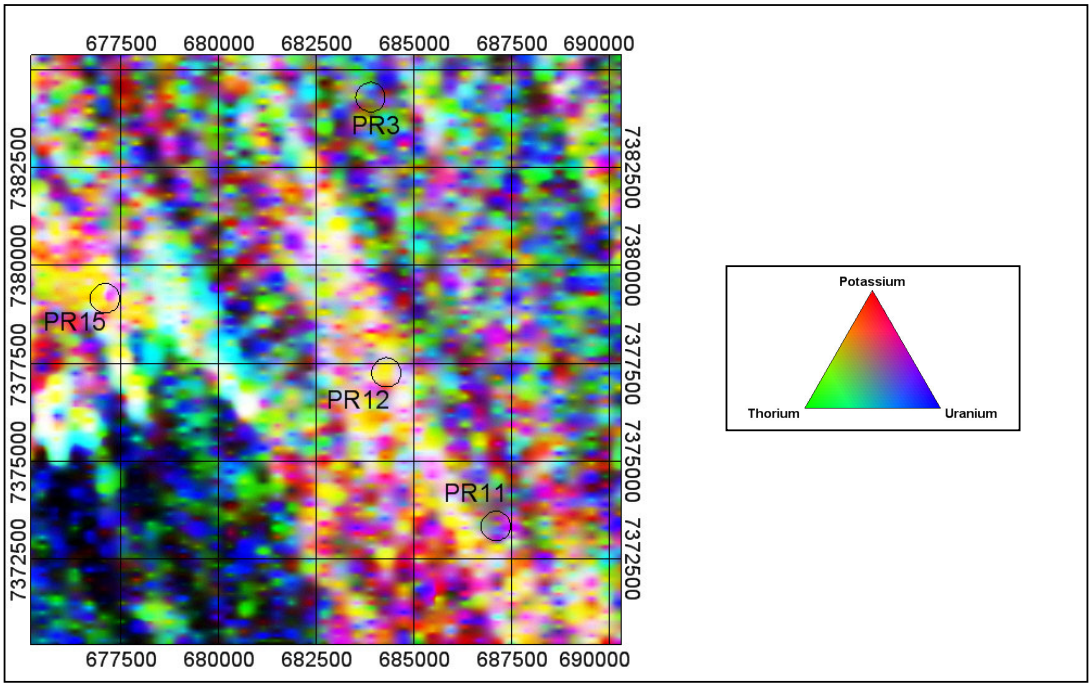


Figure 5B: South-west region's RGB radiometrics image



The South-East section (**Figure 6**), displays the majority of the selected targets. The magnetic profile of PR17 has a more pronounced low proving difficult to model and due to its uniqueness is of interest.

Figure 6A: South-east region's magnetic image overlaid with targets.
(Magnetic image is TMI with sun shading and partial regional magnetic trend removed.)

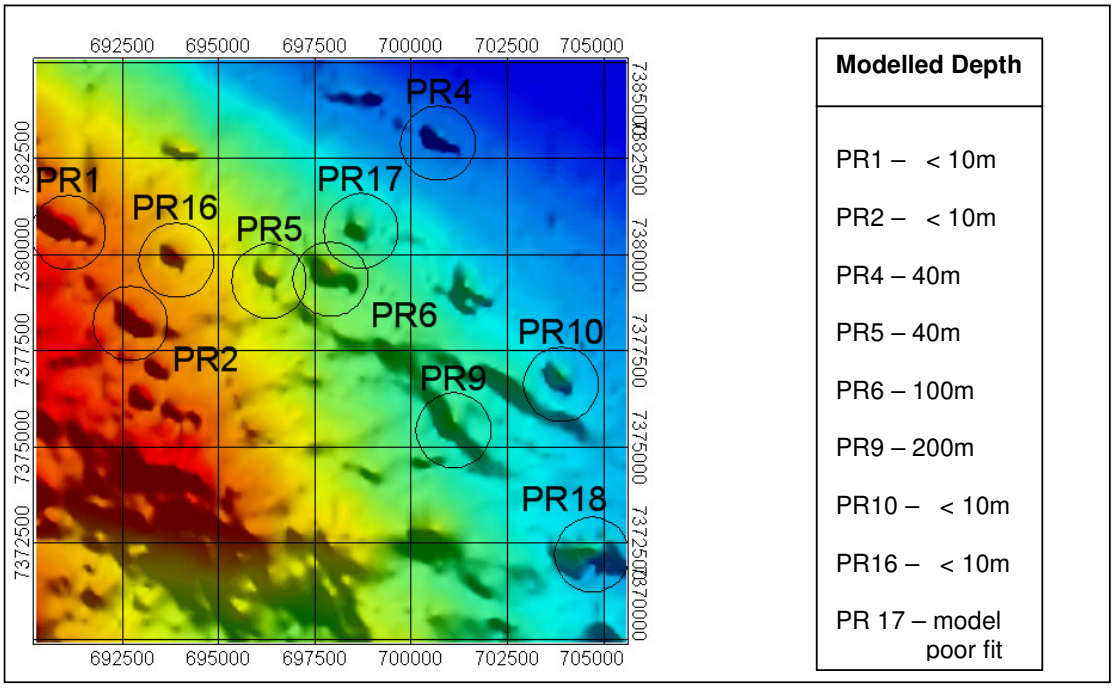
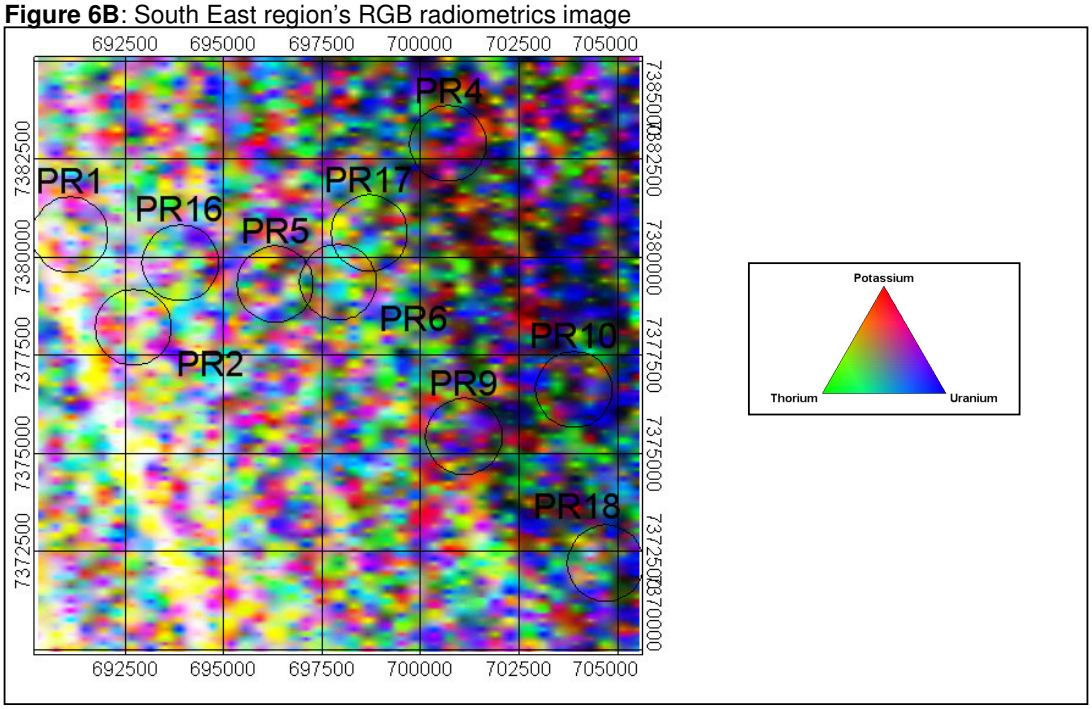


Figure 6B: South East region's RGB radiometrics image



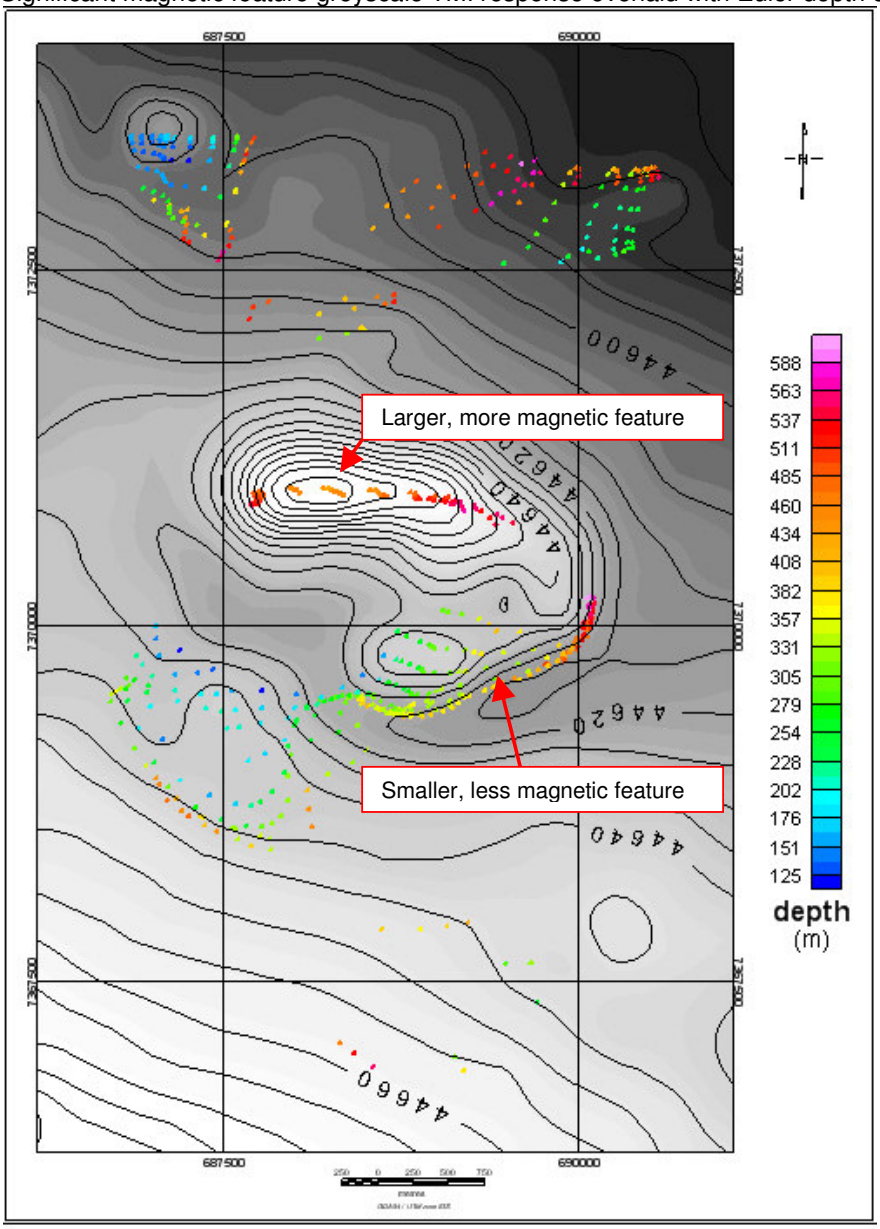
Significant Feature

The significant feature labelled in **Figure 2** is an isolated magnetic feature being investigated as a potential target. The target consists of two magnetic responses:

- a larger more magnetic, (60nT ampl. P – P) east-west striking body to the north and
- a less magnetic, (20nT ampl. P – P) east-west striking body to the south.

The magnetic response of the target, the location of the two bodies and the Euler depth calculations are displayed in **Figure 7**. It can be seen that the shallowest depth estimations for the northern feature is 400m while the southern feature's shallowest calculations (at western extent of the target) is 330m. Modelling with ModelVision and MAGMOD inversions (**Appendix C**) suggest the northern body is between 210m and 270m. Both inversion techniques suggested the northern body dips considerably to the south.

Figure 7: Significant magnetic feature greyscale TMI response overlaid with Euler depth estimates



Discussion

The modelling involved mostly constraining the inversion to vertical bodies of significant depth extent. Observed variations in modelling results between MAGMOD and ModelVision are potentially due to differing removal of complicated magnetic regional trends. ModelVision allows for non-linear regional trend removal and is therefore likely to give more accurate results than MAGMOD for those targets with complicated regional magnetic tends. The Magnetic susceptibility has not been restrained during modelling. The resulting calculated magnetic susceptibilities from MAGMOD and ModelVision are comparable, except on targets PR5 and PR6.

Trends observed within the radiometrics RGB images correspond to the dune cover though inter-dune response variations are evident. This combined with variations within the LANDSAT image indicate potential for inter-dune breaks in overburden is possible.

Conclusions

Most sources are close to outcrop and we expect to have magnetic susceptibilities of approximately 100 – 200 x 10^{-5} SI if depth extensive or perhaps 1000 – 2000 x 10^{-5} SI if depth limited (e.g. laterite).

With expected shallow targets and inter-dune variations observed within the radiometrics and LANDSAT responses considerable target information may be evident observed on the ground.

To ensure that a variety of "types" of targets are tested the targets have been grouped

Targets with normally magnetized, isolated dipole responses that have been modelled as shallow (less than 10m) targets of several hundred metres in surface diameter include: PR1, PR2, PR3, PR13 and PR16
PR3 is the highest magnitude target at 16nT peak to peak.

Targets with normally magnetized, isolated dipole responses that have been modelled as shallow (less than 10m) targets of elongated extent include: PR5, PR10, PR11 and PR14.
PR11 is potentially related to the adjacent magnetic units and is of less interest.

Targets with normally magnetized, isolated dipole responses that have been modelled as deeper targets include: PR3, PR4, PR6, PR9.
Pr9 also has considerably higher magnetic susceptibility.

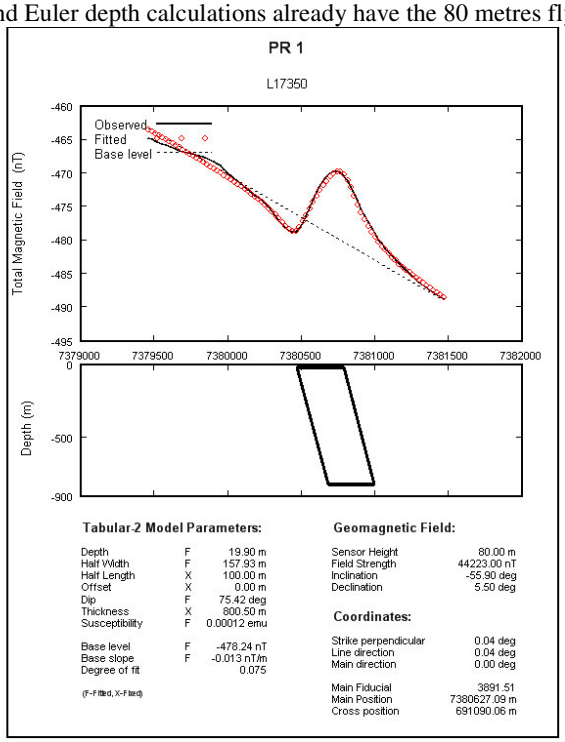
Targets with normally magnetized, isolated dipole responses that have been modelled as shallow targets, with surface diameters less than 100m include:
PR7 and PR15.

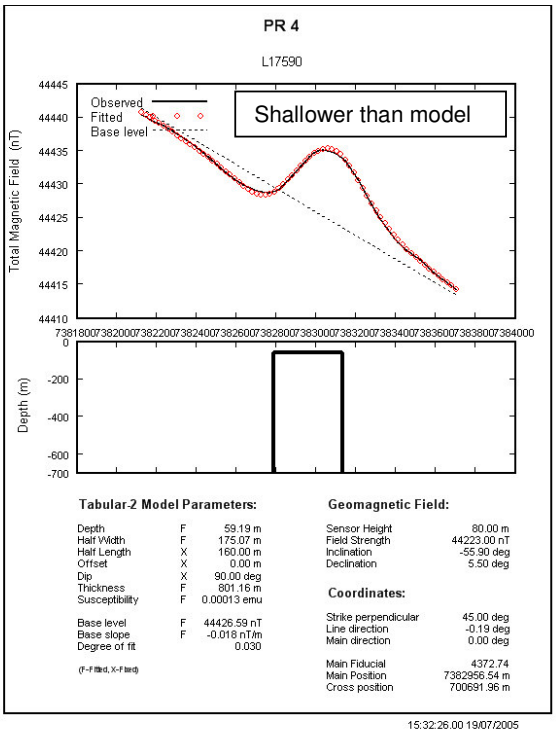
Target PR8 is potentially a blow along a dyke placing it in a group of it's own. PR8 models (unconstrained) to a shallow (< 10m), vertical body, while the linear feature the target straddles is steeply dipping to the north and 170m deep

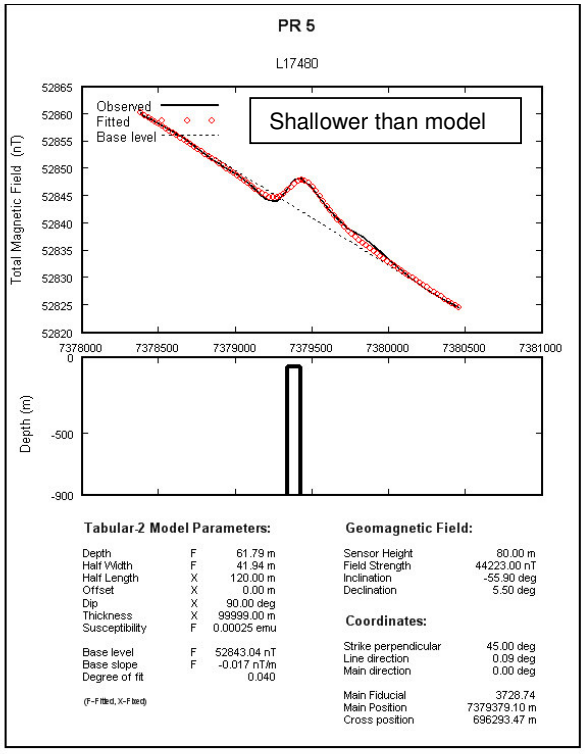
Targets that could not be modelled effectively include: PR12 and PR17.
PR12 is two closely spaced bodies and due to it's magnetic profile having a pronounced low is of interest

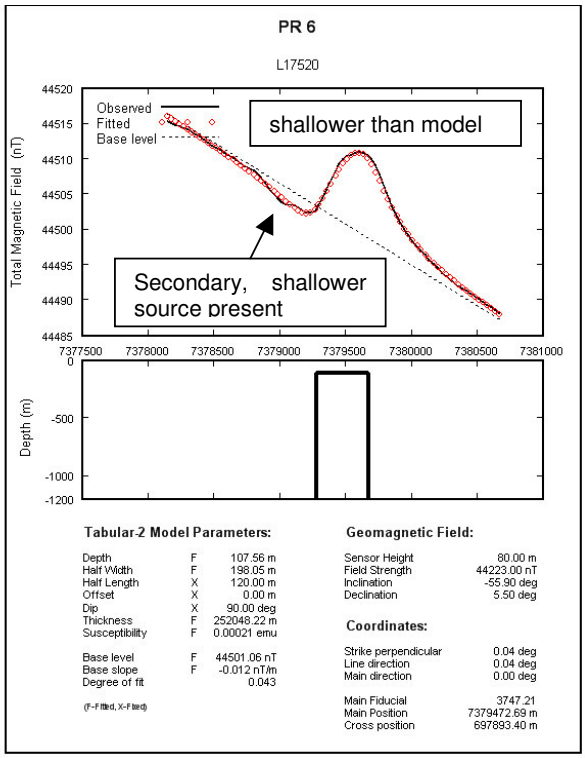
Appendix A - MAGMOD modelling results for aeromagnetic targets

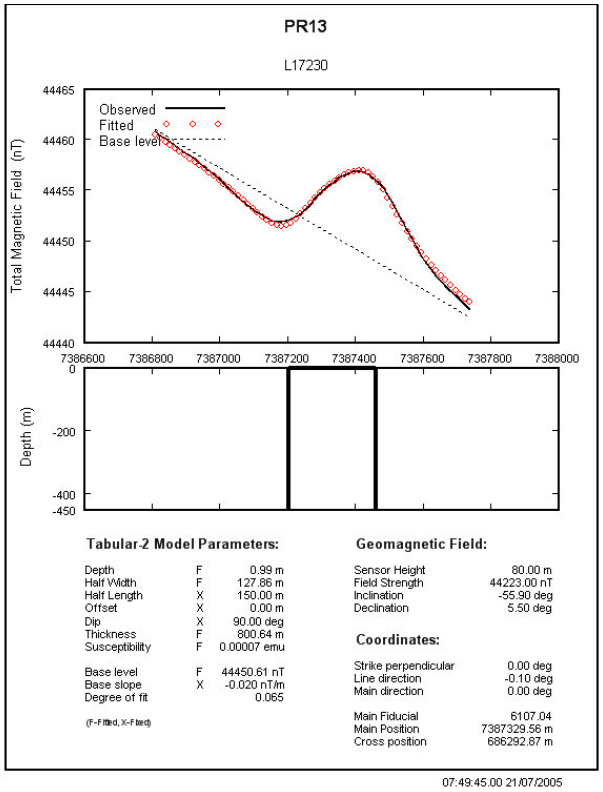
Note the 80 metres flying height needs to be removed from the Model Vision depth calculations displayed. GEOSOFT's MAGMOD and Euler depth calculations already have the 80 metres flying height removed.

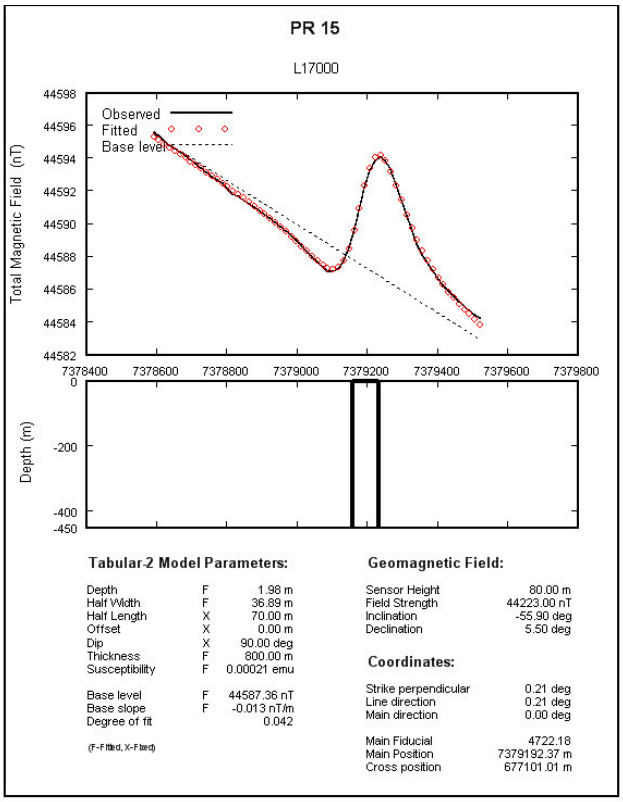


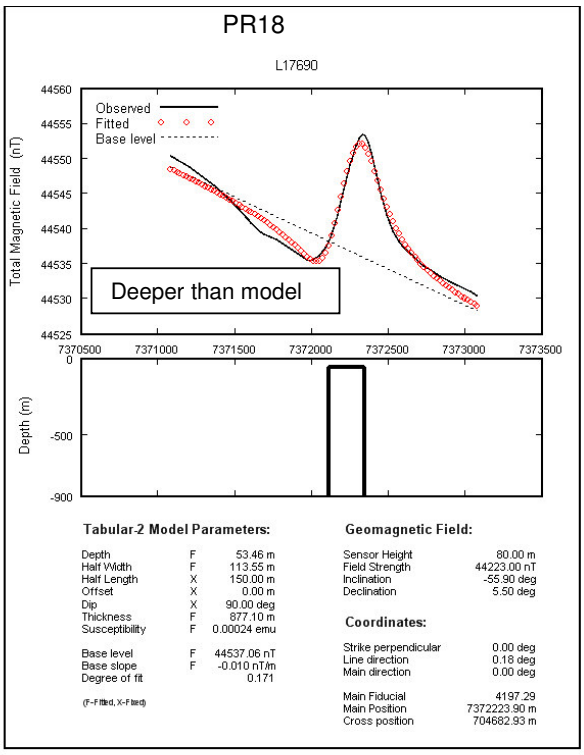






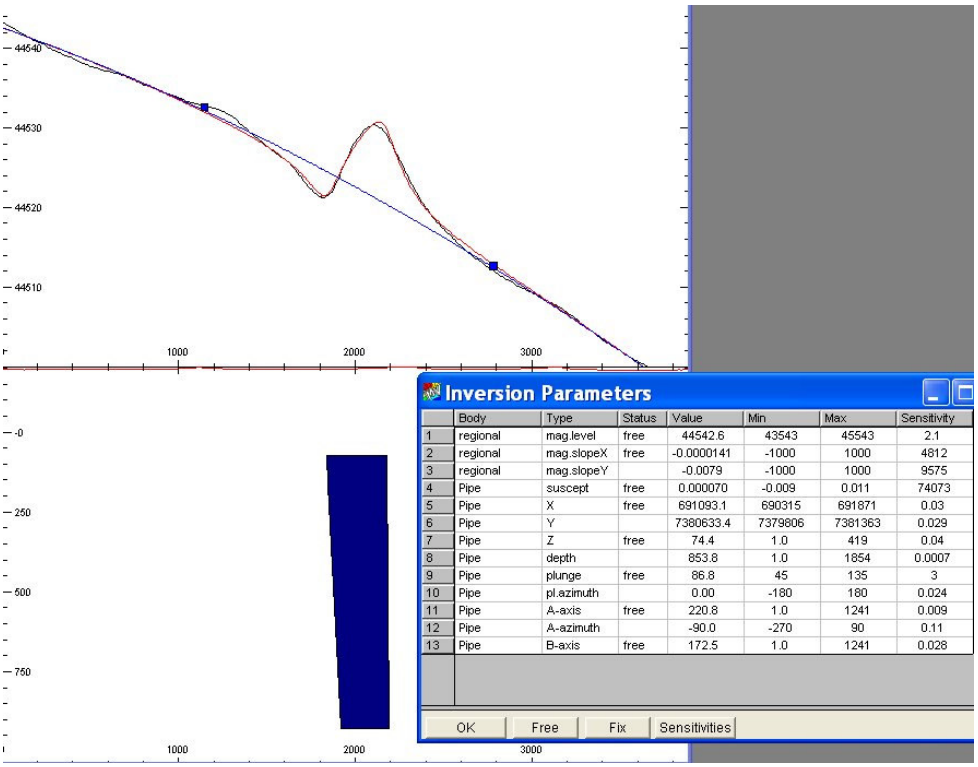




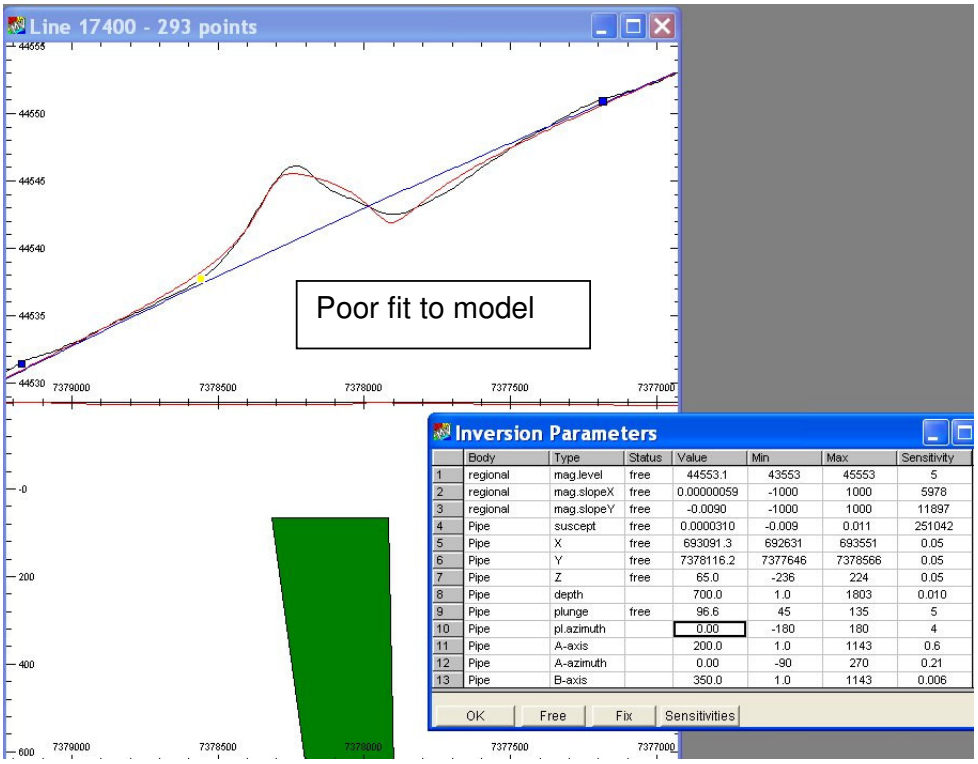


Appendix B – ModelVision modelling results for aeromagnetic targets
Note the 80 metres flying height needs to be removed from the Model Vision depth calculations displayed. GEOSOFT's MAGMOD and Euler depth calculations already have the 80 metres flying height removed.

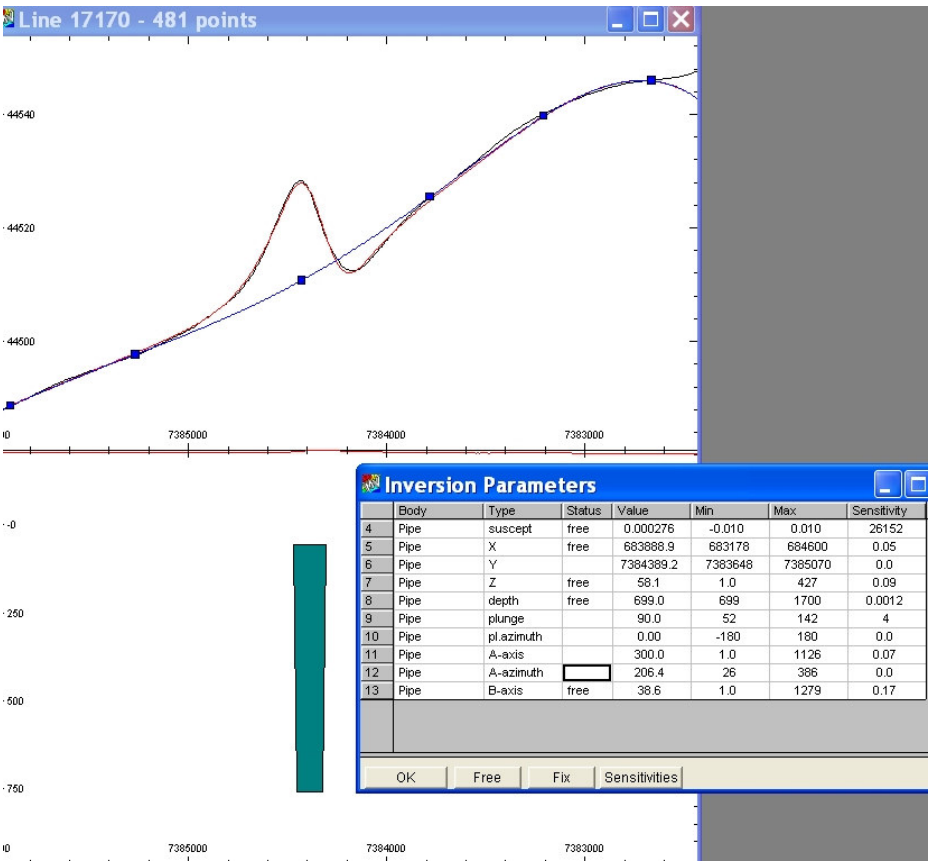
PR1



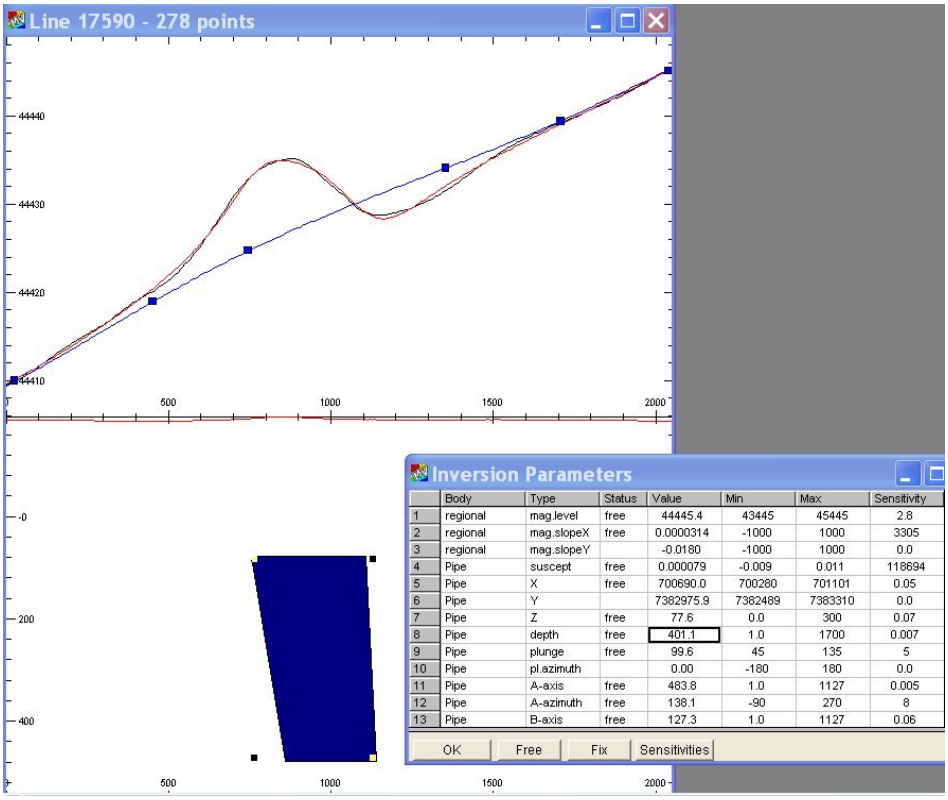
PR2



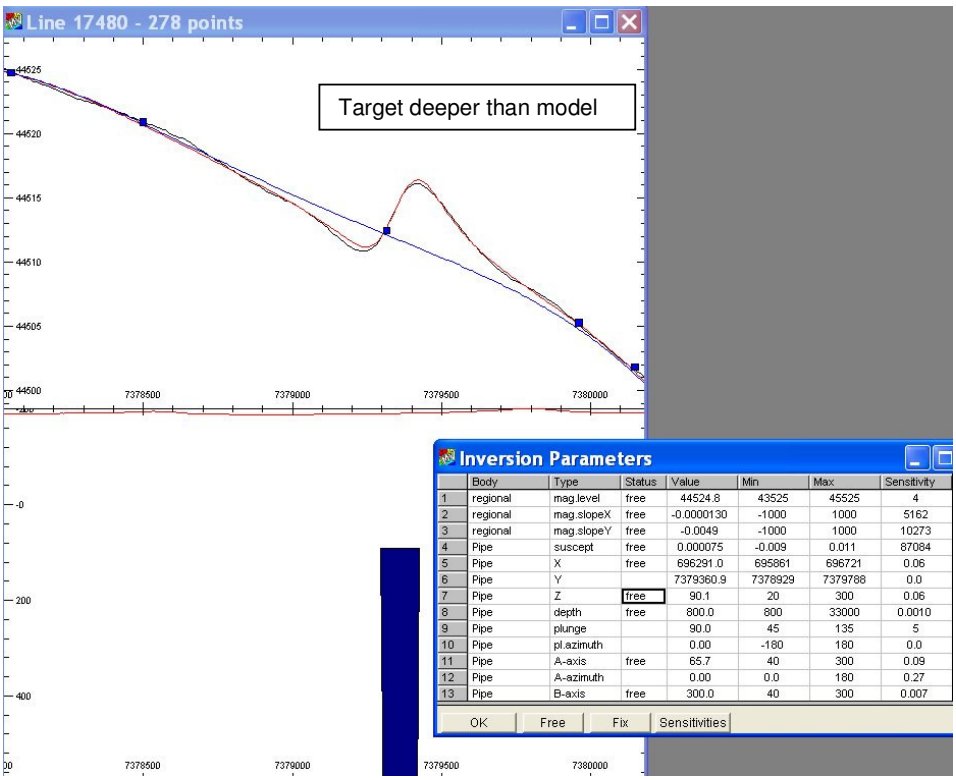
PR3



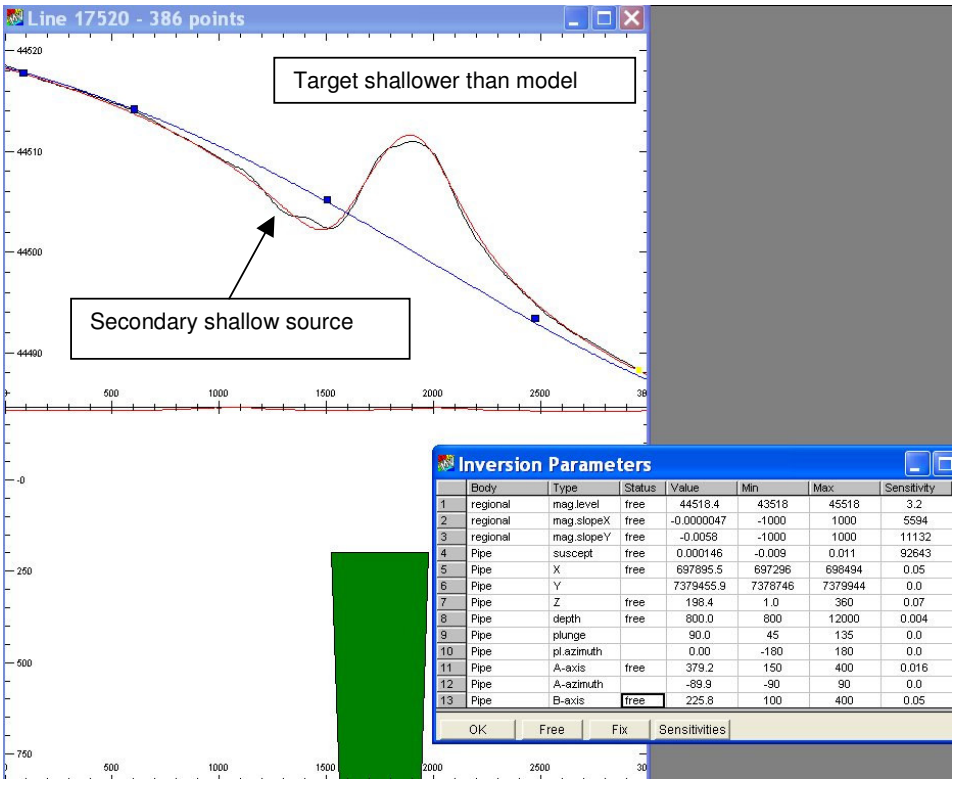
PR4



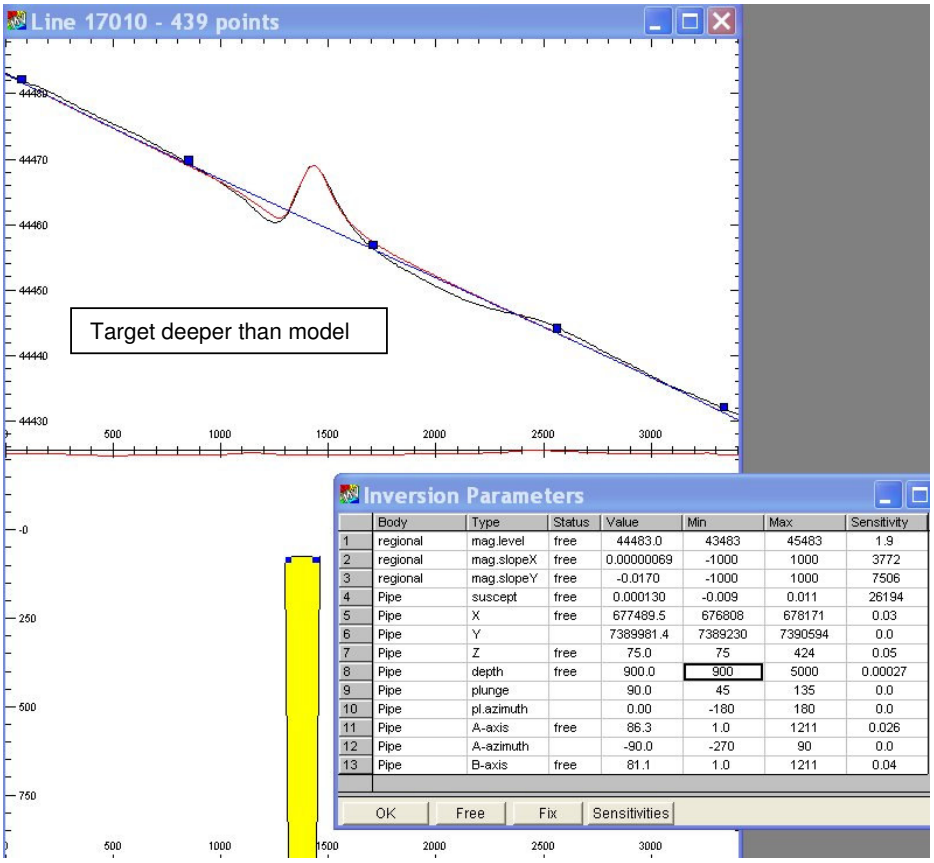
PR 5



PR6



PR7



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3	regional	mag.slopeY	free	-0.0170	-1000	1000	7506
4	Pipe	suscept	free	0.000130	-0.009	0.011	26194
5	Pipe	X	free	677489.5	676808	678171	0.03
6	Pipe	Y		7389981.4	7389230	7390594	0.0
7	Pipe	Z	free	75.0	75	424	0.05
8	Pipe	depth	free	900.0	900	5000	0.00027
9	Pipe	plunge		90.0	45	135	0.0
10	Pipe	pl.azimuth		0.00	-180	180	0.0
11	Pipe	A-axis	free	86.3	1.0	1211	0.026
12	Pipe	A-azimuth		-90.0	-270	90	0.0
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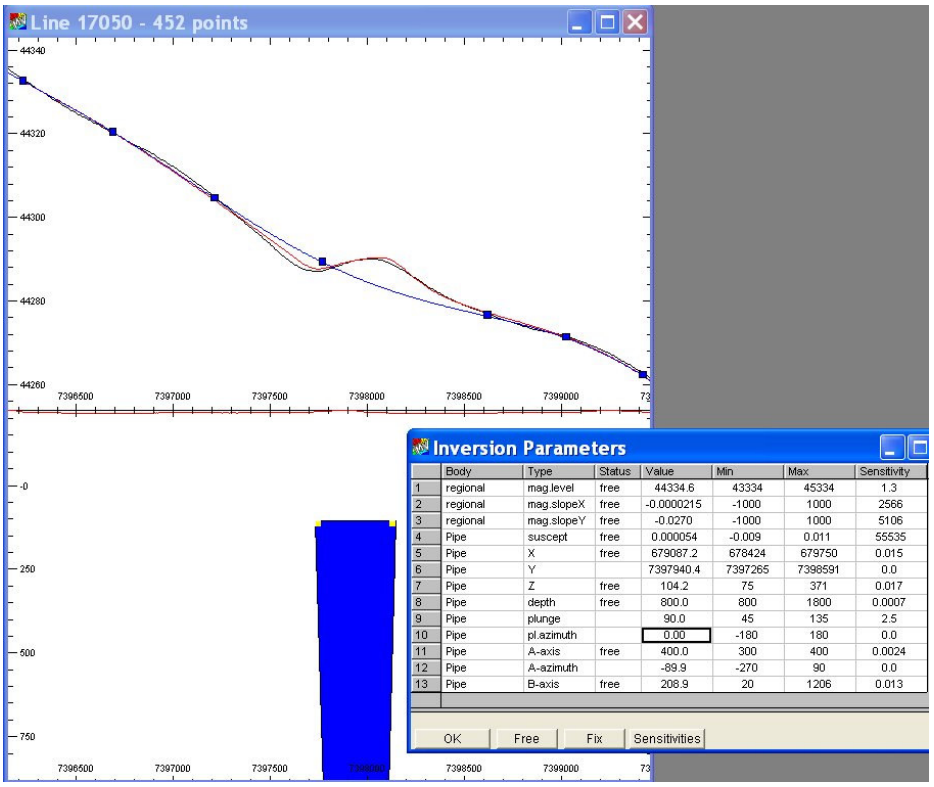
PR8



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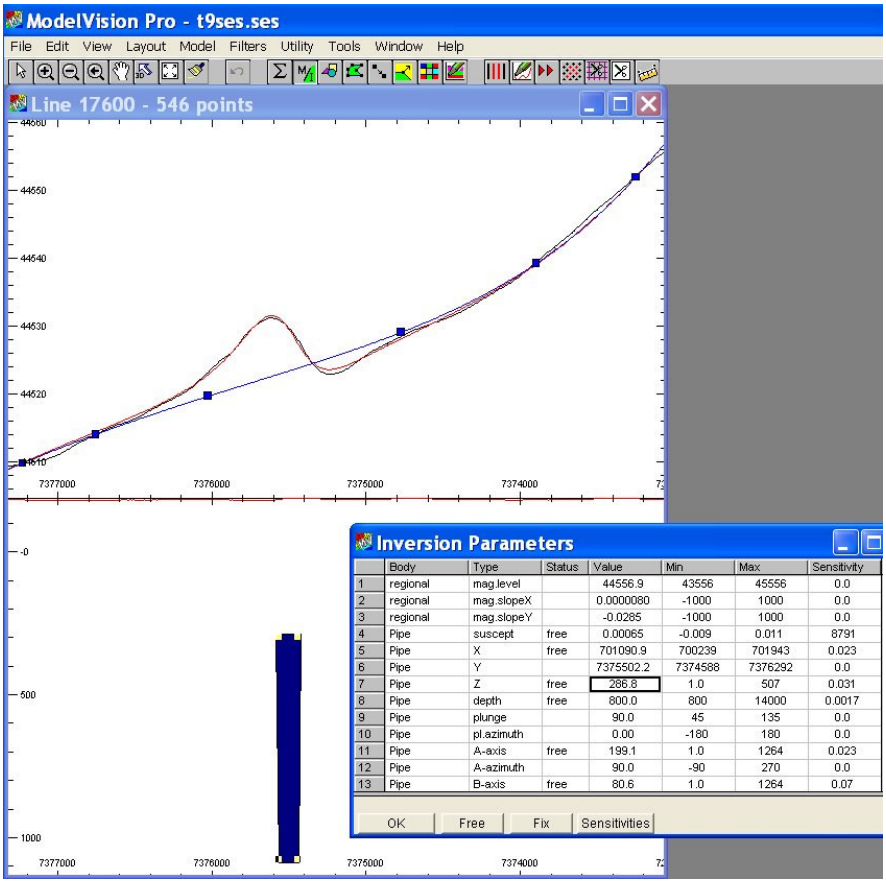
3	regional	mag.slopeY	free	-0.0270	-1000	1000	5106
4	Pipe	suscept	free	0.000054	-0.009	0.011	55535
5	Pipe	X	free	679087.2	678424	679750	0.015
6	Pipe	Y		7397940.4	7397265	7398591	0.0
7	Pipe	Z	free	104.2	75	371	0.017
8	Pipe	depth	free	800.0	800	1800	0.0007
9	Pipe	plunge		90.0	45	135	2.5
10	Pipe	pl.azimuth		0.00	-180	180	0.0
11	Pipe	A-axis	free	400.0	300	400	0.0024
12	Pipe	A-azimuth		-89.9	-270	90	0.0
13	Pipe	B-axis	free	208.9	20	1206	0.013

PR9



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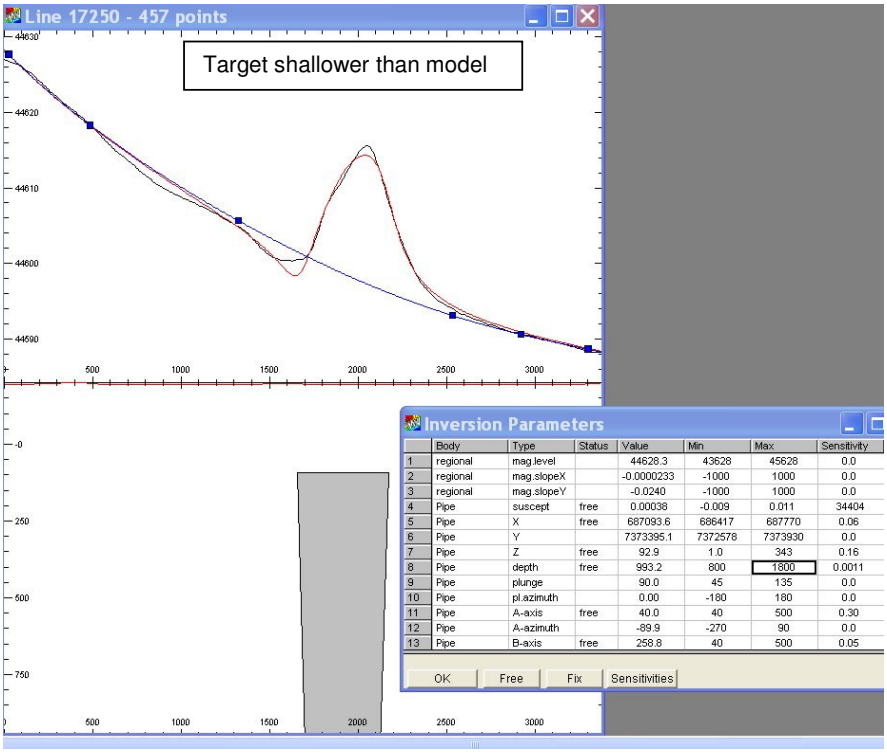
2	regional	mag.slopeX		0.0000080	-1000	1000	0.0
3	regional	mag.slopeY		-0.0285	-1000	1000	0.0
4	Pipe	suscept	free	0.00065	-0.009	0.011	8791
5	Pipe	X	free	701090.9	700239	701943	0.023
6	Pipe	Y		7375502.2	7374588	7376292	0.0
7	Pipe	Z	free	286.8	1.0	507	0.031
8	Pipe	depth	free	800.0	800	14000	0.0017
9	Pipe	plunge		90.0	45	135	0.0
10	Pipe	pl.azimuth		0.00	-180	180	0.0
11	Pipe	A-axis	free	199.1	1.0	1264	0.023
12	Pipe	A-azimuth		90.0	-90	270	0.0
13	Pipe	B-axis	free	80.6	1.0	1264	0.07

PR10



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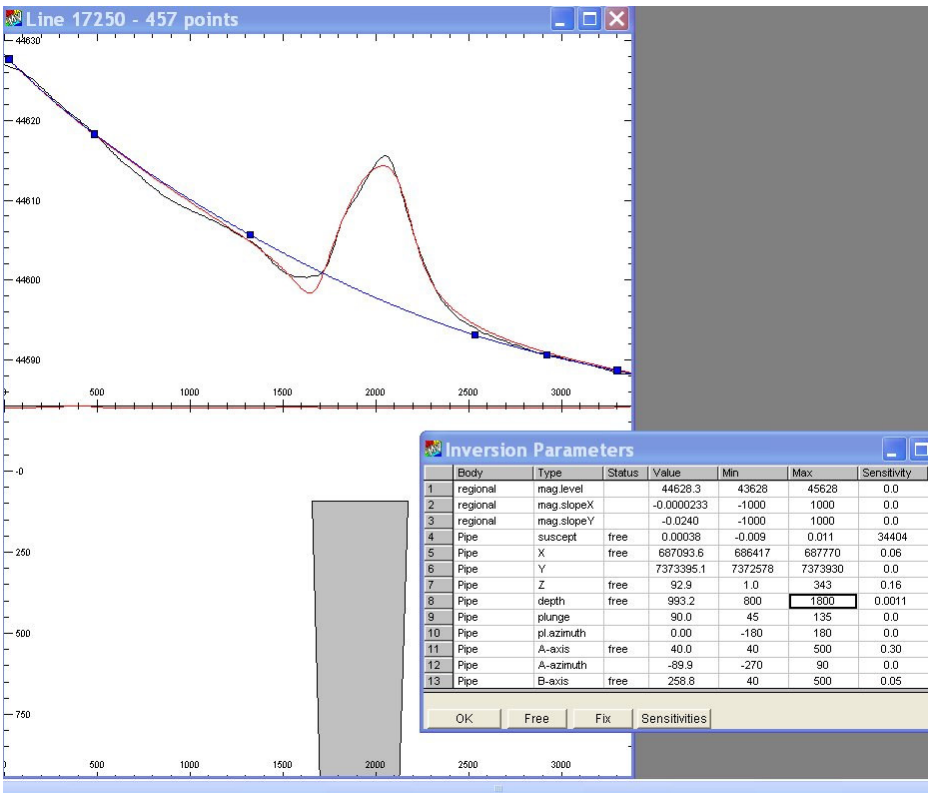
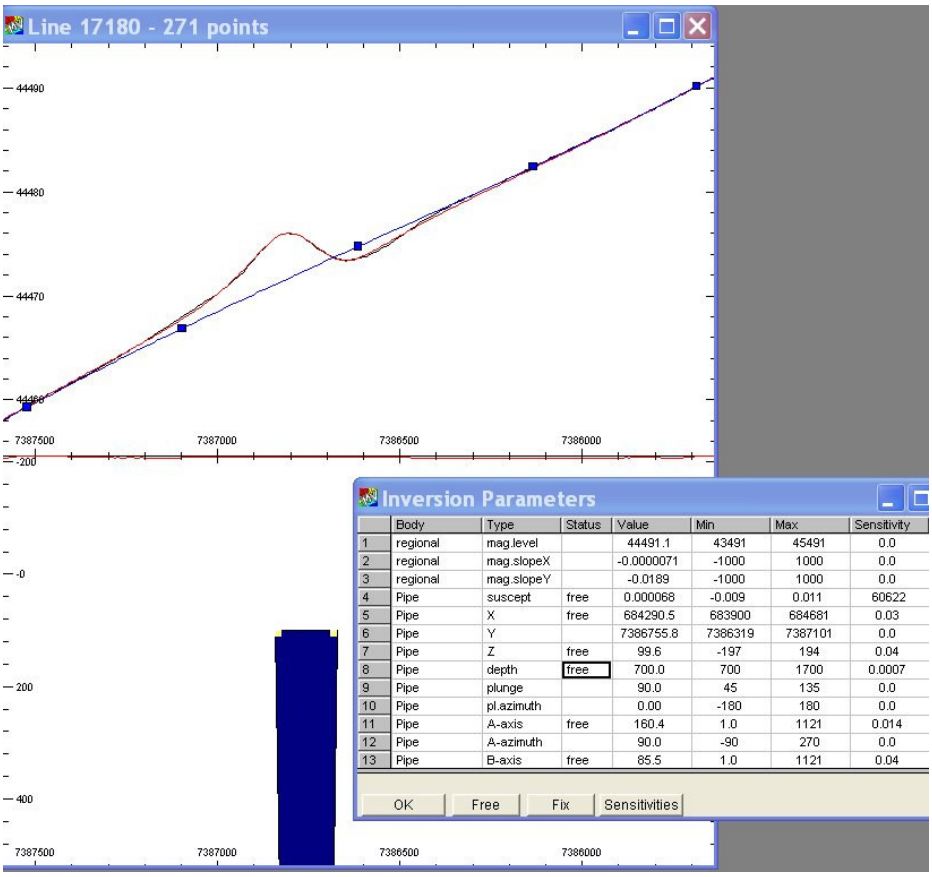
3	regional	mag.slopeY		-0.0240	-1000	1000	0.0
4	Pipe	suscept	free	0.00038	-0.009	0.011	34404
5	Pipe	X	free	687093.6	686417	687770	0.06
6	Pipe	Y		7373395.1	7372578	7373930	0.0
7	Pipe	Z	free	92.9	1.0	343	0.16
8	Pipe	depth	free	993.2	800	1800	0.0011
9	Pipe	plunge		90.0	45	135	0.0
10	Pipe	pl.azimuth		0.00	-180	180	0.0
11	Pipe	A-axis	free	40.0	40	500	0.30
12	Pipe	A-azimuth		-89.9	-270	90	0.0
13	Pipe	B-axis	free	258.8	40	500	0.05

PR11



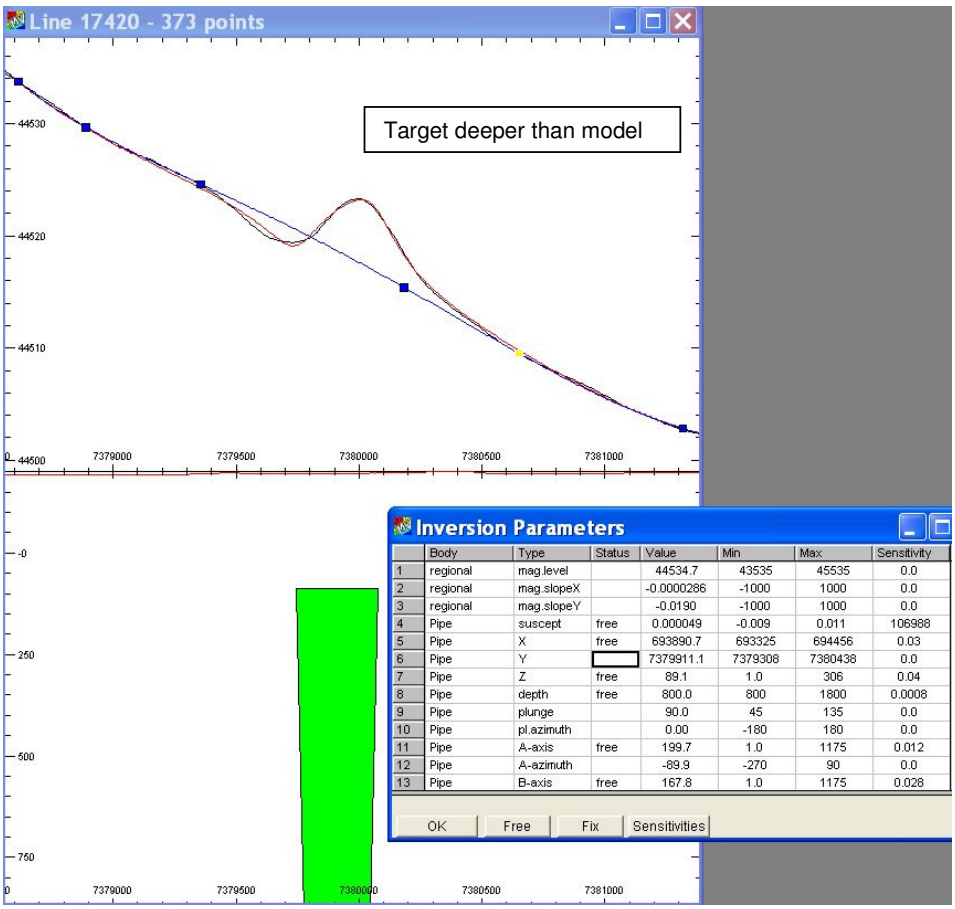
	Body	Type	Status	Value	Min	Max	Sensitivity
1	regional	mag.level		44628.3	43628	45628	0.0
2	regional	mag.slopeX		-0.0000233	-1000	1000	0.0
3	regional	mag.slopeY		-0.0240	-1000	1000	0.0
4	Pipe	suscept	free	0.00038	-0.009	0.011	34404
5	Pipe	X	free	687093.6	686417	687770	0.06
6	Pipe	Y		7373395.1	7372578	7373930	0.0
7	Pipe	Z	free	92.9	1.0	343	0.16
8	Pipe	depth	free	993.2	800	1800	0.0011
9	Pipe	plunge		90.0	45	135	0.0
10	Pipe	pl.azimuth		0.00	-180	180	0.0
11	Pipe	A-axis	free	40.0	40	500	0.30
12	Pipe	A-azimuth		-89.9	-270	90	0.0
13	Pipe	B-axis	free	258.8	40	500	0.05

PR14

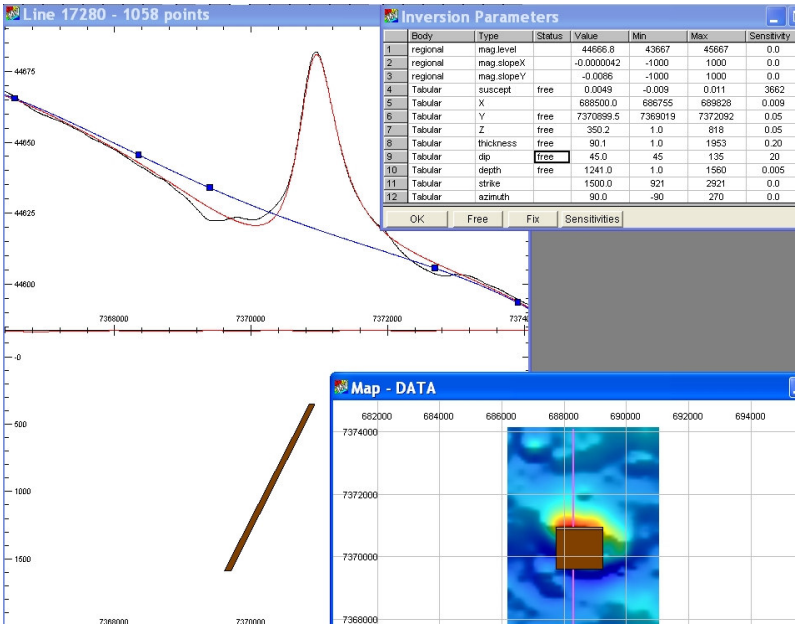


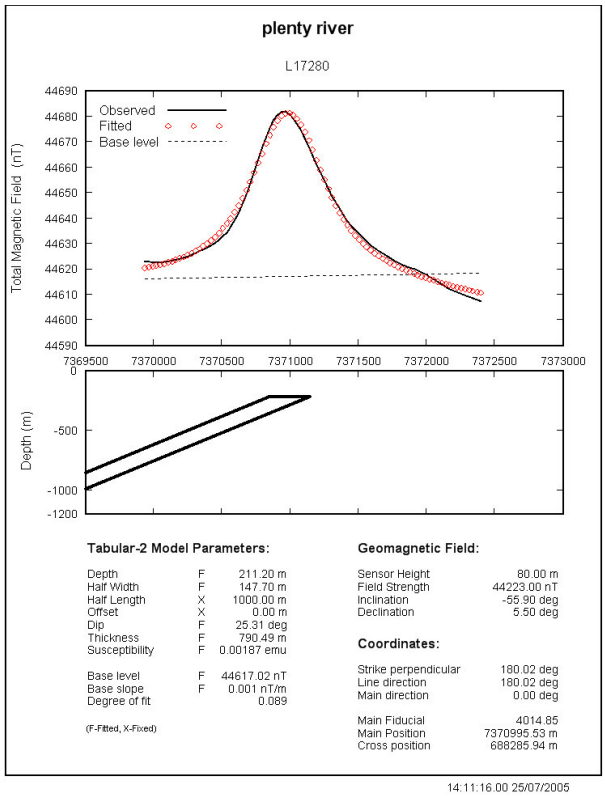
	Body	Type	Status	Value	Min	Max	Sensitivity
1	regional	mag.level		44491.1	43491	45491	0.0
2	regional	mag.slopeX		-0.0000071	-1000	1000	0.0
3	regional	mag.slopeY		-0.0189	-1000	1000	0.0
4	Pipe	suscept	free	0.000068	-0.009	0.011	60622
5	Pipe	X	free	684290.5	683900	684681	0.03
6	Pipe	Y		7386755.8	7386319	7387101	0.0
7	Pipe	Z	free	99.6	-197	194	0.04
8	Pipe	depth	free	700.0	700	1700	0.0007
9	Pipe	plunge		90.0	45	135	0.0
10	Pipe	pl.azimuth		0.00	-180	180	0.0
11	Pipe	A-axis	free	160.4	1.0	1121	0.014
12	Pipe	A-azimuth		90.0	-90	270	0.0
13	Pipe	B-axis	free	85.5	1.0	1121	0.04

PR16



Appendix C - Modelling results for significant magnetic feature from **Figure 2**.
Note the 80 metres flying height needs to be removed from the Model Vision depth calculations displayed. GEOSOFT's MAGMOD and Euler depth calculations already have the 80 metres flying height removed.





Appendix D - North-east Linear Feature potentially associated with PR8

Note the 80 metres flying height needs to be removed from the Model Vision depth calculations displayed. GEOSOFT's MAGMOD and Euler depth calculations already have the 80 metres flying height removed.