



# The optimum specifications for regional aeromagnetic surveys in Northeast Tasmania

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## Abstract

Following a review of all open-file magnetic surveys in northeast Tasmania and the reprocessing of data from the best of these it is recommended that any future regional survey be flown with a square flight line spacing of 400 m and a terrain clearance of 80 metres. The data acquired must be suitable for contouring with a contour interval of 0.5 nT or smaller to show the subtle magnetic character of the Mathinna Beds.

## INTRODUCTION

Previous modern surveys in the area were:

### (i) Scamander (BHP, 1979)

- 300 m line spacing
- East-West lines
- 90 m nominal terrain clearance
- Helicopter survey
- Gridded 50 m × 75 m mesh
- 5 nT contour interval
- Obvious levelling problems.

### (ii) Lisle (Storer, 1985)

- 200 m line spacing
- North-South lines
- 70 m nominal terrain clearance
- Helicopter survey
- Gridded 50 m × 50 m mesh
- 5 nT contour interval

### (iii) Gladstone (Leaman, 1987)

- 125 m line spacing
- East-West lines
- 60 m nominal terrain clearance
- Fixed wing survey
- Gridded 40 m × 40 m mesh
- 2 nT contour interval

### (iv) Lyndhurst (Davidson and Hofto, 1988)

- 125 m line spacing
- East-West lines
- 60 m nominal terrain clearance
- Fixed wing survey
- Gridded 40 m × 40 m mesh
- 1 nT contour interval

### (v) Mangana-Alberton (Richardson, 1989)

- 500 m line spacing
- East-West lines
- 150 m nominal terrain clearance
- Fixed wing survey
- Gridded 150 m × 150 m mesh
- 5 nT contour interval

### (vi) Mathinna (Leaman, 1989)

- 50 m line spacing
- East-West lines
- Ground survey
- 1.5–2 m measurement interval

### (vii) Mathinna (Leaman, 1990)

- 150 m line spacing
- North-South lines
- 80 m nominal terrain clearance
- Helicopter survey
- 400 m tie line spacing
- Gridded 50 m × 50 m mesh
- 0.5 nT contour interval

Of the above surveys the helicopter survey of the Mathinna area (Leaman, 1990) flown for Pegasus offers the best potential for calculating the optimum specifications for acquisition, particularly in areas of considerable topographic relief. The Department of Mines

Mangana-Alberton survey (Richardson, 1989) covered this entire survey area.

## DISCUSSION

To enable a true comparison of different acquisition systems to be made the data from the Mathinna area was reprocessed using the Exploration Computer Services GPC package.

Initially the data was processed as by the original contractor, with a 50 m grid mesh and 0.5 nT contour interval (fig. 1), and produced a result identical to the original. This method of processing took no account of the east-west tie lines (400 m spacings) and these were gridded separately with a 100 m grid mesh (fig. 2). As expected features with a north-south orientation were enhanced by this. By summing these two grids and dividing the result by two a map showing features dominant in both data sets was produced (fig. 3). Unfortunately the difference in line spacing between the traverse lines and the tie lines, and the resultant difference in grid size, has slightly widened some of the features. A number of dominant trends are immediately visible.

To simulate a flight line spacing of 300 m, every second traverse line was removed from the data set and the traverse data were then re-gridded using a 100 m grid mesh (fig. 4). This data set was then combined with the data set based only on the tie lines (fig. 2) as discussed previously to produce a combined data set simulating a 300 m line spacing (fig. 5).

A simulated flight line spacing of 450 m was then produced in a similar manner. Data based only on the traverse lines are shown in Figure 6, whilst the combined data set is shown in Figure 7.

A comparison of the Department of Mines survey (fig. 8) flown with 500 m spaced east-west lines, and the Pegasus survey (fig. 2), gridded using only 400 m spaced east-west lines, shows the Department of Mines survey to be severely affected by the high terrain clearance associated with fixed wing aircraft in areas of rugged topography. The largest features were still, however, shown by this survey. It is of interest to note that the National Geoscience Mapping Accord surveys use a 400 m line spacing for regional surveys.

## CONCLUSIONS

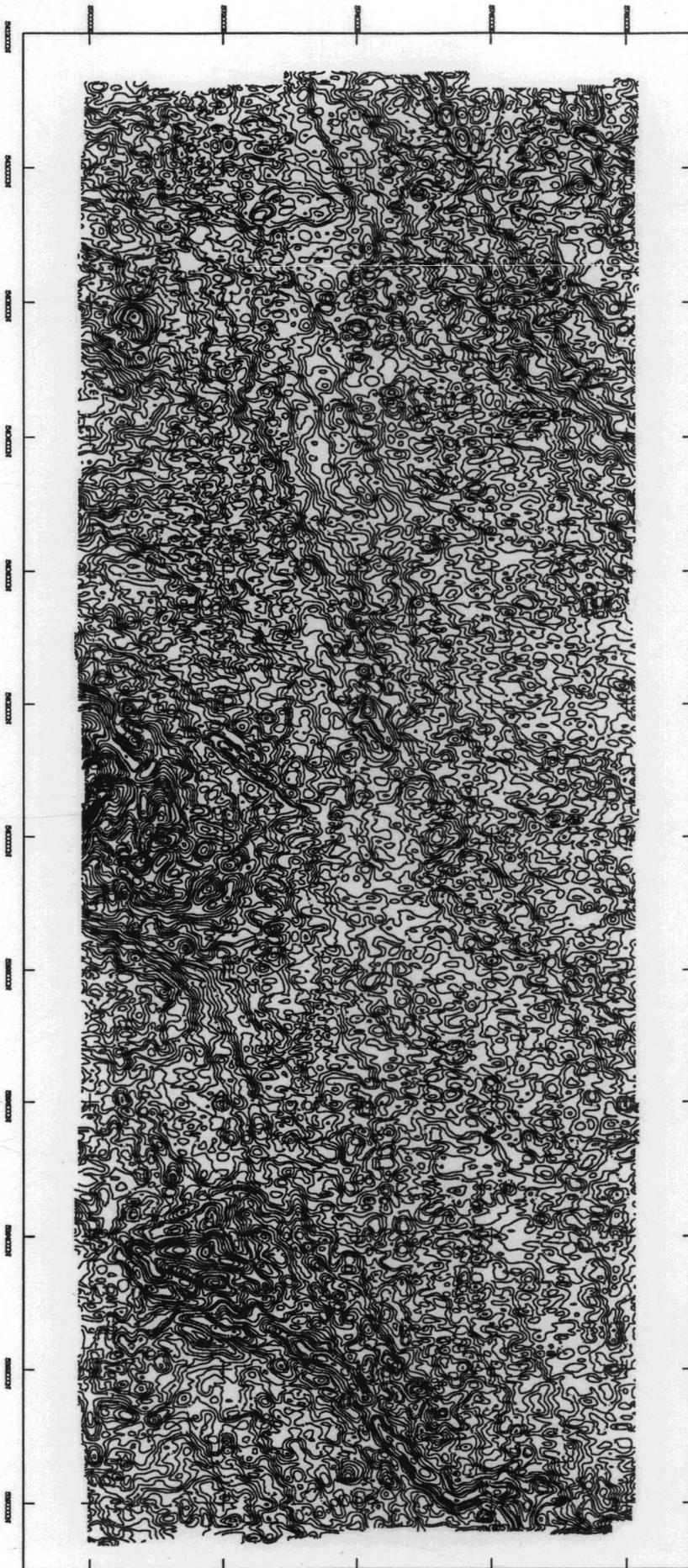
The availability of a good quality data set has allowed selection of optimum specifications for further regional surveys by simulation of several different line spacings. Comparisons between the contour maps (figs 1 to 7) and between the banded colour pixel maps (fig. 8) show that although there is the expected loss of fine detail as the line spacing increases the main features remain.

It is recommended that regional surveys in this area be flown with a square flight line spacing of 400 m, a terrain clearance of 80 m, and that the data be suitable for contouring with contour interval of 0.5 nT. Differential 3-dimensional GPS navigation should be used along with both radar altimeter and barometric altimeter.

## REFERENCES

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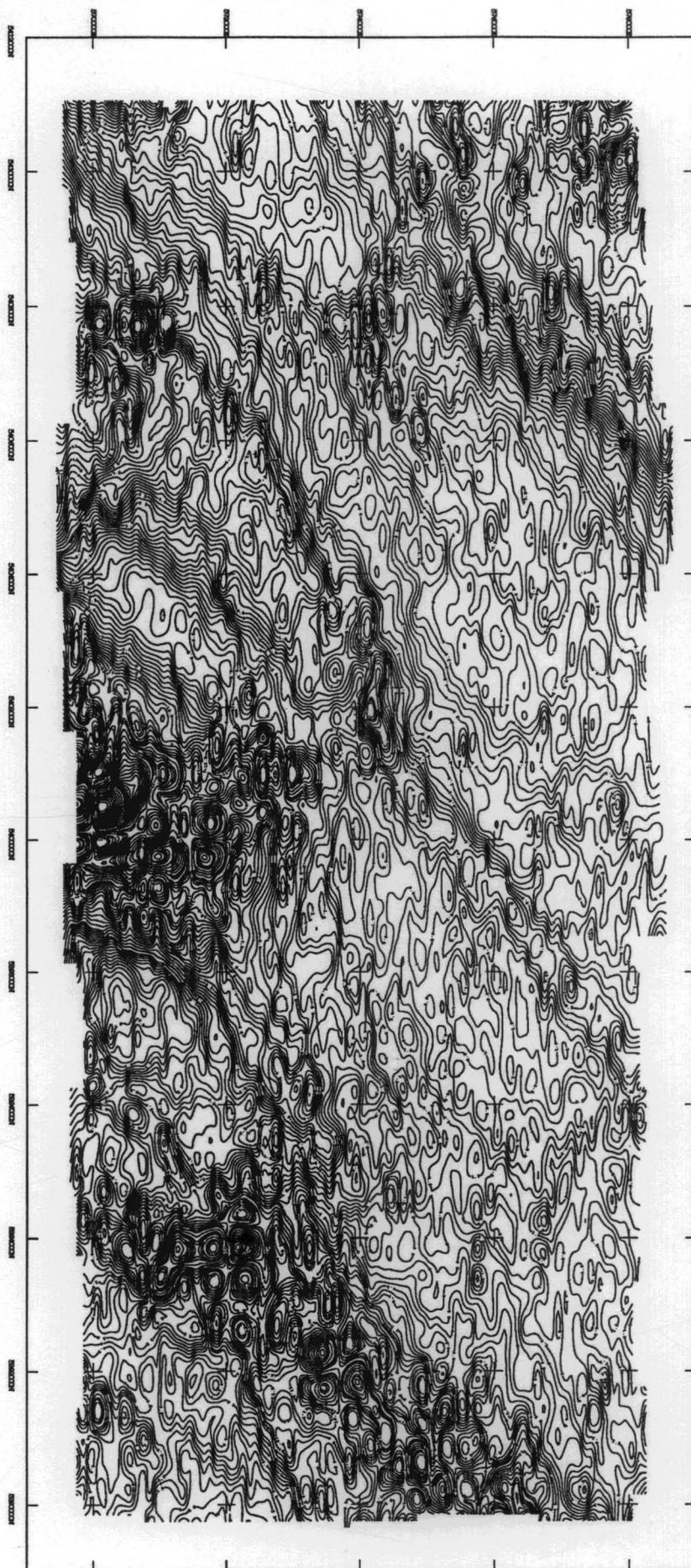
[15 June 1992]



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Figure 1.

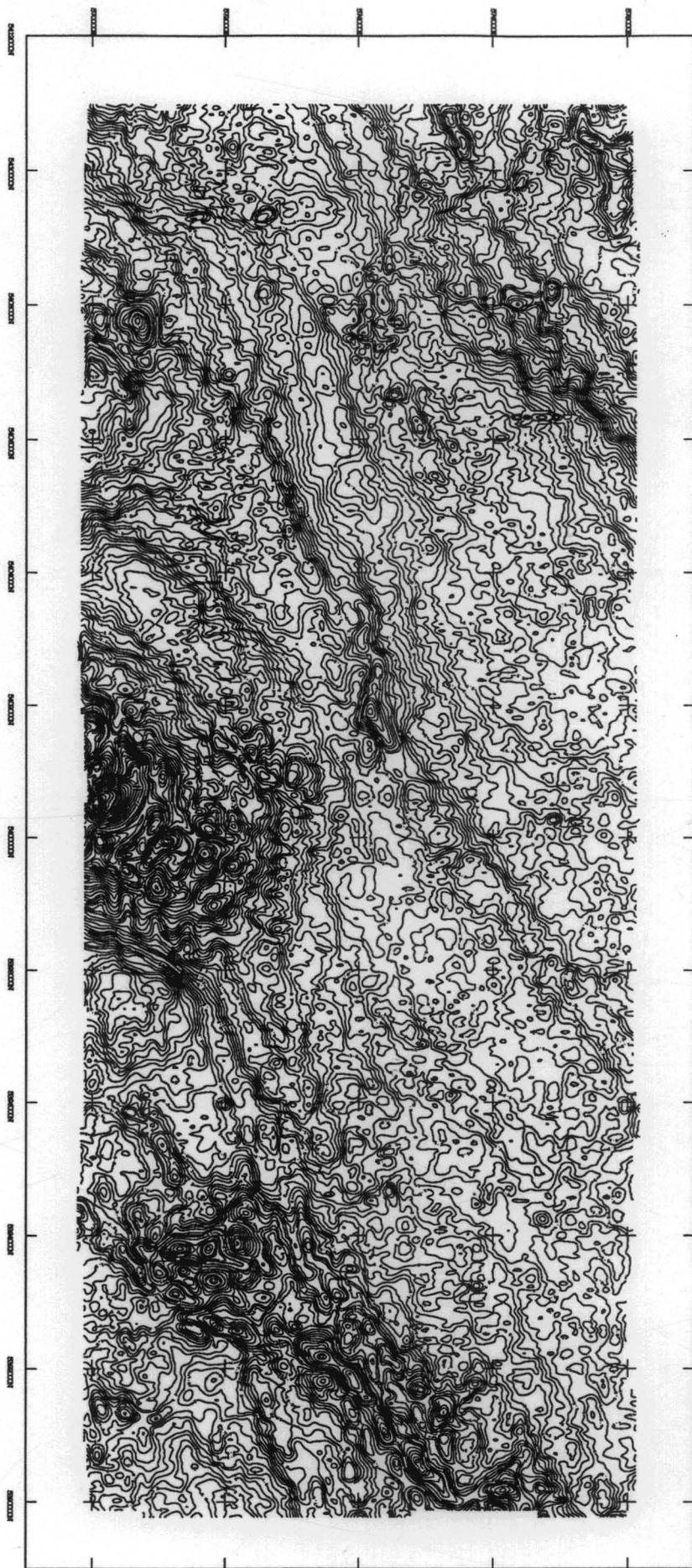
Original data processing. 50 m grid mesh, 0.5 nT contour interval



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**Figure 2.**

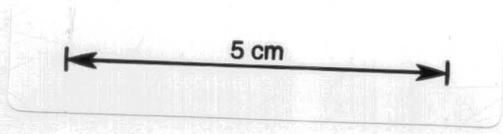
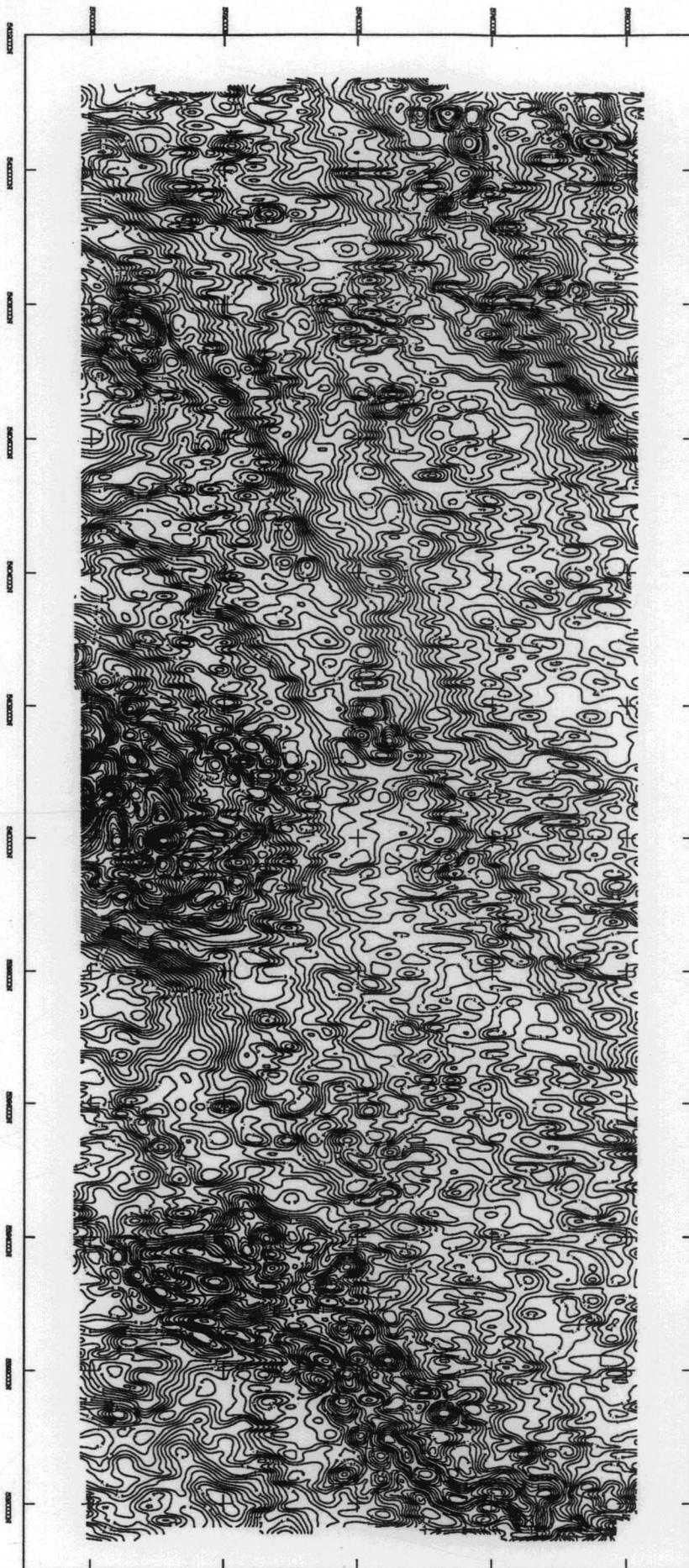
East-west tie lines only. 100 m grid mesh, 0.5 nT contour interval



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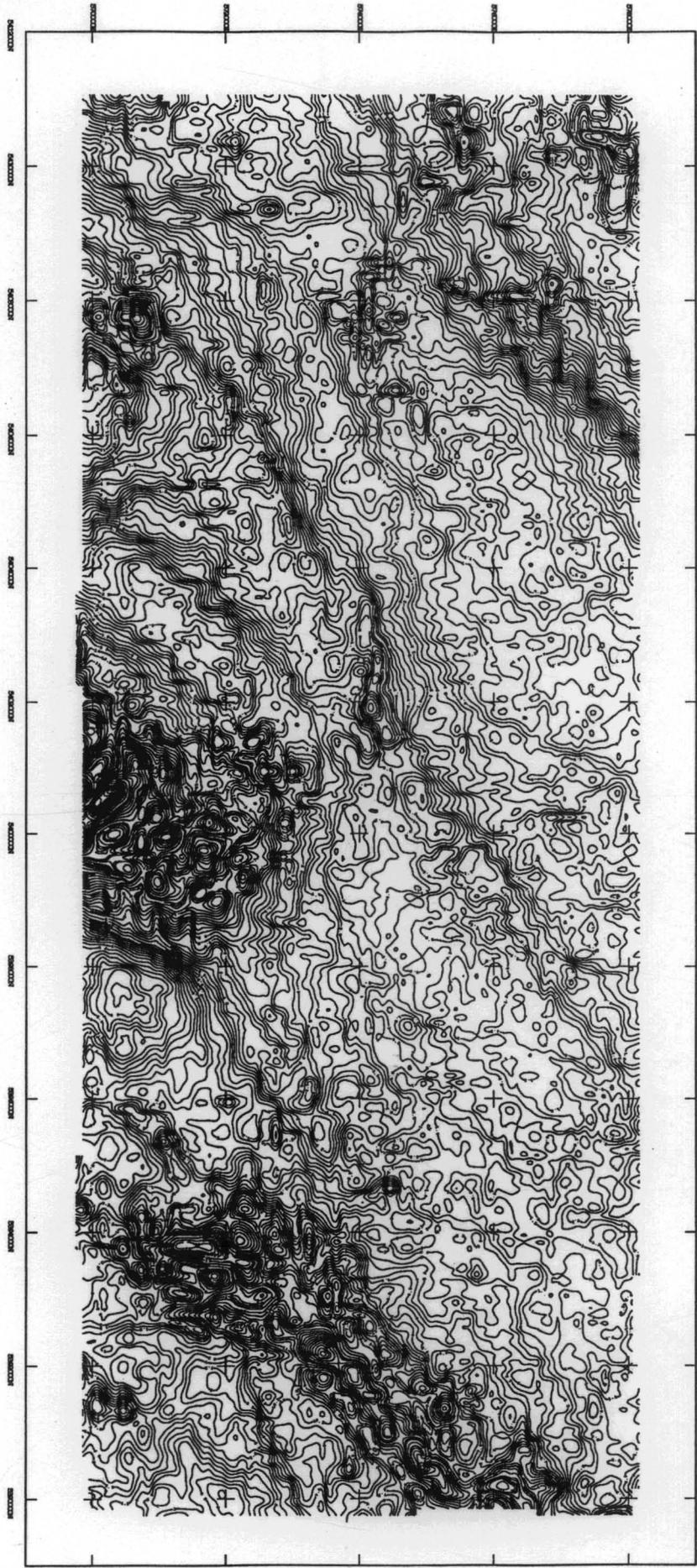
**Figure 3.**

Combined data set. 50 m grid mesh, 0.5 nT contour interval



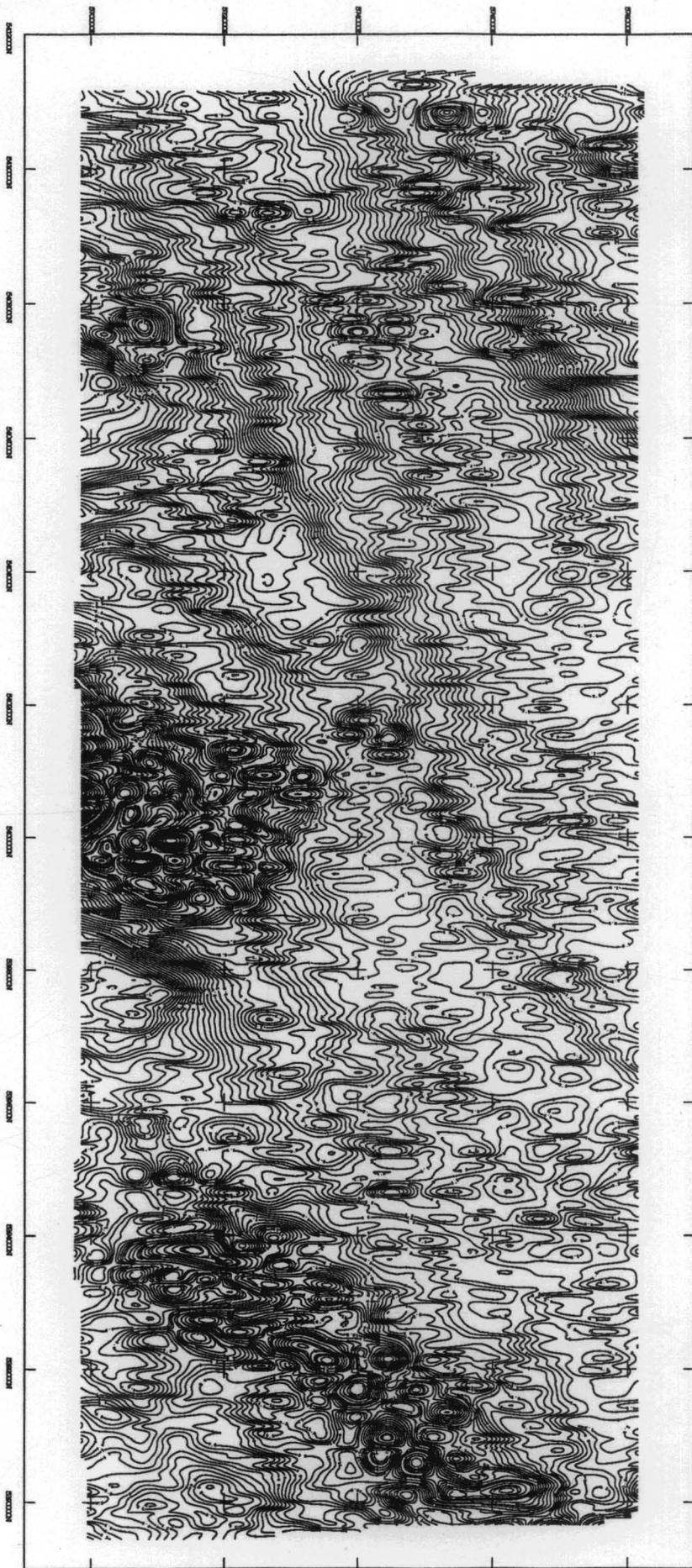
**Figure 4.**

300 m simulated line spacing,  
traverse lines only. 100 m grid  
mesh, 0.5 nT contour interval



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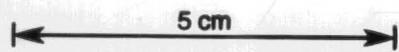
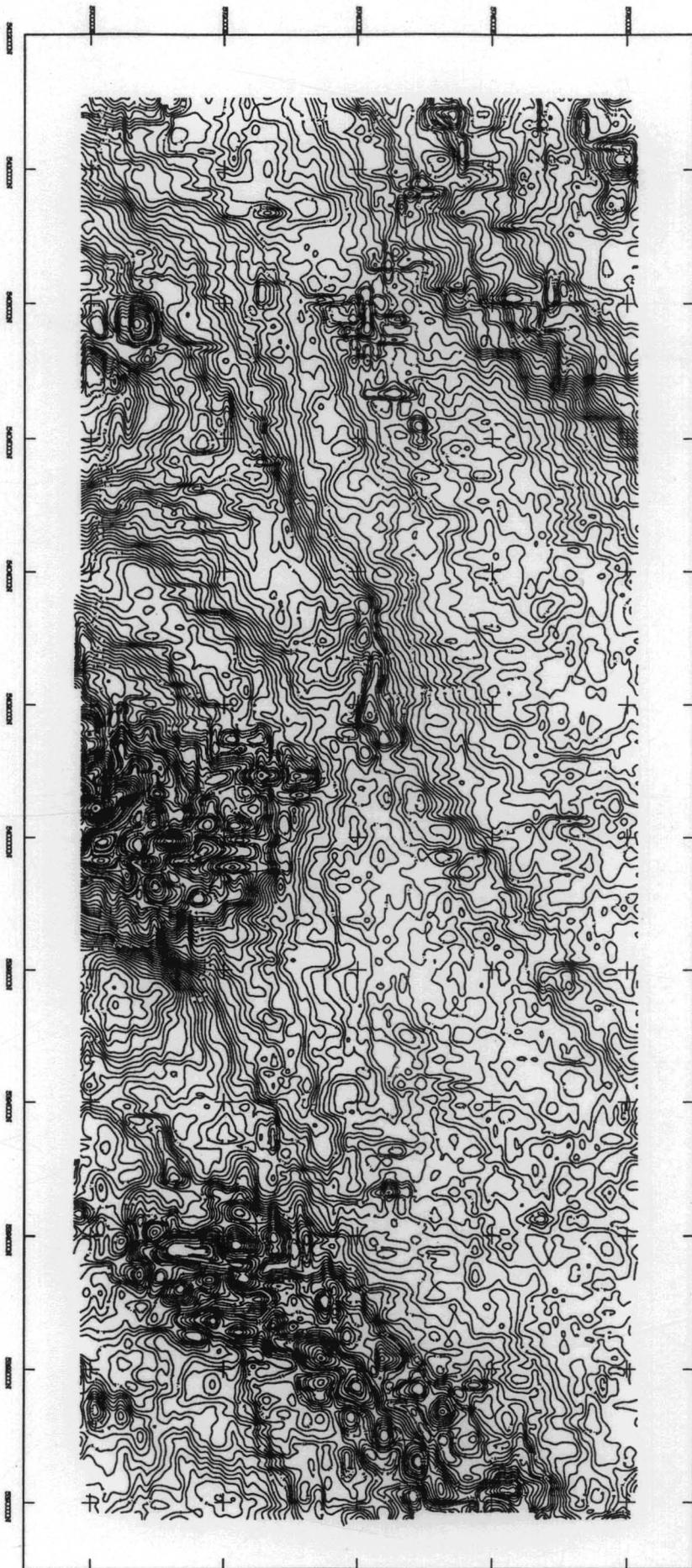
**Figure 5.**  
Combined data set with 300 m  
simulated line spacing. 100 m grid  
mesh, 0.5 nT contour interval



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Figure 6.

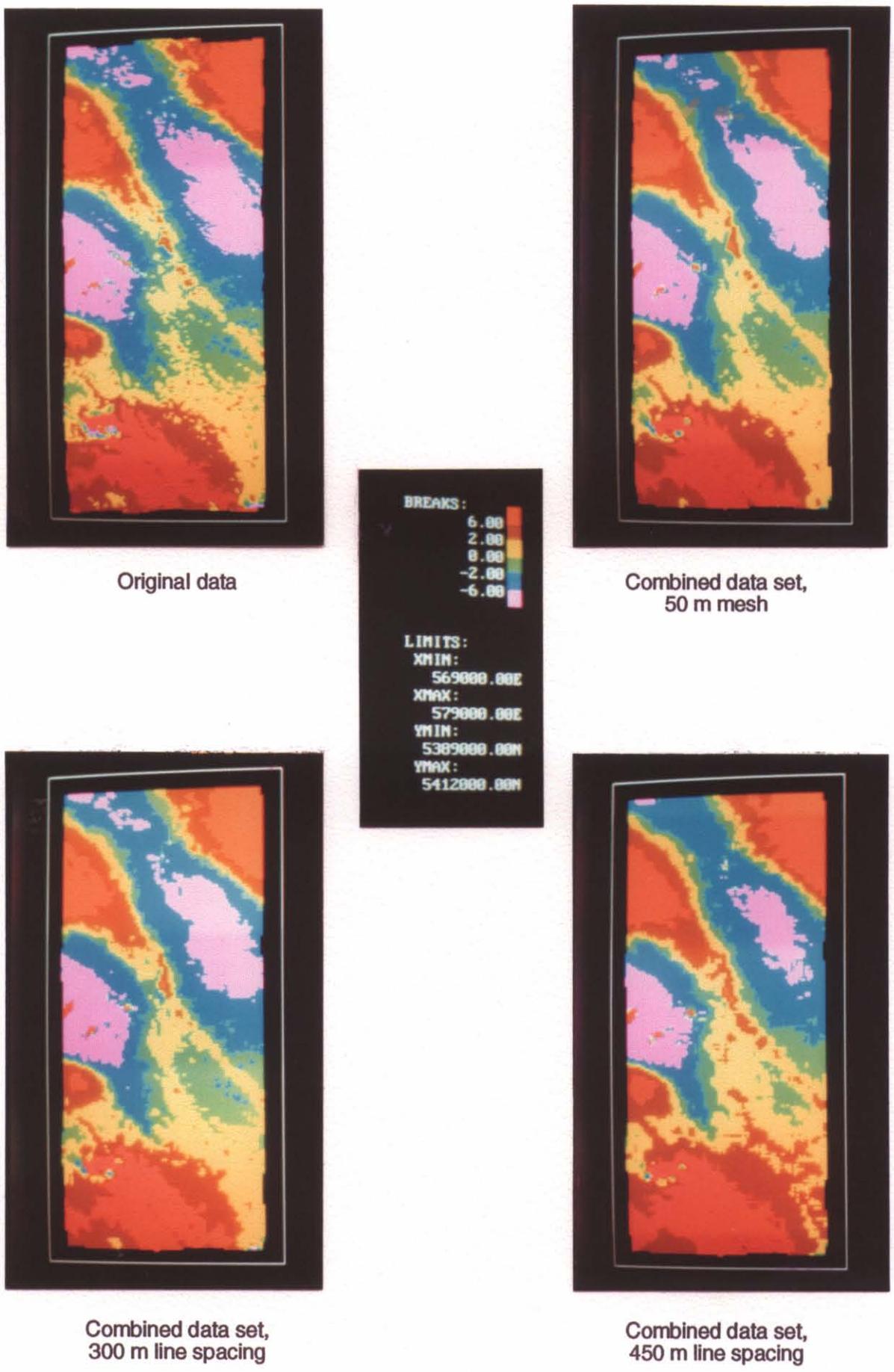
450 m simulated line spacing,  
traverse lines only. 100 m grid  
mesh, 0.5 nT contour interval



**Figure 7.**

Combined data set with 450 m simulated line spacing, 100 m grid mesh, 0.5 nT contour interval





Original data

Combined data set,  
50 m mesh

Combined data set,  
300 m line spacing

Combined data set,  
450 m line spacing

Figure 9.

Banded colour pixel maps.

