Gradient Tensor Magnetic Mapping

For Higher Resolution and Greater Accuracy at Wider Line Spacing

KIMBERLITES

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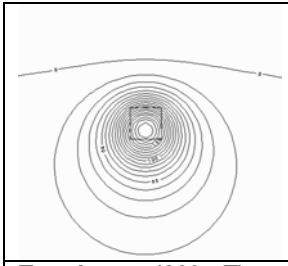
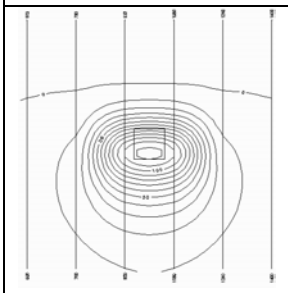
Aeromagnetic surveys are a valuable component of most exploration programs and represent a significant exploration investment. While aeromagnetic survey lines must be close enough to resolve the targets of interest; over-specification can increase cost with very little added benefit. The new Gradient Tensor methodology, using horizontal magnetic gradients, can provide higher resolution and greater accuracy at wider line spacing. The example presented here illustrates the technical and economic value of the GT-GRID process.

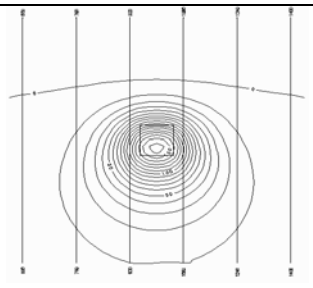


True Image (200 nT)

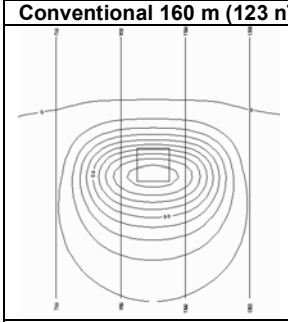
On the left is the modeled response of a 100 by 100 metre vertical magnetic source, 100 m below the aircraft.. The peak amplitude is 200 nT and the contour interval 10 nT.



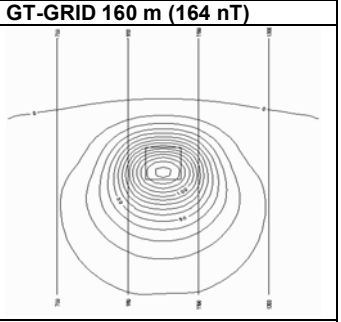
Conventional 160 m (123 nT)



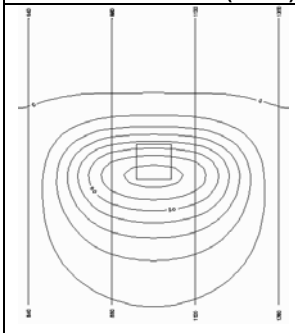
GT-GRID 160 m (164 nT)



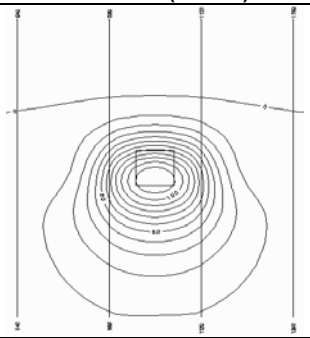
Conventional 200 m (97 nT)



GT-GRID 200 m (143 nT)



Conventional 240 m (74 nT)



GT-GRID 240 m (120 nT)

Fight line spacing is always a critical survey specification. The appropriate range is a function of the height of the aircraft above the magnetic sources of interest. A minimum, very tight line spacing would be equal to the height, and a maximum, very loose spacing would be 3 times the height. A good choice would be in the range of 1.5 to 2.5 times the height of the aircraft above source.

A conventional total field aeromagnetic survey will detect the true amplitude of a small target if it is directly over-flown. Should the target occur between flight lines, its true amplitude will not be measured and at a sufficiently large line spacing, its presence or significance will no longer be recognized. The possibility of missing an anomaly can be minimized by closely spaced flight lines but this can be an expensive solution.

The new **Gradient Tensor** griding process provides a cost-effective alternative. It uses measured horizontal magnetic gradients to improve small anomaly recognition without decreasing the line spacing. The example on the left presents the true anomaly together with examples of the mapping outcome with flight line intervals of 160, 200 and 240 metres. The peak amplitude associated with each example is presented for comparison. Even at a tight line spacing of 160 metres there is a recognizable difference between **GT-GRID** and the conventional process. The true amplitude is 200 nT, the **GT-Grid** gradient process presents 164 nT and the conventional total field process presents 123 nT. The ability of the conventional approach to measure and display true amplitude diminishes rapidly in comparison to the **Gradient Tensor** process.

The amplitude presented by GT-GRID at 240 metre line spacing is essentially the same as that of a conventional survey at 160 metre line spacing. Also note that the true circular nature of the anomaly is preserved by the GT-GRID process, even at the wide 260 m. line spacing.

♦Project Management ♦Quality Control ♦Data Processing
♦Interpretation ♦Re-processing ♦Non-proprietary Data