Air-FTG® for Regional Scale Mapping

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Fundamental Subject Matter

Air-FTG® Offers Greater Resolving Power of Longer Wavelengths Which can be Compared with Conventional Airborne Gravity for Regional Exploration

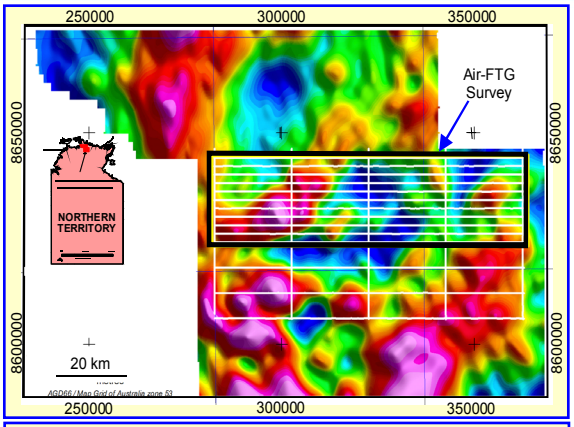
Abstract

Airborne Full Tensor Gradiometry (Air-FTG®) was flown at high altitude (650m) coincident with Airborne Gravity (AG) flown in 2003 in West Arnhem Land, Australia. A preliminary analysis of two data sets indicates that the Air-FTG® system has the capability of resolving intermediate to long wavelengths
features that may be associated with relatively deeper geological structures.

A comparison of frequency filtered slices and power spectral density (PSD) for both data sets using the short (> 5 km), intermediate (10 km) and long (20 km) wavelengths reveals that high altitude Air-FTG® data show greater response in high frequency anomalies than a conventional Airborne Gravity and matches well with the AG even at the longest wavelengths anomalies.

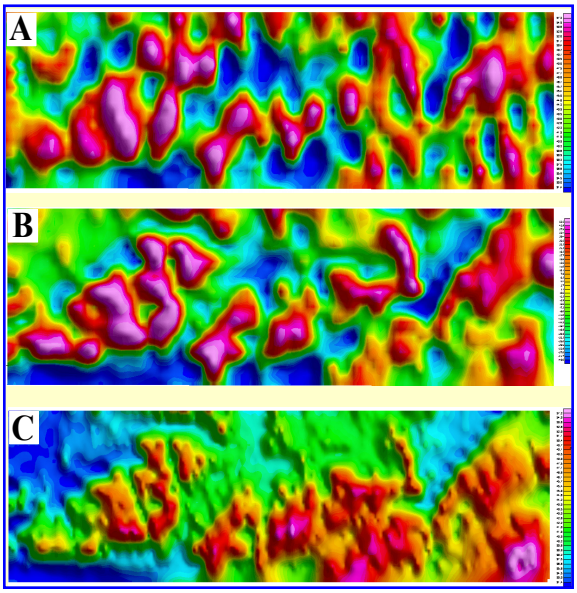
The effect of line spacing and target resolution was examined between the two data sets. Reprocessed gradient and AG data at 2, 4 and 6 km line spacing suggest that Air-FTG® could be effectively flown at a comparatively wider line spacing to resolve similar targets the AG would resolve with tighter line spacing

- ***For a one to one comparison, the vertical gradient of the AG data was computed and compared to Air-FTG® (Image A).***
- ***The measured Air-FTG® free air data was micro leveled and full tensor processed prior to comparison (Image B).***
- ***AG and Air-FTG® are both compared with digital terrain model (Image C).***



The location map of a test survey at West Arnhem Land, Australia. Air-FTG® survey location is shown in a black rectangle. *(The AG data is obtained from Australian Geoscience's website)*

High Frequency Contents Comparison Between Air-FTG® and Airborne Gravity



A = Airbone Gravity (AG)
B = Airborne Gravity Gradiometry (Air-FTG®)
C= Digital Terrain Model (DEM)

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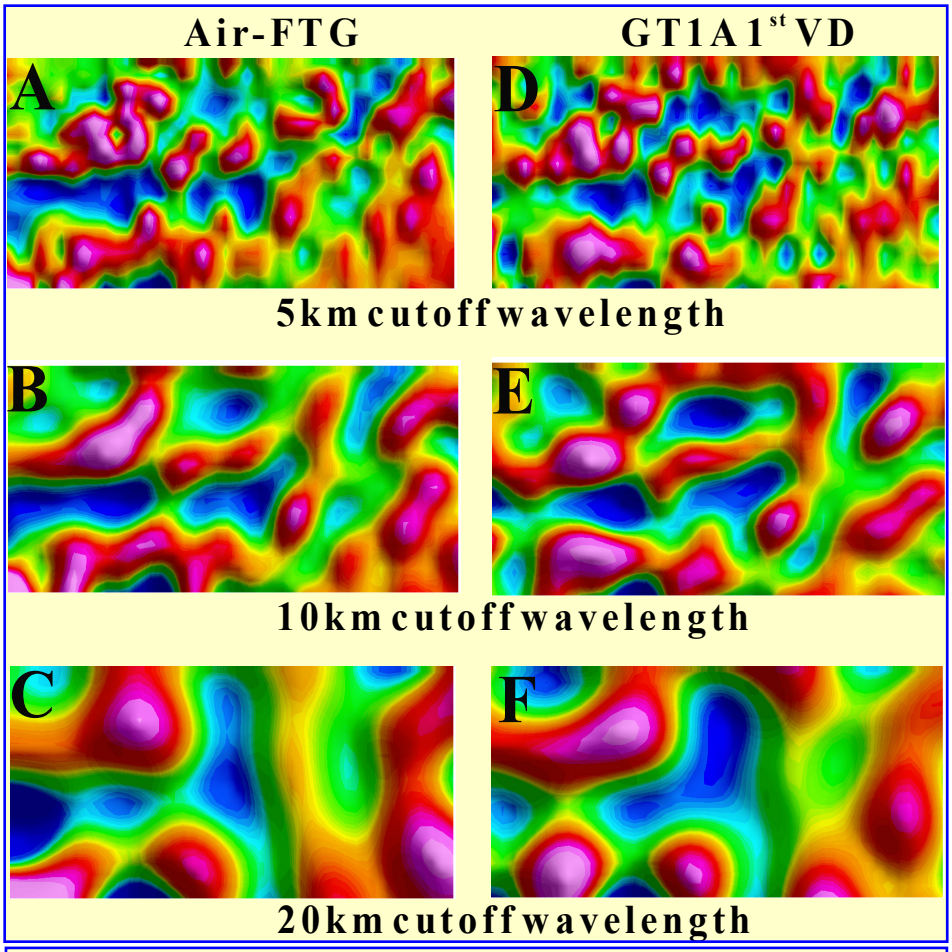
Frequency Content Analysis Between Air-FTG® and Airborne Gravity



- *At short wavelength two data sets correlate well. However, resolution variations exist, Air-FTG® resolves targets with much details compared to AG (A and D)*
- *At medium wavelength both data sets resolve similar linear gravity highs and lows features trending NE-SW (B and E).*
- *At long wavelength both data compare fairly well, both measuring regional structures*

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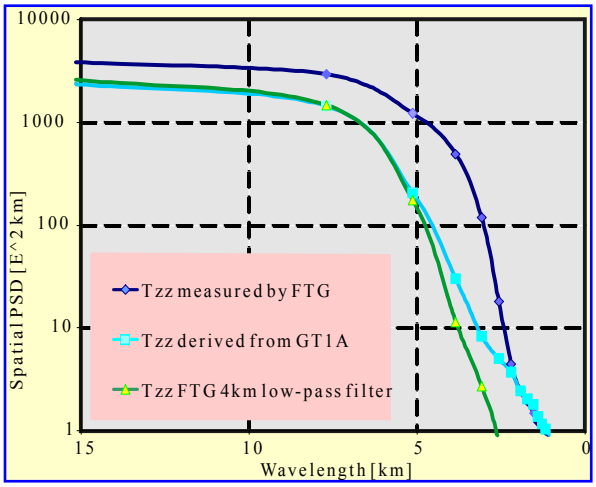
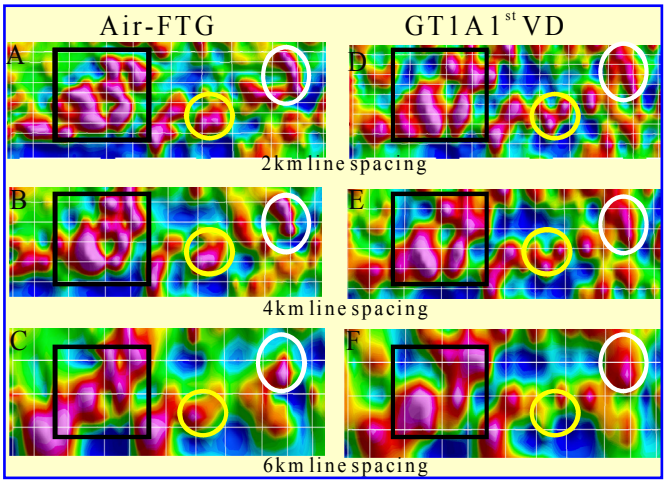
Line Spacing and Power Spectral Density Comparison Between Air-FTG® and Airborne Gravity

Power Spectral Density



- The graph of the Power Spectral Density (PSD) for Air-FTG® Tzz and the Tzz response derived from the AG
- The energy level in FTG Tzz is higher than that of AG response over a broad range of wavelengths
- Air-FTG® measurements could be matched to the AG at the long wavelength end of the spectrum by application of a low-pass filter.

Line Spacing Analysis



- Six Air-FTG® and AG images corresponding to 2, 4, and 6 km line spacing are displayed
- Anomalies in black box (image A and D) show differences in resolution at 2 km line spacing between the two systems
- The yellow circle highlights a geological target which is clearly detectable using Air-FTG® even at wider line spacing, but the same target almost disappears in AG data with the same line spacing.

Conclusions

High altitude Air-FTG® data compares well with airborne gravity and resolves intermediate to relatively long wavelengths anomalies that may be associated with deeper geologic features.

High frequency response of Air-FTG® is greater than that of the AG. Filtering the low frequency response of Air-FTG® matches well with the AG even at the longest wavelengths

Line spacing analysis indicate that Air-FTG® system is more cost effective, surveys could be flown at wider line spacing with the same or better resolution than the conventional airborne gravity.

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