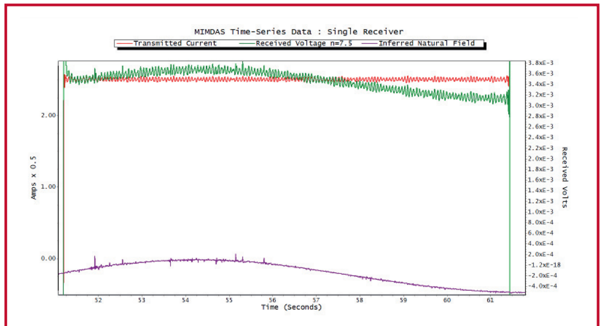

Figure 4: Blow-up of one on-period from the data presented in Figure 1. Cursory analysis indicates that the received signal (green) is corrupted by irregularities in the transmitted waveform (red) and a lively natural electric field (purple). The MIMDAS system is unique in its correct treatment of both corrupting sources.

From Figure 4 it can readily be seen that received signal (green) is corrupted by both irregularities in the transmitted waveform (red) and what is in fact a severe magnetic storm perturbing the local electrical field at the time of the reading. The MIMDAS processing stream is unique in that both of these corrupting influences are taken into account and effectively removed from the final presented data.

This is most advantageous if it is intended to retrieve spectral information from time-domain decay curves. It is important to note that this level of sophistication in processing is only possible because of the quality and near-perfect channel synchronisation of the recorded data.

Summary

The provision of raw time-series as well as the software tools to process it (included in the survey cost) give geophysicists unprecedented ability to view, interrogate, process and above all improve data quality. This leads to better interpretation and ultimately to a reduction in drilling risk. This is testament to our confidence in both the raw data quality and the processing stream applied to it. If you would like to know more about the MIMDAS system please feel free to contact us directly.

References

Rowston, P.A., Busuttil, S. and McNeill, G., 2003. 'Cole-Cole Inversion of Telluric Cancelled IP Data'. ASEG Conference Proceedings Feb 2003.

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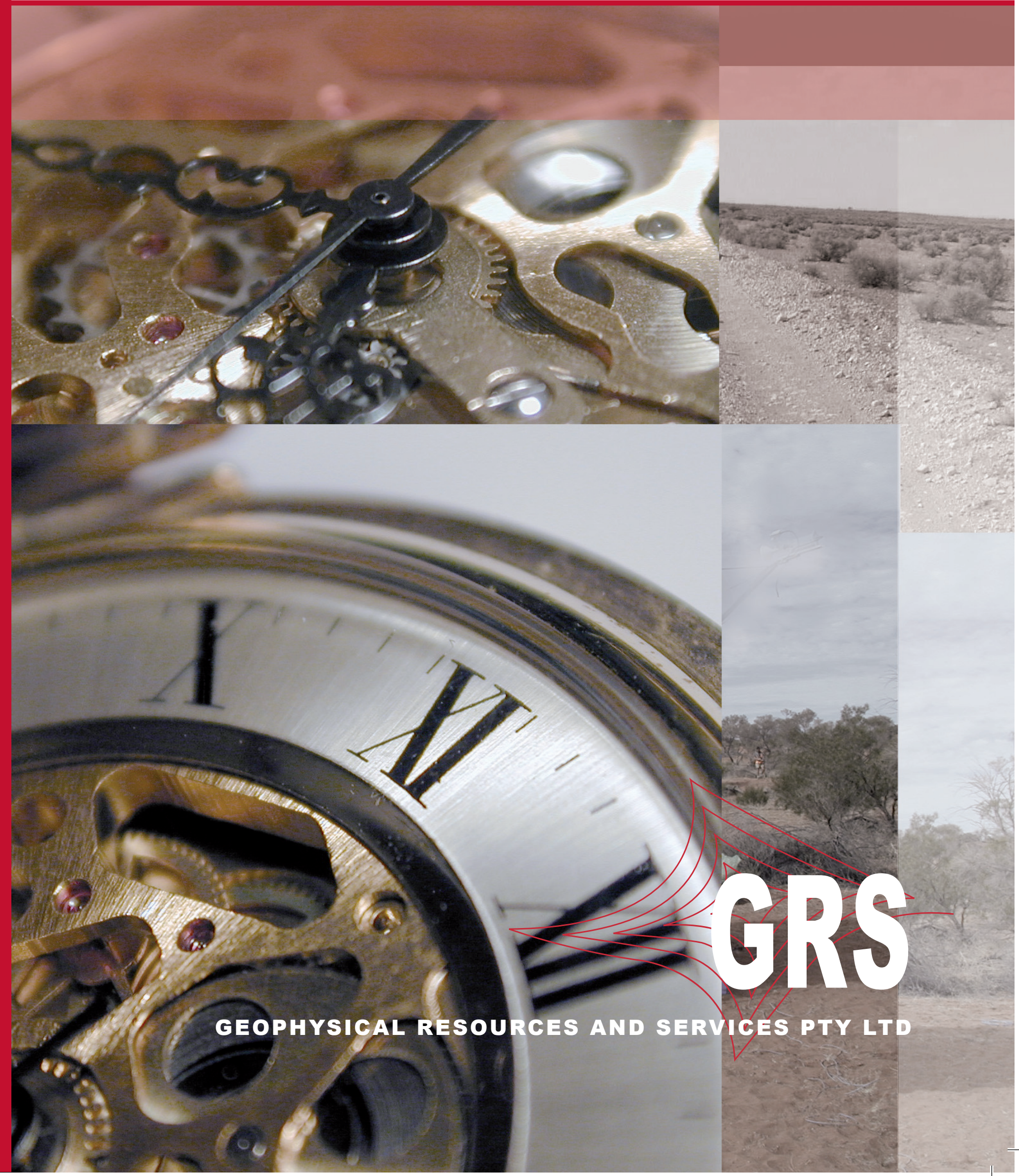
MIMDAS

Time-Series Recording



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GEOPHYSICAL RESOURCES AND SERVICES PTY LTD

Time-Series Recording

Introduction

In recent times there has been a shift to the recording of full time-series data in modern geophysical acquisition. This is where the recording or receiving devices sample at a constant interval and in some way buffer this data such that processing is carried out on “all” recorded data.

The use of time-series recording has facilitated a quantum increase in the sophistication of the processing applied to electrical geophysical data compared with systems that only sample part of the received signal.

The processing applied to MIMDAS acquired time series data makes full use of up to date improvements in acquisition technology. Features such as 24 bit A/D conversion (with 4 gain stage recording) and the accurate measurement of the transmitted signal enable significant improvement in the measurement of the earth’s response to a given excitation.

GRS and the MIMDAS system are unique in that we acquire time-series data and then make it available and accessible to our clients.

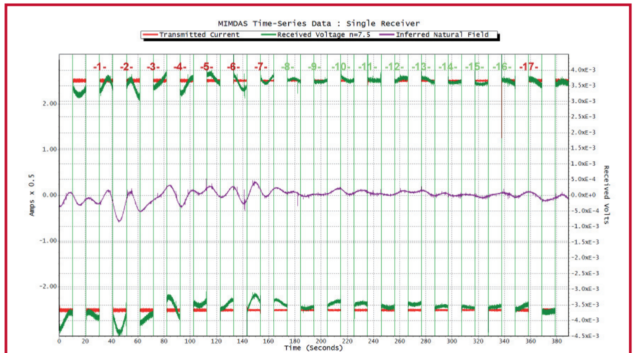

Figure 1: Time-series plot of 100% duty cycle transmitted waveform in Amperes (red), received Voltages at n=7.5 (green) and calculated Inferred Natural Field (purple). Automatic selective stacking has rejected the cycles in red rom the stacking process.

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MIMDAS IP Processing

The generalised MIMDAS processing sequence is provided below for an individual IP reading.

1. Time series collection of transmitted and received 100% duty cycle signals.

2. Conversion of raw time-series into real units using calibrations for sensors and individual DAUs (distributed acquisition unit), optionally with the removal of tellurics through the recording and calculation of an Inferred Natural Field (Rowston et al. 2003, see Figure 1).

3. Ensemble stacking of transmitted and received time series, perfectly rejecting linear drift, whilst minimising noise outside of the transmitter fundamental and harmonics.

4. Conversion of stacked data to the frequency domain.

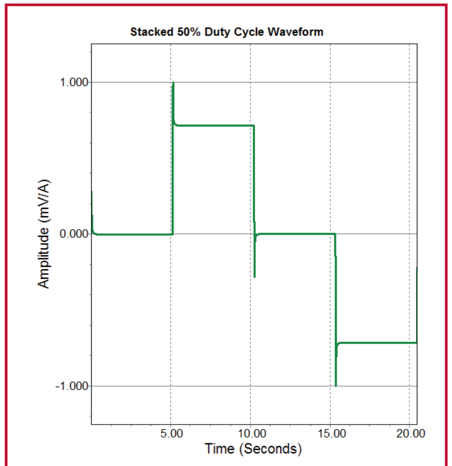

Figure 2: The stacked system response derived from the data in Figure 1, convolved with a unit 50% duty cycle frequency response, plotted in the time domain for easy QC.

5. Calculation of the system response for individual stacks.

6. Optional automatic selective rejection of outlier system response stacks (see Figure 1).

7. Averaging of system response stacks, weighted by observational errors.

8. Convolution of the system response with a 50% duty cycle frequency response at the fundamental period.

9. Conversion back to time domain for operator QC display (see Figure 2).

The generation of repeatable, clean decays (see Figure 3) from the raw data plotted in Figure 1 can be more readily appreciated from analysis of the time series presented in Figure 4.

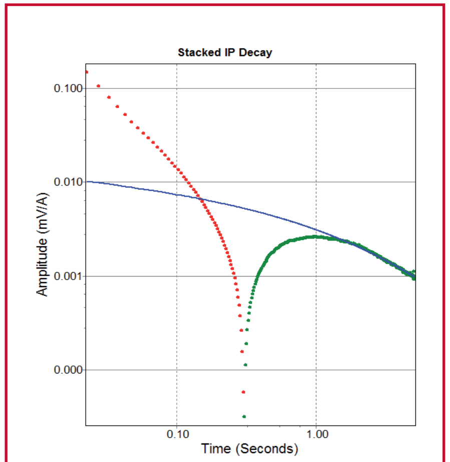

Figure 3: A Log-Log plot of the positive decay curve pictured in Figure 2. Negative EM Coupling (red) gives way to the polarisation decay past 0.2 seconds. A fitted Cole-Cole decay is plotted in blue to aid QC. Note that the positive portion of this clean decay is at a secondary voltage beyond some competitor’s systems resolution!