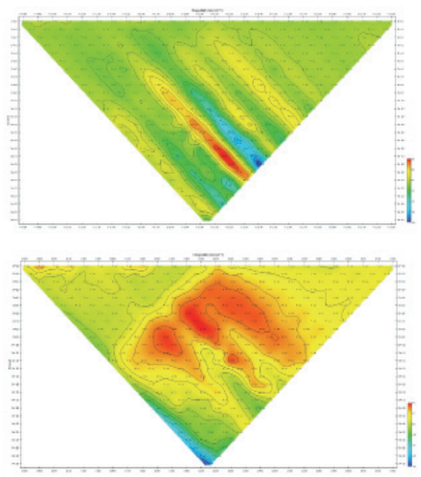

Figure 4: Pseudosection displays of non-telluric corrected (top) and telluric corrected (bottom) pole-dipole data for a line over the Prominent Hill prospect.

Given signal levels in the sub microvolt range this is an impressive result. A second example is provided in Figure 4, where pseudosection plots before and after telluric cancellation are presented for a line of pole-dipole data acquired over the Prominent Hill prospect. Again the improvement in data quality is obvious. Striping in the non-telluric corrected data completely masks the response of the mineralisation, however post telluric cancellation the telluric component is significantly reduced and the anomaly of interest emerges.

Summary

The use of telluric correction improves data quality, increases investigation depths and reduces the uncertainty associated with the interpretation of noisy and substandard data. Telluric cancellation also reduces the amount of down time incurred due to telluric noise, allowing acquisition to continue through storm conditions. If you would like to know more about the MIMDAS system please feel free to contact us.

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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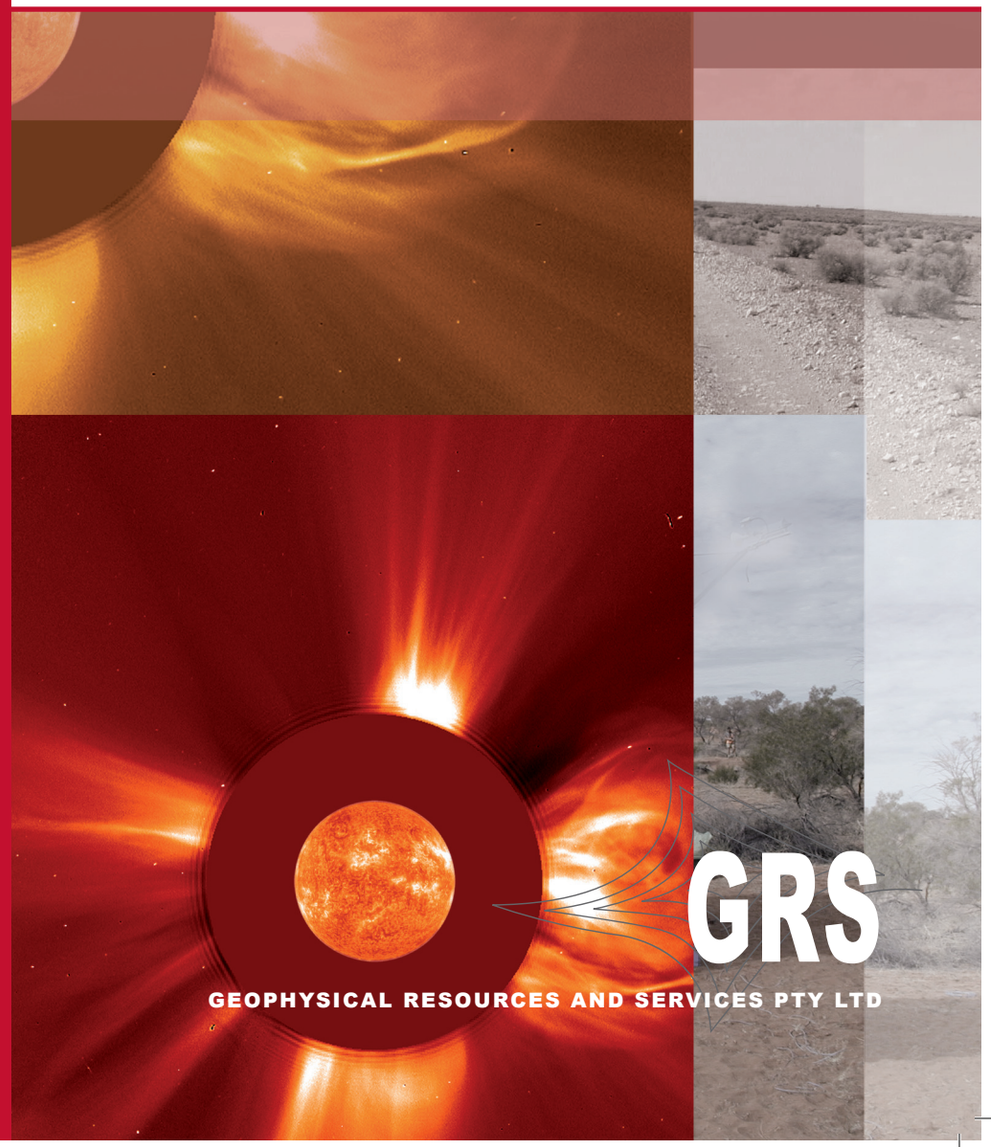
MIMDAS

Telluric Cancellation



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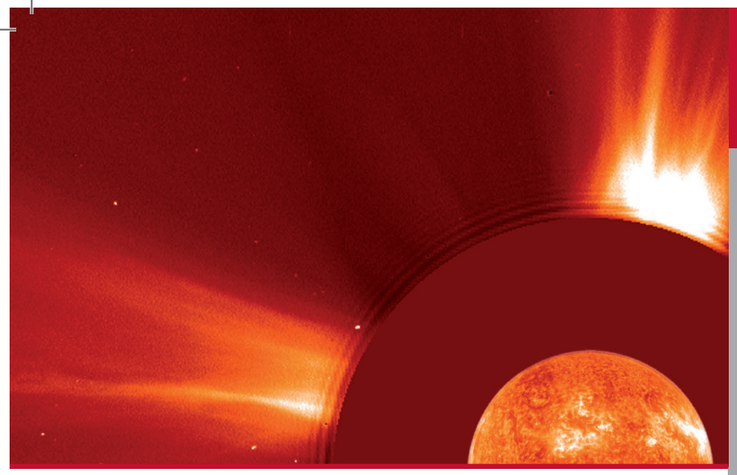

Telluric Cancellation

Introduction

Telluric noise is often the limiting factor in collecting measurable IP signal at low signal levels. At best, the presence of 'tellurics' decreases signal to noise and limits the penetration of the technique and, at worst, it brings acquisition to a stand still. With the introduction of the MIMDAS system an effective telluric cancellation technique has been implemented and field proven. It utilises MIMDAS's ability to acquire both IP and MT data in the same survey setup and produces significantly improved signal to noise levels. This allows reliable and repeatable IP measurements down to n-levels of 30 and greater. IP signal can now be measured down to the microvolt level, several orders of magnitude lower than previously accepted.

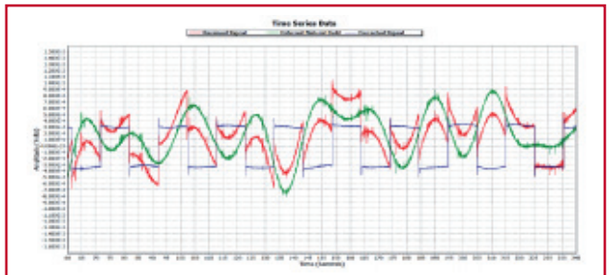

Figure 1: Plot of 100% Duty Cycle received waveform at n=25 (red) measured over the Prominent Hill prospect S.A. plotted with the estimated natural field component (green) and corrected signal (received signal - I.N.F) (blue). Significant telluric signal is noted.

Wth the introduction of the MIMDAS system an effective telluric cancellation technique has been implemented and field proven.

Method

Telluric cancellation is carried out via the calculation of an 'Inferred Natural Field' (INF) which is simply the natural electric field at each dipole in the absence of the transmitted signal. This is calculated by synchronously measuring horizontal magnetic field components remote from the survey area (i.e. away from the effects of the transmitter).

The magnetic field data is combined with previously acquired impedance data (MT survey) to produce the INF estimate (Rowston et al, 2003). The removal of the telluric component is then simply effected by the subtraction of the INF from the measured signal (see Figure 1). The correction is applied in real time via a satellite linked network connection between survey area and remote site (see Figure 2). Real time corrections allow the operator to make informed decisions on data quality at the time of acquisition.

Results

The effectiveness of the telluric cancellation process is demonstrated in Figure 3. Here two repeat readings are plotted before and after the application of telluric cancellation. The reduction in scatter and the better agreement between the readings after the cancellation process is applied is clear. This improved repeatability is, as expected, translated into better and more repeatable chargeability estimations. In this case, the chargeability estimates for the repeat readings prior to telluric cancellation were 39.7 and 52.8 mV/V compared with 42.3 and 42.4 mV/V after telluric cancellation.

Figure 2: Satellite dish used for network connection between the survey area and the remote site.

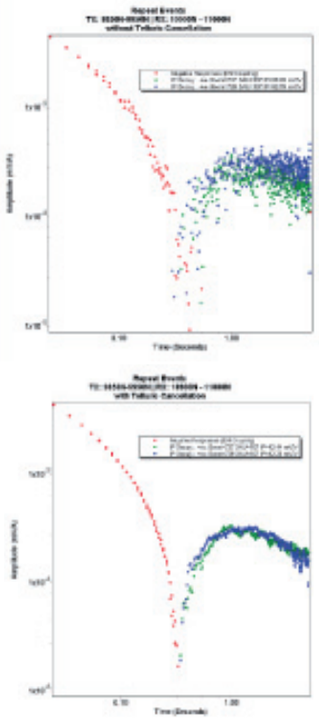

Figure 3: Log-Log plots of decay curves for two repeat readings (red curve is negative portion of decay). The top is prior to telluric cancellation and the bottom is after the application of telluric cancellation.