

Advances in the application of audio-magnetotellurics for mineral exploration

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The high-frequency magnetotelluric method, audio-magnetotellurics (AMT), is currently employed in Canada for both base and precious metals exploration. However, broader appeal has been hindered by various problems in acquisition, processing and interpretation. We have been addressing some of these issues in our research.

Prominent in these issues is that of adequate signal levels, particularly in the AMT "dead-band" of 1000-3000 Hz. Our studies confirm diurnal and seasonal signal variations, and we suggest data acquisition methodologies to improve the quality of the AMT response estimates.

High anthropogenic noise in existing mining camps also lead to degradation of response estimation, and to address this we have applied wavelet transformation approaches to the time series.

Small-scale inhomogeneities distort the regional response of the target body, and we have extended galvanic distortion removal to include that for a 3D regional body.

Finally, target bodies are often strongly conductive, disposed in intricate geometry deposits that require 3D modelling and interpretation. Large-scale regional structures can couple with the target body to produce an unexpected response that may be misidentified.

This paper describes our efforts in these four aspects of AMT exploration.

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