

A PILOT STUDY OF UNDERGROUND AUDIO-MAGNETOTELLURIC (AMT) MEASUREMENTS AND ITS APPLICATION FOR THE MINING INDUSTRY

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Surface-based electromagnetic surveys have been used successfully for over half a century to discover economic base metal and precious metal ore bodies. However, underground geophysical surveys have significantly greater potential of imaging geological targets at depth with higher resolution, compared to those same measurements taken at the surface, because of their being closer to the geological target.

The work presented here will be the initial results of Audio-Magnetotelluric (AMT) measurements that were recorded underground in a recently dewatered Cu-Au mine in Canada. The fundamental objectives of this pilot-study are: (a) to develop logistics for down-mine AMT acquisition, (b) to investigate the feasibility of obtaining high quality magnetotelluric responses (c) to explore opportunities from these measurements to improve resolution of deeper conductive targets below existing mine workings and (d) to record simultaneous surface and subsurface AMT measurements to investigate the attenuation of electromagnetic fields.

The initial results presented here will comprise magnetotelluric responses from the surface and from various levels within the mine down to a depth of approximately 700 metres. AMT data were collected during different scenarios such as: complete electrical power shutdown of the mine, partial shutdown at various levels, etc. These responses will be quantitatively compared and discussed as well as the various processing algorithms employed, which include both “conventional” (robust frequency-domain) approaches as well as wavelet approaches.

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