

# Case Histories and Modelling Interpretation In CSAMT

## E. van Reed

*Zonge Engineering and Research Organization (Australia) Pty. Ltd*  
242 Glen Osmond Road  
Fullarton SA 5067

## M. Smith

*Austpac Gold N.L.*  
Sydney, NSW

## S. MacInnes

*Zonge Engineering and Research Organization Inc*  
Tucson, Arizona, USA

### Abstract

Two CSAMT case history studies are presented in which modelling has been applied to data in order to produce geoelectric depth sections. These sections then assist in developing an idealized geologic model used as part of a geological exploration programme. At the geological planning level, one can define certain key geologic features which need to be identified as part of an exploration programme. Modelling may give some indication as to the success of a particular planned geophysical programme.

At the interpretation level, modelling can be used to confirm or disprove geologic ideas previously developed, and aid in quantifying features that survive the test. In addition, modelling may give new insights on how to get more information from the geophysical data and give rise to new ideas.

The case history information comes from the Golden Cross mine development programme near Waihi, New Zealand, and from the Togi exploration programme conducted near Kanazawa on the island of Honshu, Japan. While the distance separating the two survey sites is great, they are both epithermal gold prospects. CSAMT was used to obtain high resolution structural mapping both for near-surface geology and geology at depth, which are two important tasks.

Modelling of the CSAMT data obtained at Golden Cross and Togi is provided by three different computer programmes: CSINV is a one-dimensional general EM field approach using a finite number of layers where the survey geometry is specified; a variation of CSINV uses an infinite number of one-dimensional layers; and EM2D is a two-dimensional approach using a finite number of bodies/layers based on plane-wave EM theory. All three modelling approaches provide resistivity values varying as a function of depth, however useful results with EM2D are limited to modelling frequencies where data satisfies plane-wave criteria.

Modelling at Golden Cross provides cross-sectional geoelectric information which extends known drill-hole geology. This provides broader detail to known information, and suggests additional potentially interesting features. Modelling at Togi was directed at providing plan view coverage of certain geologic structures. Here one survey objective of the CSAMT

survey was to provide structurally related control to be used with interpretation of geochemical data.

Even though targets are geologically similar, planning and interpretational goals differed. CSAMT modelling optimized the interpretational use of CSAMT data in each case history.