

**CHEERS!**

Welcome to our November 2009 edition of *Perfiles*. Once again, we have had a very enjoyable and instructing Society of Exploration Geophysicists meeting, in Houston. We had the opportunity to meet again, like every year, with friends from the companies that design and manufacture geophysical instrumentation as well as software developers. We have also participated in several of the annual gatherings and have had the chance to examine the methods and technology that will be available over the next couple of years.

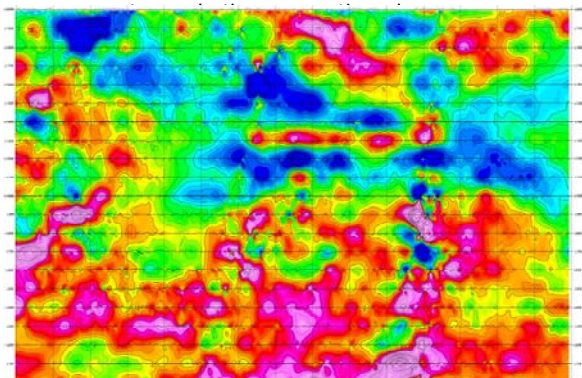
In this edition of *Perfiles* we will present the results of a new generation of modeling techniques applied to potential field methods, which we are currently applying in our geophysical surveys.

José R. Arce

**NEW PROCESSING AND MODELING**

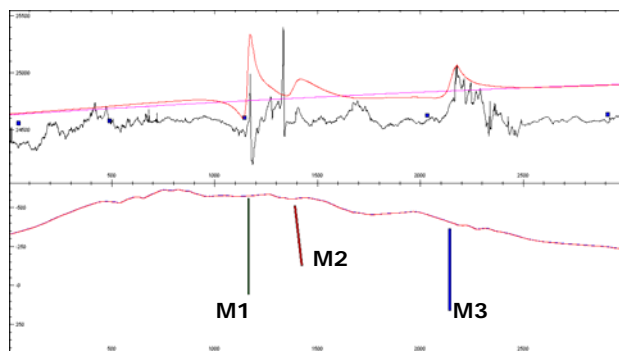
Potential field methods, specifically gravity and magnetics, traditionally have been most difficult to obtain a satisfactory model from. In the last several years we have worked with several modeling techniques for these applications, but decided to move to a different set of processing and modeling set of tools a few months ago, manufactured in Australia by Encom, mostly known for their GIS software Mapinfo. Having in mind our constant objective of improving our current geophysical techniques, and offering better quality in our data processing, analysis and modeling, we have added to our suite of software two of Encom's programs: Profile Analyst and Modelvision; we have been using Profile Analyst to work in section space, construct stunning 2D section results and to prepare combined sections and maps, for engineering seismic and groundwater applications. Modelvision is our newest platform for potential field modeling.

Among our new capabilities with Modelvision and Profile Analyst, we now have a greater selection of 2D filters, yielding much better quality results than those offered in other commercial packages. Among these, we now have a powerful algorithm to compute a reduction to the pole at low magnetic latitudes, typical of all Peruvian projects. The example we show below is from an area of 3km by 2km with a reduction to the pole where the red-pink colors show higher magnetic intensity over magnetic structures and formations. This is the opposed case for a reduction to the equator, where the magnetic rocks had to be shown as lower magnetic intensity anomalies.



**UNDERSTANDING MAGNETIC STRUCTURES**

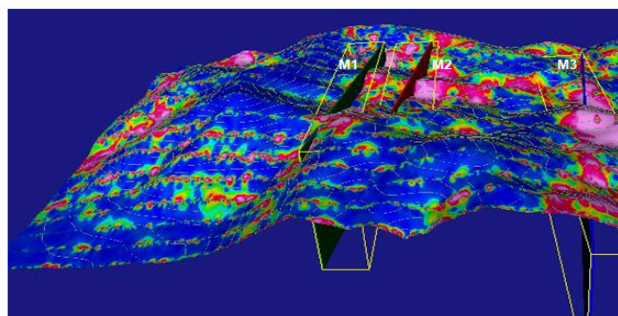
The following example comes from a recent survey with the objective of identifying magnetic structures, as well as determining some of their general geometric characteristics. One of the East-West profiles is shown below in two panels. The top part shows the measured total field magnetic intensity (in black), the calculated third order regional field (in magenta) and the calculated response for the different models (in red). In the lower panel the surface topography is shown in red and, underneath it, the three magnetic tabular structures: M1 (left), M2 (center) and M3 (right).



The tabulated results for the three models are shown next. Their magnetic properties in the light grey top portion of the table, while their geometric characteristics in the bottom dark grey section. All three resulting structures are very similar.

|                            | M1        | M2        | M3        |
|----------------------------|-----------|-----------|-----------|
| Susceptibility (SI)        | 0.013     | 0.013     | 0.013     |
| Q: Koenigsberger Ratio     | 150       | 130       | 100       |
| NRM Intensity              | 3825.2453 | 3315.2126 | 2550.1635 |
| NRM Inclination            | 40.1      | 40.1      | 40.1      |
| NRM Declination            | 100.745   | 100.745   | 100.745   |
| Thickness (m)              | 7         | 8.2       | 10        |
| Max. Theoretical Depth (m) | 616.6     | 384.1     | 524.5     |
| Dip (degrees)              | 90        | 85        | 90        |
| Strike Length (m)          | 1300      | 1300      | 1800      |
| Azimuth (degrees)          | NE8       | NE8       | NE8       |

Finally, to have a better idea of the spatial position of the three tabular bodies, we have located the models in a 3D view, under the analytic signal of the total field magnetic intensity grid draped over the GPS surface topography information.



Until next time...

