perfiles ...YOUR GEOPHYSICAL NEWSLETTER

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induced polarization-resistivity–self potential–magnetics–gravity-radiometrics-electromagnetics-seismics–downhole
MINING – GROUNDWATER – ENGINEERING - ARCHAEOLOGY

CHEERS!

Welcome to the last *Perfiles* of 2010. This year has been a very busy year for us, not only because of the services we provide to the mining and geotechnical industries but also because of the expansion of our current operations through new field crews. We started the year with a new cesium vapor magnetometer field crew, and halfway through the year we added two new GPS surveying crews and instruments. Finally this month we added a fifth induced polarization crew, which will start field work in the next few days. On another hand, during 2010 we have introduced new modeling techniques, such as our new 3D gravity and magnetics modeling, which are improvements over the traditional methods developed by the UBC. We have also complied with our commitment to continually update our processing and modeling techniques for all the geophysical methods we offer.

We are ending 2010, the year of our 50th anniversary since our company started, with our best wishes for our friends and colleagues for this final month and through 2011.

José R. Arce

NEW INSTRUMENTS

We recently received our latest Trimble Pro XRT GPS with a TDS Ranger 500X data collector, to be part of our third Omnistar GPS crew.

We have also received this month our new induced polarization instruments, which will be used by our fifth IP field crew. These new instruments are an Iris Elrec Pro 10-channel receiver and two GDD TXII-5000, 5kW transmitters, which can operate as stand-alone units or connected together to output up to 10 kW of total power. With these latest instruments we already have five Elrec Pro receivers and seven IP transmitters (four Iris VIP 4000-4kW, 1 Iris VIP 3000-3kW and 2 GDD TXII-5000-5kW units).

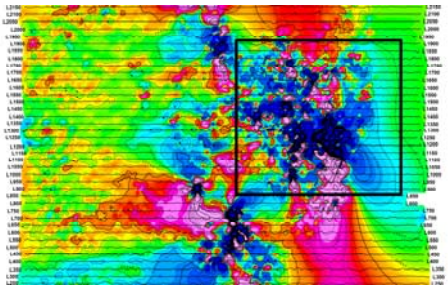
Iris Elrec Pro Receiver

GDD TXII - 5000 Transmitter

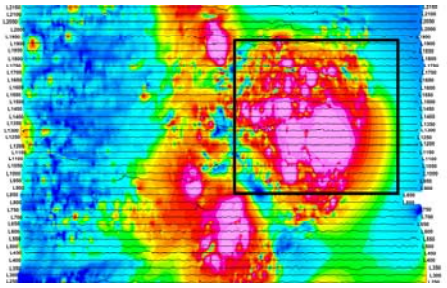
REMANENT MAGNETISM

The total field magnetic intensity we measure during a magnetometer survey has two main components: induced and remanent. The first is caused by the current position of the Earth's magnetic field over magnetic sources, while the second is the effect caused by the Earth's field position at the time magnetic minerals formed. We are basically interested in the induced field but it is common for a magnetic response to have a remanent component, which poses a challenge to geophysical interpretation.

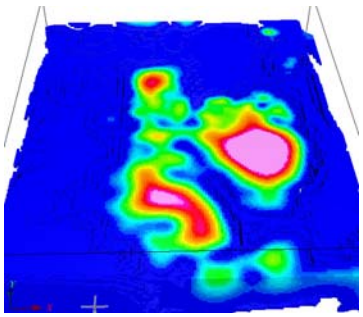
The case history shown next is part of a magnetics and IP survey conducted over Southern Perú this year. The following map shows the Total Field Magnetic Intensity (TMI), reduced to the Pole. The magnetic masses should yield higher intensities (red-pink), while less magnetic sources should be of lower intensities (blue). The area marked, of approximately 1 km^2 , outlines the location of an intrusive mapped with numerous magnetic outcrops at surface, but this map shows it mostly as a magnetic low, mainly due to the remanent magnetization component of the intrusive.



To model this information correctly, we must remove most of the remanent magnetization, mainly by using the Analytic Signal (AS), or possibly one of the following transformations: ASVI (Analytic Signal of the Vertical Integration), VIAS (Vertical Integration of the Analytic Signal) or VRMI (Vector Residual Magnetic Intensity). The ASVI is shown next.



The ASVI is relatively insensitive to the remanent magnetization because as an analytic signal, it converts all high and low TMI gradients, into magnetic highs. Thus the intrusive is correctly modeled as a high magnetic susceptibility source (pink, 0.2-0.3 SI units) in the 3D model below. In some specific cases, it may be necessary to model the remanent field directly, in order to eliminate it from the inversion processes.



Until next time...

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