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 our first edition of *Perfiles* for 2010. Last year was full of changes worldwide but fortunately Perú had a privileged situation of relative stability. 2009 was a solid year for us, where we extended our line of geophysical instrumentation and methods, and added significant new capabilities in data analysis and software modeling. We also successfully completed newly developed techniques for geophysical applications, such as the ones mentioned in previous editions of *Perfiles* in seismics and magnetics.

We want to start this new year discussing in this *Perfiles* the applicability of a deep-penetrating exploration method for mining applications.

José R. Arce

NEW PROCESSING AND MODELING

In November we published an update of our available 3D modeling techniques for structures and simple geometric bodies, using magnetometry. Currently we are testing a new 3D modeling method for gravity and magnetics which will yield detailed results of magnetic and or dense masses, and with exceptional resolution. Over the next few months we will provide more information and case histories of these applications through this newsletter. We will also present appropriate case histories to demonstrate the modeling effectiveness.

On another subject, we announce our computational routines for combining P-wave seismic tomography and modeled S-wave velocities from MASW into 2D computations of Poisson Modulus and the dynamic elastic moduli is complete. The technique has gone through extensive testing since we first announced it in May 2009 and we have been applying it routinely in several geological and geotechnical environments.

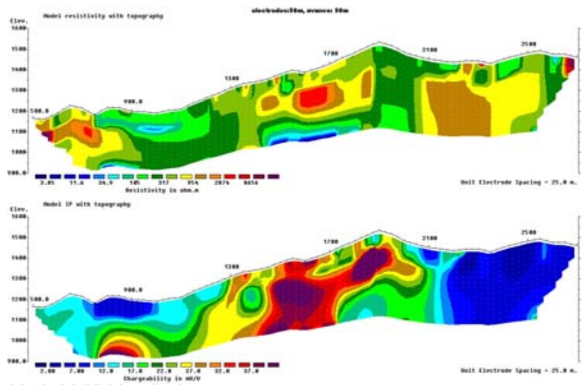
DEEP INDUCED POLARIZATION

Over the last years, companies involved in mining exploration have been exploring for deeper mineralized targets. We note there is some confusion about the applicability of IP for deeper applications, so we would like to summarize some concepts to help better understand this possible application.

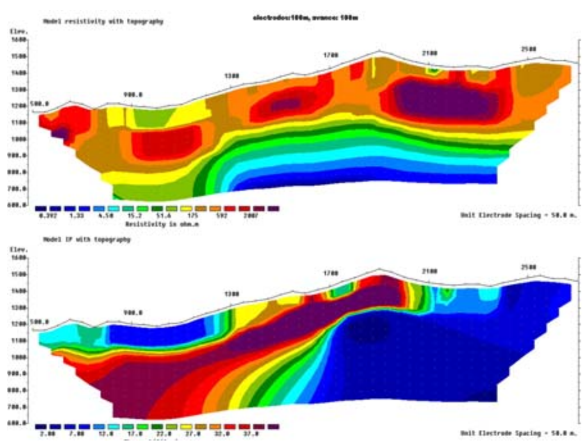
The viability of the method greatly depends on local operational conditions as well as size and volume of the mineralized targets, which would need to provide sufficient geophysical contrast. It must be understood that for any geophysical method, to have greater depth reach means a significantly larger volume of material needs to be energized. If the mineralized target has sufficient size as well as resistivity and chargeability contrast from its host environment, then it is possible to obtain information from greater depths. Appropriate depth reach will also depend on local terrain conditions, to allow sufficient current to be sent into the ground, as well as local resistivities. There may be also problems by not obtaining enough measureable signal over the background noise levels.

For instance, a maximum depth reach of 600-650 meters may be attained using the Pole-Pole array, with 7 electrode separations of 100 meters (a=100m). Using Edward's depth penetration formulae, we can assume a maximum depth reach of 595m. This reach, however, depends on local conditions, as well as the electrical resistivity contrast between different materials.

In the following case history, we present a 2D Induced Polarization model from the Yarabamba district, Arequipa, in July 2009. The following 2D Resistivity (top) and Chargeability (bottom) model sections were measured along one of the survey lines, using electrode separations of 50m and 100m to obtain average depth reaches of 300m and 600m, respectively. The first image, with a maximum depth reach of 310m, shows an irregular central chargeability mass, which coincides with a mineralized zone mapped at the surface, which extends below the 300 meters of depth reach. There is also an anomaly below 150 meters of depth in the left (West) portion of the model.



When we completed modeling the same line, but using electrode separations of 100 meters in the field, we determined that maximum depth reach was in the order of 630m. There is less horizontal resolution in this case, even after moving the electrode array with a density of 50m along the line, instead of 100m. We can see in this model that the chargeable mass deepens towards the left (West) end of the section and continues well below 600m of depth.



Until next time...

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