

## CHEERS!

We would like to welcome you to a new edition of our periodic newsletter *Perfiles*. Over the last few years, we have encountered a growing need to combine geophysical techniques in order to improve result interpretation in engineering projects within mining operations. What we plan to demonstrate in this newsletter is how to combine Induced Polarization, Electrical Resistivity and Seismic Refraction to improve precision and location of faults and structures through elastic and electric properties of earth's materials.

The advantage of being able to work with a variety of geophysical methods in an almost simultaneous way allows us to clarify and clear some observations that may arise through the use of a single technique. We hope you enjoy this new *Perfiles* and we invite you to participate in it through any questions or comments you may want to send us.

José R. Arce

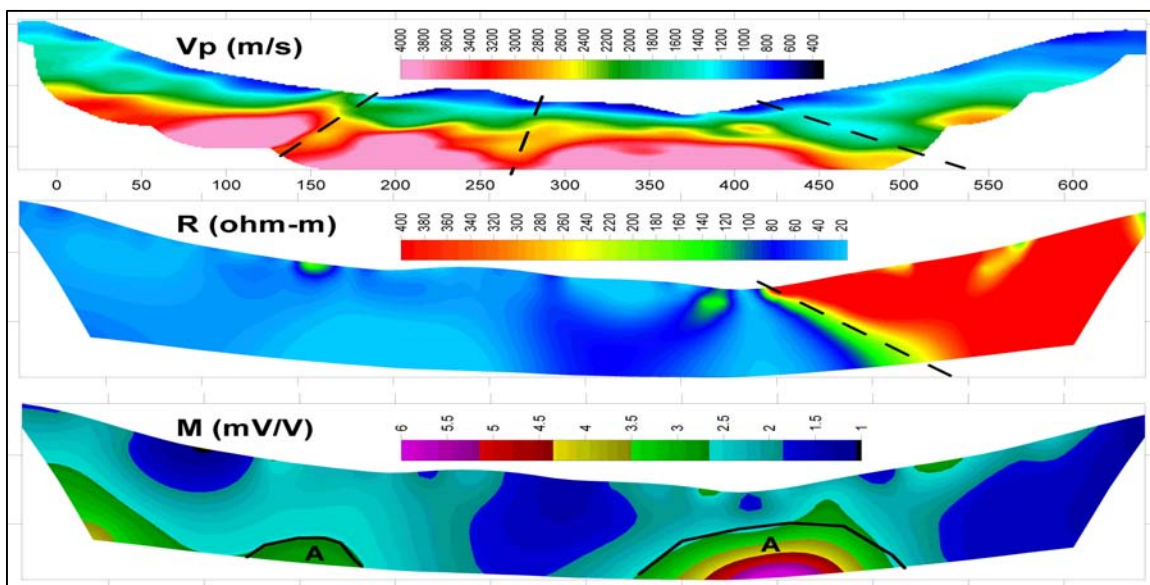
## FAULTS AND STRUCTURES

Our previous newsletter edition (May 2003) dealt with the subject of exploration of gold-bearing silicified structures with less than two meters of thickness. This is a common problem for many underground mine operations in Southern Perú and in vast areas of the Pataz batholith. Our experience and methodology has allowed us to explore in such geological environments. Faults, unlike these veins, may not contain any high-Resistivity silicification, but do tend to include a higher degree of humidity than the host rock, turning them into low-Resistivity

geophysical targets. It is common to find within these structures a greater amount of clays, which increases the chances of applying Chargeability for detection of such targets. Seismic Refraction allows differentiation of elastic materials, which is in relation to their compacity. Modeled Resistivity sections have less resolution than their seismic counterparts but retain many similarities.

## RESULTS

The sections shown below are real-life examples of two-dimensional eikonal tomography techniques for Seismic Refraction, Electrical Resistivity and Chargeability. The seismic section (Vp) presents a low-velocity overburden (blue, 400-1000m/s), altered rock (1000-2500m/s, green-yellow) and basement (>2500m/s, orange-red-pink). Faults may be readily seen as P-wave velocity (Vp) drops within bedrock, and have been drawn as segmented lines. The second section represents the true Resistivity model in ohm-meters. It has less resolution than our previous section, but permits location of the fault in the right margin of the section with greater precision through differentiation of medium-alteration rocks (blue) and less-humid rocks (red). The last section is electrical Chargeability in mV/V. This points which of the previously detected faults contain clay materials associated with it, and producing weak anomalies but well above background. Possible alteration zones are marked with the letter "A". Depth penetration for seismics was around 55m (without explosives) while IP was 85m, using the Pole-Pole array with 5 penetrations and an "a" spacing of 20m.



...Until next time

